

STATE OF SOUTH CAROLINA
IN THE COURT OF APPEALS

APPEAL FROM THE ADMINISTRATIVE LAW COURT

Ralph King Anderson, III, Administrative Law Judge

Case No. 04-ALC-07-0126-CC

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SC Court of Appeals

Sierra Club Appellant,

vs.

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

INITIAL BRIEF OF APPELLANT

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STATEMENT OF THE ISSUES

- I. **Whether the Administrative Law Judge Erred in Concluding that the Permit Issued by DHEC to Chem Nuclear Complies With the Applicable Regulations, Which Require Radioactive Waste to be “Isolated from Man’s Environment,” Despite Findings that the Design and Practices Allow Waste-Contaminated Water to Migrate Through the Bottom of the Trench Floor and Into the Groundwater?**

- II. **Whether the Administrative Law Judge Erred in Concluding that the Radioactive Waste is Being Disposed of in a Stable Manner as Required by Subsection 7.10, Despite Findings that the Design Allows Water to Enter Into and Drain From Disposal Vaults and Allows Water Contaminated with Waste to Leach from the Trenches Into the Groundwater?**

- III. **Whether the ALJ Erred in Concluding that the Renewal License Complies with Sections 7.11.11 and 7.23.6, Which Require Minimization of Contact Between Waste and Water, Minimization of Migration of Water Onto and Out of Disposal Units and the Prevention of Contact Between the Waste and Surrounding Earth, Despite Findings that the Unsealed and UngROUTED Vaults Allow Water to Enter the Vaults; the Vaults Have Holes in the Bottom to Allow Waste-Contaminated Water to Flow Out of the Vaults; and the Trenches are Designed to Allow Waste-Contaminated Water to Drain into the Groundwater?**

STATEMENT OF THE CASE

This matter arises on remand from a contested case hearing challenging the South Carolina Department of Health and Environmental Control's issuance of a renewal license to Chem Nuclear Systems, LLC, authorizing the operation of the Low Level Radioactive Waste Disposal Facility in Barnwell County.

Sierra Club filed its request for contested case hearing on March 30, 2004, pursuant to S.C. Code Ann. § 1-23-600(A) and S.C. Code Ann. § 44-1-60 before the Administrative Law Court. The Honorable John D. Geathers (at that time an Administrative Law Judge) conducted a hearing on February 16, 17, 18 and 22, 2005. On October 13, 2005, Judge Geathers issued his final order affirming the renewal license, but directing Chem-Nuclear to conduct studies concerning methods to reduce the contact between radioactive waste and rainfall and other water and the surrounding earth, and submit those studies to DHEC. Sierra Club filed a motion for reconsideration on October 24, 2005. The motion was denied on November 1, 2005.

On November 30, 2005, Sierra Club petitioned the DHEC Board for review of the decision of the ALC. The matter was expected to be heard by the DHEC Board at its July, 2006 meeting. On July 1, 2006, Act 387 of 2006 became effective, thereby amending the appeals procedures for permits and licenses issued by DHEC. The effect of the Act on this appeal was in dispute, prompting Chem-Nuclear to file a petition in the original jurisdiction of the Supreme Court. On July 23, 2007, the Supreme Court issued its opinion concluding that the DHEC Board no longer had jurisdiction to hear Sierra Club's appeal, and directing that DHEC transfer the appeal to the Court of Appeals.

The case was briefed and argued before the Court of Appeals. On March 10, 2010, the

Court of Appeals issued an opinion, affirming in part and remanding in part the ALC's Final Order and Decision. Sierra Club v. DHEC & Chem-Nuclear, 387 S.C. 424, 693 S.E.2d 13 (Ct. App. 2010; cert. denied July 21, 2011). In particular, the Court of Appeals affirmed the ALC's factual findings, but remanded the case to the ALC with instructions to apply its factual findings to the technical requirements of Sections 7.10.5-7.10.10, 7.11 and 7.23.6 of S.C. Code of Regulations 61-63. Chem-Nuclear filed a petition for certiorari, which was denied by order of the Supreme Court on July 21, 2011. The case was thereafter remitted to the ALC in accordance with the Court of Appeals' Order.

On remand the case was assigned to the Honorable Ralph King Anderson, III. The issues before the ALC were whether, under the factual findings made by Judge Geathers in 2005, the permit complied with Sections 7.11 and 7.23.6 of Regulations 61-63. The parties submitted proposed orders on May 11, 2012. On July 20, 2012, Judge Anderson issued a Final Order and Decision on Remand concluding that the renewal permit met the technical requirements of Regulation 61-63 and affirmed issuance of the permit. On August 20, 2012, Sierra Club filed its second Notice of Appeal with this Court.

Factual Background¹

Chem-Nuclear began operating a low-level radioactive nuclear waste disposal facility located approximately five miles west of the City of Barnwell, at what is called the Barnwell Facility, in 1971. It has operated continuously under License No. 097, which has been amended forty-eight times, including seven renewals. The Barnwell Facility is located on 235 acres owned

¹The parties agree that the Court of Appeal's 2010 Order required the ALC to base its legal conclusions solely on the findings contained in the 2005 Order. Therefore, the background facts are based on the undisputed findings in the ALC's 2005 Order.

by the State of South Carolina and leased to Chem-Nuclear.

The State of South Carolina and the Nuclear Regulatory Commission (“NRC”) have a formal agreement whereby the State has regulatory authority over radioactive materials in quantities not sufficient to form a critical mass. The NRC promulgated 10 C.F.R. Part 61, “Licensing Requirements for Land Disposal of Radioactive Wastes,” and South Carolina was required to adopt compatible regulations, which it did by amending Regulation 61-63.

In designing, building, and operating the Barnwell Facility, Chem-Nuclear is required to adhere to Regulation 61-63, and Part VII in particular. Thus, the renewal application had to meet these regulatory requirements.

In 2001, during review of the renewal application, DHEC advised Chem-Nuclear to “review and revise all trench construction details, plans, specifications, and procedures and revise to account for the decline in waste receipts.” (R. p. ___, ALC Order of October 13, 2005, FF # 50, citing Tr. Vol. III, p. 50). DHEC specifically asked Chem-Nuclear to consider placing temporary covers over trenches, typically kept open for active receipt of waste, in order to protect the trenches and waste contained therein from direct rainfall. (R. p. _ FF # 50). Chem-Nuclear provided some conceptual designs, but never completed evaluation of the designs and never submitted any final designs to DHEC for approval. (R. p. _ FF # 50).

The disposal technology used at the Barnwell Facility is described as “enhanced shallow land burial with engineered barriers.” The waste is brought to the facility and placed in concrete vaults, which are then placed in one of three below-grade trench designs. The purpose of the three trench designs is to segregate waste by dose rates. (R. p. _ FF # 82). In some instances, large components are qualified as “disposal vaults,” and thus they are placed directly in the

trench. (R. p. ___ FF # 98).

The primary “engineered barriers” used by Chem-Nuclear are disposal trenches, disposal vaults, and enhanced caps. (R. p. __, FF # 81). The disposal vaults provide only for structural stability to prevent subsistence. (R. p. _ FF # 70). The vaults are not sealed against water intrusion and have holes in the bottom to allow water to leave the vaults. (R. p. _ FF # ___). None of the trenches at the Chem-Nuclear site have an impermeable liner or a leachate collection system, and are in fact designed to allow water to flow into the ground beneath the trenches. (FF # 102). And the enhanced caps reduce, but do not eliminate, water intrusion into the trenches. (R. p. _ FF # 70). Not until a trench is completely filled with vaults containing waste will the enhanced cap be installed. (FF # 100). It takes years before a trench is filled and a cap is installed. (R. p. _ FF # ___).

Heavy rainfall in Barnwell County is not uncommon, and highlights the potential for ground and surface water contamination caused by the collection of rainwater in the open disposal trenches and on the radioactive waste waiting to be buried at the site. (FF # 115). Photographs taken during DHEC inspections revealed rainwater collecting in open trenches. (FF # 116).

Chem-Nuclear implemented a surface water management plan whereby it pumps rainwater collecting in its trenches into adjacent trenches or a lined pond. (FF # 117). But this system has caused tritium to migrate and cause contamination off-site in the past. In 1998 or early 1999, Chem-Nuclear pumped water from one of its trenches resulting in contamination of a neighboring property occupied by St. Paul Church. (FF # 56). Tritium contamination was discovered on the church property around March 1999. (FF # 56). The contamination resulted

from the pumping of water from Chem-Nuclear's trench 86. The pumped water ponded on the Chem-Nuclear property and then percolated through the soil and into the groundwater. (Id.). The contaminated groundwater migrated to the church property and contaminated the groundwater there. (Id.). Chem-Nuclear remediated the contamination by excavating 13,000 cubic yards of soil from the church property. (Id.).

The DHEC permit authorizes Chem-Nuclear to continue disposing of waste by placing it in concrete vaults, which are then placed in dug disposal trenches. The renewal license issued by DHEC included a few substantive changes: 1) an amendment to the waste volumes allowed into the facility; 2) an update to the list of authorized Facility users; 3) a requirement for sampling water that may be collected from waste disposal containers during inspection of the containers to verify that what is on the manifest matches what is detected in the water; 4) a requirement for an annual review of the decommissioning and long-term care funds; and 5) a requirement that Chem-Nuclear place special conditions on waste acceptance criteria, including a certification statement from a responsible individual at the company or nuclear power plant generating the waste. (FF # 23). The renewal license does not change the disposal units or practices.

STANDARD OF REVIEW

The court may reverse or modify the decision if substantial rights of the appellant have been prejudiced because the administrative findings, inferences, conclusions, or decisions are:

- (a) in violation of constitutional or statutory provisions;
- (b) in excess of the statutory authority of the agency;
- (c) made upon unlawful procedure;
- (d) affected by other error of law;

(e) clearly erroneous in view of the reliable, probative, and substantial evidence on the whole record; or

(f) arbitrary or capricious or characterized by abuse of discretion or clearly unwarranted exercise of discretion.

S.C. Code Ann. § 1-23-380.

The appellate court “will correct the decision of the ALC if it is affected by an error of law, S.C.Code Ann. § 1–23–380(5)(d) (Supp.2010), and questions of law are reviewed de novo.” S.C. Dept. of Revenue v. Blue Moon of Newberry, Inc., 397 S.C. 256, 260, 725 S.E.2d 480, 483 (2012), reh'g denied (May 4, 2012) (citing Town of Summerville v. City of N. Charleston, 378 S.C. 107, 110, 662 S.E.2d 40, 41 (2008)). When the evidence gives rise to but one reasonable inference the question becomes one of law for the courts to decide. Kinsey v. Champion Am. Service Center, 268 S.C. 177, 181, 232 S.E.2d 720, 722 (1977); Sharpe v. Case Produce Co., 329 S.C. 534, 545, 495 S.E.2d 790, 795 (Ct. App.1997) (rev'd on other grounds). Under this standard, a reviewing court may reverse or modify an agency decision based on errors of law. Turner v. S. Carolina Dept. of Health & Envtl. Control, 377 S.C. 540, 544, 661 S.E.2d 118, 120 (Ct. App. 2008).

In the instant case, there is no dispute over the evidence or the findings made by the ALC in its 2005 Order. Thus, the substantial evidence standard has no applicability, and this Court exercises de novo review to determine whether the ALC's Order is affected by an error of law.

ARGUMENT

Overview of Regulatory Program for Radioactive Waste

The South Carolina Atomic Energy and Radiation Act, S.C. Code Ann. § 13-7-10, *et seq.*,

and the South Carolina Radioactive Waste Transportation and Disposal Act, S.C. Code Ann. § 13-7-110, *et seq.* govern Chem-Nuclear's permit, as well as Regulation 61-63, which was promulgated thereunder. Regulation 61-63 provides the standards for permitting and operation of the Chem-Nuclear Facility, and Part VII specifically sets forth the standards and requirements for this land disposal facility. It bears noting that the Chem-Nuclear facility is the **only** radioactive waste disposal facility in South Carolina. As noted by the Court of Appeals in its 2010 Order, the regulations thus apply broadly and exclusively to the Chem-Nuclear renewal license. (R. p. ____).

Regulation 61-63, Part 7.2.6 defines “disposal” as “the isolation of wastes from the biosphere inhabited by man and his food chains by emplacement in a land disposal facility.” S.C. Code Ann. Regs. § 61-63, 7.2.6. The term “isolation” means “the act of isolating” or “the quality or condition of being isolated.” The American Heritage Dictionary of the English Language, Houghton Mifflin Co., 2000, p. 928. To “isolate” means to “set apart or cut off from others,” “to place in quarantine.” *Id.* Thus, this license approval must be viewed in the context of disposal that will ensure that wastes are isolated, separated and quarantined from man’s biosphere and food chains.

I. Implications of the 2005 ALC Order and the 2010 Court of Appeals Order

The ALC Order of October 13, 2005

Judge Geathers issued a Final Order and Decision upholding DHEC's issuance of renewal license No. 97. The Order concluded that Sierra Club failed to present sufficient evidence to warrant revocation of Chem-Nuclear's renewal license. Specifically, the ALC found that Sierra Club did not establish that Chem-Nuclear was not in compliance with sections 7.10.1, 7.10.2,

7.10.3 and 7.10.4. Section 7.10.3 requires a reasonable effort to maintain releases to the environment "as low as reasonably achievable," known as the "ALARA" standard. The ALC found that Sierra Club did not establish violation of the ALARA standard. The Order nevertheless recognized that the **"monumental hazardous conditions that can result from tritium and other radioactive materials leaching into the soils, and, in turn, into the groundwater cannot be ignored."** (R.p. ____, FF # 56) (emphasis added).

The Order concludes that Sierra Club did "raise legitimate issues and presented evidence suggesting that further studies are needed to evaluate the scientific and economic feasibility of employing or implementing designs and operational procedures at the Barnwell site that will (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." (R.p. ____, Conclusion of Law #16).

The 2010 Court of Appeals Opinion

The Court of Appeals issued its opinion on March 10, 2010, reviewing the 2005 ALC Order. The Court first noted that the ALC found, as DHEC and Chem-Nuclear argued, that only section 7.10, entitled "Requirements for Issuance of a License," applies in this contested case. 378 S.C. at 431. The Court of Appeals rejected this narrow reading of the regulations and ruled that Chem-Nuclear must be in compliance Regulation 61-62 as a whole, not just Sections 7.10.1-7.10.4 and 7.18. The ALC thus failed to address compliance with Parts 7.10.5-7.10.10, 7.11 and 7.23.6. This failure is significant, as the Court of Appeals further found that 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." 387 S.C. at 435.

The Court of Appeals notes that the "Sierra Club contends the ALC's factual findings establish that Chem-Nuclear's landfill fails to comply with section seven . . . because the landfill design fails to achieve the 'isolation of wastes from the biosphere inhabited by man and his food chains' and fails to meet the technical requirements of section 7.10 and 7.11." 387 S.C. at 435. The Court also recognized that Section 7.23.6 requires that the "disposal site shall be designed to minimize to the extent practicable the contact of water with waste during storage, the contact of standing water with waste during disposal, and the contact of percolating or standing water with wastes after disposal." *Id.* at 436. Finally, the Court of Appeals recognized that the ALC noted the rainfall problem and stated: "The problems caused by rainfall are compounded . . . and [r]ainfall that accumulates in the trenches eventually percolates into the soil, and drives the groundwater movement that is carrying tritium and other radioactive materials into Mary's Branch Creek." *Id.*

The Court of Appeals could not address compliance with the legal requirements found in Sections 7.10.5-7.10.10, 7.11 and 7.23.6 because the 2005 ALC Opinion did not address those regulatory requirements. The Court of Appeals thus remanded this case back to the ALC to apply the factual findings of the 2005 ALC Final Order & Decision to these specific regulations.

The 2005 ALC Findings of Fact Directly Relevant on Remand

The October 13, 2005 Final Order and Decision of Judge Geathers made numerous findings of fact that should have been relevant to the ALJ's conclusions on remand:

Revisions to Part VII of Regulation 61-63 were enacted to require the use of engineered

barriers for all waste classes disposed of at the Barnwell Facility. (R. p. ____, FF #9). These revisions were prompted by the DHEC Board learning of the application made by Chem-Nuclear to construct a low-level radioactive waste disposal facility in North Carolina and of the design that Chem-Nuclear incorporated into that application. (R. p. ____, FF #10). That design included above-grade bunker disposal and infiltration collection and detection systems in the floor. (R. p. ____, FF # 67). Incoming waste containers would be loaded and grouted in uniform concrete waste packages. (R. p. ____, FF # 67). A monitoring gallery for inspection was provided. The engineered earthen cover included a synthetic liner and a drainage layer as a secondary monitoring system. (R. p. ____, FF # 67).

There are a variety of low level radioactive wastes disposed of at the Barnwell facility, including tritium. Tritium is a radioactive isotope that is contained in and comes from waste disposed of at the Barnwell Facility (“the Site”). (R. p. ____, FF # 24 & 25). Tritium was initially discovered in trenches at the Barnwell Site in 1974. Precipitation in and on the disposal trenches drives tritium into the groundwater beneath the Site. (R. p. ____, FF # 26). It will take 120 years for the tritium on the Site to decay to a negligible level. (R. p. ____, FF # 28).

Tritium that has migrated from the trenches is referred to as the “tritium plume.” (R. p. ____, FF # 29). Thus far, tritium is the most significant source of radioactive material from the Site in the groundwater. (R. p. ____, FF # 35).

The groundwater on the Site encounters the surface waters and forms a stream know as Mary’s Branch Creek. Mary’s Branch is fed by springs containing groundwater migrating from the Barnwell site. (R. p. ____, FF # 40). The stream is outside the Site boundaries and has been approved by DHEC as Chem-Nuclear’s “compliance point.” (R. p. ____, FF # 32). This approval

is based on the recognition that this is the first point where a hypothetical member of the public might receive a dose of radiation. (R. p. ____, FF # 32).

Levels of tritium at the compliance point at Mary's Branch Creek have been as high as 1.1×10^5 picoCuries per liter (pCi/L). (R. p. ____, FF # 39). High concentrations of tritium in the groundwater have been detected nearest the disposal trenches. (R. p. ____, FF #53). Groundwater travel time from beneath the disposal trenches into Mary's Branch is approximately twenty years. (R. p. ____, FF # 53).

The license issued to Chem-Nuclear requires it to maintain a separation of at least five feet between the bottom of the trenches and the highest groundwater level. (FF # 55). But there have been at least two instances when the groundwater rose up into the trenches. (FF # 55).

Improvements in waste forms and containers, the use of vaults, and enhanced capping appear to have succeeded in reducing the amount of tritium that is migrating to groundwater. (R. p. ____, FF # 46). But in some areas, tritium levels have increased between 1997 and 2001. And when tritium data is compared to rainfall data as gauged by water table levels, it appears that tritium concentrations have been varying with the amount of rainfall, not necessarily as a result of new storage methods. (R. p. ____, FF # 46).

Importantly, the concrete vaults holding the radioactive waste are not sealed against water intrusion. (R. p. ____, FF # 47). The floors of the vaults have holes to allow water to drain from the vaults, and the lids of the vaults are not grouted or otherwise sealed to prevent water from entering the vault. (R. p. ____, FF # 47). The Barnwell site receives an average of 47 inches of rain annually, and the water table rises during wet periods. (R. p. ____, FF # 47). When waste is buried underground, a particularly rainy period will moisten the soil around the buried waste,

even with enhanced capping. (R. p. ____, FF # 47).

The problems caused by rainfall are compounded because when Chem-Nuclear is filling a vault, the vault has no cover or roof, so rain can fall directly into the vault during the loading period. (R. p. ____, FF # 48). Similarly, the trenches have no cover or roof. Rainfall that accumulates in the trenches eventually percolates into the soil and drives the groundwater movement that is carrying tritium and other radioactive materials into Mary's Branch Creek. (FF # 48).

Elevated tritium levels were first detected in monitoring wells at the Site between 1978 and 1982. In 1980, Chem-Nuclear predicted that if any radionuclides leaked from the landfill cells, it would take more than 424 years for those radionuclides to reach Mary's Branch Creek. (FF # 49). The actual travel time ended up being about 20 years. (FF # 49).

In recognition of water entering the vaults and then leaving the vaults and trenches carrying radioactive materials into the groundwater and ultimately to surface waters of Mary's Branch Creek, the Administrative Law Judge directed Chem-Nuclear to evaluate the use of designs and procedures that "will (1) shelter the disposal trenches from rainfall and prevent rainfall from entering the trenches, (2) provide temporary dry storage facilities for the storage of wastes 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." (Order, pp. 29-30).

II. The License Fails to Comply with Subsection 7.11.11 and 7.23.6 in that it does not minimize the migration of water onto and out of disposal units, does not minimize the contact of water with waste during and after disposal, and does not prevent

contact between waste and the surrounding earth and does not isolate waste

Section 7.11.11. requires that Chem-Nuclear's disposal units and the incorporated engineered barriers² shall be designed and constructed to meet the following objectives:

- (1.) to minimize the migration of water onto the disposal units.
- (2.) to minimize the migration of waste or waste contaminated water out of the disposal units.
- (3.) detection of water and other liquids in the disposal units.
- (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.
- (5.) facilitation of remedial methods without disturbing other disposal units.
- (6.) reasonable assurance that the waste will be isolated for at least the institutional control period.
- (7.) prevention of contact between the waste and the surrounding earth, except for earthen materials which may be used for backfilling within the disposal units.

S.C. Code Ann. Regs. § 61-63, 7.11.11.1 - 7.11.11.7.³

²Section 7.11.9 requires Chem-Nuclear to "incorporate engineered barriers for all waste classifications. The engineered barriers shall be designed and constructed to complement and improve the ability of the disposal facility to meet the performance objectives in this part." Engineered barriers as defined as "a man-made structure or device that is intended to improve the land disposal facility's ability to meet the performance objectives of this part." S.C. Code Ann. Reg. 61-63, Section 7.2.9. Section 7.11.10 states that: "The engineered barriers shall be designed and constructed of materials having physical and chemical properties so as to provide reasonable assurance that the barriers will maintain their functional integrity under all foreseeable conditions for at least the institutional control period." S.C. Code Ann. Regs. § 61-63, 7.11.10. In this case, the engineered barriers are the "disposal trenches, disposal vaults, and enhanced caps." (2005 Order, FF#81).

³The Court of Appeals Opinion directed the Administrative Law Court to make legal conclusions related to Section 7.11. It is clear that some subsections of 7.11 are not applicable to this licensing decision in that they address transfer, assignment, revision and termination of the license, record-keeping, closure of the facility, and inspection of the facility. Indeed, the Court of Appeals' Opinion goes on to specifically identify and list sections 7.11.9, 7.11.10 and 7.11.11

Virtually all of the objectives in Section 7.11.11 promote the goal of keeping water away from waste. Similarly, Section 7.23.6 promotes the goal of preventing the contact between water and waste by requiring the disposal site design to “minimize to the extent practicable the contact of water with waste during storage, the contact of standing water with waste during disposal, and the contact of percolating or standing water with waste after disposal.” S.C. Code Ann. Reg. 61-62, Section 7.23.6.

Because compliance with these objectives was not addressed in the 2005 Order, the ALJ was required to make conclusions of law based on the findings of the 2005 Order. The ALJ made errors of law in concluding that the renewal license complies with the requirements that migration of water onto and out of the disposal units has been minimized, that waste has been isolated, and that contact between waste and the surrounding earth has been prevented, as those conclusions are unsupported by, and directly contradict the 2005 findings.⁴

**A. Chem-Nuclear’s Disposal Units Do Not Minimize the Migration of Water
Onto Vaults and Trenches, as required by Subsection 7.11.11.1**

Judge Anderson correctly noted that 7.11.11.1 requires the disposal units to be designed

in its discussion of the merits, but this brief will only address the ALJ’s erroneous conclusions on compliance with Sections 7.11.9, 7.11.10 and 7.11.11.

⁴The ALJ relies heavily on the results of the Environmental Radiological Performance Verification (ERPV) model, and the Blue Ribbon Panel that reviewed the model, for its conclusion that “the Barnwell Facility poses a minimal risk to either the environment or members of the public, both today and into the long-term future.” (R.p. ____, Order on Remand, p. 4). In so doing, the ALJ gave misplaced reliance on a model, rather than applying the clear and plain language of Regulations 61-61, Sections 7.11 and 7.23. Nothing in the ERPV supports a conclusion that the Chem-Nuclear’s disposal practices and designs are designed to minimize the contact between waste, water and the surrounding earth; that they are designed to “isolate” waste from man’s biosphere; or that the waste is “stabilized.” As discussed throughout this brief, the design does just the opposite.

to minimize the migration of water onto the disposal units, and that the disposal units are “usually a vault or trench.” (Order, p. 13). From there the ALJ goes astray. The ALJ focused almost exclusively on points irrelevant to the question of whether the disposal units – the vaults and the trenches – minimize migration of water onto the units. The ALJ first gave an iteration of the three types of trenches, mentioned the monitoring systems for the trenches, and then discussed the “enhanced cap” that is placed over the trench after it has been completely filled with vaults.⁵ (Order, p. 13). The ALJ glossed over what occurs when the trenches are being filled with the vaults and completely ignored critical findings from the 2005 Order related to the design of the vaults and trenches, which are the “disposal units” referenced in Subsection 7.11.11.1.

First, according to the findings of the ALC Order of October 13, 2005, the incorporated “engineered barriers” used by Chem-Nuclear do not prevent water from entering the disposal units. Just the opposite. With respect to the vaults, the 2005 Order finds that the “concrete vaults are not sealed against water intrusion” and the “lids of the vaults are not grouted or otherwise sealed to prevent water from entering the vault.” (R.p. ____, 2005 Order, FF#47 & 101). The “vaults have no cover or roof, so rain can fall directly into the vault during the loading period.” (R.p. ____, 2005 Order, FF#48). The ALJ points to lids on the disposal units as evidence of minimizing the migration of water into the vaults, claiming that the lids serve as “intrusion barriers.” (2012 Order, p. 14). The ALJ misses the mark. The “intrusion barrier” function which the lids serve is for inadvertent intruders that may enter onto the property, not as a

⁵While Appellant recognizes that some measures have been taken to minimize migration of water *after* the trenches are completely filled with concrete vaults (a process which can take over two years, FF#____) with the construction of the “enhanced cap” over the trench, the ALJ completely ignores the 2005 findings discussing water intrusion while vaults are being filled and the trenches are being filled.

barrier to rain or other water.⁶ (R.p. ____, 2005 Order, FF#90).

With respect to the trenches, the 2005 Order found that the “bottoms of the trenches . . . are lined with clay sand or sandy clay that is neither compacted nor designed to be impermeable. In fact, the liner sand . . . is designed to allow liquids to infiltrate the soil beneath the trenches.” (2005 Order, FF#103). Nonetheless, the ALJ’s 2012 Order states that “the trenches are designed and constructed to prevent the flow of surface water from coming in contact with waste, and the findings related to disposal practices . . . demonstrate that the objective of minimizing the migration of water onto the disposal units was established.” (R.pp. ____, Order, pp. 13-14). This conclusion is entirely inconsistent with the 2005 Order and overlooks all of the findings related to the vault and trench design indicating that the design allows water to migrate into and out of the vaults and trenches and into the groundwater.

The ALJ’s conclusion that “there are no findings that Chem-Nuclear has failed to minimize [water] intrusion” (Order, p. 13) overlooks and is inconsistent with these 2005 findings which demonstrate a failure to minimize the migration of water onto the disposal units, as required by Section 7.11.11.1, and is reversible error of law.

B. Chem-Nuclear’s Disposal Units Do Not Minimize the Migration of Water Out of Vaults and Trenches, as required by Subsection 7.11.11.2

The ALJ again noted the proper standard for Subsection 7.11.11.2, which requires engineered barriers to be designed and constructed “to minimize the migration of waste contaminated water out of the disposal units,” but then relied on his previous conclusion that because Chem-Nuclear has minimized the migration of water into the vaults, Chem-Nuclear has

⁶The requirement for inadvertent intrusion barriers is a requirement of another part of the regulations not at issue in this appeal. *See* S.C. Code Ann. Reg. 61-63, section 7.10.4.

necessarily minimized migration of water or waste-contaminated water out of the vaults. (Order, p. 14). The ALJ gives passing reference to the vault design consisting of “**drainage holes in the floors of the vaults [to] allow water to drain out of the vault,**” but he brushes that finding aside by stating that there is a “trench drainage system” installed to monitor water in the trench.⁷ (2012 Order, p. 14, emphasis added).

The ALJ’s perplexing conclusion is that:

Furthermore, though the finding[s] clearly reflect that clay-sand trench bottoms are not designed to prevent the migration of liquids out of the bottom of trenches, but rather, are **designed to be partially impermeable and allow liquids to infiltrate the soil below the trenches,** there is no finding that Chem-Nuclear’s waste disposal design is faulty or fails to minimize the migration of waste or waste contaminated water out of the disposal units.

(2012 Order, p. 15, emphasis added). The ALJ’s conclusion is confounding in its recitation of, but utter failure to apply, the 2005 findings that the vaults were intentionally designed to *allow* water to migrate out of those units, and that the trenches were intentionally designed to *allow* water to infiltrate into the soil and groundwater beneath the trenches. (2005 Order, FF# _____). The ALJ’s conclusion on compliance with Subsection 7.11.11.2 is clearly erroneous and demands reversal.⁸

Chem-Nuclear's disposal practices and designs simply fail to minimize migration of

⁷Appellant submits that a monitoring system tells you when water has entered the trench, but in and of itself does nothing to minimize or prevent contact of water and waste.

⁸The ALJ dismisses the Appellant’s assertions that there are obvious ways to minimize migration into and out of the vaults, such as sealing and grouting the vaults and eliminating the hole in the bottom of the vaults and covering the trenches while they are being filled, but rejects them by claiming that they were “dismissed by the findings.” (2012 Order, p. 15). However, the 2005 findings in fact support some of these assertions. Indeed, the Appellant’s suggestion of covering the trenches while they were being filled came directly from DHEC evidence that it asked Chem-Nuclear to do, even though Chem-Nuclear never implemented that recommendation. (2005 Order, FF#50).

waste or waste contamination water out of the vaults. Indeed the evidence shows that the disposal design and practices have the opposite result, actually encouraging water movement in and out of the vaults and into the soil beneath the trenches. Some relatively simple measures are available to reduce water infiltration. As evidenced by Judge Geathers' findings, the North Carolina design, which was also created by Chem-Nuclear, demonstrates that sealing the vaults to prevent contact between the waste and water would be one step towards minimizing this water migration and groundwater contamination. (R.p. ___, 2005 Order). In addition, the design of the proposed North Carolina facility was to have incoming waste containers loaded and grouted in uniform concrete waste packages. Covering the trenches while they are being filled with the vaults would also help prevent contact between the waste and the water. The 2005 Order, and Chem-Nuclear's response to DHEC's Interrogatories, indicate that a cover over the trenches to prevent rainfall from coming into contact with the waste-filled vaults would also help achieve compliance with Section 7.11.11. None of these relatively simple design features or disposal practices were required under the license, although the 2005 Order gives a nod to the use of these practices. (R.p. ___, 2005 Order, CL#16).

The ALJ goes one step further to conclude that Chem-Nuclear's practices have reduced the migration of tritium and therefore Chem-Nuclear's "effort to minimize migration of waste or waste contaminated water out of the disposal units is successful." (2012 Order, p. 15-16). The ALJ places great weight on an incomplete portion of a finding suggesting that practices may have led to a decrease in tritium releases, but ignores the remainder of Finding #46 that tritium levels have "**increased** between 1997 and 2001," and "when tritium data is compared to rainfall data as gauged by water table levels, **it appears that tritium concentrations have been varying with the amount of rainfall, not necessarily varying as a result of new storage methods.**" (R.p.

____, 2005 Order, FF # 46, emphasis added).

C. The license fails to prevent contamination of groundwater or surrounding soil, as required by Subsection 7.11.11.4

Subsection 7.11.11.4 requires “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.” The disposal units and their "engineered barriers" fail to provide for 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, and fail to prevent contact between the waste and the surrounding earth. Appellant submits that the best evidence on compliance with this provision are the findings that Chem-Nuclear’s monitoring, collection, retention and remedial measures have already resulted in the contamination of the adjacent church property. (2005 Order, FF# ____). Chem-Nuclear’s practice under the license is to pump contaminated water from the trenches into ponds or other sites on its property. That practice is exactly what Chem-Nuclear did when waste water contaminated the church property in 1999. The contaminated water “ponded on the Chem Nuclear property and then percolated into the soil and into the groundwater,” ultimately contaminating the groundwater at the church and requiring excavating of soil. (R.p. ____, 2005 Order, FF#56). If it happened once utilizing these practices, it can happen again and Chem-Nuclear does not have a collection and retention system sufficient to allow for detection or removal or other remedial measures to prevent the contamination of groundwater and the surrounding soil, as required by Subsection 7.11.11.4.

The ALJ appears to place complete reliance on the monitoring and detection system utilized by Chem Nuclear. The system is designed to pump water out of the trenches. However,

the ALJ ignores two important facts. First, none of the trenches at the Chem-Nuclear site have a leachate collection system. (R.p. ____, 2005 Order, FF # 102). Second, this system has resulted in contamination of an adjacent church when contaminated water was pumped out of a trench. (2005 Order, FF#56). The ALJ's reliance on the monitoring and detection system for a conclusion that the license allows for detection and removal of waste without resulting in contamination is clearly erroneous in light of the 2005 findings that despite that system waste had left the Chem Nuclear property and contaminated groundwater and soil at the church property and there is no leachate collection system.

D. The License Does Not Require Waste to be Isolated and is thus in violation of Subsections 7.11.11.6 and 7.2.6

The ALJ's conclusion that Chem-Nuclear has provided "reasonable assurance that the waste will be isolated for at least the institutional control period," as required by Subsection 7.11.11.6, overlooks the purpose of the regulatory program.

As discussed above, the ordinary meaning of "isolate" means to "set apart or cut off from others," "to place in quarantine." The American Heritage Dictionary of the English Language, Houghton Mifflin Co., 2000, p. 928. Instead of applying the ordinary meaning of the regulations, the ALJ asserts that isolation means "isolation from inadvertent intruders, and this is accomplished through the use of engineered barriers" because the lids on the vaults are "designed to protect against an inadvertent intrusion for at least 500 years." (2012 Order, p. 18). The ALJ goes astray in focusing on inadvertent intruders, while failing to acknowledge that the waste is not "set apart or cut off from others" nor is it "quarantined," because it is entering the soils and groundwater as a direct result of Chem-Nuclear's disposal practices. These specific findings from the 2005 Order establish that waste is not isolated:

1. the vault design allows water to enter into and drain from the vaults (FF#47 & 101);
 2. the trenches are lined with clay sand or sandy clay and are designed to allow liquids to infiltrate the soil below the trenches (FF#103);
 3. rainfall accumulates in the trenches and percolates into the soil, driving the groundwater movement that is carrying tritium and other radioactive materials (FF#48);
- the contaminated groundwater from beneath the site is intercepted by surface waters of Mary's Branch Creek (FF#32);
 - tritium has been detected in Mary's Branch Creek (FF# 39);
 - radioactive materials have contaminated an adjacent church site (FF# 56).

The ALJ seems to recognize that waste is not isolated in that it escapes the trenches and reaches the groundwater, but claims unconditionally that there is a "continually declining trend in releases" as a result of Chem-Nuclear's disposal practices to justify his conclusion. (Order, p. ____). That conclusion is based on a selective reading, which is contradictory to the 2005 findings related to the nature and extent of tritium releases. (R.p. ____, 2005 Order, FF# ____).

E. The disposal units and engineered barriers do not prevent contact between waste and the surrounding earth and thus violate Subsection 7.11.11.7

The ALJ's conclusion on compliance with Subsection 7.11.11.7 is confusing, at best. Subsection 7.11.11.7 requires the disposal units and the incorporated engineered barriers to be designed and constructed for "prevention of contact between the waste and the surrounding earth, except for earthen materials which may be used for backfilling within the disposal units." S.C. Code Ann. Reg. _____. The ALJ first restates a separate, and previously discussed,

requirement to minimize migration of waste out of disposal units. The ALJ then fails to point to any findings from the 2005 Order establishing that the disposal units are designed to “prevent” contact between waste and the surrounding earth and ignores all of the previously discussed findings, particularly those related to the trench design and allowing water to infiltrate into the soil and groundwater beneath the trenches. (2005 Order, FF# ____).

It is true that the list of findings on page 20 of the 2012 Order mention some things that Chem-Nuclear is doing, but merely taking some steps in the right direction and away from disposal of waste in cardboard boxes does not mean that all of the regulatory requirements have been fulfilled. The findings that directly contradict the ALJ’s conclusion that the disposal units and engineered barriers prevent the contact between waste and the surrounding earth, together with findings related to vault design, are 1) the trenches are lined with clay sand or sandy clay and are not designed to be impermeable, but are designed to allow liquids to infiltrate the soil below the trenches (FF#103) and 2) rainfall accumulates in the trenches and percolates into the soil, driving the groundwater movement that is carrying tritium and other radioactive materials (FF#48).

F. The disposal site is not designed to minimize the contact of water with waste during storage, disposal or after disposal, as required by Section 7.23.6

Section 7.23.6 requires Chem-Nuclear to design the disposal site to “minimize to the extent practicable the contact of water with waste during storage, the contact of standing water with waste during disposal, and the contact of percolating or standing water with waste after disposal.” S.C. Code Ann. Reg. 61-62, Section 7.23.6. Again, the ALJ cites, but immediately discredits, the 2005 findings that the vaults are not covered while they are being filled and are designed to allow water to flow into and drain from them. Then he cites, and dismisses, the

finding that post-disposal, the holes in the bottoms of the vaults allow water to rise up into the vaults during heavy rains. (R.p. ____, 2005 Order, FF# ____). The ALJ's recitation of the pertinent findings followed by a swift dismissal of those findings is particularly troublesome given the major risks to public health implicated by the license at issue. Instead, the ALJ claims that contact between water and waste is not prohibited (p. 20) and concludes that Chem-Nuclear is doing enough to "minimize" said contact. As described thoroughly throughout this brief, there is no question (at least based on the 2005 Order) that water is coming into contact with waste, and given the design of the disposal units and "engineered barriers," waste will continue to come into contact with water unless rain never again falls in Barnwell County.

In sum, the license renewal at issues fails to comply with Regulation 61-63, Section 7.11.11 and 7.23.6, in that the disposal units and disposal practices at the Barnwell Facility fail to minimize the migration of waste or waste contaminated water out of the disposal units and fail to prevent contact of waste and water. Judge Geathers found that the vaults "are not sealed against water intrusion." (FF # 101). The vaults have holes in the bottoms, are not grouted and sealed at the top, have no cover or roof, and thus rain can fall directly into the vault during the loading period. The base of the trenches are sand and are designed specifically "to allow liquids to infiltrate the soil below the trenches." (FF # 103). The trenches are open and uncovered until they are filled with vaults, and only then are they covered with dirt. The design allows rainfall that accumulates in the trenches to percolate into the soil, and drive the groundwater movement that is carrying tritium and other radioactive materials into Mary's Branch Creek.

III. The Radioactive Waste is Not Stabilized and There is No Assurance that it Will be Stabilized for the Institutional Control Period as Required by Section 7.10

Section 7.10 of the Regulations sets forth requirements for the issuance of a waste

disposal permit. The 2005 Order previously addressed subsections 7.10.1, 7.10.2, 7.10.3 and 7.10.4 of these requirements, which the Court of Appeals affirmed, and are not at issue in this appeal.

On remand, the ALJ addressed the remaining subsections of 7.10 that were not addressed by the 2005 Order, but erred in applying those remaining subsections. The remaining subsections at issue are:

7.10.6 The applicant's proposed disposal site, disposal site design, land disposal facility operations, disposal site closure, and postclosure institutional control are adequate to protect the public health and safety in that they will provide reasonable assurance that **long-term stability of the disposed waste and the disposal site will be achieved** and will eliminate to the extent practicable the need for ongoing active maintenance of the disposal site following closure;

7.10.7 The applicant's demonstration provides reasonable assurance that the applicable technical requirements of this part will be met;

7.10.8 The applicant's proposal for institutional control provides reasonable assurance that such control will be provided for the length of time found necessary to ensure the findings in 7.10.3 through 7.10.6 and that the institutional control meets the requirements of 7.27; . . .

S.C. Code Ann. Reg. 61-63, Section 7.10 (emphasis added).

The Appellant contests the ALJ's conclusions on 7.10.6, 7.10.7 and 7.10.8.

A. The Waste is not Stabilized as Required by Subsection 7.10.6

Chem-Nuclear is required to "provide reasonable assurance that long-term stability of the disposed waste and the disposal site will be achieved." S.C. Code Ann. § 61-63, subsection 7.10.6. The ALJ erred in concluding that the disposal practices and designs are consistent with Section 7.10.6 and that the "waste is stabilized." (2012 Order, p. 5). In concluding that the waste is stabilized, the ALJ selectively chose certain limited findings, but excluded consideration of numerous other findings from the 2005 Order directly bearing on the question of stability of the

waste. Stabilize is defined as “to make stable or steadfast; to become stable, steadfast or fixed.” Stable is defined as “resistant to change of position or condition; not easily moved or disturbed; enduring or permanent.” The American Heritage Dictionary of the English Language, Houghton Mifflin Co., 2000, p. 1687.

The ALJ points to the structural nature of the concrete vaults, along with “backfilling methods,” as providing “stability” to “minimize subsistence.” (Order, p. 4). Indeed, the 2005 Order notes that the purpose of the concrete vaults is to provide “structural stability” to stabilize the trenches for the enhanced caps, so that the caps would not sink, but not to keep the waste in a stable position. (2005 Order, FF#70 & 107). The ALJ’s finding of stability is based entirely on the sturdiness of the vaults in maintaining structural integrity. When dealing with nuclear waste, one would hope that no credit would be given to the fact that the nuclear storage vaults will not collapse upon themselves, but instead look to whether the waste contained within those vaults is “fixed” and “permanent” in its location. The ALJ erroneously equated structural stability of the trenches with stability of the disposed waste, which is the purpose of Section 7.10.6.

The ALJ failed to apply the findings of the 2005 Order that indicate that while the vaults are structurally stable, the waste is not stabilized within the vaults nor within the trenches nor within the site. For instance, the 2005 Order makes the following findings related to stability of waste:

- the vaults are not sealed to prevent water intrusion and are designed with holes in the bottom (FF#47 & 101);
- the vault design allows water to enter into and drain from the vaults (FF#47 & 101);
- rain falls directly into the vaults when the trenches are being loaded because there

is no cover (FF#48)⁹;

- some trenches take over two years to fill (FF#51);
- the trenches are lined with clay sand or sandy clay and are designed to allow liquids to infiltrate the soil below the trenches (FF#103);
- rainfall accumulates in the trenches and percolates into the soil, driving the groundwater movement that is carrying tritium and other radioactive materials (FF#48);
- the contaminated groundwater from beneath the site is intercepted by surface waters of Mary's Branch Creek (FF#32);
- tritium has been detected in Mary's Branch Creek (FF# 39);
- radioactive materials have contaminated an adjacent church site (FF# 56).

Applying all of these findings collectively, it is apparent that the current design allows waste to leave the disposal vaults and the trenches and migrate into the groundwater, and does not keep it stable in one location. Based on these findings it is evident that design and operations are not currently providing stability of waste and are certainly not providing any assurance of long-term stability, as required by Subsection 7.10.6. S.C. Code Ann. Regs. 61-63, §7.10.6. The ALJ's conclusion to the contrary is reversible error of law.

B. The License Fails to Meet the Requirements of 7.10.8 for Institutional Control for Stability of Waste Given that the Waste is Presently Not Stabilized

⁹During the license renewal process DHEC asked Chem Nuclear to consider giving protection to the open trenches from direct rainfall, such as temporary covers. (2005 Order, FF#50). To date nothing has come of this request.

Because the license fails to comply with section 7.10.6, it also fails to comply with section 7.10.8, which requires institutional controls to ensure that section 7.10.6, among other standards, is met. Section 7.10.8 requires the “applicant's proposal for institutional control provides reasonable assurance that such control will be provided for the length of time found necessary to ensure the findings in 7.10.3 through 7.10.6 and that the institutional control meets the requirements of 7.27.” In Judge Anderson’s words, “the applicant is required to demonstrate that the waste and disposal site are stable after the facility is closed.” (2012 Order, p. 7). The ALJ concluded that the renewal license complied with Section 7.10.8 in part because “there is no evidence of any actual release resulting in exposure above the regulatory limits to any member of the general public and there are no known incidents of such releases since the inception of the facility.” (2012 Order, p. 6). While this statement is technically accurate, the 2005 Order finds that there have been multiple releases from the site over its history, including releases into Mary’s Branch Creek and the adjacent church property.

The flaw in the 2005 Order, which is compounded in the 2012 Order, is the erroneous conclusion that simply because a release is below the regulatory limits the waste is stabilized and is sufficiently “isolated,” as required by S.C. Code Ann. Regs. § 61-63, 7.2.6. This statement also fails to establish that waste will be “stable” after the facility is closed. The ALJ’s conclusion that the waste is stabilized is based on a partial application of selectively chosen facts, rather than the entirety of the relevant findings from the 2005 Order. Instead the ALJ ignores all of the other facts directly bearing on the question of “stability” of waste, which establish that the waste is not “fixed” or “steadfast,” but can and has migrated from the disposal vaults, trenches and the site itself.

The ALJ also bases his conclusion of compliance with Section 7.10.8 on the statement that “the data demonstrates a trend of decreasing concentrations in Mary’s Branch Creek and in groundwater.” (2012 Order, p. 6). However, the ALJ summarizes a finding of the 2005 Order out of context and without looking at the entire finding, which states that “decreasing tritium concentrations have been varying with the amount of rainfall, and not necessarily as a result of new storage practices” and that at some monitoring stations tritium has increased. (2005 Order, FF#46).

C. The License Fails to Meet Technical Design Requirements of 7.10.7

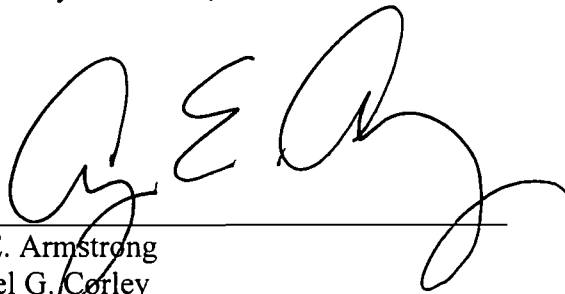
Section 7.10.7 requires that the applicant "provide reasonable assurance that the applicable technical requirements of this part will be met." Section 7.11 sets forth the applicable standards and technical requirements for the design standards for disposal units and the engineered barriers to be utilized in disposal units. As discussed thoroughly above in Section II, the disposal units – vaults and trenches – and their engineered barriers fall short of meeting those requirements. The disposal units and engineered barriers do not minimize contact between water and waste; do not minimize migration of water onto and out of disposal units; do not prevent contact between the waste and surround soil; and do not isolate waste, as evidenced by the extensive findings that the vaults are unsealed and ungrouted allowing water to fall into the vaults; the vaults have holes in the bottom to allow water to migrate out of the vaults; the trenches are designed to allow water to percolate into the groundwater. The ALJ’s conclusions to the contrary defy the logical application of these findings and is reversible error of law.

CONCLUSION

The words of a regulation must be given their plain and ordinary meaning without resort to subtle or forced construction to limit or expand the regulation's operation. S.C. Dept. of Revenue v. Blue Moon of Newberry, Inc., 397 S.C. 256, 261, 725 S.E.2d 480, 483 (2012), reh'g denied (May 4, 2012) (citing Byerly v. Connor 307 S.C. 441, 444, 415 S.E.2d 796, 799 (1992)). Yet rather than apply the plain and ordinary meaning of the regulations to the relevant findings of the 2005 Order, the Administrative Law Judge failed to incorporate the findings that due to Chem-Nuclear's current disposal practices and designs 1) water enters the disposal units and 2) that water carries radioactive waste into the surrounding soil and then into the groundwater forming a tritium plume that ultimately leaves the site. By discarding findings from the 2005 Order that are material to compliance with the specific provisions of Regulation 61-63, the ALJ re-weighed the evidence, ignoring some facts in favor of others, and issued an opinion that is fundamentally inconsistent both internally and with the 2005 Order.

For the foregoing errors of law, the Final Order and Decision on Remand of the Administrative Law Judge should be reversed.

Respectfully submitted,



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