From: Monica Perales <monicap@forl.com>
Sent: Tuesday, November 3, 2020 9:07 PM
To: WCS_CISFEIS Resource
Subject: [External_Sender] Docket No. 72-1050 / NRC-2016-0231

In response to the ISP DEIS request for comments, I, Aaron Pachlhofer, wish to restate prior comments submitted to the NRC as well as additional comments regarding the threat of Cesium to the environment of West Texas and the Permian Basin.

i. I hold the position of licensed geologist and geoscientist, Fasken Oil and Ranch, Ltd. ("Fasken"), located at 6101 Holiday Hill Road, Midland, Texas 79707 and am a member in good standing of the Permian Basin Land and Royalty Owners and Operators Coalition ("PBLRO") and am duly authorized to execute this affidavit.

ii. I have personal knowledge of the information as stated herein.

iii. Fasken presently has lands and mineral interests within eighteen miles of the proposed WCS/ISP CISF located in Andrews County, Texas. The PBLRO presently has lands and mineral interests throughout Andrews County with the nearest member holding land and minerals within two miles of the proposed WCS/ISP CISF.

iv. My name is Aaron Pachlhofer, and I am a licensed geologist and geoscientist. Since 2013, I have been employed by Fasken Oil & Ranch, Ltd. as Environmental Coordinator. In that capacity, my duties include primary management of all environmental policies, procedures, and programs for air, soil, and water concerns. My specific duties include coordination and oversight of all spill incidents, air permitting & air compliance, management of radiation issues, all regulatory interaction & notification, also management & oversight of environmental vendors. I have knowledge of and interpret, prepare comments on and ensure compliance with all new and current Federal, state, and local regulations under the U.S. Environmental Protection Act ("EPA"), the U.S. Bureau of Land Management ("BLM"), the Texas Rail Road Commission ("RRC"), the Texas Commission on Environmental Quality ("TCEQ"), the New Mexico Environment Department ("NMED"), and the State of New Mexico Oil Conservation Division ("NMOCD"). Additionally, I monitor legislation, regulations and ensure compliance with any protected, threatened and endangered species program requirements.

v. In my previous employment, my responsibilities involved environmental regulatory compliance, program management, emergency response, environmental assessments, groundwater monitoring, remediation and environmental data gathering and analysis.

vi. I was awarded the B.S. in Geology in 1998 and the M.S. in Geology in 2004 from Sul Ross State University, Alpine, Texas.

vii. In 2003, I received and have maintained a Geologist/Geoscientist license from the State of Texas.

The sections below provide my professional analysis of the WCS/ISP license application and erroneous analysis of the environment of the proposed CISF including WCS/ISP's contradictory statements regarding the occurrence and movement of groundwater at and beneath the proposed CISF and a failure to appreciate the hydrologic process.

I. SPECIFIC CONCERNS REGARDING ISP'S APPLICATION DOCUMENTS

1. In ISP's response to RAI WR-6, they provide new details regarding the presence of groundwater in the northern portion of the CISF and discloses reliance upon insufficient boring data provided by WCS.

A. In responding to RAI WR-6, ISP admittedly erred in relying upon WCS' groundwater data. ISP reports that erroneous information which admittedly was "not based on sufficient boring data to distinguish the contacts between the Antlers and the Ogallala in the proposed CISF area, nor between the Antlers and the Gatuna on the south side of the ridge," misled ISP into previously reporting the lack of presence of groundwater. In updating their report as to the presence or absence of groundwater, ISP reveals that one to five feet of groundwater is present in the northern portion of the CISF site. This new information more closely corresponds with earlier statements made by Fasken and the Permian Basin Coalition in that there is now an admission that groundwater is present throughout the site and nearer the surface than had been stated by ISP.

B. Based upon this new information, I argue that the goal post is constantly moving with ISP. Fasken and the Permian Basin Coalition have repeatedly asserted that cross-formational groundwater exists between the Ogallala and the Antler Formations and these two aquifers are situated beneath and all around the ISP CISF. As such, the application documents and the ISP DEIS are erroneous and fail to analyze the potential for radiological and other environmental impacts based on the siting of a CISF above multiple, cross-connected aquifers.

2. ISP's response to RAI WR-11 is grounded in generalizations and is flawed.

A. In RAI WR-11, NRC Staff request that ISP identify the shallowest groundwater located beneath the proposed CISF footprint by name and depth below the CISF land surface, whether in the Antlers, Ogallala, Gatuna, or Cooper Canyon Formation. Further, Staff request that ISP name specific aquifers in the Dockum Group in the future and avoid "use of the lumped term 'Dockum Aquifer'" as it does not clearly denote the site-specific aquifer that is being referenced at the proposed CISF. Staff also instructs that near-surface groundwater formations be referred to by name. This request is made by Staff in

accordance with 10 CFR 51.45(b) and (b)(1), which require that the Environmental Report include a description of the affected environment and an assessment of environmental impacts.

B. In response, ISP downplays the presence of groundwater and utilizes generalizations where factual based evidence is required. When identifying the "shallowest groundwater located beneath the proposed CISF footprint by name and depth below the CISF land surface," the response is nonresponsive. ISP answers, "The shallowest groundwater beneath the proposed CISF footprint is a few inches to a few feet of saturation in the undifferentiated Antlers/Ogallala sediments starting at the northern fence line of the Protected Area boundary in the northeast corner." They go on to cite their joint venture member, Waste Control Specialists (WCS), as their reference source.

C. In the instant matter, it is critical to avoid broad generalizations and, instead, rely upon evidence-based practice. It is also critical to rely upon scientific-based evidence that is substantiated. To cite WCS without the support of objective, admissible evidence or even so much as an affidavit is not in compliance with the clear standards of the industry.

D. The low-quality response to RAI WR-11 presents new information regarding the presence of groundwater "a few inches" beneath the CISF footprint. This admission contradicts ISP's previous ERs which fail to differentiate between water beneath WCS versus beneath the CISF. Instead, previous ERs simply state that the shallowest water bearing zone is about 225 feet deep at the WCS CISF. (WCS Consolidated Interim Storage Facility Safety Analysis Report. Rev. 2)

3. In responding to RAI-WR-5, ISP discusses potable water from 13 windmills (including the Letter B Ranch well) but does not discuss the groundwater wells located within a 10 km radius of the WCS site.

A. WCS conducted a water well search in 2007 using Banks Environmental Data Inc. The search identified 174 water wells drilled within a 10 km radius of the WCS landfill site (Table 3-1, Banks Survey). Approximately 20 of these water wells are at or near the WCS site (Figure 6-1). Most of these wells are open to formations less than 200' deep, which indicates groundwater production is from the OAG aquifer unit. Water usage is for domestic, stock, irrigation, and commercial purposes (Table 3-1). These data clearly show that there is groundwater present within the CISF footprint. Table 3-1 and Figure 6-1 are within the Attachment WR-5-2.

4. ISP's response to RAI WR-3 indicates that ISP has selectivity ignored or omitted groundwater data.

A. In their response to RAI WR-3, ISP discusses geochemical data from well TP-14 compared to water sampled from Baker Spring. ISP does not discuss the aquifer source of the water sample collected from TP-14, nor does ISP disclose the sampling location. ISP failed to collect groundwater samples and fails to provide geochemical data from all wells containing groundwater, especially wells containing groundwater that are located on the CISF, particularly PZ-47 and PZ-57.

5. ISP's response to RAI WR-2 provides new details regarding playas.

A. ISP's response to RAI WR-2 acknowledges the presence of playas and reports that existing playas may be as much as "a few feet deep" and as large as a "few acres" in size. Although this generalization lacks the specificity called for in this type of licensing proceeding, this admission as to the size and depth of the playas is new information, which gives rise to a new contention.

B. In responding to the RAI WR-2's request for additional detail on the surface water environment at and near the proposed CISF, ISP reports that there are localized wetland features such as playas and man-made excavations identified by the U.S. Fish and Wildlife Service (USFSW) at the surface of the WCS facility. ISP's admission that playas are present is not new information, however, the newly described size and depth of the playas presents new information that gives rise to a contention that the playas pose a possible contamination source for groundwater beneath the site. As stated in their Consolidated Interim Storage Facility Safety Analysis Report, Rev. 0 (2-18), "The primary sources of recharge to the Ogallala aquifer are playas." (WCS citing Blandford et al., (2003)[2-3]. ISP continually fails to recognize that playas are a direct connection to groundwater and nexus for contamination from the surface to groundwater beneath their site.

C. Additionally, according to Texas Parks and Wildlife, playas serve as what has been described as the most important wetland habitat type for waterfowl. Failure to provide an objective, scientific study regarding migratory birds, butterflies and pollinators is poor conservation practice and gives rise to this contention that ISP has failed to provide adequate information regarding a conservation practice to demonstrate that they are engaged in managing and conserving playas that are a critical source of water for wildlife.

II. ISP'S RESPONSE TO RAIs PRESENTS A SIGNIFICAT ENVIRONMENTAL ISSUE

1. ISP's new description of groundwater depth and presence creates a plausible contamination scenario.

A. According to Section 4.4 of ISP's ER, cask storage pads located at the CISF are "potential source[s] of low-level radioactivity that could enter runoff" throughout the operation of the CISF. ISP claims that the potential levels of radioactivity in rainwater runoff due to surface contamination of the dry casks would be "well below" the effluent discharge limits. ER Section 4.4 reasons that "the potential for negative impacts on surface water resources is very low due to lack of water presence and *formidable natural barriers to any surface or subsurface water occurrences.*" As it is now abundantly clear, the "formidable natural barriers" of the red bed clays no longer provide cover for the groundwater located "within

inches" of the CISF's surface. ISP's claim regarding potential levels of radioactivity in runoff is based on its erroneous description as to the presence and depth of groundwater. ISP must reevaluate the potential for groundwater contamination based on accurate, fact-based, present-day findings regarding groundwater. To do otherwise, poses a significant threat to the environment.

i. Casks: Chloride-induced stress corrosion cracking (CI-SCC)

Currently, Dry Storage Casks (DSCs) cannot be inspected once they are placed within their storage systems. The WCS/ISP facility is located within 26,000 square miles of the Salado Salt Formation that is replete with surface salt lakes and salt formation outcrops that critically contain magnesium chloride salts ($MgCl_2$) that are the most reactive salt species for the induction and propagation of Chloride induced stress corrosion cracking (CISCC). The proposed CISF location is increasingly experiencing the "haboob" sandstorm phenomena that translocate tons of surface sediments for tens of miles. The historical paths of haboobs have included sweeping storms across the Salado surface salt flats in eastern New Mexico and West Texas.

Additionally, persistent fog and mist conditions are prevalent during the fall and winter in this region of the country. When combined, a single "salt deposition" event from a haboob, along with a sufficient amount of fog/mist event, could easily create the conditions that would initiate CISCC.

In the U.S. NRC draft report, "Identification and Prioritization of the Technical Information Needs Affecting Potential Regulation of Extended Storage and Transportation of Spent Nuclear Fuel," the federal government recognizes the potential risk for monitoring dry casks and the "pitting and crevice corrosion" of the stainless steel canisters, which affect the safety functions of confinement, criticality, retrievability (of fuel from the dry storage canister), shielding (of radiation from people and the environment), and thermal (degradation of the fuel, potentially leading to fuel fires).

Further, the potential for stress corrosion cracking of welded stainless steel interim storage containers for spent nuclear fuel (SNF) has been identified as a high priority data gap by the Nuclear Waste Technical Review Board (NWTRB), the Electric Power Research Institute (EPRI), the Department of Energy (DOE) Fuel Cycle Research and Development (FCRD) programs and Used Fuel Disposition (UFD) campaign (Hanson et al, 2012) and the Nuclear Regulatory Commission (NRC 2012a; 2012b).
Little has been done to assess canister material properties and their impact on corrosion, especially localized corrosion.

In response to the numerous ways in which CISCC can occur and which are raised in this affidavit, WCS/ISP will likely argue that CISCC is an impossibility, or they may go so far as to claim that research is underway to increase understanding of the CISCC mechanism and to develop techniques for detecting CISCC in SNF canisters. However, a better understanding of the vulnerability of the canisters does not equate to a solution and is discordant to a continually progressing license application. Simply put, the SNF canister system which is meant to confine radioactive material is not proven to resist CISCC and is not, therefore, guaranteed to confine radioactive material.

ii. Mitigating Controls upon a Release / Containment monitoring

WCS/ISP has no way of inspecting the canisters once installed in the CISF. Currently, WCS/ISP has no plans to monitor the dry storage casks but only to perform occasional "leak tests of the accessible surfaces of the DSCs." Additionally, WCS/ISP has no plans to monitor either DSC temperatures or airborne effluents that could emerge from a breached DSC. Once there is a breach, there is no way to repair a DSC or stop a DSC from leaking without first contaminating the facility and the environment. Without proven monitoring or inspection capabilities that i) are proactive in monitoring the entire DSC and not only occasionally and not only that small exposed portion of the partially buried DSC; ii) recognize areas of corrosion or vulnerability; and iii) have the capacity to properly repair susceptible DSCs, then it is impossible to argue that a significant environmental threat is not likely to occur.

III. HAD ISP'S RESPONSE TO RAIs BEEN CONSIDERED INTIALLY, CONTENTION FOUR WOULD HAVE LIKELY BEEN ADMITTED

1. ISP has failed to provide accurate information describing the environment.

A. NRC Regulation 10 CFR 51.45(b)(1) requires an applicant's ER to "contain a description of the…environment affected, and discuss…the impact of the proposed action on the environment." ISP has failed to satisfy this requirement. While ISP may have now provided a more accurate description of existing groundwater, the ER's analysis of the impact on the environment is based on older, erroneous descriptions. Without an accurate description of the affected environment, a proper impact analysis cannot be made. All safety and environmental reports, data, and analysis based on ISP's faulty descriptions of the environment, before the response to the RAIs had been made, should be criticized until ISP reevaluates the impact that the site will have based on the new descriptions provided in the response to RAIs.

B. Until ISP reevaluates the impacts to groundwater, the site will continue to pose a serious contamination risk to the groundwater, and ISP will fail to satisfy the burden of 10 C.F.R. § 51.45(b)(1) to discuss the impact of the proposed action on the environment.
C. Because ISP cannot satisfy its burden based on 10 C.F.R. § 51.45(b)(1) to discuss the impact on the newly described environment, amended Contention Four should likely be admitted.

ISP has stated that there is no risk of groundwater contamination. However it appears that ISP has not evaluated all of the chemical properties of the radiological products that will be stored in the dry casks. One of the primary daughter products of fission inside of a nuclear reactor is cesium (also spelled caesium) 137 with a half-life of 30.2 years. Cesium-137 is the primary contaminant of concern in the well known Chernobyl Exclusion Zone that was created after the 1986 nuclear reactor accident in the Ukraine. Cesium 137 is also widely found across most European countries as a result of the Chernobyl accident. Notably, cesium-137 has been detected in the food chain of wild game where all animals that are harvested (usually boar and reindeer) are required to be tested for radiation that resulted from Chernobyl. As a result of the cesium, the Chernobyl Exclusion zone will have to remain about the year 2,107.
According to the Agency for Toxic Substances and Disease Registry, cesium is the most reactive of the alkali metals and has a melting point of 83.1 degrees F. Cesium will readily combine with inorganics such as chloride or carbonate (both readily available in western Texas). With water, it creates cesium hydroxide which is the strongest base known to science. Cesium chloride is soluble in water at 1.87 kg/L, cesium carbonate at 2.1 kg/L, and cesium hydroxide at 4 kg/L. For perspective, sodium chloride is soluble in water at .36 kg/L according to the CRC Handbook of Chemistry and Physics (92nd ed). Cesium-137 has the ability to spread widely and rapidly into the environment once released. Cesium chloride and cesium carbonate are fine white solids that will transport quickly and easily with a small amount of wind. ISP has questioned how contamination might occur in the event that a dry cask might leak or rupture. However cesium compounds are easily transported by the wind and have high water solubility. Any cask breach or other accidental release would allow cesium to rapidly spread downwind (the wind always blows in west Texas). Once deposited onto a ground surface after wind transport, the cesium will dissolve into water with the first available precipitation event and begin infiltrating into the local water table where the cesium has fallen. Combined with the risk of cask breach by chloride induced stress corrosion cracking, ISP cannot be allowed to store the waste in west Texas.

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