

**THE STATE OF SOUTH CAROLINA
In The Supreme Court**

Sierra Club, Respondent,

v.

South Carolina Department of Health and Environmental
Control and Chem-Nuclear Systems, LLC, Defendants,

of whom Chem-Nuclear Systems, LLC, is Petitioner,

and South Carolina Department of Health and
Environmental Control is Respondent.

Appellate Case No. 2015-001915

ON WRIT OF CERTIORARI TO THE COURT OF APPEALS

Appeal from the Administrative Law Court
Ralph King Anderson III, Administrative Law Judge

Opinion No. 27871
Heard April 18, 2018 – Filed March 27, 2019

**AFFIRMED AS MODIFIED IN PART, REVERSED
IN PART, AND REMANDED**

Stephen P. Groves, Sr., Mary D. Shahid and Sara S.
Rogers, all of Nexsen Pruet, of Charleston, for Petitioner.

Amy E. Armstrong, of South Carolina Environmental Law Project, of Pawleys Island, Robert Guild, of Columbia, Special Counsel Claire H. Prince and Chief Deputy General Counsel Jacquelyn Sue Dickman, both of Columbia, for Respondents.

JUSTICE JAMES: This matter stems from the administrative law court's (ALC) decision to uphold the South Carolina Department of Health and Environmental Control's (DHEC) renewal of the license under which Chem-Nuclear Systems, LLC (Chem-Nuclear) operates a disposal facility for low-level radioactive waste. Sierra Club appealed the ALC's decision, and the court of appeals affirmed the ALC as to all issues, except as to four subsections of the regulation governing DHEC's issuance and renewal of such licenses. *Sierra Club v. S.C. Dep't of Health & Env'tl. Control*, 414 S.C. 581, 779 S.E.2d 805 (Ct. App. 2015). We granted Chem-Nuclear's petition for a writ of certiorari to review the court of appeals' decision. Although DHEC did not file a petition for a writ of certiorari, DHEC submitted a respondent's brief in the matter agreeing with Chem-Nuclear's arguments and expanding on certain issues raised by Chem-Nuclear. We affirm as modified in part and reverse in part the court of appeals. We remand this matter to DHEC for further proceedings consistent with this opinion.

I. FACTUAL AND PROCEDURAL BACKGROUND¹

Chem-Nuclear operates a low-level radioactive waste disposal facility in Barnwell County, South Carolina. The facility is located on approximately 235 acres of property owned by the State and leased to Chem-Nuclear. Chem-Nuclear began its disposal operations in 1971 and has been the sole operator of the Barnwell facility since. Chem-Nuclear's license and operations are overseen by DHEC. Throughout the years, Chem-Nuclear's operating license has been amended and renewed multiple times. The numerous amendments reflect improvements made in the disposal methods and operations of the facility. Early disposal practices, although acceptable at the time, were less than ideal, and Chem-Nuclear and DHEC have since been working together to improve disposal practices.

In 2000, the General Assembly enacted the Atlantic Interstate Low-Level Radioactive Waste Compact Implementation Act (the Compact Act). *See* S.C. Code Ann. §§ 48-46-10 to -90 (2008 & Supp. 2018). Through this legislation, South

¹ Our recitation of the facts is limited to the ALC's factual findings in its 2005 order.

Carolina joined the Atlantic Low-Level Radioactive Waste Compact (the Compact) with Connecticut and New Jersey. *See* § 48-46-30(3). The Barnwell facility was designated the regional waste disposal facility of low-level radioactive waste for the Compact. *See* § 48-46-40. The Compact Act mandated decreasing limits for the amount of waste to be disposed of at the Barnwell facility from 2001-2008. *See* § 48-46-40(A)(6)(a). After fiscal year 2008, the Barnwell facility could not accept any out-of-Compact waste, and the amount of waste that has been since disposed at the facility has been substantially reduced. *See id.*

A. Summary of Chem-Nuclear's Low-Level Radioactive Waste Disposal Practices

Chem-Nuclear disposes low-level radioactive waste at the facility using a method described as "enhanced shallow land burial with engineered barriers." Engineered barriers are man-made structures designed to improve the facility's ability to meet certain objectives. The primary engineered barriers implemented by Chem-Nuclear include disposal trenches, disposal vaults, and enhanced caps.

Waste is shipped from outside sources into Chem-Nuclear's facility in disposal containers. Depending upon the type of shipment and waste classification, the transport vehicle will be directed to either the Cask Maintenance Building for further inspection or to the appropriate trench for disposal. At the appropriate trench, containers are unloaded and placed into concrete disposal vaults. Chem-Nuclear continues to inspect the containers as they are unloaded and placed into the vaults. Larger components—including steam generators and pressurizers—need not be stored in concrete vaults and are disposed of directly into a trench following DHEC's approval.

Chem-Nuclear uses three engineered trench designs to separate waste by dose rates external to the waste packages. Each trench design has a drainage system to assist in the monitoring of water infiltration entering the trench. The bottoms of the trenches are lined with clay sand or sandy clay that is designed to be permeable to allow liquids to infiltrate the soil below the trenches. None of the trench designs at the facility have an impermeable liner or a leachate collection system.² Chem-Nuclear implements a surface water management plan to manage precipitation

² Leachate is defined as "any liquid, including any suspended or dissolved components in the liquid, that has percolated through or drained from the [radioactive] material." 10 C.F.R. Pt. 40, App. A (2018).

collected in its trenches, which consists of pumping water into either adjacent trenches or a lined pond.

The concrete disposal vaults provide structural stability. By design, the concrete vaults are not sealed against water intrusion. The floors of the vaults have holes to permit water to drain from the vaults into the trench, and the lids of the vaults are not grouted or otherwise sealed to keep water from entering the vault. In the past, the holes in the floor of the vaults have allowed water that has collected in the trenches to rise up into the vault.

Disposal vaults and trenches are "active" when they are in the process of being filled. Vaults are active until they are filled to capacity with disposal containers; trenches are active until they are filled to capacity with vaults and other large components. When a vault becomes full, Chem-Nuclear covers the vault with "general cover soils and an initial clay cap," reducing the infiltration of surface water into the trench. When a trench becomes full, Chem-Nuclear installs a multi-layer enhanced cap over the "inactive" trench; the enhanced cap consists of an initial clay cap, polyethylene and bentonite, a sand drain layer, and general soil materials for vegetation growth. When Chem-Nuclear is filling a vault, the active vault has no cover or roof, permitting rain to fall directly into the vault during the loading period. The Barnwell facility receives an average of forty-seven inches of rain annually. The enhanced cap is not installed until a trench is completely filled—a process that can sometimes take almost two years. DHEC inspections have revealed rainwater collecting in the open trenches. Water that comes in contact with the disposed materials eventually percolates into the soil and drives the groundwater movement that carries radioactive materials, such as tritium, out of the facility.

Chem-Nuclear first discovered tritium in its trenches in 1974. Tritium is a radioactive isotope of hydrogen and is contained in the low-level radioactive waste disposed of at the Barnwell facility. Hydrogen is a key element in water, and tritium exchanges with hydrogen in water—causing this radioactive isotope to migrate with water and groundwater. Tritium is driven into the groundwater by precipitation falling in and on the disposed materials. DHEC and Chem-Nuclear have been working together to reduce the amount of tritium migrating into the groundwater at the facility. Tritium migration from the trenches is referred to as the "tritium plume."

Chem-Nuclear has installed an extensive system of groundwater monitoring wells in and around the disposal areas at the facility. The groundwater from the facility rises to the surface and enters an above-ground stream known as Mary's Branch Creek. This stream is located outside the boundary of the property owned

by the State and is on property owned and controlled by Chem-Nuclear. Chem-Nuclear has taken steps to protect the public from exposure to radiation at Mary's Branch Creek. For example, the general public is restricted from access to the waters of Mary's Branch Creek—the area is secured by a fence and is heavily vegetated. Chem-Nuclear regularly samples and tests the waters of Mary's Branch Creek.

Because Mary's Branch Creek is the first point where a hypothetical member of the public could receive a dose of radiation, DHEC has approved this point as Chem-Nuclear's regulatory compliance point. Although high concentrations of tritium have been discovered in groundwater samples elsewhere on Chem-Nuclear's property, samples taken at the compliance point have been well-below the regulatory limit for exposure. After comparing data regarding tritium levels to rainfall data as gauged by water level tables, it appears tritium concentrations may fluctuate with the amount of rainfall and may not necessarily vary as a result of new storage methods at the facility.

B. Current Controversy

Chem-Nuclear's facility is licensed and overseen by DHEC pursuant to South Carolina's status as an "Agreement State" with the Nuclear Regulatory Commission (NRC) under the United States Atomic Energy Act of 1954. *See* 42 U.S.C. § 2021 (2005). South Carolina became an Agreement State in 1969 after enacting the Atomic Energy and Radiation Control Act and promulgating the necessary regulations governing the disposal and handling of radioactive waste. *See* S.C. Code Ann. §§ 13-7-10 to -100 (2017); S.C. Code Ann. Regs. 61-63 (2011 & Supp. 2018). In designing, building, and operating the facility, Chem-Nuclear is required to comply with these regulations. The breadth and complexity of the applicable regulations are a given because of the nature of the materials being permanently disposed into the ground at the Barnwell facility.

In 2000, Chem-Nuclear timely submitted its application for the renewal of its operating license to DHEC. After reviewing Chem-Nuclear's application, DHEC imposed additional requirements on Chem-Nuclear outside of the regulations. These requirements included a comprehensive assessment of site performance (the Environmental Radiological Performance Verification (ERPV)) and a review of Chem-Nuclear's methodologies and conclusions in a predictive site assessment by a "Blue Ribbon" panel of experts appointed by DHEC. Following public hearing and comment, DHEC renewed Chem-Nuclear's license in 2004.

Sierra Club requested a contested case hearing before the ALC to challenge the renewal. Sierra Club argued Chem-Nuclear's current practices for waste disposal at the Barnwell facility did not meet the regulatory requirements. Specifically, Sierra Club contended Chem-Nuclear's current disposal methods did not adequately prevent the migration of radioactive particles from the site into the groundwater and other waters surrounding the property. DHEC and Chem-Nuclear maintained the disposal methods were sufficient under the regulatory requirements.

In 2005, the ALC affirmed DHEC's decision to renew Chem-Nuclear's license, concluding Sierra Club did not present sufficient evidence to warrant reversal of DHEC's renewal of the operating license. However, the ALC found Sierra Club raised legitimate issues and presented evidence suggesting additional studies were needed to investigate the scientific and economic feasibility of employing or implementing designs and operational procedures at the facility that would: (1) shelter the disposal trenches from rainfall and prevent rainfall from entering the trenches; (2) provide temporary dry storage facilities for the storage of waste received during wet conditions; and (3) provide for sealing and grouting the concrete disposal vaults to prevent the intrusion of water to the maximum extent feasible. In order to address these concerns, the ALC ordered Chem-Nuclear to conduct the above-mentioned studies and submit the results to DHEC within 180 days.³

Sierra Club appealed, and the court of appeals affirmed in part and remanded in part. *Sierra Club v. S.C. Dep't of Health & Env'tl. Control*, 387 S.C. 424, 693 S.E.2d 13 (Ct. App. 2010), *cert. denied*, S.C. Sup. Ct. Order dated July 21, 2011, (hereinafter, *Chem-Nuclear I*). The court of appeals affirmed the ALC's findings related to section 7.18 and subsections 7.10.1 through 7.10.4 of Regulation 61-63. *Id.* at 439, 693 S.E.2d at 20-21. However, the court of appeals held a remand was appropriate because the ALC failed to consider whether Chem-Nuclear's disposal practices were in compliance with sections 7.11, 7.23.6, and 7.10.5 through 7.10.10 of Regulation 61-63. *Id.* at 439, 693 S.E.2d at 20. Relevant to the matter before us, the court of appeals found section 7.11 "imposes additional compliance requirements

³ Noting the "undeniable rainfall problem," the ALC explained Chem-Nuclear had previously considered conceptual designs to keep rainfall out of the trenches, but Chem-Nuclear never submitted a report to DHEC—despite DHEC's request for a report in 2001.

for Chem-Nuclear such that the balancing test of ALARA⁴ would not be sufficient to address whether Chem-Nuclear is in compliance with section 7.11." *Id.* at 435, 693 S.E.2d at 19. Importantly, in remanding the matter, the court of appeals instructed the ALC to apply the factual findings set forth in the ALC's 2005 order when addressing these unaddressed sections of Regulation 61-63. *Id.* at 439, 693 S.E.2d at 20. In effect, this requirement eliminated the ALC's ability to consider not only the study it mandated in its 2005 order, which Chem-Nuclear states it prepared and presented to DHEC, but also any improvements that have been made to the facility since the 2005 order.

Upon remand in 2012, the ALC applied the factual findings from its 2005 order and issued a new order affirming DHEC's conclusion that Chem-Nuclear complied with the relevant sections of the regulation. Sierra Club appealed the ALC's 2012 remand order, and the court of appeals affirmed in part⁵ and reversed in part, finding Chem-Nuclear had not complied with the following four subsections of Regulation 61-63: 7.11.11.1, 7.11.11.2, 7.11.11.4, and 7.10.7. *Sierra Club v. S.C. Dep't of Health & Env'tl. Control*, 414 S.C. 581, 779 S.E.2d 805 (Ct. App. 2015) (hereinafter, *Chem-Nuclear II*). The court of appeals acknowledged the difficulty the restricted record imposed by *Chem-Nuclear I* had on Chem-Nuclear's ability to demonstrate recent compliance with certain regulations. *Id.* at 622, 779 S.E.2d at 826. The court of appeals provided that on remand, "DHEC shall consider all available information as to whether Chem-Nuclear has complied with the regulations." *Id.* We granted Chem-Nuclear's petition for a writ of certiorari to address several issues regarding the court of appeals' decision.

⁴ ALARA is an acronym for "as low as is reasonably achievable" and, as used in the regulation governing radioactive materials, means "making every reasonable effort to maintain exposures to radiation as far below the dose limits [provided by regulation] . . . as is practical." S.C. Code Ann. Regs. 61-63 § 3.2.6 (2011). The ALARA standard takes into account the "state of technology, the economics of improvements in relation to state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, and in relation to utilization of nuclear energy and licensed materials in the public interest." *Id.*

⁵ The court of appeals affirmed the ALC as to Chem-Nuclear's compliance with other subsections of Regulation 61-63. None of the parties challenge this portion of the court of appeals' decision.

II. STANDARD OF REVIEW

When the court of appeals remanded the matter to the ALC in *Chem-Nuclear I*, the court of appeals instructed the ALC to apply the ALC's factual findings from the ALC's 2005 order to applicable sections of the regulation. Therefore, we accept the factual findings in the ALC's 2005 order. We review the ALC's 2012 order after remand under the standard of review provided in subsection 1-23-610(B)(d) of the South Carolina Code (Supp. 2018), and may reverse only if the ALC's decision constituted an error of law. See § 1-23-610(B)(d) (providing an appellate court may reverse the ALC's decision when it is affected by an error of law); *S.C. Dep't of Revenue v. Blue Moon of Newberry, Inc.*, 397 S.C. 256, 260, 725 S.E.2d 480, 483 (2012) ("The construction of a regulation is a question of law to be determined by the court. We will correct the decision of the ALC if it is affected by an error of law, and questions of law are reviewed de novo." (internal quotation marks and citations omitted)).

III. DISCUSSION

A. Chem-Nuclear's Compliance with Part VII of Regulation 61-63

In designing, building, and operating its Barnwell facility, Chem-Nuclear must adhere to all procedural requirements, performance objectives, and technical requirements found in Part VII of Regulation 61-63. Part VII, entitled "Licensing Requirements for Land Disposal of Radioactive Waste," sets forth the "procedures, criteria, and terms and conditions upon which [DHEC] issues licenses for the land disposal of wastes received from other persons." S.C. Code Ann. Regs. 61-63 § 7.1.1 (2011). "The requirements of this part are in addition to, and not in substitution for, other applicable requirements of these regulations." *Id.* Part VII "establishes procedural requirements and performance objectives applicable to any method of land disposal. It [also] establishes specific technical requirements for near-surface disposal of radioactive waste which involves disposal in the uppermost portion of the earth." S.C. Code Ann. Regs. 61-63 § 7.1.3 (2011).

Of course, Chem-Nuclear's appeal to this Court focuses on the court of appeals' conclusion that it was not in compliance with certain technical requirements enumerated in Part VII. In pertinent part, subsection 7.11.11 of the South Carolina Code of State Regulations (2011) provides:

The disposal units and the incorporated engineered barriers shall be designed and constructed to meet the following objectives:

7.11.11.1 to minimize the migration of water onto the disposal units.

7.11.11.2 to minimize the migration of waste or waste contaminated water out of the disposal units.

7.11.11.4 temporary collection and retention of water and other liquids for a time sufficient to allow for the detection and removal or other remedial measures without the contamination of groundwater or the surrounding soil.

Subsection 7.10.7 requires DHEC to find Chem-Nuclear "provides reasonable assurance that the applicable technical requirements of [Part VII] will be met." S.C. Code Ann. Regs. 61-63 § 7.10.7 (2011). The court of appeals concluded Chem-Nuclear's compliance with subsection 7.11.11 as a whole could not be measured solely by results and that consideration must be given as to "whether Chem-Nuclear took any actions to meet the technical requirements imposed by these subsections, and if so, the sufficiency of Chem-Nuclear's actions." *Chem-Nuclear II*, 414 S.C. at 600, 779 S.E.2d at 815.

As to subsection 7.11.11.1, the court of appeals found Chem-Nuclear had not satisfied the technical requirement of designing and constructing its disposal units and engineered barriers "to minimize the migration of water onto the disposal units." *Id.* at 606, 779 S.E.2d at 818. Regulation 61-63 does not define "minimize." In their joint brief to the court of appeals, Chem-Nuclear and DHEC presented a definition of minimize: "to reduce to the smallest possible amount, extent, size, or degree." The court of appeals accepted this definition, as do we. The court of appeals interpreted the "migration of water" to include both surface water and rainfall. *Id.* at 601, 779 S.E.2d at 815. During oral argument at the court of appeals, DHEC conceded this point. The court of appeals found the record demonstrated Chem-Nuclear had not taken any action "to prevent even one raindrop from migrating onto one active vault or trench." *Id.* at 606, 779 S.E.2d at 818. The court of appeals also found that "while initial clay caps and enhanced caps reduce the migration of water onto inactive disposal units, there is no evidence and no finding by the ALC that DHEC has required, or that Chem-Nuclear has taken, any action that would reduce this migration to the smallest possible amount." *Id.*

As to subsection 7.11.11.2, the court of appeals found Chem-Nuclear had not satisfied the technical requirement of designing and constructing its disposal units

and engineered barriers "to minimize the migration of . . . waste contaminated water out of the disposal units."⁶ *Id.* at 610, 779 S.E.2d at 820. The court of appeals acknowledged Chem-Nuclear had taken steps to *reduce* the migration of waste-contaminated water out of disposal units; however, the court of appeals noted the record failed to support a finding that Chem-Nuclear wholly complied with subsection 7.11.11.2. *Id.* The court of appeals based its holding on "(1) Chem-Nuclear's failure to comply with subsection 7.11.11.1, and (2) there being no evidence, and no finding, that Chem-Nuclear has taken action to 'minimize'—reduce to the smallest amount possible—the migration of waste-contaminated water out of disposal units." *Id.* at 610-11, 779 S.E.2d at 820.

As to subsection 7.11.11.4, the court of appeals similarly found noncompliance. *Id.* at 613, 779 S.E.2d at 821-22. The court of appeals concluded this subsection requires Chem-Nuclear to: "(1) collect and retain water that migrates onto the disposal units, (2) test this water for radioactive waste material, (3) if such waste material is discovered, engage in removal or remedial measures, and (4) accomplish this without contaminating the groundwater or surrounding soil." *Id.* at 611, 779 S.E.2d at 820. The court of appeals acknowledged Chem-Nuclear follows a surface water management plan; however, the court of appeals found there was no evidence in the record that Chem-Nuclear ever tested the water pumped from the trenches for radioactive waste material. *Id.* The court of appeals noted the 2005 ALC order found there was no leachate collection system, and the court of appeals explained such a system would allow Chem-Nuclear to satisfy all of the requirements of subsection 7.11.11.4. *Id.* at 612-13, 779 S.E.2d at 821.

The court of appeals also found Chem-Nuclear had not complied with subsection 7.10.7. *Id.* at 622, 779 S.E.2d at 826. Subsection 7.10.7 provides as a condition for issuance of a license that the applicant provide "reasonable assurance that the applicable technical requirements of [Part VII]" were met. This finding by the court of appeals was based on its conclusion that Chem-Nuclear had not demonstrated compliance with the "technical requirements" of subsections 7.11.11.1, 7.11.11.2, and 7.11.11.4. *Chem-Nuclear II*, 414 S.C. at 617, 779 S.E.2d at 823.

1. Subsection 7.10.7

⁶ The court of appeals agreed with the ALC's determination that Chem-Nuclear minimized the migration of radioactive *waste-forms* out of the disposal units. *Id.* at 607, 779 S.E.2d at 818.

Again, subsection 7.10.7 provides as a condition for issuance of a license that the applicant provide "reasonable assurance that the applicable technical requirements of [Part VII]" were met. Chem-Nuclear argues the court of appeals incorrectly concluded section 7.11 sets forth mandatory "technical requirements" for compliance. Chem-Nuclear claims this conclusion alters *Chem-Nuclear's* designation of section 7.11's requirements as "compliance requirements." Chem-Nuclear argues, "In concluding [section] 7.11 imposed 'technical requirements' instead of just 'compliance requirements,' the [c]ourt of [a]ppeals determined these 'newly discovered' requirements necessitated specific action by Chem-Nuclear."

We affirm the court of appeals' conclusion that subsections 7.11.11.1, 7.11.11.2, and 7.11.11.4 are in the category of "technical requirements" Chem-Nuclear must satisfy as a condition of its license. However, we do not interpret the court of appeals' decision to mandate any specific action Chem-Nuclear must take in order to achieve compliance with the requirements of section 7.11. To the extent the court of appeals' opinion can be interpreted to mandate certain specific actions in this case, it is modified.

2. Subsection 7.11.11.4

We reverse the court of appeals' holding that Chem-Nuclear failed to comply with subsection 7.11.11.4. Again, this subsection provides that all disposal units and engineered barriers must be designed and constructed to allow for the "temporary collection and retention of water and other liquids for a time sufficient to allow for the detection and removal or other remedial measures without the contamination of groundwater or the surrounding soil." Our focus upon this subsection is directed to the seemingly innocent use of the article "the" before the words "detection and removal." The ALC concluded this subsection requires the disposal units and engineered barriers to be designed and constructed to allow for the temporary collection of water and other liquids so as to allow for the detection and removal of water and other liquids. The court of appeals held the "plain language" of the subsection requires disposal units and engineered barriers to be designed and constructed so as to allow for the detection and removal of radioactive waste material. The sentence structure of subsection 7.11.11.4 is hardly "plain" and is awkward at best. That unclear wording necessarily begs the crucial question of exactly what must be detected and removed. Again, the ALC concluded water and other liquids must be detected and removed, but the court of appeals concluded radioactive waste material must be detected and removed.

Subsection 7.11.11.4 contains no specific reference to the detection and removal of "radioactive waste material," nor does it contain any requirement that the water and other liquids be tested at that point. The court of appeals erred in reading those requirements into the subsection. North Carolina has adopted a very similar set of technical requirements and performance objectives in its statutory scheme addressing the storage of low-level radioactive waste. *See* N.C. Gen. Stat. § 104E-25 (2017). Subsection 104E-25(f)(4) of the General Statutes of North Carolina is North Carolina's corresponding section to our subsection 7.11.11.4. In pertinent part, it provides that disposal units and engineered barriers must be designed and constructed to allow for:

(4) Temporary collection and retention of water and other liquids for a time sufficient to allow for their detection and removal or other remedial measures without contamination of groundwater or surrounding soil.

§ 104E-25(f)(4) (emphasis added). This subsection is, with the exception of the use of the word "their," essentially identical to our subsection 7.11.11.4.⁷ The North Carolina scheme's use of the word "their" confirms the purpose of its subsection 104E-25(f)(4) is to allow for the collection and retention of water and other liquids for a time sufficient to allow for the detection and removal of water and other liquids. The ALC interpreted our subsection 7.11.11.4 in this manner, and we agree with this interpretation. After so concluding, the ALC found that Chem-Nuclear employs a surface water management plan to manage precipitation collected in trenches, and water is pumped into adjacent trenches to ensure it does not come into contact with waste or disposal units. The ALC also found the water may be pumped into an adjacent lined pond. The ALC further found the trenches are designed to prevent the flow of surface water from coming into contact with waste. Thus, the ALC concluded Chem-Nuclear has established the disposal units and engineered barriers were designed and constructed in compliance with subsection 7.11.11.4. We agree and therefore reverse the court of appeals' holding as to this subsection.

3. Subsections 7.11.11.1 and 7.11.11.2

We affirm the court of appeals' decision that Chem-Nuclear failed to comply with subsections 7.11.11.1 and 7.11.11.2. We adopt the court of appeals' reasoning

⁷ Subsection 104E-25(f)(4) does not include the word "the" before the word "contamination" and the word "surrounding." However, these omissions do not affect the clarity of the subsection.

as to these two subsections. However, our affirmation of the court of appeals on this issue is not to be construed as a mandate that covers be erected over the disposal units; during proceedings to take place on remand, DHEC shall take all admissible evidence into account when addressing the question of compliance with these two subsections.

Subsection 7.11.11.1 provides that disposal units and incorporated engineered barriers must be designed and constructed to "minimize the migration of water onto the disposal units." DHEC's counsel conceded during oral argument at the court of appeals that the phrase "migration of water onto" disposal units includes rainfall. However, before this Court, DHEC joins Chem-Nuclear's position that the phrase "migration of water onto" does not include rainfall. We disagree with Chem-Nuclear and DHEC's position that subsection 7.11.11.1's reference to the "migration of water onto" includes only surface water and excludes rainfall. The regulation does not define the phrase "migration of water onto." However, based on the plain meaning of the words "water" and "onto," we find this phrase includes rainfall and other precipitation. *See Brown v. Bi-Lo, Inc.*, 354 S.C. 436, 440, 581 S.E.2d 836, 838 (2003) (providing "where . . . the plain language of the statute [or regulation] is contrary to the agency's interpretation, the Court will reject the agency's interpretation"). Water can indeed both migrate directly "onto" the disposal units from the sky as precipitation and migrate into and onto the disposal units as surface water once it hits the ground.

Chem-Nuclear and DHEC argue the court of appeals improperly interpreted the term "minimize" in subsections 7.11.11.1 and 7.11.11.2 to mean "prevent."⁸ Although we agree "minimize" does not mean "prevent," we do not agree with Chem-Nuclear and DHEC that the court of appeals' opinion requires such prevention. Nothing in the court of appeals' opinion requires the complete elimination of the migration of water and waste-contaminated water onto or out of the disposal units; in fact, the court of appeals stressed, "We do not believe our opinion can be fairly read to require Chem-Nuclear to prevent all rainfall onto the disposal units. . . Rather, the opinion is written to the requirement in subsection 7.11.11.1 that Chem-Nuclear 'minimize' rainfall." *Chem-Nuclear II*, 414 S.C. at 606 n.14, 779 S.E.2d at 818 n.14. The court of appeals simply applied the definition of "minimize" provided by Chem-Nuclear and DHEC in their joint brief before the

⁸ Subsections 7.11.11.1 and 7.11.11.2 of the South Carolina regulation mandate minimization; however, the corresponding North Carolina statutory provisions mandate prevention. *Compare* S.C. Code Ann. Regs. 61-63 § 7.11.11.1-.2 (2011) *with* N.C. Gen. Stat. § 104E-25(f)(1)-(2) (2017).

court of appeals—"to reduce to the smallest possible amount, extent, size, or degree." *Id.* at 604, 779 S.E.2d at 816. We accept this definition and reiterate that "minimize" does not mean "prevent."

4. ALARA

Chem-Nuclear also argues the court of appeals significantly enlarged its original holding in *Chem-Nuclear I*, in which the court of appeals concluded section 7.11 "imposes additional compliance requirements for Chem-Nuclear such that the balancing test of ALARA would not be sufficient to address whether Chem-Nuclear is in compliance with section 7.11." *Chem-Nuclear I*, 387 S.C. at 435, 693 S.E.2d at 19. Chem-Nuclear contends the court of appeals has abjectly rejected ALARA considerations when it considered Chem-Nuclear's disposal operations. In *Chem-Nuclear II*, when discussing the minimization requirement mandated in applicable subsections of 7.11.11, the court of appeals found there was "no inherent reasonableness or practicability consideration involved in analyzing Chem-Nuclear's compliance." *Chem-Nuclear II*, 414 S.C. at 604 n.13, 779 S.E.2d at 816 n.13. Additionally, the court of appeals stated, "In determining compliance with the technical requirements of subsection 7.11.11.4, however, we consider the actions taken by Chem-Nuclear to comply, not the reasons why it decided not to implement a certain measure based on its own ALARA analysis." *Id.* at 613 n.18, 779 S.E.2d at 821 n.18. Perhaps, such language could be interpreted to eliminate an ALARA analysis in determining what actions must be taken to comply with the technical requirements of the regulation.

We therefore modify the court of appeals' opinion insofar as these statements or any other such language in the opinion suggest ALARA is eliminated from an analysis of compliance with the technical requirements of the regulation. Although compliance with ALARA alone is insufficient (as previously held by the court of appeals in *Chem-Nuclear I*), we reject any interpretation by which ALARA is totally divorced from the technical requirements. We repeat: when determining what approach(es) Chem-Nuclear must take to achieve compliance with any given technical requirement, DHEC must take ALARA into account, but DHEC shall not rely upon ALARA as the sole basis for compliance with the technical requirement.

Chem-Nuclear's desire for our review of the court of appeals' decision is partly centered on the health and safety of its workers, and we understand this concern. Indeed, subsection 7.20, entitled "Protection of Individuals During Operations," provides in pertinent part, "Every reasonable effort should be made to maintain radiation exposures as low as is reasonably achievable." S.C. Code Ann. Regs. 61-

63 § 7.20 (2011). However, there is a parallel concern regarding the public's and the environment's exposure to radioactive waste. Subsection 7.18, entitled "Protection of the General Population from Releases of Radioactivity," provides in pertinent part, "Reasonable effort should be made to maintain releases of radioactivity in effluents to the general environment as low as is reasonably achievable." S.C. Code Ann. Regs. 61-63 § 7.18 (2011). Therefore, when reviewing Chem-Nuclear's actions to meet the requirements of the regulations, DHEC must review the technical feasibility of certain actions, weigh the consequences of requiring such actions, and evaluate such actions in the context of other applicable regulatory requirements for environmental and worker safety. Such an approach would allow for DHEC's consideration of ALARA in determining whether Chem-Nuclear has complied with the requirements of subsections 7.11.11.1 and 7.11.11.2.

Chem-Nuclear cannot rely upon its compliance with other result-based portions of the regulations to excuse noncompliance with the requirements of subsection 7.11.11. *See* S.C. Code Ann. Regs. 61-63 § 7.1.1 (2011) ("The requirements of this part are in addition to, and not in substitution for, other applicable requirements of these regulations."). However, evidence that establishes compliance with such result-based regulations may well be relevant to the issue of compliance with the requirements of subsection 7.11.11. The technical requirements in 7.11.11 must be read in conjunction with the performance objectives. The requirements of 7.11.11 are indeed designed to help meet certain performance objectives; however, the requirements in 7.11.11 are not to be ignored after performance objectives are satisfied. If mere compliance with performance objectives were sufficient to demonstrate compliance with other sections of the regulations—such as these technical requirements—then these other sections of the regulations would become unnecessary and superfluous. *See Duvall v. S.C. Budget & Control Bd.*, 377 S.C. 36, 42, 659 S.E.2d 125, 128 (2008) ("The Court must presume the Legislature intended its statutes to accomplish something and did not intend a futile act."); *State v. Sweat*, 386 S.C. 339, 351, 688 S.E.2d 569, 575 (2010) ("A statute should be so construed that no word, clause, sentence, provision or part shall be rendered surplusage, or superfluous." (quoting *In re Decker*, 322 S.C. 215, 219, 471 S.E.2d 462, 463 (1995))).

B. Deference to DHEC

Chem-Nuclear and DHEC argue that the court of appeals erred by not giving deference to DHEC's interpretations of the requirements under section 7.11 since DHEC has the technical expertise to balance the different competing considerations that the judiciary may lack. Both contend deference should have been given in

interpreting and applying the multiple, intertwined sections contained in Regulation 61-63.

"[T]he Court generally gives deference to an administrative agency's interpretation of an applicable statute or its own regulation." *Brown*, 354 S.C. at 440, 581 S.E.2d at 838. "If the statute or regulation is silent or ambiguous with respect to the specific issue, the court then must give deference to the agency's interpretation of the statute or regulation, assuming the interpretation is worthy of deference." *Kiawah Dev. Partners, II v. S.C. Dep't of Health & Envtl. Control*, 411 S.C. 16, 33, 766 S.E.2d 707, 717 (2014) (internal quotation marks and citations omitted). "Nevertheless, where . . . the plain language of the statute [or regulation] is contrary to the agency's interpretation, the Court will reject the agency's interpretation." *Brown*, 354 S.C. at 440, 581 S.E.2d at 838. Therefore, in summary, "We defer to an agency interpretation unless it is 'arbitrary, capricious, or manifestly contrary to the statute [or regulation].'" *Kiawah*, 411 S.C. at 34-35, 766 S.E.2d at 718 (quoting *Chevron, U.S.A., Inc. v. Nat. Res. Def. Council, Inc.*, 467 U.S. 837, 844 (1984)). We believe we have given due deference to DHEC's interpretation of the applicable regulations.

On a more specific point, as noted above, at oral argument before the court of appeals, DHEC conceded the phrase "migration of water onto" included rainfall. Now, DHEC urges us to adopt Chem-Nuclear's interpretation that the phrase includes only surface water. Certainly, we are not required to give deference to an agency's interpretation of a regulation when that very interpretation has changed within the same litigation. Whatever the case, we do not give deference to DHEC's current interpretation, as it runs afoul of what we conclude is the clear meaning of the phrase.

C. Burden of Proof

Chem-Nuclear and DHEC argue the court of appeals improperly shifted the burden of proof away from Sierra Club when concluding Chem-Nuclear was not in compliance with DHEC's regulations. Chem-Nuclear and DHEC assert the court of appeals shifted focus from whether Sierra Club demonstrated by a preponderance of the evidence that Chem-Nuclear failed to comply with subsections 7.11.11.1, 7.11.11.2, 7.11.11.4, and 7.10.7, to whether Chem-Nuclear had demonstrated compliance with the regulations. Chem-Nuclear and DHEC argue that by demanding a demonstration of affirmative actions by Chem-Nuclear and DHEC to show compliance with the court of appeals' interpretation of the regulations and in presuming a lack of specific findings in the ALC's 2005 record demonstrates a

failure to comply with this interpretation, the burden is impermissibly shifted to Chem-Nuclear and DHEC. We disagree.

The standard of proof in an administrative hearing of a contested case is by a preponderance of the evidence. *See* S.C. Code Ann. § 1-23-600(A)(5) (Supp. 2018) ("Unless otherwise provided by statute, the standard of proof in a contested case is by a preponderance of the evidence."). "In general, the party asserting the affirmative issue in an adjudicatory administrative proceeding has the burden of proof." *DIRECTV, Inc. & Subsidiaries v. S.C. Dep't of Revenue*, 421 S.C. 59, 78, 804 S.E.2d 633, 643 (Ct. App. 2017). Additionally, "the burden is on appellants to prove convincingly that the agency's decision is unsupported by the evidence." *Waters v. S.C. Land Res. Conservation Comm'n*, 321 S.C. 219, 226, 467 S.E.2d 913, 917 (1996).

Here, Sierra Club undoubtedly bore the burden of proof before the ALC because it was challenging DHEC's decision to renew Chem-Nuclear's operating license. Additionally, the burden remained with Sierra Club as it was the appellant before the court of appeals. With that in mind, we find the burden of proof was not improperly shifted from Sierra Club to Chem-Nuclear and DHEC during the court of appeals' review of the ALC's 2012 order.

Importantly, in *Chem-Nuclear I*, the court of appeals explicitly constrained the ALC from making any new findings of fact on remand. 387 S.C. at 438-39, 693 S.E.2d at 20. This Court denied Chem-Nuclear's petition for a writ of certiorari to review the court of appeals' decision in *Chem-Nuclear I*. Therefore, on remand, the ALC was required to apply the detailed findings of fact from its 2005 order and reach new conclusions of law regarding the unaddressed regulatory provisions. The ALC's 2012 order concluded, "[Sierra Club] has failed to carry [its] burden, as this Court finds and concludes that the factual findings in the 2005 Decision, when applied to [the regulations] demonstrate that the Barnwell Facility is compliant with these regulations and that the renewal of [Chem-Nuclear's license] was proper." In *Chem-Nuclear II*, the court of appeals also recognized its confinement to the findings of fact from the ALC's 2005 order and concluded the ALC erred in finding Chem-Nuclear's compliance with certain regulations were supported by the evidence in the record. 414 S.C. at 622, 779 S.E.2d at 826.

Before the ALC in 2005, Sierra Club presented evidence detailing the current disposal methods implemented by Chem-Nuclear and presented evidence regarding the issue of rainwater falling onto the disposal units. Sierra Club introduced evidence that the active disposal units were specifically designed to allow water to

flow into and out of them. Indeed, the ALC in 2005 recognized the "undeniable rainfall problem" based on the evidence in the record and ordered Chem-Nuclear to conduct further studies regarding ways to address the "legitimate issues" and "evidence" presented by Sierra Club.

Although Sierra Club undoubtedly bore the burden of proving its case, Chem-Nuclear nevertheless bore an overarching burden to satisfy the regulatory requirements necessary for Chem-Nuclear to earn its license. We do not read the court of appeals' conclusion that there was no evidence to show Chem-Nuclear's compliance with subsections 7.11.11.1 and 7.11.11.2 to be an impermissible shift in the burden of proof. The court of appeals applied the facts established at the hearing to the legal requirements set forth in the regulations and concluded substantial evidence did not support the ALC's findings as to subsections 7.10.7, 7.11.11.1, and 7.11.11.2.

D. Feasibility Report

Chem-Nuclear argues the court of appeals misapprehended or overlooked its compliance with the ALC's directive in its 2005 order to conduct further studies to address concerns regarding the reduction of contact between rainfall and waste. Chem-Nuclear contends that while the court of appeals acknowledged the existence of the report, it incorrectly concluded the report required it to take further affirmative action. Chem-Nuclear asserts the report's findings demonstrate it conducted an ALARA analysis and determined the benefits of certain proposed rainfall mitigation designs did not outweigh the hazards to workers that would result if the designs were implemented.

Through no fault of Chem-Nuclear, the details of the report's findings are not part of the record on appeal. *See* Rule 210(h), SCACR ("[T]he appellate court will not consider any fact which does not appear in the Record on Appeal."). Therefore, this Court will not address the impact of these findings. Throughout the procedural history of this case, Chem-Nuclear attempted—to no avail—to supplement the record on appeal with the report. We acknowledge the report's findings may have been helpful to Chem-Nuclear in making its compliance arguments; however, the court of appeals' remand instructions in *Chem-Nuclear I* were specific and limiting, and the remand instructions from the court of appeals in *Chem-Nuclear II* will now allow Chem-Nuclear to supplement the record before DHEC without any limitations. We are aware Chem-Nuclear and DHEC have continued to refine and improve disposal practices and have made technological improvements at the Barnwell facility since the ALC's 2005 factual findings. The record upon remand

will be open, and Chem-Nuclear will be able to present evidence of actions it has taken to address its compliance with 7.10.7, 7.11.11.1, and 7.11.11.2.

The ALC's 2012 order states Chem-Nuclear conducted the studies required by the 2005 ALC order and that DHEC "concurred with the report's evaluation of the issues." In *Chem-Nuclear II*, the court of appeals expressed concern regarding DHEC's failure to amend the requirements for issuance of Chem-Nuclear's license following the ALC's instructions in its 2005 order for Chem-Nuclear to evaluate these concerns and submit the report to DHEC. 414 S.C. at 621, 779 S.E.2d at 825. The court of appeals noted "the fact that DHEC did not require Chem-Nuclear to take *any* action or make *any* changes to its disposal practices casts doubt upon DHEC's decision to renew the license." *Id.* at 621, 779 S.E.2d at 826. However, the court of appeals stated "[t]he propriety of DHEC's decision to 'concur[] with the report's evaluation of these issues' *is not before this court, and we do not base our holding on the merits of that decision.*" *Id.* at 621, 779 S.E.2d at 825 (alteration in original) (emphasis added).

We likewise do not base our holding regarding Chem-Nuclear's compliance with the applicable sections of the regulations on the fact that DHEC chose not to amend the license requirements in light of the ALC's request for further studies in its 2005 order. We agree with Chem-Nuclear that the ALC's 2005 order did not mandate additional compliance requirements for Chem-Nuclear above and beyond its duty to evaluate the ALC's concerns and submit its findings to DHEC. Nevertheless, it was not reversible error for the court of appeals to comment on DHEC's decision to choose not to amend Chem-Nuclear's license based upon the ALC's 2005 request for further evaluations to be conducted.

E. The Facility's Natural Physical Attributes

Chem-Nuclear contends the specific natural physical attributes of the facility—groundwater pathways and travel time—clearly contribute positively to a reduction in the radiation and ensure site performance and compliance. Therefore, Chem-Nuclear argues the court of appeals erred by not considering the facility's natural physical attributes, analyzed under section 7.7, when concluding it was noncompliant with subsections 7.11.11.1 and 7.11.11.2. We disagree.

Section 7.7, entitled "Technical Analyses," provides "[t]he specific technical information shall also include the following analyses needed to demonstrate that the performance objectives of this part will be met." S.C. Code Ann. Regs. 61-63 § 7.7 (2011). Subsection 7.7.1 states:

Pathways analyzed in demonstrating protection of the general population from releases of radioactivity shall include air, soil, groundwater, surface water, plant uptake, and exhumation by burrowing animals. The analyses shall clearly identify and differentiate between the roles performed by the natural disposal site characteristics and design features in isolating and segregating the wastes. The analyses shall clearly demonstrate that there is reasonable assurance that the exposures to humans from the release of radioactivity will not exceed the limits set forth in 7.18.

S.C. Code Ann. Regs. 61-63 § 7.7.1 (2011).

The court of appeals did not err in failing to consider the natural attributes of the facility when concluding Chem-Nuclear was noncompliant with subsections 7.11.11.1 and 7.11.11.2. Although the natural attributes of the facility may assist in a demonstration that there is reasonable assurance the exposure to humans from the release of radioactivity from the disposed waste will not exceed the regulatory limits, it is not a factor that excuses noncompliance from the requirements of subsections 7.11.11.1 and 7.11.11.2. Importantly, the natural physical aspects of the facility are only relevant *after* water has been in contact with waste and has migrated out of the disposal units. These aspects are irrelevant to the question of whether Chem-Nuclear satisfied the provisions of 7.11.11.1 and 7.11.11.2, which require Chem-Nuclear to minimize (1) the migration of water onto the disposal units and (2) the migration of waste or waste-contaminated water out of the disposal units.

IV. CONCLUSION

We affirm the court of appeals' conclusion that Chem-Nuclear has not yet demonstrated compliance with subsections 7.10.7, 7.11.11.1, and 7.11.11.2. However, we modify the court of appeals' opinion to the extent it can be read to (1) mandate what specific actions must be taken in accomplishing the technical requirements of Part VII and (2) completely ignore the concept of ALARA when Chem-Nuclear takes direct action to satisfy the technical requirements of Part VII. As we noted above, upon remand to DHEC, there will be no limitations to the record, and Chem-Nuclear will be free to introduce any additional actions it has taken to conform to the requirements of the regulations. In the event of an appeal to the ALC, the ALC may conduct its proceedings with no limitations from this Court on the

evidence it may consider. We reverse the court of appeals' conclusion that Chem-Nuclear is noncompliant with subsection 7.11.11.4.

AFFIRMED AS MODIFIED IN PART, REVERSED IN PART, and REMANDED.

BEATTY, C.J., KITTREDGE, J., and Acting Justices Paul E. Short and D. Garrison Hill, concur.