



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

OCT 31 2013

REPLY TO THE ATTENTION OF:
WU-16J

CERTIFIED MAIL 7009 1680 0000 7674 2019
RETURN RECEIPT REQUESTED

Kenneth K. Humphreys
Chief Executive Officer
FutureGen Industrial Alliance, Inc.
73 Central Park Plaza East
Jacksonville, Illinois 62650

Subject: Request for Additional Information Regarding four FutureGen 2.0 Wells, United States Environmental Protection Agency Underground Injection Control (UIC) Permit Applications for Four Geologic Sequestration Wells; United States Environmental Protection Agency UIC Permit Nos. IL-137-6A-0001, -0002, -0003, & -0004

Dear Mr. Humphreys:

In order to complete our review of FutureGen's permit applications, we need additional information described in the enclosures with this letter. The enclosed table shows the application language in question that is promised at a later date as part of the permit applications. If any of that information is presently available, it should be included in your response. There are also requests for additional information that is needed for our review of your applications. Please submit any information no later than 30 days from the receipt of this letter.

Inquiries concerning the contents of the enclosure may be directed to Jeffrey McDonald of my staff by telephone at (312) 353-6288 or by email to mcdonald.jeffrey@epa.gov.

Sincerely,

Rebecca Harvey, Chief
Underground Injection Control Branch

cc: Stephen Nightingale, IEPA

Enclosures

FutureGen 2.0 Permit Applications

Deficiencies

Section of Application	Deficiency
2	<p>2.3.1.1 "The Illinois State Geological Survey (ISGS) recently acquired a new 120-mi long seismic reflection survey across central Illinois as part of a DOE-sponsored research project to characterize reservoir rocks for geologic storage of carbon dioxide. The continuous east-west line extends from Meredosia to southwestern Champaign County (Figure 2.14). This line, which is currently under re-processing, will supply additional information about the structure of the sedimentary layers which will be correlated to the observations made on both profiles L101 and L201."</p> <p>"Future efforts at Morgan County will also include the acquisition of vertical seismic profiling data in the stratigraphic well to better evaluate the cause of the vertical disruptions in seismic reflections observed on the two existing seismic profiles."</p> <p>Have these tests been completed? Please report the results.</p>
	<p>2.4.1 "Various supportive geomechanical data were collected, but there are no available "mini-frac" or leakoff tests to directly measure fracture pressure in either the injection or confining zones. Mini-frac or leakoff data are required to definitively calculate site-specific fracture gradients, and to produce high confidence failure plots, fault slip tendency estimates, and critical pore fluid pressure increase estimates. All of these tests will be realized in 2013 during the second phase of the project"</p> <p>Have these tests been completed? Please report the results.</p>
	<p>2.4.2 "Uncalibrated geomechanical stress properties logs were calculated from the density log and the compressional and shear wave sonic log data. These geomechanical logs indicate there is strong stress anisotropy. These uncalibrated geomechanical logs will later have been calibrated over the cored interval with six triaxial core-plug tests"</p> <p>Has this analysis been completed? If so, please report the results.</p> <p>"Data are insufficient at this stage of analysis to be able to quantify the horizontal components of stress and thus distinguish between normal and strike-slip regimes."</p> <p>How will you obtain and when will you have sufficient data?</p>

<p>3</p>	<p>3.1.2 Page 3.3: "Laboratory investigations are currently quantifying the important of these reactions [transformations of formation minerals to carbonate minerals] at the Morgan County CO₂ storage site. Therefore, not included in simulations."</p> <p>Will this information be incorporated into the modeling? Please report the results of the core investigations.</p> <p>3.1.2 Capillary Pressure and Saturation Functions: Page 3.15: "Capillary pressure data determined from site-specific cores were not available at the time the model was constructed."</p> <p>Will such data be collected and compared with values used in the simulation? Also, please report the results of the core evaluations.</p> <p>3.1.8 Delineation of the Area of Review (AoR) -- "These control measures and natural geologic features that protect the USDW include the following: ... planned development of environmental release model... to predict vertical CO₂ and/or brine movement under different containment-loss scenarios...." When will this be done?</p> <p>As you note, EPA Guidance for AoR delineation suggests that with an over-pressurized injection zone some analytical methods for calculating a pressure front can lead to an infinite pressure front. Instead of automatically using the separate-phase plume to delineate the AoR, we suggest that you look into other methods to estimate an acceptable pressure increase for over-pressurized reservoirs. Refer to "Geologic Sequestration of Carbon Dioxide Underground Injection Control (UIC) Program Class VI Well Area of Review Evaluation and Corrective Action Guidance", page 42, which can be found at: http://water.epa.gov/type/groundwater/uic/class6/upload/lep816r13005.pdf</p>
<p>4</p>	<p>4.1.4 "Table 4.2 contains a summary of the pipeline design assumptions and results. Note that these results are for a mass flow rate of 1.3 MMT/yr rather than the current design basis of 1.1 MMT/yr because the Gulf Interstate calculations have not been updated since the design basis was changed from 1.3 MMT/yr to 1.1 MMT/yr. The next phase of the pipeline design, to be developed in 2013, will update this information."</p>

	<p>Please submit the results or provide a date for future submittal.</p>
<p>5</p>	<p>Pg. 5.4, Sec. 5.1.1.2 Par. 1: "As additional characterization data are collected, the site conceptual model will be revised and the modeling steps described above will be updated to incorporate new knowledge about the site". i.e., they will add information to this section as it becomes available</p> <p>When will this be done?</p> <p>Pg. 5.8, Sec. 5.1.4 end of Par 2: "The location of any wells required to support implementation of indirect monitoring approaches <u>will be determined once candidate technologies have been evaluated and the selection process completed</u>". Future Gen has selected locations for the monitoring wells based on the preliminary modeling. Once they begin on-site activity, these locations may change. If the locations do change, the monitoring wells will retain the intent described in this plan.</p> <p>When will these technologies be evaluated and when will any changes be proposed?</p>
<p>6</p>	<p>EPA Form 7520-14 (Plugging & Abandonment Plan) is missing – please provide it for each well</p> <p>Information concerning the slurry volume and slurry weight of the EverCrete cement is needed.</p> <p>In Figure 6.2, the 7" casing is set at 3400 feet, however a cement retainer will be at 3900 feet, which is below the cased hole. Please correct.</p>
<p>9</p>	<p>Table 9.1. Approach to Meeting Financial Responsibility Requirements – several financial mechanisms state that they are to be "Created prior to injection." These must be established prior to draft permit decisions. Please provide the mechanism to EPA.</p>

Enclosure 2

In accordance with 40 CFR 144.4 (c), the U. S. Environmental Protection Agency (EPA) is required to comply with the Endangered Species Act (ESA) when issuing permit decisions. Therefore, when considering a permit application, the Underground Injection Control (UIC) Branch must consider the potential impacts from the new or existing injection well to endangered species present in the area. In order to determine whether an injection well will adversely impact endangered and threatened species, the UIC branch must have location-specific ecological information, such as the presence of certain vegetation, soils or surface water bodies. The U.S. Fish and Wildlife Service has listed the following in Morgan County:

<p>Morgan Field Office to Contact: U.S. Fish and Wildlife Service Marion Illinois Sub-Office 8588 Route 148 Marion, Illinois 62959 Phone: (618) 997-3344, ext. 340 FAX: (618) 997-8961 e:mail Marion@fws.gov</p>	<p>Indiana bat (Myotis sodalis)</p>	<p>Endangered</p>	<p>Caves, mines (hibernacula); small stream corridors with well developed riparian woods; upland forests (foraging)</p>
	<p>Decurrent false aster (Boltonia decurrens)</p>	<p>Threatened</p>	<p>Disturbed alluvial soils</p>
	<p>Eastern prairie fringed orchid (Platanthera leucophaea)</p>	<p>Threatened</p>	<p>Mesic to wet prairies</p>

As a result, we are requiring the following information to be submitted in each permit application.

- a. A summary of the critical habitat which, if present, may support one of the above-listed species. Detailed information on critical habitat can be found at the following web address: <http://www.fws.gov/midwest/endangered/section7/s7process/lifehistory.html>.
- b. A survey of the surface vegetation, soils, topography and hydrologic features in the action area in sufficient detail to address the presence or absence of critical habitat for any endangered, threatened, or candidate species. This will include descriptions such as "mature mixed forest", "plowed field" or "stabilized dunes", and may also include specific trees or plants listed as critical to a species.

Enclosure 2

- c. A description of the action area for the well and associated surface facilities. This will include dimensions of the affected area, such as the clearing in which the well is located, length of road or pipeline to be built, etc., as well as the extent of disruption of the area. For example, an existing well with no construction plan will be less disruptive than a proposed well, and a proposed well in an open, plowed field will be less disruptive than one which requires some clearing of forest.

This information must be certified in accordance with 40 CFR 144.32(d). EPA recommends that this information be gathered in consultation with an ecologist, botanist, or other environmental professional.

If critical habitat is present, the permit is not automatically denied. EPA, in conjunction with the U.S. Fish and Wildlife Service, will examine more detailed information to determine the presence of endangered species in the area and the likelihood of negative impact to the species. We appreciate your cooperation in protecting these important species from endangerment and extinction.