From: BOSHOVEN Jack (ORANO) <jack.boshoven@orano.group>
Sent: Thursday, July 30, 2020 3:08 PM
To: WCS_CISFEIS Resource
Cc: BOSHOVEN Jack (ORANO)
Subject: [External_Sender] ISP Comments on DEIS
Attachments: E-57096 Comments on DEIS signed.pdf

Attached

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INTERIM STORAGE PARTNERS

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July 30, 2020
E-57096

Office of Administration
Mail Stop: TWFN-7-A60M
Attn: Program Management, Announcements and Editing Staff
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Submittal of Comments on Draft Environmental Impact Statement (DEIS) for Interim Storage Partner's License Application for a CISF in Andrews County, Texas, Docket ID NRC-2016-0231

Reference:
1. "Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas Draft Report for Comment," NUREG-2239, Date Published: May 2020, Docket ID NRC-2016-0231 (ML20122A220).

2. Letter from Jeffery D. Isakson to Director, Division of Fuel Management (NRC), "Submission of ISP Responses for RAIs and Associated Document Markups from First Request For Additional Information, Part 3, Docket 72- 1050 CAC/EPID 001028/L-2017-NEW-0002," E-55363, dated November 21, 2019

3. Letter from Jeffery D. Isakson to Director, Division of Fuel Management (NRC), "Submittal of Additional Partial Response to First RAI, Part 1, Docket 72-1050 CAC/EPID 001028/L-2017-NEW-0002," E-54422, dated June 28, 2019

Interim Storage Partners LLC (ISP) has reviewed the Draft Environmental Impact Statement (DEIS) (Reference [1]) and offers the following comments for NRC consideration when finalizing the document.

Suggested Edits for DEIS

1. The description in Sections 3.4.1.2 and 3.5.2.2 of the DEIS of Ogallala caprock (pedogenic calcrete) and later pedogenic calcretes are categorized as "limestones" and in the understanding of the relationships between Ogallala, Blackwater Draw, etc. Limestone development is different from that of caliche. “Limestone” should be removed from the text or replaced with caliche throughout (pg 3-12 Ln 10, pg 3-14 Ln 41, pg 3-17 Ln 6 and 18, pg 3-31 Ln 2). See ISP response to RAI WR-7 [2].
2. On page 3-10, line 8, Hills (1986) did not define the southwestern boundary of the Southern High Plains.
3. On page 3-12, lines 42-43, the DEIS references Hills. The reference Hills (op. cit., p. 261) mentions Laramide Orogeny (55 million years ago) once, and does not say this is the last major tectonic event in North America. Most would consider the Basin and Range, a period of tectonic extension in North America that started 17 million years ago, a major tectonic event in North America.
4. On page 3-14, lines 18-19, the "caprock caliche" is listed in the text as up to 12 ft thick; however, Figure 3.4-4 on the following page shows a thickness of over 40 feet in some boreholes. Some clarification could be provided to explain what appears to be an inconsistency regarding the text and cross-section where caprock caliche is on top of Blackwater Draw caliche and so the two caliche sequences combined have a thickness of over 40 feet (See Geologic Column in Figure 3.4-3). The cross section does not distinguish between the two caliche units. Suggested re-write for lines 4-25 on page 3-14:

   3.4.2 Site Geology

   Ground elevation above sea level ranges from about 1,072 to 1,061 m [3,520 to 3,482 ft] across the proposed CISF project area. The area of the proposed CISF is located in the Southern High Plains, and in the area surrounding the proposed site, the land surface has a gentle slope of approximately 2.4 to 3 m per km [8 to 10 ft per mi]. (ISP, 2020, 2019c).

   The geologic formations of interest beneath the proposed CISF are presented in Figure 3.4-3. From oldest to youngest (corresponding to deepest to most shallow) they include the Triassic-aged Dockum Group mudstones, the undifferentiated OAG (Ogallala/Antlers/Gatuña Formations, collectively referred to as the OAG unit) which occur in the same hydrostratigraphic position over the Red Bed Ridge, the Quaternary Blackwater Draw Formation, the Holocene windblown sands, and playa deposits. There are two caliche layers: a hard, well-developed Stage IV-V caprock caliche that developed on all pre-Quaternary surfaces (i.e. in the upper part of the Ogallala. Antlers and Gatuña Formations), and a softer less-developed caliche that has formed within the windblown sands of the Quaternary Blackwater Draw Formation.

   EIS Figures 3.4-4, 3.4-5, and 3.4-6 contain information from borings WCS conducted between 2005 and 2009. The information was reconfirmed by an additional geotechnical survey covering the area for the proposed action (Phase 1) in 2015 (ISP, 2019c). The geologic cross-sections indicate a thin veneer of

recent windblown cover sands and silt across the proposed CISF project area. The topsoil within the cover sands consists of brown silty sand with sparse vegetation debris and roots. As shown in EIS Figure 3.4-6 and 3.4-7, the thickness of cover sands at the surface increase to the north and east and thin to the south and west (ISP, 2019c). Beneath the cover sands are the calichified Blackwater Draw sands, consisting of reddish brown, fine- to very-fine-grained sand with minor amounts of silt. In the southern and western portion of the CISF site, the entire section of the Blackwater Draw has been altered to caliche and is immediately underlain by the hard, well-developed caprock caliche. In the northern and eastern portion of the site unconsolidated sand, silt and gravels of the Blackwater Draw are present between the upper calichifed Blackwater Draw and the underlying Caprock caliche. The geologic logs in Figures 3.4-5 and 3.4-6 do not distinguish between Blackwater Draw caliche and caprock caliche, as their purpose was to establish the thickness of overburden deposits lying above the Dockum mudstones, where the WCS Low Level radioactive waste facility was eventually located to the south of the CISF.

5. The matter of post-Dockum deposition and exposure/erosion needs clarification or small edit. At one point (p. 3-12, line 34-35), thick Cretaceous sediments are said to have been deposited over a large area, but there is little to no evidence of this at the site or over most of adjacent southeast New Mexico. The remaining Cretaceous deposits around this area consist of time-transgressive sands and gravels (e.g., Antlers, Cox, etc) that are marginal between a generally subaerially exposed area and surrounding marine sediments. There is evidence of a very limited transgression with a few spots with preserved Cretaceous fossils. The WCS-CISF facility is located on the edge of the Cretaceous deposits. Suggest that on P. 3-12, Line 34 remove the word ‘thick’ as a descriptor for the sequence.
6. Dockum – On page 3-14, lines 26 to 32: There are site-specific data on the Dockum. The reference, Bradley and Kalaswad (2003), does not appear to discuss or show a map of the thickness of Dockum (top and bottom elevations approximate). See WCS License Application 2007. Suggested Re-write for lines 26-32 on page 3-14:

Dockum Group

The Dockum Group consists of clays, shales, siltstones, sandstones, and conglomerates. Five formations form the Dockum Group, of which four, the Santa Rosa, Tecovas, Trujillo, and Cooper Canyon Formations are present in approximately 1,400 ft of Dockum sediments beneath the proposed CISF project area (WCS, 2007). The Santa Rosa Formation sandstone at the base of the Dockum Group is approximately 76 m [250 ft] thick (Bradley and Kalaswad, 2003), and the top of the formation is approximately 347 m [1,140 ft] below ground surface at the proposed CISF project area (WCS, 2007).

7. See Response to RAI NP 2.6-1[3]. Suggested re-write for Section 3.4.4 Subsidence and Sinkholes. Based on the following comments:

   a. Page 3-19, Line 26. Conceptual models were developed, but no “modeling” (i.e. computer driven analysis) was undertaken. Suggest removing the word “modeling.”

   b. Page 3-19, Lines 41-Page 3-20, Line 2. Most of this should to be removed; as this discussion of gypsum karst and sinkholes formed “annually” all has to do with the lower Pecos valley, and does not pertain to the WCS site. Although a suggested revision is provided in the text below, ISP recommends removing it to avoid confusion.

   c. Page 3-19, Line 4. Notwithstanding media accounts, I&W brine well had not collapsed as of early May 2020. This brine well appears to be of public interest because of its location in southern Carlsbad at the intersection of US285 and US62/180. However, it is not relevant to the WCS CISF site, accordingly it should be removed from the DEIS.

   d. Page 3-19, Lines 6-9. The DEIS refers to wells associated with the Wink sinks as simply “industrial.” Per Johnson et al. (2003), Wink sink #1 was associated with an abandoned oil well while Wink sink #2 was associated with an industrial water supply well. Suggested revision is below.

   e. Page 3-20, Line 20. Powers (2003) noted halite in the Rustler as well as in the Salado and did not distinguish which might have been most affected.

   f. Page 3-20, Line 22. The Kim et al. (2016) study is particular to a small area including the Wink sinks. Using the reference here gives the misimpression that it also covers a large area. It is a good reference, but it is limited to the Wink sinks. The Kim et al. (2016) study was of InSAR data for the period of April to August of 2015, a period not exceeding 5 months. Kim et al noted an interesting pattern that indicated the short-term behavior evaluated also shows a relationship to ground-water level changes during the period of analysis.

   g. Page 3-20, Line 27. The report in SMU Research News (2018) can be found here: https://blog.smu.edu/research/2018/03/20/radar-images-show-large-swath-of-texas-oil-patch-is-heaving-and-sinking-at-alarming-rates/

However, the primary source is an article in Scientific Reports, an open-access publication of Nature (Kim and Lu, 2018):
https://www.nature.com/articles/s41598-018-23143-6

From the Abstract:

"Based on our observations and analyses, human activities of fluid (saltwater, CO2) injection for stimulation of hydrocarbon production, salt dissolution in abandoned oil facilities, and hydrocarbon extraction each have negative impacts on the ground surface and infrastructures, including possible induced seismicity."

In the text, Kim and Lu point out different examples they relate to this different activities. In the discussion, they group the examples into three types: "Our observations in West Texas can be separated into three groups: i) surface uplift induced by fluid injection, ii) rapid subsidence in a karst terrain due to dissolution of underlying salt deposit, and iii) ground subsidence and seismicity induced by hydrocarbon production."

The DEIS text as written needs clarification, as it can be taken to indicate that surface movements observed were all due to dissolution of salt. They did attribute the Wink sinks and depressions in the area near Grandfalls and Imperial (TX) as due to dissolution of salt. These align along the N-S trough along the Capitan reef attributed to natural dissolution of Salado salt (and possibly Rustler salt) adjacent to the Capitan.

The response to RAI NP-2.6.1[3] (Figures 6 and 7) show this trough. Detailed figures in Ewing et al. (2012; Rustler GAM) show this trough as well. This discussion in the DEIS in this paragraph should clarify these examples are not in any material proximity the CISF location.

Suggested re-write for Section 3.4.4 Subsidence and Sinkholes (Page 3-19 Line 21 through Page 3-20 Line 27):

3.4.4 Subsidence and Sinkholes

The WCS site and proposed location for the CISF are located over Permian-age halite-bearing formations approximately 460 m [1,500 ft] below the surface. Holt and Powers (2007, 2010) posed three conceptual models of dissolution processes (shallow, deep, and stratabound) based on features found in the Delaware Basin west of the WCS site and proposed CISF project area. Investigations by Holt and Powers (2007, 2010) showed that no features in the study area in and around the proposed CISF project area indicated past dissolution, and the hydrologic systems at the proposed location limit the potential for future dissolution and/or sinkholes (Holt and Powers, 2007).

Specifically, at the WCS site and proposed CISF project area, halite and other soluble evaporites are at depths of approximately 460 m [1,500 ft], which would be below the Dockum Group, and are overlain by a thick section of red beds. Using stratigraphic and lithofacies data from geophysical logs from the area of the WCS site, Holt and Powers determined that the deeply buried halite is difficult to dissolve because it behaves as a ductile material, and pore fluids within halite

flow outward from the halite units into overlying and underlying rocks (Holt and Powers, 2007). It is common for formation fluids at depth to be slow moving and saline, further limiting the dissolution process. Holt and Powers (2007) did not identify any features within and around the WCS site that would indicate past dissolution, and also state that the hydrologic system beneath the WCS site (including the proposed CISF site) limits the potential for future dissolution.

Over the last 40 years, six sinkholes have formed that are man-made in origin and are associated with improperly cased, abandoned oil and groundwater wells or with solution mining of salt beds in the shallow subsurface (Land, 2009, 2013). In southeastern New Mexico and west Texas, the location of man-made sinkholes and dissolution features include the Wink, Jal, Jim's Water Service, Loco Hills, and Denver City sinkholes. All of these features formed around a well location, and the sinkholes have diameters ranging from 30 to more than 213 m [100 to more than 700 ft] (Land, 2013). The Wink sinkholes in Winkler County, Texas, are approximately 72 km [45 mi] south-southwest of the proposed CISF project area and probably formed by dissolution of salt beds in the upper Permian Salado Formation that resulted from an improperly cased abandoned oil well (Wink Sink #1) and an industrial water supply well (Wink sink #2) (Johnson et al., 2003). The Jal Sinkhole near Jal, New Mexico, is approximately 30 km [18 mi] southwest of the proposed CISF and also probably formed by dissolution of salt beds in the Salado Formation and/or the Rustler Formation caused by an improperly cased groundwater well (Powers, 2003). The Jim's Water Service Sinkhole, Loco Hills Sinkhole, Denver City Sinkhole, resulted from injection of freshwater into underlying salt beds and pumping out the resulting brine for use as oil field drilling fluid (Land, 2013). The Jim's Water Service, Loco Hills, and Denver City sinkholes are located in relatively remote areas. The I&W Brine Well, which is neither a sinkhole nor a collapse feature, is located within the City of Carlsbad, New Mexico and s being remediated (sand backfill) to try and prevent any collapse. The wells and karst features described above all occur outside of the land use study area. In the proposed CISF project area, there are no subsurface salt mining operations.

Recent studies employing satellite imagery have identified movement of the ground surface across an approximately 10,360 km^2 [4,000 mi^2] area of west Texas that includes Winkler, Ward, Reeves, and Pecos counties (Kim et al., 2016; SMU Research News, 2018). In one area, as much as 102 cm [40 in] of subsidence was identified over the past 2.5 years. This area is approximately 0.8 km [0.5 mi] east of the Wink No. 2 sinkhole in Winkler County, Texas, where there are two subsidence bowls. The rapid sinking in this area is most likely caused by water leaking through abandoned wells into the Salado Formation and dissolving salt layers (SMU Research News, 2018). Unrelated to the Paleozoic Central Basin Platform is a Cenozoic-age structural feature on the surface of the buried Dockum Group termed the Red Bed Ridge. The Red Bed Ridge, a subsurface high on the buried Triassic Dockum surface, is the position of a drainage divide that separated two major fluvial systems throughout the Cenozoic (Hawley, 1993; Fallin, 1988). The ridge may be related to Laramide Orogeny upliftstart of the Laramide Orogeny and retreat of the Cretaceous seas

from the area. Relatively resistant limestones over partially silicified (i.e., silica-rich) Cretaceous Antlers Formation on the crest of the ridge may have effectively capped the Red Bed Ridge, maintaining it as a mesa or inter-drainage high. From the late Paleocene to near the end of the Pliocene, the area was subject to erosion, removing most of the Cretaceous deposits.

The axis of the buried Red Bed Ridge is approximately coincident with the current local topographic high, between Monument Draw Texas, which drains to the Colorado River, and Monument Draw New Mexico, which drains to the Pecos River. The nearest location of the crest of the Red Bed Ridge on the Dockum surface is about 1,200 ft southwest of the CISF. The CISF is situated on the northeast slope of the buried Red Bed Ridge, although surface drainage is to the southwest.

8. Section 3.4.5 – Suggest including a map of faults from the ISP Probabilistic Seismic Hazard Analysis for the CISF (ISP, 2020)
9. Page 3-12 Lines 6-14: Section is on regional geology and red bed ridge is localized or sub-regional. Also, the red bed ridge is a drainage divide and groundwater divide – OAG to the North and Pecos Valley to the South. See SAR RAI Response NP 2.6-2[3] and RAI Response WR-4[2]. Suggested Rewrite of Page 3-12 Lines 6-14:

    Unrelated to the Paleozoic Central Basin Platform is a Cenozoic-age structural feature on the surface of the buried Dockum Group termed the Red Bed Ridge. The Red Bed Ridge, a subsurface high on the buried Triassic Dockum surface, is the position of a drainage divide that separated two major fluvial systems throughout the Cenozoic (Hawley, 1993; Fallin, 1988). The ridge may be related to Laramide Orogeny upliftand retreat of the Crestaceous seas from the area. Relatively resistant limestones over the partially silicified (i.e., silica-rich) Cretaceous Antlers Formation on the crest of the ridge may have effectively capped the ridge, maintaining it as a mesa or inter-drainage high. From the late Paleocene to near the end of the Pliocene, the area was subject to erosion, removing most of the Cretaceous deposits. Consistent with surface drainage throughout the Cenozoic, the axis of the ridge is approximately coincident with the current local topographic high, between Monument Draw Texas, which drains to the Colorado River, and Monument Draw New Mexico, which drains to the Pecos River. The nearest location of the crest of the Red Bed Ridge on the Dockum surface is about 1,200 ft southwest of the CISF. The CISF is situated on the northeast slope of the buried Red Bed Ridge, although surface drainage is to the southwest.

10. Page 2-10 Lines 20-24: The Rail Side track was not updated in accordance with the response to RAI PA-1[2].
11. Page 3-14 Lines 36-37 – It is stated here, that the Antlers is ‘not calichified.’ The Antlers “is” calichified. In a field observation of the side walls at WCS the lower / deeper section of the Antlers may appear unconsolidated but the upper part is calichified (WCS, 2007).
12. Page 3-14, Line 33 Heading on Sub-heading ‘Formation’ should not be capitalized.

13. Page 3-16 Line 12, 1.5 to 12 m – This observation is accurate for the specific borings drilled by Lehman and is not accurate for the entire site. Not every boring drilled by Lehman encountered the Ogallala Formation and the range should start at 0. For borings that Lehman completed that encountered Ogallala the range is 1.5 to 12. Same issue with characterization of Gatuna and Antlers. These Formations were not always present and sometimes 0.

14. Page 3-29, Lines 3-17. The Antlers Aquifer is not part of the Edwards Aquifer and should be revised and there is more updated information following Lehman and Rainwater (2000). Please see suggested re-write below for the Antlers Aquifer and add to reference list: TWDB. Conceptual Model for the High Plains Aquifer System Groundwater Availability Model. Deeds et al, 2015. Suggested Rewrite of Page 3-29 Lines 3-17:

    Antlers Aquifer

    The Trinity Group Antlers Formation (also known as the Trinity Aquifer or the Antler Aquifer) is part of the High Plains major aquifer in Texas (TWDB, 2015). The Antlers Formation is sometimes overlain and potentially hydraulically connected to the Ogallala Aquifer (Anaya and Jones, 2009; their Figure 5-12). Regionally the southern limit of the Antlers, or Trinity High Plains Aquifer, a remnant Cretaceous outlier, occurs in Gaines County, about 10 miles north of the CISF. Although the Antlers or Trinity High Plains Aquifer does not occur at the CISF, the OAG unit overlying the Dockum Group consists of undifferentiated Ogallala, Antlers and Gatuna deposits that exist contiguously in the same hydrostratigraphic position on the surface of the buried Dockum Group.

    On a regional bases the Antlers or Trinity High Plains Aquifer is primarily recharged by precipitation infiltration in surface depressions (playas), stream losses, a small amount of cross-formational flow from the Ogallala Aquifer (Blandford and Blazer, 2004), and irrigation return flow (Anaya and Jones, 2009). Groundwater discharge from the High Plains Aquifer occurs naturally to springs, seeps, and through cross-formational flow to the Pecos Valley Aquifer/Gatuña Formation, as well as through pumpage (Anaya and Jones, 2009; their Figure 10-2).

15. Page 3-31, Lines 22-24. The statement "….but may approach 7.5 m [25 ft] in the Antlers Formation at the far northwestern corner of the proposed CISF project area (Lehman and Rainwater, 2000; their Figure 10)." This does not appear on the referenced figure and suggest deleting this portion of the sentence.

16. Page 3-34 Lines 10-13 GW chemistry. The groundwater chemistry stated is actually for the shallow pockets of water in the OAG. See response to RAI WR-10[2]. Suggested Re-write for Lines 10-13 on page 3-34:

    Shallow groundwater (groundwater 69 m [225 ft] below the surface in the Cooper Canyon low-permeability sandstone referred to as the '225 ft zone', monitored for regulatory purposes at the WCS Low Level radioactive waste facility) is asodium sulfate type of water with total dissolved solids in the range of about 3,800 to

4,700 mg/L. The maximum secondary constituent level for drinking water, according to the TCEQ, is 1,000 mg/L [1,000 ppm] (30 TAC 290).

17. Page 2-7 Line 10. It should state southwestern and not southeastern.

18. Page 3-22, Lines 12-13 state Shaffer Lake but it is actually Shafter Lake.

19. Section 3.5.2.3, Page 3-33, Lines 17-21. The Central/CW Well was plugged and abandoned in 2010. WCS uses potable water from Eunice for site operations. See response to RAI WR-9[2].

20. Section 3.4.5, Page 3-21, Lines 9-10. The sentence "As part of the analysis for the WCS site, the PSHA estimated a 2,500-year return period peak horizontal acceleration on soft rock of only 0.04g (ISP, 2020)." should be removed, as ISP only evaluated the 10,000 year return period earthquake and the balance of the discussion is consistent with the accelerations estimated for that return period.

Sincerely,

Digitally signed by ISAKSON Jeffery

Jeffery D. Isakson
Chief Executive Officer/President
Interim Storage Partners LLC

cc: Jack Boshoven, ISP LLC
Elicia Sanchez, ISP LLC