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Michael D. Harris
Director
Enforcement and
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Region 5, EPA
77 West Jackson Boulevard
(ECW-15J)
Chicago, Illinois 60604-3590

Via Email
(adamiec.james@epa.gov)

RE: Response to August 14, 2024 Notice

Dear Mr. Harris:

Thank you for the opportunity to respond to EPA's recent concerns regarding one of the deep monitoring wells at our location, which is plugged and not in use.

As the first American company to operate Class VI carbon capture and storage (CCS) wells permitted by the EPA, ADM continues to be a pioneer in the CCS industry and has successfully and safely operated CCS wells in Decatur for more than a decade. ADM is also playing a critical role in the advancement and evolution of this technology, utilizing the input and guidance of numerous third-party experts, including the EPA. Decatur is the home of our North American headquarters, where more than 4,000 of our colleagues live and work, and we take very seriously our responsibility to operate this technology safely, capture our learnings along the way, and make adjustments as needed.

We began operating CCS Well #1 as part of a pilot project in 2011 with the goal of demonstrating the viability of CCS by injecting 1 million metric tonnes of CO₂ over a three year period. We followed that successful pilot project in 2017 when we began operating CCS Well #2, with the goal of demonstrating injection at an industrial scale rate of up to 1 million metric tonnes of CO₂ per year. During the installation of each CCS Well, we installed companion deep monitoring wells that similarly reached from the surface to more than 7,000 feet below the ground. Both VW#1 and VW#2 were engineered and installed using a novel design in an effort to advance monitoring capabilities and maximize data collection, with a multi-zone sampling technology and industry standard metallurgy for the anticipated well conditions. Each of these deep monitoring wells, when combined with the already extensive monitoring capabilities of CCS Well #1 and CCS Well #2, allow us to detect, address, and learn from any monitored developments.

In September 2020, a gauge in Zone 5 of VW#2 began to develop intermittent electrical malfunctions at a depth of 5,027 feet. By January 2022, all VW#2's gauges were malfunctioning. Ultimately, in October 2023, because of the failed gauges and our attempt to restore VW#2's monitoring capabilities, we pulled VW#2's completion assembly. In the process of pulling the VW#2 completion, we discovered corrosion

(primarily pitting) on tubing below the Zone 5 packer, which prevented recovery of the entire completion. Following unsuccessful attempts at further recovery, we set two bridge plugs in the casing, and stopped using VW#2, relying instead on the remaining monitoring network capabilities of CCS Well #1, CCS Well #2 and VW#1 for data collection. Afterward, in March 2024, as part of our ongoing testing and monitoring efforts, we discovered Zone 2 formation fluid just above the confining zone in VW#2 at a depth of 5,000 feet. Based on additional data subsequently developed with the assistance of third parties, we determined that the unexpected fluid we discovered related to historical impacts from the previously identified VW#2 corrosion condition, which we already addressed the previous October with the installation of the dual bridge plugs. We also confirmed that the unique fluid conditions that caused corrosion at VW#2 do not exist at any of the other wells in our CCS operation. At no time since the discovery of these developments has there been any impact to the surface or ground water sources or any threat to public health.

We took all of those steps to detect, evaluate and address these unexpected developments as we learned about them. We also reported updates about our ongoing efforts and progress to EPA based on the best information available to us at the time. We made those reports in accordance with our good faith understanding of the applicable regulations and permit requirements when there is no potential endangerment to an underground source of drinking water, which was the situation here (i.e., because fluids were contained within the VW#2 well and the Zone 5 formation). Nevertheless, beyond the relevant semi-annual and testing reports submitted since 2021 in which we shared key information we knew about these prior developments, we met with EPA in February 2024 to present and discuss all we knew about the matter at that time and presented a proposal to restore VW#2 to operating condition solely for monitoring Zone 5. We also previewed some of the above-described developments during EPA's on-site inspection this June, explaining then that we were still developing some data and planned to provide a more detailed presentation to EPA soon afterward. We ultimately gave that presentation to EPA last month, which included a revised proposal for next steps, and submitted our semi-annual report for the period to EPA soon afterward with additional details.

We continue to appreciate receiving EPA's candid feedback about our CCS operation, which has made our project and compliance efforts better. The combination of formal reporting, regular interactions and inspections has helped ADM ensure that any issues that arise are timely and collaboratively identified, shared, and corrected. This also facilitates improved understanding and advancement of the technology based on valuable learning experience. We remain proud of our regulatory partnership with EPA and shared commitment for the success of our CCS projects and other planned projects around the country. We're also proud of our CCS-related compliance record, including the results of EPA's prior inspection in 2020, when the agency did not identify any specific areas of concern. In sum, we welcome the opportunity to learn more about EPA's perspective and concerns, describe our perspective, and confirm our ongoing commitment to safely operating the CCS wells.

Beyond the summary above, we're attaching comments about EPA's related Inspection Report. We look forward to meeting with EPA at a mutually agreeable time to provide additional information and answer questions about our compliance efforts and this submission.

Sincerely,


Steven Murawski

Attachment

Attachment: Comments on Inspection Report

Statement in Inspection Report	ADM Comment
No holding tanks are used for CO2 storage and no tanks are present at the injection well site. [Page 3, Paragraph 2]	There is an annulus pressure tank located at the CCS#2 wellsite.
EPA Permit No. IL-115-6A-0001 ("The Permit") for CC#2 became effective on December 20, 2021. [Page 3, Paragraph 4]	Authorization for injection under the original EPA Permit No. IL-115-6A-0001 ("The Permit") for CCS#2 became effective on April 7, 2017, and injection began at that time. A modified EPA Permit No. IL-115-6A-0001 ("The Permit") for CCS#2 became effective on December 20, 2021.
Unlike VW1, VW2 has the ability to sample from different zones (depths) using the same well. [Page 5, Reference # IN-001, paragraph 1]	VW#1 and VW#2 both have the ability to sample from different zones (depths) using the same well.
At the time of the inspection, ADM staff reported that VW2 began experiencing what they thought were instrumentation shorts in 2019, limiting the functionality of the sliding sleeves. [Page 4, Reference # IN-001, paragraph 2]	The electrical shorts were affecting the gauges rather than the sliding sleeves. As stated in the letter we believe intermittent electrical shorts began in 2020.
Samples collected in 2020 and 2021 from the Ironton Galesville, above the confining zone, showed characteristics of being contaminated with injection fluid. [Page 4, Reference # IN-001, paragraph 2]	Only samples collected after 2021 were affected.
ADM staff stated that these samples were not representative of actual below ground conditions. [Page 4, Reference # IN-001, paragraph 2]	ADM staff stated that the samples were not representative of native reservoir fluid.
ADM hypothesized that malfunctions to the sliding sleeves in lower zones allowed injection fluid to migrate up VW2 and contaminate samples being taken from the upper zone. [Page 4, Reference # IN-001, paragraph 2]	The migration was up the VW#2 sampling well tubing at a depth of 5,000 feet.
ADM conducted pulse neutron testing along the length of VW2, down to the depth of the plug. ADM reported that the results were satisfactory, and that there was no pressure in the well, indicating that the plug had been successful. [Page 4, Reference # IN-001, paragraph 2]	The pulse neutron testing done in January 2024 and reported as required by the permit showed: "In the 5004 - 5007 interval, which averaged 21% CO2 saturation in 2022, the measurement in 2024 shows 0% saturation."
In March 2024, ADM conducted additional sampling in VW2, preparing to put the well back into service. However, ADM continued to get what it classified as non-representative samples, indicating that injection fluid was still present in samples taken above the confining zone. [Page 4, Reference # IN-001, paragraph 3]	As required by the Permit, in March 2024, ADM conducted reservoir fluid sampling in VW#2. Initial samples showed characteristics of the heavy brine used during the recompletion operation. Subsequent sampling resulted in the production of lighter brine and entrained CO2. The lighter brine showed characteristics of Zone 2 fluid when compared to previous sampling. ADM conducted production logging including pressure, temperature, and spinner surveys and confirmed that there was no fluid movement from the lower zones. This confirmed that the dual bridge plugs isolated the Ironton-Galesville from the lower zones. ADM produced over 3,000 bbls of reservoir fluids with very little change in the fluid characteristics.
During the inspection, ADM staff maintained that it was their belief that any injection fluid outside of the injection zone near VW2 was confined to the sample tubing, but because injection fluid had migrated to upper sample tubing, they were unable to collect	ADM staff recalls explaining that initial belief was that the injection fluid was maintained within the injection zone. Subsequent fluid sampling in March 2024 indicated that Zone 2 fluid with entrained CO2 (injectate) had migrated into the Ironton-Galesville, above the confining zone, at a depth of 5,000 feet.

Statement in Inspection Report	ADM Comment
samples from VW2 beginning in at least January 2022. [Page 4, Reference # IN-001, paragraph 4]	
While VW2 was down, ADM relied on VW1 for deep monitoring of the injection zone. [Page 4, Reference # IN-001, paragraph 4]	ADM also relied on VW#1 for above confining zone monitoring in the Ironton-Galesville.
CCS#2 is the active CO2 injection well at the ADM facility and is constructed to a depth of roughly 6,800'. [Page 5, Reference # IN-002, paragraph 1]	The CCS#2 well is constructed to a depth of roughly 7,100 feet. Injection zone perforations range from 6,630' to 6,825'.
The fluid was removed from the well using a bailer, a downhole extraction and sampling tool. [Page 5, Reference # IN-002, paragraph 4]	Samples of the tarlike fluid were removed from the CCS#2 well using a bailer, a downhole extraction and sampling tool allowing the permittee to conduct analysis of the fluid and determine the cause of the fouling of the injection zone perforations. This analysis guided ADM on the design of a stimulation program and the well was subsequently treated with a hydrochloric acid and naphtha-based mixture to dissolve the fouling material present in the well, followed by a hot water wash of the lower portion of the well.
Alarms produce a visual on-screen warning and an audible noise. [Page 5, Reference # IN-003, paragraph 1]	The alarms produce visual warnings but not audible noise.
Frank Tudor, from ADM's Carbon Capture Operations, is on call at all times for emergency response. [Page 5, Reference # IN-003, paragraph 2]	The person on call is Randy Tudor or his designee.
Daily walkthroughs are conducted at all ADM wells, including the CCS#2 injection well. [Page 5, Reference # IN-004, paragraph 1]	Daily walkthroughs are conducted only for CCS#2 injection well.
Each well, with the exception of CCS#1 which is located inside the plant, is additionally secured with its own perimeter fence. [Page 6, Reference # IN-006, paragraph 1]	CCS#1 and GM#1 are both inside the plant perimeter rather than having dedicated perimeters.
Fluid samples at VW1 are collected annually from three zones, including two zones in the injection formation. [Page 8, Reference # OB-006, paragraph 1]	For VW#1 fluid samples are collected from two zones, including one in the injection zone and one above the confining zone.
Metal corrosion in the monitoring well caused fluid to enter an upper sampling zone (Zone 2) in the Ironton-Galesville formation, above the confining layer. According to the report, "the movement of fluid from the Mt. Simon to the Ironton-Galesville was caused by corrosion to the tubing in VW#2 that created holes sufficient to allow that movement. [Page 8, Reference # RR-001, paragraph 1]	The corrosion occurred below the upper Zone 5 packer at a depth of 4,954 feet. The sampling zone in the Ironton-Galesville is Zone 5.
The Zone 5 gauge essentially failed in July 2021 and little data (1.32%) is being received from the instrument... Zone 2 sliding sleeve developed a leak and the operator installed a bridge plug above Zone 4. This bridge plug isolated the leaking zone within the injection zone but does not allow reservoir fluid sampling below Zone 5. [Page 9, Reference # RR-003, paragraph 1]	ADM installed two tubing bridge plugs which isolated the zones within the injection zone from the above confining zone sampling port (Zone 5).

Other notes:

- Jeff Neisslie's name is spelled incorrectly in the cover letter and report.
- Adam O'Connell's title is Decatur Area Environmental Manager / ADM.
- Randy Tudor's first name is Randy.
- The well designation is CCS#2 rather than CC#2.
- The authorized injection zone is 5,553 feet to 7,043 feet in depth.
- On page 3, paragraph 5, annulus is misspelled.
- In the middle of page 4 AMD should be ADM.