BEFORE THE INDUSTRIAL COMMISSION

OF THE STATE OF NORTH DAKOTA

CASE NO. 29888
ORDER NO. 32474

IN THE MATTER OF A HEARING CALLED ON A MOTION OF THE COMMISSION TO CONSIDER THE APPLICATION OF BLUE FLINT SEQUESTER COMPANY, LLC REQUESTING CONSIDERATION FOR THE GEOLOGIC STORAGE OF CARBON DIOXIDE IN THE BROOM CREEK FORMATION FROM THE BLUE FLINT ETHANOL FACILITY IN THE STORAGE FACILITY LOCATED IN SECTIONS 11, 12, 13, 14, AND 24, TOWNSHIP 145 NORTH, RANGE 83 WEST AND SECTIONS 6, 7, 8, 17, 18, AND 19, TOWNSHIP 145 NORTH, RANGE 82 WEST, MCLEAN COUNTY, NORTH DAKOTA PURSUANT TO NORTH DAKOTA ADMINISTRATIVE CODE SECTION 43-05-01.

ORDER OF THE COMMISSION

THE COMMISSION FINDS:

(1) This cause came on for hearing at 9:00 a.m. on the 21st day of March, 2023.

(2) Blue Flint Sequester Company, LLC (Blue Flint) made application to the Commission for an order requesting consideration for the geologic storage of carbon dioxide in the Broom Creek Formation from the Blue Flint Ethanol (BFE) facility in the storage facility located in Sections 11, 12, 13, 14, and 24, Township 145 North, Range 83 West, and Sections 6, 7, 8, 17, 18, and 19, Township 145 North, Range 82 West, McLean County, North Dakota, pursuant to North Dakota Administrative Code (NDAC) Chapter 43-05-01.

(3) Blue Flint submitted an application for a Storage Facility Permit and attachments pursuant to NDAC Section 43-05-01-05 and all other provisions of NDAC Chapter 43-05-01 as necessary.

(4) Case Nos. 29888, 29889, and 29890 were combined for the purposes of hearing.

(5) Case No. 29889, also on the March 21, 2023 docket, is a motion of the Commission to consider the amalgamation of storage reservoir pore space, pursuant to a Storage Agreement by Blue Flint for use of pore space falling within portions of Sections 11, 12, 13, 14, and 24, Township 145 North, Range 83 West, and Sections 6, 7, 8, 17, 18, and 19, Township 145 North, Range 82 West, McLean County, North Dakota, in the Broom Creek Formation, and to determine it has been signed, ratified, or approved by owners of interest owning at least sixty percent of the pore space interest within said lands, pursuant to North Dakota Century Code (NDCC) Section 38-22-10.

(6) Case No. 29890, also on the March 21, 2023 docket, is a motion of the Commission to consider to determine the amount of financial responsibility to be required of Blue Flint for the geologic storage of carbon dioxide from the BFE facility in the storage facility located in Sections 11, 12, 13, 14, and 24, Township 145 North, Range 83 West, and Sections 6, 7, 8, 17, 18, and 19, Township 145 North, Range 82 West, McLean County, North Dakota, in the Broom Creek Formation, pursuant to NDAC Section 43-05-01-09.1

(7) The record in these matters was left open to receive additional information from Blue Flint. Such information was received on May 1, 2023, and the record was closed.

(8) The Commission received a notice of filing of the application from Blue Flint, addressed to Bradley Schafer, on February 6, 2023. Blue Flint was questioned by Commission staff at the hearing on March 21, 2023, if proper notice pursuant to NDCC Section 38-22-06 and NDAC Section 43-05-01-08 was given to Bradley Schafer. Blue Flint provided a supplemental affidavit on April 14, 2023, indicating Bradley Schafer was provided a notice out of an abundance of caution because he was listed as a potential heir on a Proof of Death and Heirship document, even though he does not own any interests of record within the notice area. Exhibit A of the supplemental affidavit is the Proof of Death and Heirship filed with McLean County on May 20, 2013, by The Falkirk Mining Company for the NW/4 of Section 4 and NW/4 of Section 13, Township 145 North, Range 83 West, and the SE/4 of Section 32, Township 146 North, Range 83 West, McLean County, North Dakota. Only the NW/4 of Section 13, Township 145 North, Range 83 West, is within the hearing notification area as shown by Figure 1-1 of the application and Exhibit 2 provided by Blue Flint at the hearing on March 21, 2023, shows The Falkirk Mining Company to be the owner of the pore space.

Pursuant to NDCC Section 38-22-06 and NDAC Section 43-05-01-08, the notice of filing of the application and petition and the time and place of hearing thereof was given, and that at least 45 days prior to the hearing, Blue Flint, as the applicant, did give notice of the time and place of said hearing and the Commission has accepted the notice as adequate, and that the applicant did, at least 45 days prior to the hearing, file with the Commission engineering, geological, and other technical exhibits to be used and which were used at said hearing, and that the notice so given did specify that such material was filed with the Commission; that due public notice having been given, as required by law, the Commission has jurisdiction of this cause and the subject matter.

(9) The Commission gave at least a thirty-day public notice and comment period for the draft storage facility permit and issued all notices using methods required of all entities under NDCC Section 38-22-06 and NDAC Section 43-05-01-08. Publication was made February 1,

2023, and the comment period for written comments ended at 5:00 PM CDT March 20, 2023. The hearing was open to the public to appear and provide comments.

(10) The Commission received a letter from the State Historical Society of North Dakota on March 13, 2023, indicating it reviewed the application of Blue Flint and recommends a Class III (pedestrian survey) in the project area for portions of Sections 6, 8, 17, 18, and 19, Township 145 North, Range 82 West, and portions of Sections 11, 12, 13, 14, and 24, Township 145 North, Range 83 West, McLean County, North Dakota. Blue Flint committed to the State Historical Society of North Dakota, in a letter dated April 10, 2023, that a commissioned analysis of cultural resources proximate to the areas of surface disruptions shows no recorded sites are anticipated to be impacted, that several Class III surveys have already been completed within the project area, and project construction will include protocols for immediate stoppage of work in the event of cultural resource discovery.

(11) Steven Heger (Heger) appeared on March 21, 2023, to provide testimony, and submit a letter supplementing his testimony. Heger testified to owning surface acreage directly south of the power plant within the hearing notice area and being a tenant for Falkirk Mine within the storage facility area, including farming around the MAG #1 (File No. 37833) well location.

Heger testified both verbally and in his letter that he is not against the project but that the project falls short of the intent of NDCC Section 38-22-07 of the Carbon Storage Underground Storage Rules [sic; Heger meant to reference 38-22-08], that requires the applicant to get consent of at least 60% of the pore space owners to go forward with the project. Heger states in his letter that within the Hearing Notification Area, the land ownership is as follows: Falkirk Mine 56%; Rainbow Energy/Midwest Ag 23%; and private landowners 21%. Heger states he heard during the hearing that the applicant spoke about having approximately 91% consent. Heger testified to and stated in his letter that within the Project Storage Area, the land ownership is as follows: Falkirk Mine 64%; Rainbow Energy/Midwest Ag 26%; and private landowners 10%. Heger testified that with such a small percentage of private land ownership in the proposed area there is no incentive for the energy industry to work with local private landowners. Heger questioned what percent of private landowners have signed the leases or if only the corporations have signed the leases.

Heger stated there could be more collaboration on where they placed what he thought were groundwater test wells located east of the MAG #1 well, because it is not conducive to agricultural production to have to farm around all of them.

Heger is concerned with the amount of kochia, a noxious weed, located on the MAG #1 well location and would like to see it addressed.

Heger questioned what effect the project would have on Falkirk Mine's bond release and the value of the land. He stated that after the mining is done the land is supposed to go back to the public and that it is a joint goal between his family and the mine that the land return to his family's ownership.

(12) The Commission notes the following in response to Heger's testimony:

NDCC Section 38-22-08(4) requires the storage operator to make a good-faith effort to get the consent of all persons who own the storage reservoir's pore space and NDCC Section 38-22-08(5) requires the storage operator to obtain the consent of persons who own at least sixty percent of the storage reservoir's pore space. Exhibit 2 shows Blue Flint has leased approximately 91.3% of the pore space acreage, with 1.6% attributable to private landowners. Blue Flint testified they have made multiple efforts to communicate with the pore space owners throughout the development of the project and have made a good-faith effort to get the consent of all persons who own pore space in the storage area. Blue Flint also provided that Exhibit 2 indicates which members have signed a lease and a copy will be mailed to Heger.

A soil gas profile station located on the MAG #1 wellsite and a Fox Hills groundwater well located directly south of the southwest corner of said wellsite, are the only soil gas and groundwater monitoring test wells to be located near the MAG #1 wellsite, as shown by Figures 5-3 and 5-5 of the application. Blue Flint testified the test wells located east of the MAG #1 well are not associated with their carbon storage project but instead are associated with a project between the mine and Rainbow Energy.

NDAC Section 43-02-03-28 states in part, "Any rubbish or debris that might constitute a fire hazard shall be removed to a distance of at least one hundred fifty feet from the vicinity of wells and tanks… All vegetation must be removed a safe distance from any production or injection equipment to eliminate a fire hazard."

Exhibit 2 indicates The Falkirk Mining Company has signed the pore space lease for all acreage it owns within the storage facility area. Figures 3-21 and 5-5 of the application show the location of surface infrastructure planned for the project will not be located on reclaimed mine land. Blue Flint testified the project facilities and infrastructure locations would not impact current or future mining activities and surface agreements for the locations of the MAG #1, MAG #2, and flow line have been executed with the mine.

(13) Michael Johnson (Michael) appeared on March 21, 2023, to provide testimony. Michael testified to owning property west of the power plant, specifically 50 acres in Section 18, Township 145 North, Range 82 West; having shared ownership of a quarter (160 acres) that is divided between his family members; he owned the property under Falkirk Power Plant but it was taken from him by eminent domain in the past; two years ago Midwest Ag Energy made him an offer of five-thousand dollars ($5,000) an acre to lease his property which he declined; but they continue to ask him to sign a lease, stating if he signs, he will get a five-hundred dollar ($500.00) bonus and if he does not they will go through the state process and he does not get the bonus; and Blue Flint is offering him fifty cents a metric ton to store carbon dioxide, while the US government gives corporations eighty-five dollars ($85.00) a metric ton.

Michael testified there is no incentive for Blue Flint to clean up and produce less carbon dioxide if it is allowed to pump it underground.

Michael testified he owns the mineral rights for his property and questioned if the carbon dioxide underneath his property will be his and if he would be paid if they decided in the future to pump it back out.

(14) The Commission notes the following in response to Michael's testimony:

NDCC Section 38-22-10 states "If a storage operator does not obtain the consent of all persons who own the storage reservoir's pore space, the Commission may require that the pore space owned by nonconsenting owners be included in a storage facility and subject to geologic storage." NDCC Section 38-22-08(14) states "That all nonconsenting pore space owners be equitably compensated." Blue Flint testified that all pore space owners would be compensated in the same fashion regardless of if they signed a pore space lease.

NDCC Section 38-22-01 states in part, "It is in the public interest to promote the geologic storage of carbon dioxide. Doing so will benefit the state and the global environment by reducing greenhouse gas emissions."

NDCC Section 38-22-16 states in part, "The storage operator has title to the carbon dioxide injected into and stored in a storage reservoir and holds title until the Commission issues a certificate of project completion." NDCC Section 38-22-17(6) states in part, that once a certificate is issued, the title is acquired by the state.

(15) Margo Johnson (Margo) appeared on March 21, 2023, to provide testimony. Margo testified she does not own land across from the power plant but was born and raised in North Dakota. Margo stated her brother (Michael) spoke mostly about what she had to say. Margo stated she has no issue with carbon capture but has an issue with companies not reducing their carbon footprint and being held accountable.

Margo questioned if society honestly knows the results carbon will have when it is stuck underground. Margo questioned the reliability of modeling and asked if a forty-year study had been done on carbon capture.

(16) The Commission notes the following in response to Margo's testimony:

The equation of state reservoir simulator used by Blue Flint is Computer Modelling Group LTD.'s GEM software, a United States Environmental Protection Agency (EPA) acknowledged existing software used for the development of geologic sequestration models. Commission staff reviewed all inputs for Blue Flint's reservoir model and also used Computer Modelling Group LTD.'s GEM software to verify the outputs given by Blue Flint.

NDAC Section 43-05-01-05.1, states in part, that the reevaluation date of the area of review is not to exceed five years from the date of first injection. Monitoring and operational data will be used to inform the reservoir model used during the reevaluation of the area review.

(17) Blue Flint's application provides adequate data to show suitability of the Broom Creek Formation for geologic storage of carbon dioxide in the facility area.

(18) Blue Flint's application provides adequate modeling of the storage reservoir for delineation of the facility area, and adequate monitoring to detect if carbon dioxide is migrating into properties outside of the facility area pursuant to NDAC Section 43-05-01-11.4. Vertical release of carbon dioxide is addressed by the application pursuant to NDAC Section 43-05-01-13, and lateral release of carbon dioxide from the facility area is addressed by the application pursuant to NDAC Section 43-05-01-05.

Blue Flint was questioned by Commission staff on March 21, 2023, on how the pressure and temperature parameters in the GEM model were derived. Blue Flint provided supplements on April 11, 2023, and May 1, 2023 and the Commission finds these supplements adequately account for how the pressure and temperature values used in the GEM model were derived and that the values used in the GEM model produce a conservative plume boundary.

(19) The amalgamated storage reservoir pore space to be utilized is not hydrocarbon bearing as determined from test data included with the application. There has been no historic hydrocarbon exploration, production, or studies suggesting there is an economic supply of hydrocarbons from formations above or below the Broom Creek Formation within the proposed storage facility area. Lignite coal is mined in the area from the Sentinel Butte Formation in the area above the proposed facility area. Coal seams exist in the Bullion Creek Formation. All coal seams present in the Fort Union Group above the facility area will not be impacted by this project as there are no current or future planned mining activities with the proposed facility area. Blue Flint testified that should operators decide to drill wells for hydrocarbon exploration or production in the future, the lateral extent of the stabilized plume and the pressure differential are minor enough to allow for either horizontal drilling without penetrating the stored carbon dioxide or vertical drilling with proper controls, for hydrocarbon exploration under the Broom Creek Formation. The Commission agrees.

(20) The BFE facility is a dry mill ethanol production plant located in McLean County, North Dakota, near the city of Underwood. Carbon dioxide is emitted from the fermentation process during ethanol production. Blue Flint testified that the BFE facility is operated by Blue Flint Ethanol LLC; and that Blue Flint Ethanol LLC, Blue Flint Sequester Company, LLC, and Midwest AgEnergy Group, LLC are all subsidiaries of Harvestone Low Carbon Partners.

(21) The BFE facility currently emits an annual average of 200,000 metric tons of carbon dioxide that is expected to be captured, dehydrated, compressed, transported to a Class VI well by a flow line, and then injected. Blue Flint testified that 220,000 metric tons would be the maximum anticipated volume the BFE facility could produce in a year. Blue Flint testified that in addition to the dynamic reservoir simulation for an anticipated scenario of 200,000 metric tons a year, an additional scenario was run to determine the maximum amount of carbon dioxide that could be injected using the bottom hole pressure and wellhead pressure constraints. The results of this maximum case scenario indicated a volume exceeding the 220,000 metric tons annual volume being proposed would be obtainable without exceeding the maximum bottom hole pressure

constraint, derived as ninety percent of the fracture pressure gradient for the Broom Creek Formation.

(22) The entire length of the 3-mile flow line to be utilized for carbon dioxide transportation from the capture facility (carbon dioxide injection facility) to the wellhead falls within the facility area delineation and is under the jurisdiction of the Commission.

(23) The flow line will be constructed using FlexSteel, a 3-layer flexible steel pipe product with inner and outer layers containing a carbon dioxide resistant polyethylene liner and other materials that will be carbon dioxide resistant in accordance with API 171J (2017) requirements. Blue Flint testified the flow line will be rated at 2,250 psi and 150 degrees Fahrenheit, and the anticipated liquefaction pressure will be approximately 1,760 psi.

(24) The flow line will be equipped with flowmeters, pressure gauges, and a Supervisory Control and Data Acquisition (SCADA) system to detect leaks. Carbon dioxide detection stations will be located on the flow line risers and wellhead.

(25) The projected composition of the carbon dioxide stream is greater than 99.98% carbon dioxide with trace quantities of water, oxygen, nitrogen, methane, acetaldehyde, hydrogen sulfide, dimethyl sulfide, ethyl acetate, isopentyl acetate, methanol, ethanol, acetone, n-Propanol, and n-Butanol.

(26) The MAG #1 well is a stratigraphic test well that was used for reservoir characterization and constructed to Class VI requirements, located 295 feet from the north line and 740 feet from the west line of Section 18, Township 145 North, Range 82 West, McLean County, North Dakota. This well is to be converted to a Class VI injection well.

(27) The MAG #2 well is proposed to be located approximately 820 feet from the south line and 165 from the east line of Section 7, Township 145 North, Range 82 West, McLean County, North Dakota. This well is to be utilized as a direct method of monitoring the injection zone pursuant to NDAC Section 43-05-01-11.4.

(28) Blue Flint created a geologic model based on site characterization as required by NDAC Section 43-05-01-05.1 to delineate the area of review. Data utilized included seismic survey data, geophysical logs from nearby wells, and core data. Structural surfaces were interpolated with Schlumberger's Petrel software, and included formation top depths, data collected from the MAG #1, the Flemmer #1 (File No. 34243), the J-LOC #1 (File No. 37380), the BNI #1 (File No. 34244), the ANG #1 (Class I well), and two 3D seismic surveys conducted at the Flemmer #1 and MAG #1 locations. Due to uncertainty in sonic log values related to washouts in the Broom Creek Formation in the MAG #1 well, publicly available variograms from the Minnkota Center MRYS Broom Creek Storage Facility #1 (Facility No. 90000330) were used to inform lithofacies and petrophysical properties in the geologic model. The variograms were selected as they provided a generalized representation of property distributions expected in the Broom Creek Formation. Based on the reservoir pressure obtained from the MAG #1 well, critical threshold pressure for this storage facility exists in the Broom Creek Formation prior to injection. Critical threshold

pressure has the same meaning as pressure front, defined in NDAC Section 43-05-01-01, for area of review delineation purposes. EPA's "UIC Program Class VI Well Area of Review Evaluation and Corrective Action Guidance" lists several methods to estimate an acceptable pressure increase for over-pressurized reservoirs, including a multiphase numerical model designed to model leakage through a single well bore, or through multiple well bores in the formation. Blue Flint used this method to determine cumulative leakage potential along a hypothetical leaky wellbore without injection occurring, estimated to be 0.019 cubic meters over 20 years. Incremental leakage with injection occurring was estimated to be a maximum of 0.005 cubic meters over 20 years. A value of 1 cubic meter is the lowest meaningful value that can be produced by the Analytical Solution for Leakage in Multilayered Aquifers (ASLMA) model as smaller values likely represent statistical noise. An actual leaky wellbore or transmissive conduit would likely communicate with the Inyan Kara Formation. Blue Flint's application noted no indications of communication between the Broom Creek Formation and Inyan Kara Formation were observed, and that nothing in fluid samples indicated communication to USDWs. The predicted extent of the carbon dioxide plume from beginning to end of life of the project, at the time when the carbon dioxide plume ceases to migrate into adjacent cells of the geologic model, was used to define the area of review in this case. Pursuant to NDAC Section 43-05-01-05(1)(b)(2) the area of review included a one-mile buffer around the storage facility boundaries. Time lapse seismic surveys will be used to monitor the extent of the carbon dioxide plume.

(29) The area proposed to be included within the storage facility is as follows:

TOWNSHIP 145 NORTH, RANGE 83 WEST
ALL OF SECTIONS 12 AND 13, THE SE/4 OF SECTION 11, THE NE/4 OF SECTION 14, AND THE NE/4 OF SECTION 24,

TOWNSHIP 145 NORTH, RANGE 82 WEST
ALL OF SECTIONS 7, 8, 17, AND 18, THE S/2 OF SECTION 6, AND THE N/2 OF SECTION 19.

ALL IN MCLEAN COUNTY AND COMPRISING OF 4,953.71 ACRES, MORE OR LESS.

(30) In the MAG #1 well, the undifferentiated Spearfish and Opeche Formations, hereinafter referred to as the Spearfish Formation, unconformably overlie the Broom Creek Formation. The Picard and Poe members of the Piper Formation, hereinafter referred to as the Lower Piper Formation, overlie the Spearfish Formation. The Broom Creek Formation, the upper confining Lower Piper-Spearfish Formations, and the lower confining Amsden Formation are laterally extensive throughout the area of review.

(31) Core analysis of the Broom Creek Formation shows sufficient permeability to be suitable for the desired injection rates and pressures without risk of creating fractures in the injection zone. Thin-section investigation shows the Broom Creek Formation is dominated by quartz, dololmite, anhydrite, and clay (mainly illite/muscovite) minerals. Within the Broom Creek Formation, feldspar and iron oxide intervals are present. Anhydrite obstructs the intercrystalline porosity in the upper part of the formation and dolomite in the middle and lower parts. Porosity is

due to the dissolution of anhydrite in the upper part and the dissolution of quartz and feldspar in the middle and lower parts. Microfracture in situ tests were not attempted in the MAG #1 well due to unstable wellbore conditions. A one-dimensional mechanical earth model (1D MEM) was used to compensate for the lack of microfracture data within the storage facility area. Log data from MAG #1 well was used to determine ductility and rock strength to characterize stress in the storage complex to calculate the fracture pressure gradient. Side wall core samples collected in the MAG #1 well were horizontally oriented and inadequate for multistage triaxial testing. The Matthew and Kelly method was utilized in Schlumberger's Techlog software to calculate a fracture gradient of 0.69 psi/ft. This method calculates the fracture gradient from pore pressure and overburden gradient and was used due to the absence of closure pressure measurements in the Broom Creek Formation from microfracture testing. Pressure and temperature sensors were set at depths of 4,735 feet and 4,741 feet to record values from the Broom Creek Formation yielding a pore pressure gradient of 0.512 psi/ft. An overburden gradient of 0.911 psi/ft was extrapolated from the bulk density log.

Core analysis of the overlying Lower Piper-Spearfish Formations show sufficiently low permeability to stratigraphically trap carbon dioxide and displaced fluids. Thin-section investigation shows the siltstone intervals are dominated by clay, quartz, and anhydrite minerals. Throughout these intervals are occurrences of dolomite, feldspar, and iron oxides. Microfracture in situ tests were not attempted in the MAG #1 well due to unstable wellbore conditions. A fracture gradient of 0.69 psi/ft was calculated from the Matthew and Kelly method. The maximum allowable bottomhole pressure of 2,970 psi is estimated to be ninety percent of the fracture gradient of the Broom Creek Formation multiplied by the depth of the top perforation in the injection zone. Injection formation breakdown would be observed and recorded if permitted operational pressures were exceeded before compromising the confining zone.

Core analysis of the underlying Amsden Formation shows sufficiently low permeability to stratigraphically contain carbon dioxide and displaced fluids. Thin-section investigation shows the Amsden Formation is comprised of dolostone, sandstone, anhydrite, and limestone.

(32) The in situ fluid of the Broom Creek Formation in this area is in excess of 10,000 parts per million of total dissolved solids.

(33) Investigation of wells within the area of review found no vertical penetrations of the confining or injection zones requiring corrective action. The area of review will be reevaluated at a period not to exceed five years from beginning of injection operations.

(34) The Fox Hills Formation is the deepest underground source of drinking water (USDW) within the area of review. Its base is situated at a depth of 955 feet at the location of the MAG #1 well, leaving approximately 3,773 feet between the base of the Fox Hills Formation and the top of the Broom Creek Formation.

(35) Fluid sampling of shallow USDWs has been performed to establish a geochemical baseline, with additional baseline sampling proposed for the Fox Hills Formation and other shallow wells under investigation. Future sampling is proposed in Blue Flint's application pursuant to NDAC Section 43-05-01-11.4.

(36) Soil sampling is proposed pursuant to NDAC Section 43-05-01-11.4. A baseline of soil gas concentrations was initiated in September 2022 and is anticipated to be completed by July 2023. A baseline of soil gas concentrations will be established and submitted to the Commission for review prior to injection operations. Soil gas profile stations will be located near the MAG #1 well and proposed MAG #2 well locations.

(37) The top of the Inyan Kara Formation is at 3,574 feet, approximately 2,619 feet below the base of the Fox Hills Formation at the location of the MAG #1 well and it provides an additional zone of monitoring between the Fox Hills Formation and the Broom Creek Formation to detect vertical carbon dioxide or fluid movement.

(38) No known or suspected regional faults or fractures with transmissibility have been identified during the site-specific characterization. Formation imaging logs showed drilling induced fractures were observed in the Lower Piper Formation. The Spearfish Formation log was dominated by what appear to be conductive fractures. Seismic data used to characterize the subsurface within the project area showed no indication of faulting with sufficient vertical extent to transect the storage reservoir and confining zones. Blue Flint testified that the Spearfish Formation fractures were filled with precipitated minerals, primarily anhydrite, and all fractures lack sufficient permeability or vertical extent to act as fluid pathways.

(39) Fluid samples from the Inyan Kara Formation and Broom Creek Formation suggest that they are hydraulically isolated from each other, supporting that the confining formations above the Broom Creek Formation are not compromised by migration pathways.

(40) Geochemical simulation performed with the injection stream and data obtained from the confining and injection zones determined no observable change in injection rate or pressure. Simulations of conservatively high carbon dioxide exposure to the cap rock determined that geochemical changes will be minor and will not cause substantive deterioration compromising confinement.

(41) Risk of induced seismicity is not a concern based on existing studies of major faults within the area of review, tectonic boundaries, and relatively stable geologic conditions surrounding the proposed injection site.

(42) NDAC Section 43-05-01-11.3(3) requires the storage facility operator to maintain pressure on the annulus that exceeds the operating injection pressure, unless the Commission determines that such a requirement might harm the integrity of the well or endanger USDWs. Blue Flint testified their intention is to submit a variance request with the injection permit. The Commission believes placing this pressure on the annulus will create a risk of micro annulus by debonding of the long string casing–cement sheath during the operational life of the well. A micro

annulus would harm external mechanical integrity and provide a potential pathway for endangerment of USDWs.

(43) Both the injection and monitoring well are proposed to be equipped with DTS fiber optic cables enabling continuously monitored external mechanical integrity.

(44) The approval of this application is in the public interest by promoting the policy stated in NDCC Section 38-22-01.

IT IS THEREFORE ORDERED:

(1) The creation of the Blue Flint Underwood Broom Creek Storage Facility #1 in McLean County, North Dakota, is hereby authorized and approved.

(2) Blue Flint Sequester Company, LLC, its assigns and successors, is hereby authorized to store carbon dioxide in the Broom Creek Formation in the Blue Flint Underwood Broom Creek Storage Facility #1.

(3) The Blue Flint Underwood Broom Creek Storage Facility #1 shall extend to and include the following lands in McLean County, North Dakota:

TOWNSHIP 145 NORTH, RANGE 83 WEST
ALL OF SECTIONS 12 AND 13, THE SE/4 OF SECTION 11, THE NE/4 OF SECTION 14, AND THE NE/4 OF SECTION 24,

TOWNSHIP 145 NORTH, RANGE 82 WEST
ALL OF SECTIONS 7, 8, 17, AND 18, THE S/2 OF SECTION 6, AND THE N/2 OF SECTION 19.

ALL IN MCLEAN COUNTY AND COMPRISING OF 4,953.71 ACRES, MORE OR LESS.

(4) Injection into the Blue Flint Underwood Broom Creek Storage Facility #1 shall not occur until Blue Flint Sequester Company, LLC has met the financial responsibility demonstration pursuant to Order No. 32476.

(5) This authorization does not convey authority to inject carbon dioxide into the Blue Flint Underwood Broom Creek Storage Facility #1; an approved permit to inject for the MAG #1 well (File No. 37833) shall be issued by the Commission prior to injection operations commencing.

(6) The authorization granted herein is conditioned on the operator receiving and complying with all provisions of the injection permit issued by the Oil and Gas Division of the Industrial Commission and complying with all applicable provisions of NDAC Chapter 43-05-01 and this order.

(7) Definitions.

"Area of review" in this case means an area encompassing a radius around the facility area of one mile.

"Cell" in this case means individual cell blocks of the geologic model; each cell is approximately 1,000 feet by 1,000 feet.

"Facility area" means the areal extent of the storage reservoir as defined in paragraph (3) above, that includes lands within the lateral boundary of the carbon dioxide plume from beginning of injection to the time the carbon dioxide plume ceases to migrate into adjacent geologic model cells.

"Storage facility" means the reservoir, underground equipment, and surface facilities and equipment used or proposed to be used in the geologic storage operation. Pursuant to NDCC Section 38-22-02, it does not include pipelines used to transport carbon dioxide to the storage facility.

(8) The storage facility operator shall comply with all conditions of this order, the permit to inject, and applicable provisions of NDAC Chapter 43-05-01. Any noncompliance constitutes a violation and is grounds for enforcement action, including but not limited to termination, revocation, or modification of this order pursuant to NDAC Section 43-05-01-12.

(9) In an administrative action, it shall not be a defense that it would have been necessary for the storage facility operator to halt or reduce the permitted activity in order to maintain compliance with this order, the permit to inject, and applicable provisions of NDAC Chapter 43-05-01.

(10) The storage facility operator shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this order, the permit to inject, and applicable provisions of NDAC Chapter 43-05-01.

(11) The storage facility operator shall implement and maintain the provided emergency and remedial response plan pursuant to NDAC Section 43-05-01-13.

(12) The storage facility operator shall cease injection immediately, take all steps reasonably necessary to identify and characterize any release, implement the emergency and remedial response plan approved by the Commission (insofar as the Commission has jurisdiction), and notify the Commission within 24 hours of carbon dioxide detected above the upper confining zone.

(13) The storage facility operator shall at all times properly operate and maintain all storage facilities which are installed or used by the storage facility operator to achieve compliance with the conditions this order, the permit to inject, and applicable provisions of NDAC Chapter 43-05-01. Proper operation and maintenance includes effective performance, adequate funding, adequate operator staffing and training, and adequate laboratory and process controls, including

appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems only when necessary to achieve compliance.

(14) This order may be modified, revoked and reissued, or terminated pursuant to NDAC Section 43-05-01-12. The filing of a request by the storage facility operator for and order modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance, does not stay any condition contained herein.

(15) The injection well permit or the permit to operate an injection well does not convey any property rights of any sort of any exclusive privilege.

(16) The storage facility operator shall furnish to the Director, within a time specified, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this order, or to determine compliance thereof. The storage facility operator shall also furnish to the Director, upon request, copies of records required to be kept by this order, the permit to inject, and applicable provisions of NDAC Chapter 43-05-01.

(17) The storage facility operator shall allow the Director, or an authorized representative, upon presentation of credentials and other documents as may be required by law, to:

(a) Enter upon the storage facility premises where records must be kept pursuant to this order and NDAC Chapter 43-05-01.

(b) At reasonable times, have access to and copy any records that must be kept pursuant to this order and NDAC Chapter 43-05-01.

(c) At reasonable times, inspect any facilities, equipment, including monitoring and control equipment, practices, or operations regulated or required pursuant to this order, the permit to inject, and NDAC Chapter 43-05-01.

(d) At reasonable times, sample or monitor for the purposes of assuring compliance, any substances or parameters at any location.

(18) The storage facility operator shall maintain and comply with the proposed testing and monitoring plan pursuant to NDAC Section 43-05-01-11.4

(19) The storage facility operator shall comply with the reporting requirements provided in NDAC Section 43-05-01-18. The volume of carbon dioxide injected, the average injection rate, surface injection pressure, and down-hole temperature and pressure data shall be reported monthly to the Director on or before the fifth day of the second succeeding month once injection commences regardless of the status of operations, until the injection well is properly plugged and abandoned.

(20) The storage facility operator must obtain an injection well permit under NDAC Section

43-05-01-10 and injection wells must meet the construction and completion requirements in NDAC Section 43-05-01-11.

(21) The storage facility operator shall notify the Director at least 48 hours in advance to witness all mechanical integrity tests of the tubing-casing annulus in the injection well. The packer must be set within 100 feet of the upper most perforation and in the chrome enhanced casing, as an exception to NDAC Section 43-05-01-11. However, the packer must also be set within confining zone lithology, within carbon dioxide resistant cement, and not interfere with down-hole monitoring equipment.

(22) The storage facility operator shall maintain and comply with the prepared plugging plan pursuant to NDAC Section 43-05-01-11.5.

(23) The storage facility operator shall establish mechanical integrity prior to commencing injection and maintain mechanical integrity pursuant to NDAC Section 43-05-01-11.1.

(24) The storage facility operator shall implement the worker safety plan pursuant to NDAC Section 43-05-01-13.

(25) The storage facility operator shall comply with leak detection and reporting requirements pursuant to NDAC Section 43-05-01-14.

(26) The storage facility operator shall implement the proposed corrosion monitoring and prevention program pursuant to NDAC Section 43-05-01-05.1.

(27) The storage facility operator shall maintain financial responsibility pursuant to NDAC Section 43-05-01-09.1 and Order No. 32476.

(28) The storage facility operator shall maintain and comply with the proposed post-injection site care and facility closure plan pursuant to NDAC Section 43-05-01-19.

(29) The storage facility operator shall notify the Director within 24 hours of failure or malfunction of surface or bottom hole gauges in the MAG #1 injection well.

(30) The storage facility operator shall implement surface air and soil gas monitoring as proposed.

(31) This storage facility authorization and permit shall be docketed for a review hearing at least once every five years from commencement of injection to determine whether it should be modified, revoked, or minor modification made, pursuant to NDAC Section 43-05-01-05.1(4).

(32) The storage operator shall file minor modification to the permit requests pursuant to NDAC Section 43-05-01-12.1 through a Facility Sundry Notice form.

(33) The storage facility operator shall pay fees pursuant to NDAC Section 43-05-01-17 annually, on or before the last business day in June, for the prior year's injection, unless otherwise approved by the Director.

(34) This order shall remain in full force and effect until further order of the Commission.

Dated this 25th day of May, 2023.

INDUSTRIAL COMMISSION
STATE OF NORTH DAKOTA

/s/ Doug Burgum, Governor

/s/ Drew H. Wrigley, Attorney General

/s/ Doug Goehring, Agriculture Commissioner