U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF FEDERAL AND STATE MATERIALS AND ENVIRONMENTAL MANAGEMENT PROGRAMS

DIVISION OF WASTE MANAGEMENT AND ENVIRONMENTAL PROTECTION

FINAL ENVIRONMENTAL ASSESSMENT FOR THE PROPOSED RENEWAL OF U.S. NUCLEAR REGULATORY COMMISSION LICENSE NO. SNM–124 FOR NUCLEAR FUEL SERVICES, INC.

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EXECUTIVE SUMMARY

On June 30, 2009, Nuclear Fuel Services, Inc. (NFS) submitted an application and accompanying environmental report to the U.S. Nuclear Regulatory Commission (NRC) to request renewal of special nuclear material (SNM) license SNM–124. Under the conditions of SNM–124, NFS operates a nuclear fuel fabrication facility located in Erwin, Tennessee. If granted as proposed, the renewed license would allow NFS to continue authorized operations and activities at the site for a 40-year period. Among other licensed operations, NFS produces nuclear reactor fuel for the U.S. Navy and downblends high-enriched uranium (HEU) to produce low-enriched uranium (LEU) material, which is used as fuel for commercial nuclear reactors.

The NRC staff prepared this environmental assessment (EA) following NRC regulations at 10 CFR Part 51 that implement the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. §4321), and NRC staff guidance in NUREG–1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." The purpose of this EA is to assess the potential environmental impacts of the proposed license renewal and of reasonable alternatives. Based on this EA, the NRC staff has determined that preparation of an Environmental Impact Statement (EIS) is not warranted and will issue a Finding of No Significant Impact (FONSI) to be noticed in the *Federal Register*.

By its application, NFS is requesting authorization to continue the currently approved licensed activities at its Erwin, Tennessee, facility for a 40-year period. In accordance with the provisions of 10 CFR Part 70, the current license authorizes NFS to receive, possess, store, use, and ship SNM enriched up to 100 percent. Under this proposed action, NFS would continue production of reactor fuel for the U.S. Navy and for commercial domestic operations. Current facility operations include:

- Producing nuclear reactor fuel using high-enriched uranium (HEU);
- Enrichment blending of HEU with natural uranium to produce blended low-enriched uranium (BLEU) materials;
- Converting HEU hexafluoride to other uranium compounds;
- Converting low-enriched uranyl nitrate to uranium dioxide powder;
- Recovering ammonia by converting ammonium diuranate liquid into ammonium hydroxide;
- Recovering uranium from scrap generated internally or received from other facilities;
- Performing general services, laboratory support, and waste management; and
- Conducting research and development.

NFS is also authorized under its NRC license to conduct specified onsite decommissioning activities.

In addition to the NFS proposed action to renew its license for 40 years, the NRC staff analyzed two alternatives: (1) the no-action alternative and (2) renewing the NFS license for 10 years.

Under the no-action alternative, NRC would not renew License SNM–124, and as a result, operations at the NFS site would be required to cease. Also, NFS would be required under 10 CFR 70.38 to submit a detailed site decommissioning plan, and facility decommissioning would begin upon NRC approval of that plan. NRC's review would address both the health and safety and the environmental aspects of the proposed decommissioning plan. Given that NFS is proposing continued operations, a detailed site decommissioning plan is not required at this time. The NRC staff's assessment of the environmental impacts for the no-action alternative is based on NRC's experience in the site decommissioning of nuclear fuel cycle facilities.

Regarding the 10-year license renewal alternative, the potential transportation and waste management impacts of this alternative to the proposed action are addressed in the EA. The NRC staff did not separately address the 10-year alternative for the other resource areas evaluated in the EA, because the staff determined that the types of potential environmental impacts associated with site operations during the proposed 40-year license renewal period would be the same as those during a 10-year license renewal period.

Additionally, for the 10-year alternative, the NRC staff does not consider the potential impacts from NFS discharges of effluents that are in compliance with 10 CFR Part 20 annual regulatory limits (and discharges that are in compliance with the permit conditions issued by other federal, state, or local agencies) to differ either in type or in magnitude with the potential impacts for the requested 40-year period. The annual regulatory limits in 10 CFR Part 20 and the respective permit conditions are protective of public health and safety and the environment. Discharges in compliance with those limits and conditions would thus not be expected to pose undue cumulative risks to human health and the environment.

Impacts from site decommissioning are evaluated for the proposed action and the 10-year alternative, in addition to the no-action alternative. In doing so, the NRC staff recognizes that site decommissioning will be a reasonably foreseeable future action for the NFS facility and site. In conducting its evaluation, the staff also recognized that continued operations over 40 years or 10 years have the potential for increased site contamination that would need to be addressed in the detailed site decommissioning plan submitted by NFS for NRC review.

Generally, in its NEPA evaluations, the NRC staff categorizes the potential environmental impacts of a proposed action as follows:

- SMALL—environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource

- MODERATE—environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource

- LARGE—environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource

Tables ES-1 and ES-2 summarize the NRC staff's findings regarding the potential environmental impacts for each of the three alternatives considered.

Table ES–1 Summary of Potential Environmental Impacts from Operations			
Resource Area	**Proposed Action**	**10-Year Renewal**	**No-Action**
Land Use	SMALL to MODERATE	SMALL to MODERATE	SMALL
Transportation	SMALL (overall) MODERATE (local)	SMALL (overall) MODERATE (local)	SMALL
Socioeconomics	SMALL	SMALL	SMALL to MODERATE
Air Quality	SMALL	SMALL	SMALL
Water Resources – Surface Water	SMALL	SMALL	SMALL
Water Resources – Groundwater	SMALL to MODERATE	SMALL to MODERATE	SMALL
Geology & Soils	SMALL (geology) SMALL to MODERATE (soils)	SMALL (geology) SMALL to MODERATE (soils)	SMALL (geology) SMALL to MODERATE (soils)
Ecology	SMALL	SMALL	SMALL
Noise	SMALL	SMALL	SMALL
Historic & Cultural	SMALL	SMALL	SMALL
Scenic & Visual	SMALL	SMALL	SMALL
Public & Occupational Health	SMALL	SMALL	SMALL
Public & Occupational Health – Accidents	MODERATE	MODERATE	SMALL
Waste Management	SMALL	SMALL	SMALL

Table ES–2 Summary of Potential Environmental Impacts from Decommissioning			
Resource Area	**Proposed Action**	**10-Year Renewal**	**No-Action**
Land Use	MODERATE	MODERATE	MODERATE
Transportation	SMALL (overall) MODERATE (local)	SMALL (overall) MODERATE (local)	SMALL (overall) MODERATE (local)
Socioeconomics	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Air Quality	SMALL	SMALL	SMALL
Water Resources – Surface Water	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Water Resources – Groundwater	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Geology & Soils	SMALL (geology) SMALL to MODERATE (soils)	SMALL (geology) SMALL to MODERATE (soils)	SMALL (geology) SMALL to MODERATE (soils)
Ecology	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Noise	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Historic & Cultural	SMALL	SMALL	SMALL
Scenic & Visual	MODERATE	MODERATE	MODERATE
Public & Occupational Health	SMALL	SMALL	SMALL
Public & Occupational Health – Accidents	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Waste Management	MODERATE	MODERATE	MODERATE

Based on its review of the proposed action relative to the requirements set forth in 10 CFR Part 51, and as shown in Table ES–1 and ES–2, the NRC staff has determined that renewal of NRC license SNM-124, authorizing operations at NFS's nuclear fuel fabrication facility in Erwin, Tennessee for a period of 40 years will not significantly affect the quality of the human environment. In its license renewal request, NFS is proposing no changes in how it processes enriched uranium, and no significant changes in NFS' authorized operations are planned during the proposed license renewal period. The impacts of ongoing and planned

construction actions – including those related to the physical protection and safeguarding of licensed materials – are not expected to significantly affect the quality of the human environment. Gaseous emissions and liquid effluents would continue to be treated prior to discharge and monitored in accordance with applicable license and permits and would be expected to remain within regulatory limits for non-radiological and radiological components. Public and occupational radiological dose exposures would be expected to remain below 10 CFR Part 20 regulatory limits. Therefore, based on this assessment, an EIS is not warranted, and pursuant to 10 CFR 51.32, a FONSI is appropriate.

Pursuant to 10 CFR 51.33(a), the NRC staff made a draft of this EA and FONSI available for public review and comment. In doing so, the NRC staff had determined that (1) the NFS request to renew SNM–124 for a period of 40 years was without precedent, because, if granted, it would be the first 40-year license renewal for a Category I nuclear fuel fabrication facility, and (2) preparation of a draft EA and draft FONSI would further the purposes of NEPA. Comments on the draft EA and draft FONSI were accepted through December 31, 2010. Appendix B to this EA provides summaries of the comments made on the draft EA and draft FONSI and the NRC staff's responses to those comments.

ACRONYMS/ABBREVIATIONS

AOC	areas of concern
ATSDR	Agency for Toxic Substances and Disease Registry
BLEU	blended low-enriched uranium
CEDE	committed effective dose equivalent
DDE	direct dose equivalent
DOE	U.S. Department of Energy
EA	environmental assessment
EIS	environmental impact statement
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
FONSI	Finding of No Significant Impact
GCRP	U.S. Global Change Research Program
GHG	greenhouse gas
HEU	high-enriched uranium
LEU	low-enriched uranium
MEI	maximally exposed individual
NAAQS	National Ambient Air Quality Standards
NCRP	National Council on Radiation Protection and Measurement
NEPA	National Environmental Policy Act of 1969
NFS	Nuclear Fuel Services, Inc.
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
POTW	Publicly Owned Treatment Works
ppb	parts per billion
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
ROI	region of influence
SER	safety evaluation report
SNM	special nuclear material
SWMU	solid waste management units
TDEC	Tennessee Department of Environment and Conservation
TEDE	total effective dose equivalent
TVA	Tennessee Valley Authority
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USACE	U.S. Army Corps of Engineers
WWTF	Waste Water Treatment Facility

1.0 INTRODUCTION

1.1 License Renewal Request

On June 30, 2009, Nuclear Fuel Services, Inc. (NFS) submitted an application and accompanying environmental report (NFS, 2009a, b) to the U.S. Nuclear Regulatory Commission (NRC) to request renewal of special nuclear material (SNM) license SNM–124. Under the conditions of license SNM–124, NFS operates a nuclear fuel fabrication facility located in Erwin, Tennessee. If granted as proposed, the renewed license would allow NFS to continue authorized operations and activities at the site for a period of 40 years.

The NRC staff has prepared this environmental assessment (EA) following NRC regulations at 10 CFR Part 51 that implement the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. §4321 *et seq.*), and pursuant to NRC staff guidance in NUREG–1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (NRC, 2003). The purpose of this document is to assess the potential environmental impacts of the proposed license renewal and of reasonable alternatives. Based on this EA, the NRC staff has determined that renewal of NRC license SNM-124 for a period of 40 years would not significantly affect the quality of the human environment and that a Finding of No Significant Impact (FONSI) should therefore be made.

The NRC staff also is performing a detailed safety analysis of the NFS proposal to assess compliance with 10 CFR Part 20, "Standards for Protection Against Radiation," and 10 CFR Part 70, "Domestic Licensing of Special Nuclear Material." The staff's analysis will be documented in a separate safety evaluation report (SER). The NRC decision whether to renew the NFS license as proposed will be based on the results of the NRC staff's review as documented in this EA and in the SER.

Pursuant to 10 CFR 51.33(a), the NRC staff made a draft of this EA and FONSI available for public review and comment. In doing so, the NRC staff had determined that (1) the NFS request to renew license SNM-124 for a period of 40 years was without precedent, because, if granted, it would be the first 40-year license renewal for a Category I nuclear fuel fabrication facility and (2) preparation of the draft EA and draft FONSI would further the purposes of NEPA. Appendix B to this EA provides summaries of the comments made on the draft EA and the NRC staff's responses to those comments.

1.2 The Proposed Action

By its application (NFS, 2009a), NFS has requested authorization to continue licensed activities at its Erwin, Tennessee facility for a 40-year period. In accordance with the provisions of 10 CFR Part 70, the current license authorizes NFS to receive, possess, store, use, and ship SNM enriched up to 100 percent. Under this proposed action, NFS would continue production of reactor fuel for the U.S. Navy and for commercial domestic operations. Current facility operations include:

Producing nuclear reactor fuel using high-enriched uranium (HEU);

- Enrichment blending of HEU with natural uranium to produce blended low-enriched uranium (BLEU) materials;

- Converting HEU hexafluoride to other uranium compounds;
- Converting low-enriched uranyl nitrate to uranium dioxide powder;
- Recovering ammonia by converting ammonium diuranate liquid into ammonium hydroxide;
- Recovering uranium from scrap generated internally or received from other facilities;
- Performing general services, laboratory support, and waste management; and
- Conducting research and development.

A more detailed discussion of authorized operations at the NFS site is contained in previous EAs prepared by the NRC staff for prior NFS-related licensing actions (see Section 1.5.2 of this EA). NFS is also authorized under its NRC license to conduct specified onsite decommissioning activities. These activities are discussed in Section 2.2.

In its license renewal request, NFS is proposing no changes in how it processes enriched uranium, and no significant changes in NFS' authorized operations are planned during the proposed license renewal period. Should NRC approve the license renewal, NFS may in the future decide that operational changes are necessary. Prior to making any such change to the site, structures, processes, systems, equipment, components, computer programs, or personnel activities, NFS must determine in accordance with 10 CFR 70.72 whether a license amendment is required at that time. In cases where a license amendment is required, NFS will submit the request to NRC and NRC will perform an environmental review and a safety analysis at that time.

Because NFS is proposing continued operations, it is currently not required to submit or have in place an approved detailed site decommissioning plan for the entire Erwin facility, pursuant to 10 CFR 70.38. Additionally, because NFS has not included decommissioning of the entire site as part of the proposed action, the NRC staff has not included the potential environmental impacts of decommissioning the entire site as part of its assessment of the impacts of the proposed action that are documented in Chapter 4 of this EA.

1.3 Need for the Proposed Action

As discussed in Section 1.2, NFS conducts a variety of activities at its Erwin facility. Renewal of license SNM–124, as requested by NFS, would allow NFS to continue these activities for a period of 40 years. The NFS facility is presently the only facility that operates its classified processes to produce nuclear fuel for the U.S. Navy. Additionally, the NFS facility is one of only two facilities NRC licenses to downblend HEU to produce low-enriched uranium (LEU) material, which is used as fuel for commercial nuclear reactors (NRC, 2002).

1.4 Alternatives to the Proposed Action

1.4.1 No-Action Alternative

Under the no-action alternative, NRC would not renew license SNM–124 and, as a result, operations at the NFS site in Erwin, Tennessee would cease. NFS would be required under 10 CFR 70.38 to submit a detailed site decommissioning plan to NRC for approval. NRC's

review would address both the health and safety and the environmental aspects of the proposed decommissioning plan. Following NRC approval, NFS would conduct site and facility decommissioning in accordance with the plan.

While the specific steps may vary for the Erwin site, the basic process identified in a site decommissioning plan are presented in Volume 1 (Revision 2) to NUREG–1757, "Consolidated Decommissioning Guidance: Decommissioning Process for Materials Licensees" (NRC, 2006). The basic steps in decommissioning include the following: (1) ceasing operations at the site; (2) determining and confirming the locations and concentrations of any radiological contamination; (3) developing the schedules, decommissioning procedures, and final survey methods to be used to demonstrate compliance with NRC criteria; (4) conducting the decontamination and decommissioning activities to achieve the applicable decommissioning standards; and (5) disposing of the decommissioning wastes (NRC, 2006). Following NRC approval of the plan, NFS would begin site decommissioning, and NRC would conduct onsite inspections to ensure that all activities are conducted in accordance with the plan and conduct final confirmatory surveys prior to approving completion of decommissioning to meet the applicable standards (NRC, 2006).

1.4.2 Renewal for a 10-Year Term Alternative

Regarding the 10-year license renewal alternative, the potential transportation and waste management impacts of this alternative to the proposed action are addressed in the EA. The NRC staff did not separately address the 10-year alternative for the other resource areas evaluated in the EA, because the staff determined that the types of potential environmental impacts associated with site operations during the proposed 40-year license renewal period would be the same as those during a 10-year license renewal period.

Additionally, for the 10-year alternative, the NRC staff does not consider the potential impacts from NFS discharges of effluents that are in compliance with 10 CFR Part 20 annual regulatory limits (and discharges that are in compliance with the permit conditions issued by other federal, state, or local agencies) to differ either in type or in magnitude with the potential impacts for the requested 40-year period. The annual regulatory limits in 10 CFR Part 20 and the respective permit conditions are protective of public health and safety and the environment. Discharges in compliance with those limits and conditions would thus not be expected to pose undue cumulative risks to human health and the environment.

1.5 Scope of the Environmental Analysis

1.5.1 Federal, State, and Local Authorities

NRC authorizes NFS to conduct activities at the Erwin facility in accordance with the license conditions in SNM–124, issued under 10 CFR Part 70. As discussed in Section 1.1, in addition to this EA, the NRC staff is preparing an SER. The SER will address NFS compliance with the provisions in 10 CFR Parts 20 and 70. In preparing the EA and SER, the NRC staff will have evaluated the potential impacts to public health and safety and the environment associated with the proposed continuation of licensed operations at the NFS site for 40 years. The NRC staff decision on the proposed action will be based on the results of both the EA and SER.

Under the Atomic Energy Act of 1954, as amended, the U.S. Department of Energy (DOE) has broad authority to regulate activities involving radioactive materials that are undertaken by DOE

or on its behalf, including the transportation of radioactive materials. DOE exercises this authority to regulate certain DOE shipments, such as shipments of materials of national security interest undertaken by governmental employees or shipments involving special circumstances (DOE, 2010).

The U.S. Department of Transportation (DOT) was established in 1966 to ensure a fast, safe, efficient, accessible and convenient transportation system that meets the national interests and enhances the quality of life of the American people (DOT, 2011). DOT regulations addressing the packaging and transport of hazardous materials are found in Title 49, "Transportation," of the Code of Federal Regulations (CFR). The NRC and DOT jointly regulate the safety of radioactive material shipments. Applicable NRC regulations are found at 10 CFR Part 71 and the DOT regulations are found at 49 CFR Parts 171-180.

The U.S. Army Corps of Engineers (USACE) regulates the discharge of dredge or fill material into waters of the United States, including wetlands, in accordance with Section 404 of the Clean Water Act through a permitting program.

TDEC authorizes certain activities at the NFS site through the relevant state permitting processes under authorities delegated by the U.S. Environmental Protection Agency (EPA), TDEC has issued permits to NFS that address surface water and storm water discharges. Additionally, in concert with EPA, TDEC regulates NFS management of certain solid and hazardous wastes at the site and also in the remediation of surface soil and groundwater contamination under the Resource Conservation and Recovery Act (RCRA).

TDEC Division of Radiological Health regulates the use of certain radioactive materials within the State. In 1965, the former Atomic Energy Commission established an agreement with the State of Tennessee (http://nrc-stp.ornl.gov/special/regs/tnagreements.pdf) to discontinue Commission authority over certain radioactive materials and allow the radioactive materials to be regulated by the State. The TDEC Division of Radiological Health regulates byproduct material, source material, and special nuclear materials in quantities not sufficient to form a critical mass (as defined in the Atomic Energy Act).

The Tennessee Air Pollution Control Board adopts regulations and initiates court actions to enforce regulations on the discharge of air pollutants from boilers and other pollutant-generating equipment. The Tennessee Air Pollution Control Board is administered by the TDEC Division of Air Pollution Control.

The State of Utah, under Rule R313-26 of the Utah Radiation Control Rules, establishes the terms for a Generator Site Access Permit Program. This program authorizes waste generators, waste processors and waste collectors to deliver radioactive wastes to a land disposal facility located within the state (State of Utah, 2011).

Erwin Utilities Publically Owned Treatment Works (POTW) receives the wastes from two sanitary sewers at the NFS site. Erwin Utilities regulates effluents to the sewers through an industrial pretreatment permit program.

Table 1-1 summarizes the various federal, state, and local agency licenses and permits issued to NFS for activities at its Erwin facility.

Table 1-1. Federal, State, and Local Agency Licenses and Permits For Activities at the NFS Site	
Issuing Agency	**Description**
U.S. Nuclear Regulatory Commission (NRC)	Radioactive Materials License SNM-124
	Quality Assurance Program for Radioactive Material Packages (71-0249)
U.S. Department of Energy	Quality Assurance Program for Radioactive Material Packages (2011-004)
U.S. Department of Transportation (DOT)	Hazardous Material Certificate of Registration (060910 550 0185)
NRC / DOT	Certificates of Compliance for Shipping Packages
State of Utah	Generator Access Permit (0109 000 006)
U.S. Army Corps of Engineers	Nationwide Permit 38*
Tennessee Department of Environment and Conservation, Division of Radiological Health	Radioactive Source Material License (S-86001-B15)
	Radioactive Material License [Sealed Sources] (R-86002-H19)
	Registration of X-Ray Producing Equipment (786-0008)
	Radioactive Material License [Grounds Decommissioning] (S-86007-G13)
	Radioactive Material License [Research and Development] (R-86008-E20)
	Radioactive Waste License-for Delivery (T-TN001-L10)
Tennessee Department of Environment and Conservation (TDEC)	National Pollution Discharge Elimination System (NPDES) Permit for Waste Water Treatment Facility (TN0002038) **
	NPDES Permit for Stormwater Discharge (TNR050873)
	NPDES Permit for Stormwater Discharge for BLEU Complex (TNR056583)
	Tennessee Stormwater Permit Exclusion for Industrial Park Facility (TNR053969)

Table 1-1. Federal, State, and Local Agency Licenses and Permits For Activities at the NFS Site	
Issuing Agency	**Description**
Tennessee Department of Environment and Conservation (TDEC) (continued)	Aquatic Resource Alteration Permit
	§401 Water Quality Permit for wetland fill and excavation (NRS09-332)
	RCRA Permit [Part B] (TNHW-108)
	Class V Underground Injection Permit (UNC 0000001)
Tennessee Air Pollution Control Board (TDEC)	Air Permits 040471P, 955420P, 954441P, 042347P, 137723P, 86-0002-27, and 017604P
Erwin Utilities	POTW (Sanitary Sewer) Discharge Permit (013)
Erwin Utilities	POTW (Sanitary Sewer) Discharge Permit for BLEU Complex (019)
* For discharge of dredge or fill material into the waters of the United States in accordance with Section 404 of the Clean Water Act. ** Expired 8/31/2010; renewal application submitted in 2010	

The NRC assumes that existing regulations are applied, as appropriate, by other Federal, State, and local regulatory agencies. In evaluating potential environmental impacts, the NRC also assumes that the licensee would comply with regulatory requirements, license and permit conditions issued by these agencies. In Chapter 4 of this EA, the NRC staff, therefore, has considered NFS's compliance with the permits issued by other agencies in the staff's assessment of impacts.

1.5.2 Basis for Review

The NRC staff has addressed the potential environmental impacts associated with the renewal of license SNM-124 and has documented the final results of the assessment in this document. The staff performed this review in accordance with the requirements of 10 CFR Part 51 and staff guidance found in NUREG-1748.

The NRC staff reviewed and considered the following documents in the development of this EA:

- NFS license application dated June 30, 2009 (NFS, 2009a), and accompanying environmental report (NFS, 2009b);
- NFS responses to NRC requests for additional information (RAIs) (NFS, 2010a,b).
- Previous NRC environmental review documents for the NFS site (NRC, 2002; 2001; 1999);

- Information gathered from the NRC site visits, including public information provided by stakeholders and NFS;

- NRC inspections reports for 2000 through 2010 for the NFS site; and

- Effluent monitoring reports for 2000 through 2010 for the NFS site that NFS submitted in accordance with 10 CFR 70.59.

As reflected in Appendix B, the NRC staff has also reviewed and considered comments on the draft EA in preparing this final EA. The conclusions presented in this EA are based on all aspects of the proposed action and the affected environment including those that have been evaluated in previous environmental reviews. Note that many aspects of the proposed action and the affected environment have been addressed in previously issued NRC environmental review documents [e.g., for the previous license renewal in 1999 (NRC, 1999) and for the BLEU licensing actions in 2002 (NRC, 2002)]. Therefore, in discussing site activities and the affected environment in this EA, the staff has summarized those prior descriptions while at the same time, providing revisions as needed to reflect current conditions.

1.5.3 Issues Outside the Scope of the EA

As discussed further below, the NRC staff determined the following listed areas to be outside the scope of this EA:

- Material control and accountability
- Criticality safety controls
- Equipment failures
- Plant building stability
- Seismic risk analysis (likelihood)
- Accidents (in part)
- Safety culture
- Terrorism
- License violations
- NRC enforcement actions

The potential environmental impacts from postulated accidents are addressed in Section 4.11.2 of the EA. To the extent that postulated accidents raise safety issues, such issues will be addressed in the SER.

Through NRC Confirmatory Orders, NFS has been subject to assessments of its safety culture as conducted by an independent organization. This organization has issued two reports, one in 2007 and the other in 2010, on the safety culture at NFS. Future assessments and reports are expected to be conducted and issued in the coming years. In response to these assessments, NFS is required to take actions to strengthen its safety culture, and these actions are subject to NRC oversight. The NFS proposed action implicitly includes safety culture as it is an aspect of facility operation, which is the subject of the NRC staff's safety review that will be documented in the SER.

Concerning terrorism, it is the NRC's position that NEPA does not require analysis of the potential environmental impacts associated with acts of terrorism. While the NRC recognizes that the United States Court of Appeals for the Ninth Circuit ruled to the contrary, the NRC has

determined not to analyze the potential environmental impacts of terrorism when the proposed action is located outside the jurisdiction of that court (see Commission Memorandum and Orders CLI-07-08, CLI-07-09, and CLI-07-10, all issued on February 26, 2007). Because the geographic location of the NFS site is not within that court's jurisdiction, the NRC staff has not addressed the environmental impacts of terrorist acts in this EA.

The remaining topic areas listed previously concern aspects of facility design and operation, and as such will be addressed in the NRC staff's safety review and documented in the SER. Potential environmental effects associated with a particular area listed above (e.g., with seismic activity) are addressed in the accident analysis found in EA Section 4.11.2.

2.0 PROPOSED ACTION

This section describes the ongoing activities at the NFS site that comprise the proposed action analyzed in this EA. As discussed previously, NFS requests renewal of its NRC license for a period of 40 years. NFS has stated that the activities discussed in this chapter would be expected to continue during the renewal period (NFS, 2009b). Two alternatives to the proposed action, the no-action alternative and a 10-year renewal of NRC license SNM–124, are discussed in Sections 1.4.1 and 1.4.2, respectively, of this EA.

2.1 General Site Location and Description

The NFS site is situated on approximately 28 ha [70 acres] of land in Unicoi County, Tennessee, within the southwestern town limits of the Town of Erwin in Unicoi County, Tennessee. The property is located at latitude of 36°07'47"N and longitude of 82°25'57"W, approximately 499 to 512 m [1,640 to 1,680 ft] above sea level. The NFS site is bounded on the north by Martin Creek, on the south by residential properties along Carolina Avenue, on the southwest by Banner Hill Road, and on the northwest by CSX (formerly Carolina, Clinchfield, and Ohio) railroad tracks. Interstate 26 is less than 1.6 km [1 mi] from the site (Figure 2-1). The Nolichucky River is approximately 0.3 km [0.2 mi] from the site boundary (NFS, 2009a).

Four bodies of surface water are in the immediate vicinity of the plant. Banner Spring is a natural spring originating on the NFS property. Banner Spring forms Banner Spring Branch, which empties into Martin Creek at the site boundary. NFS enclosed Banner Spring Branch in an underground pipe in 2003. Martin Creek ultimately empties into the Nolichucky River.

Within the site boundary, a 10-ha [24-acre] fenced, protected area contains processing, support, and administrative office buildings. The remaining land area is used for parking, is undergoing decommissioning, or remains undeveloped (NFS, 2009b).

2.2 Current Facility Use

Current facility use includes processing operations for the proposed action, support operations, and ongoing decommissioning activities. The proposed action would involve renewing the license to authorize continuing operations, with the primary activities at the NFS site identified in Section 1.2.

Those activities are supported by other operations, including:

- Laboratory activities (e.g., wet chemical and physical testing);
- General services (e.g., storage, maintenance and repair of processing equipment, and decontamination of equipment and materials);
- Research and development (e.g., working with SNM); and
- Radioactive waste management (e.g., activities to process waste to reduce, reuse, package, and ship to proper disposal sites).

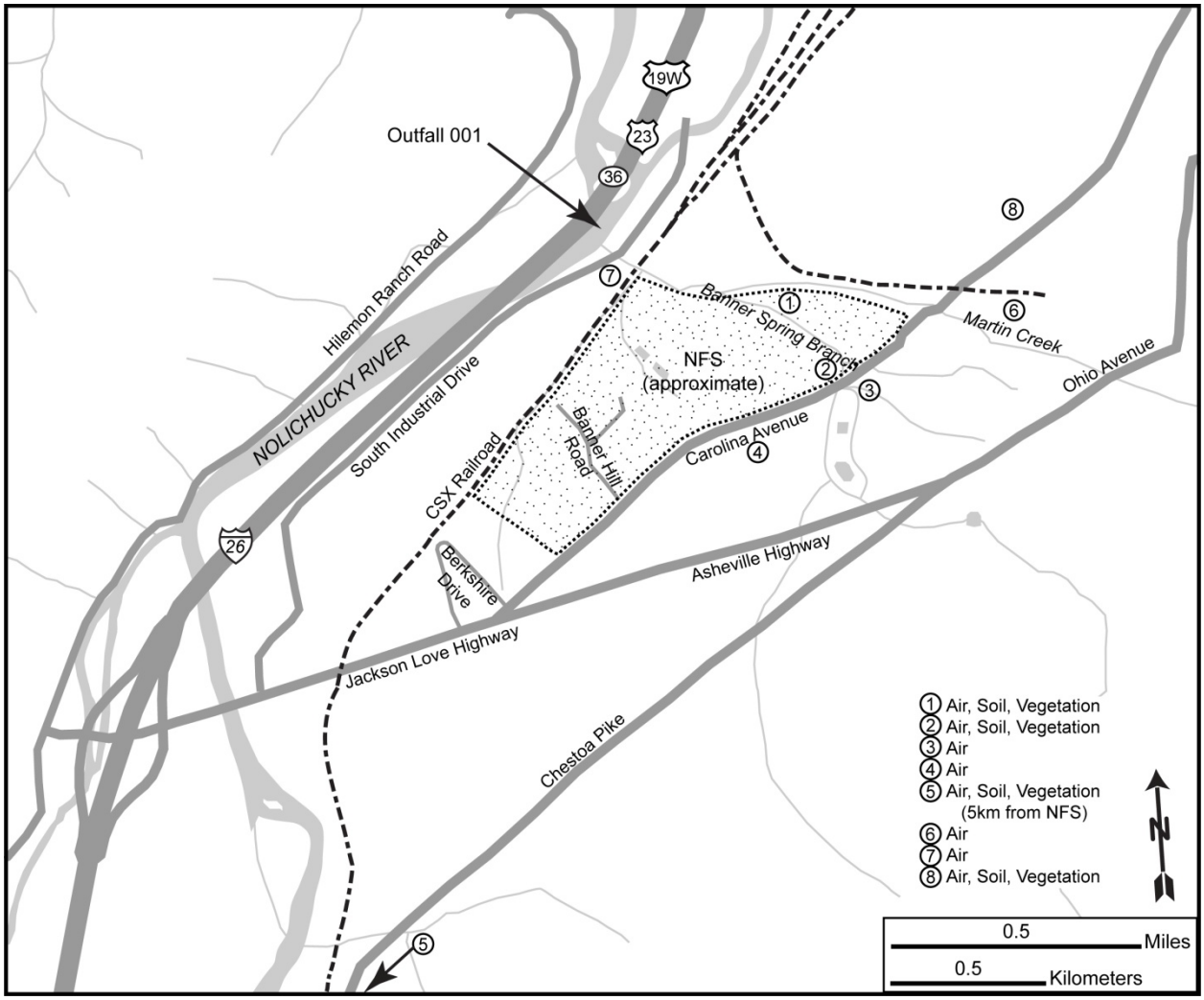

Figure 2-1. Vicinity Map Showing Major Features, Transportation Routes, Outfall 001, and Approximate Air, Soil, and Vegetation Sampling Locations Near the NFS Site

Since the last license renewal in 1999, NFS has conducted decommissioning activities for certain areas of the site that are no longer being used. These areas comprise the North Site area, burial trenches in the southwest portion of the site, and the former plutonium building (Building 234) that is centrally located on the site. The NRC staff has previously analyzed the environmental impacts of the North Site and southwest burial trench decommissioning activities (e.g., in the 1999 license renewal EA [NRC, 1999] and in the North Site Decommissioning Plan EA [NRC, 2001]). Decommissioning of the North Site area is nearly complete, with the exception of removing contaminated soils. Excavation of debris and contaminated soil from the southwest burial trenches is complete, and NFS completed a final status survey in 2000 to determine the remaining radionuclide concentrations in the remediated area (NFS, 2009b). The locations of these formerly contaminated areas are shown in Figure 2-2.

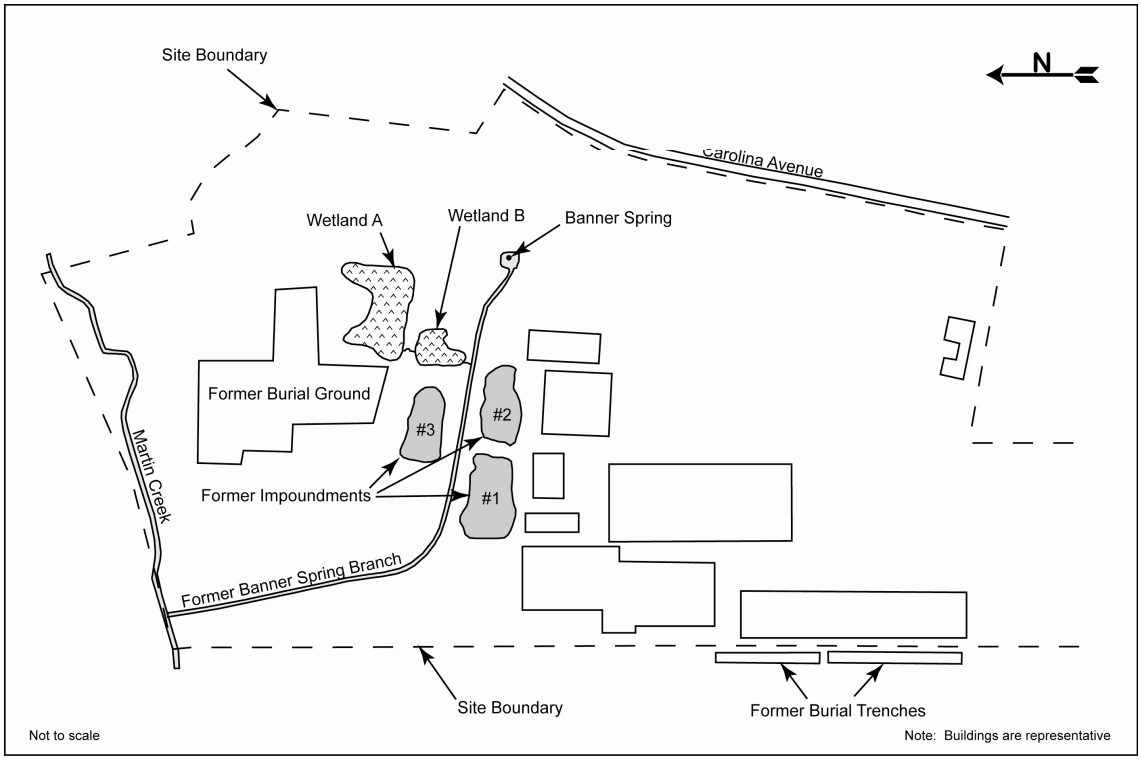

Figure 2-2. Locations of the Formerly Contaminated North Site and Southwest Burial Trench Areas at the NFS Site [adapted from NFS (2010a)]

Another area of on-site contamination is at the site of the former plutonium building (Building 234). NFS previously removed the most highly contaminated equipment and soil (NFS, 2009c). The NRC staff reviewed NFS's plans to continue soil remediation at the site and determined that a decommissioning plan was not required under 10 CFR 70.38(g)(1) for that action. Plutonium contamination levels were below the "significant" threshold, significant airborne contamination was unlikely, and significant releases to the environment were unlikely (NRC, 2010). Therefore, the NRC staff determined that no further environmental review was needed (NRC, 2010). NFS restarted excavation of contaminated soil in December 2010 and currently plans to complete work by the end of 2012 (NFS, 2011a).

2.3 Waste Generated and Waste Management

The processes associated with the activities at NFS will continue to generate gaseous, liquid, and solid wastes during the proposed 40-year license renewal period. This section describes the nature of the wastes generated and NFS' waste management practices.

2.3.1 Effluents to Air

Under the proposed action, continued operations would be expected to generate gaseous effluents. These effluents would come mainly from the process stacks and from fugitive dust. Gaseous effluents from process stacks are currently discharged and discharges are expected to continue in the future in accordance with operating permits issued by the Tennessee Air Pollution Control Board. In addition, gaseous effluents are required to meet NRC radionuclide-specific limits in 10 CFR Part 20, Appendix B. The state-issued air permits identify

thresholds for emission rates for individual pollutants (i.e., maximum concentrations of pollutants that can be released into the environment over certain timeframes). In addition, these permits set conditions such as limiting the hours of operation or the rates that input materials or wastes can be processed. These permit conditions are implemented to control air emissions at levels below the thresholds established in the permit. Proposed changes in facilities may require modification of existing air permits. Fugitive dust would be created from activities associated with ongoing decommissioning and from the removal of contaminated soil at the North Site.

Radioactive particulates and chemicals from the effluents are primarily removed using venturi and demisting scrubbers and high-efficiency particulate air filtration. The scrubbers remove chemical compounds, and the high-efficiency particulate air filters remove particulates before their release through the NFS main stack.

Other filters/scrubbers also are used at the site, including: (i) American Society of Heating, Refrigerating, and Air Conditioning prefilters, which are used on heating, ventilation, and air conditioning recirculation room air handlers; (ii) packed-bed or sieve tray scrubbers that use sodium hydroxide, water, and sulfuric acid as solutions; and (iii) multiple high-efficiency particulate air filters that are used throughout the plant to achieve higher removal efficiencies.

Table 2-1 contains data for non-radiological gaseous pollutants that NFS activities are expected to emit. The table identifies the various pollutants, NFS' estimated annual emission level of each pollutant based on process knowledge, and the annual allowable emission limit as established by TDEC for each pollutant under NFS's operating air permits issued by the State. Emissions are estimated because there is no TDEC or EPA regulatory requirement for monitoring these emissions.

Table 2-1. Estimated and Allowable Annual Emissions (Mass)* of Air Pollutants†

Pollutant	Estimated Emissions	Allowable Emissions
Particulate	0.4 MT [0.5 T]	34 MT [38 T]
Sulfur dioxide	0.04 MT [0.05 T]	28 MT [31 T]
Carbon monoxide	4.1 MT [4.5 T]	5.7 MT [6.3 T]
Volatile organic compounds	1.2 MT [1.3 T]	4.3 MT [4.7 T]
Nitrogen oxides	17 MT [19 T]	52 MT [57 T]
Hydrogen fluoride	0.07 MT [0.08 T]	0.27 MT [0.3 T]
Hydrogen chloride	0.57 MT [0.63 T]	0.8 MT [0.9 T]
Vinyl chloride	0.00009 MT [0.0001 T]	0.009 MT [0.01 T]
Tetrachloroethylene	0.008 MT [0.009 T]	0.19 MT [0.21 T]
Trichloroethylene	0.0005 MT [0.0006 T]	0.05 MT [0.06 T]
Bis-2-ethylhexyphthalate	0.0006 MT [0.0007 T]	0.009 MT [0.01 T]
Mercury	0.0005 MT [0.0006 T]	0.009 MT [0.01 T]
Ammonia	22 MT [24 T]	103 MT [114 T]
Hydrogen	51 MT [56 T]	83 MT [92 T]
Nitric Acid	0.04 MT [0.05 T]	0.38 MT [0.42 T]
Hydrogen sulfide	0.009 MT [0.01 T]	0.018 MT [0.02 T]
Silicon tetrafluoride	0.009 MT [0.01 T]	0.06 MT [0.07 T]

*Metric tons abbreviated as MT, while short tons abbreviated as T.
†Modified from Nuclear Fuel Services, Inc. "Response to the Request for Additional Information Regarding the Environmental Assessment for Nuclear Fuel Services, Inc. Materials License SNM–124 Renewal." Docket No. 70-143. Erwin, Tennessee: Nuclear Fuel Services, Inc. May 2010.

NFS activities produce greenhouse gases (GHGs) (NFS, 2009b). In October 2009, EPA released a final rule that identified a threshold of 25,000 metric tons [27,588 short tons] for mandatory reporting of GHGs from stationary sources (EPA, 2009c). In May 2010, EPA released a final rule implementing a phased approach to monitoring and reporting GHGs by stationary sources and revised the threshold value to 75,000 metric tons [82,672 short tons] and in some cases 100,000 metric tons [110,230 short tons] (EPA, 2010a). Under 40 CFR 98.30, Subpart C of the mandatory reporting of GHGs rule, EPA classifies NFS as a stationary fuel combustion source. As required under this rule, NFS conducted an inventory to determine whether GHG emission levels exceeded the threshold requiring periodic reporting. NFS emits fewer than 25,000 metric tons [27,558 short tons] of CO_2 equivalents (CO_2e) (NFS, 2010a) and is not subject to mandatory reporting requirements at this time. Section 3.4.2 of this EA contains background information on GHGs.

2.3.2 Effluents to Water

Effluents to water are expected to be generated under the proposed action. Activities that contribute to these effluents include: wastewater from Fenton's process, laboratory facilities, laundry facility, fuel production facilities, the commercial development line, the BLEU facility, development laboratories and decommissioning activities (TDEC, 2010b). Waste water from these activities is batch treated and sampled at the Waste Water Treatment Facility (WWTF) then discharged into the Nolichucky River. Prior to discharge, radiological and non-radiological constituents in the waste water must be below limits set forth in 10 CFR Part 20 and in compliance with the facility's National Pollutant Discharge Elimination System (NPDES) permit (see Table 1-1). Generally, pre-discharge treatment involves (i) adjusting the pH level using sodium hydroxide or sulfuric acid and (ii) precipitating and removing fluoride ions and uranium by adding lime slurry [$Ca(OH)_2$]. In addition, ammonia is removed using air stripping, and the pH is readjusted to ensure that the physical and chemical properties of the water to be discharged into the Nolichucky River are within the applicable NPDES limits (NFS, 2009b).

Wastes discharged to the sanitary sewers at NFS come from two sources. The first source is the NFS main facility and includes waste from the onsite bathrooms and showers and the Groundwater Treatment Facility. The Groundwater Treatment Facility treats groundwater collected onsite during ongoing decommissioning and reclamation activities. The second sanitary waste stream comes from the BLEU complex. These wastes consist of noncontact cooling water, treated process waste water, and sanitary sewage. Waste streams from both sources are discharged separately under Erwin Utilities POTW permits 013 and 019 (see Table 1-1). NFS disposal of wastes into the sanitary sewers also must meet the requirements in 10 CFR 20.2003.

The primary pathway for surface runoff across the NFS main plant site is from south to north into Banner Spring Branch, then into Martin Creek (see Figure 2-1), and ultimately into the Nolichucky River (NFS, 2009b). Although Banner Spring Branch was enclosed in 2003, it continues to collect surface runoff through a storm water drainage system that empties into the Banner Spring pipe. Storm water from the BLEU complex drains into a culvert that parallels the northwest plant boundary and empties into Martin Creek. Discharge of storm water from the site is covered under TDEC-issued NPDES storm water permits (see Table 1-1).

NFS main plant storm water discharge data for calendar years 2009 and 2010 are provided in Table 2-2a and Table 2-2b (NFS, 2011a). BLEU Complex storm water discharge data for the calendar years 2007 through 2010 are provided in Tables 2-3a and Table 2-3b. As shown in

Tables 2-2a and 2-3a for the non-radioactive constituents, discharges have been within NPDES permit levels, except for nitrate/nitrite as nitrogen, total recoverable magnesium, and total recoverable aluminum. Elevated levels for these three non-radiological constituents have been documented since at least 1999 (NFS, 1999; 2003). Based on its sampling and analysis, NFS considers that the nitrate/nitrite as nitrogen and total recoverable magnesium levels in the storm water are consistent with naturally occurring background levels in surface water and groundwater in the vicinity of the site. The source of the elevated total recoverable aluminum is not known (NFS, 2003). A recent letter from TDEC to NFS on the NFS NPDES permit renewal application indicates that TDEC may be looking to resolve this issue in the renewed NPDES permit (TDEC, 2010a).

Table 2-2a. 2009–2010 NFS Main Plant Site Storm Water Data (Non-Radiological)

Parameter	Target Concentration Value* (mg/l)	2009 NFS Sample Point A (mg/l)	2010 NFS Sample Point A (mg/l)	2009 NFS Sample Point B (mg/l)	2010 NFS Sample Point B (mg/l)
Chemical oxygen demand	120	68.6	113	117	84.8
pH	<5.0, >9.0	9.0	7.3	8.4	6.7
Total suspended solids	200	19.8	53.2	108	26.4
Nitrate + nitrite nitrogen	0.68	1.29	1.03	0.940	0.715
Ammonia	4	0.182	0.289	0.327	0.209
Total recoverable magnesium	0.0636	4.310	0.00445	3.400	0.00233
Total recoverable aluminum	0.75	1.280	<0.068	1.260	0.469
Total recoverable iron	5.0	0.784	0.574	1.620	0.542
Total recoverable cadmium	0.0159	<0.001	<0.001	<0.001	<0.01
Total cyanide	0.0636	<0.00166	<0.0017	0.00287	<0.0017
Total recoverable lead	0.156	0.00301	<0.0033	0.0072	<0.0033
Total recoverable mercury	0.0024	<0.00007	<0.00007	<0.00007	<0.00007
Total recoverable selenium	0.2385	<0.005	<0.005	<0.005	<0.005
Total recoverable silver	0.0318	<0.001	<0.001	<0.001	<0.001
Total recoverable copper	0.0636	0.0131	0.021	0.0415	0.052

*NFS. ""Supplemental Information to Support Chapter 9 and the Environmental Assessment for Renewal of SNM License 124." Letter (June 24) to Director, Office of Nuclear Materials Safety and Safeguards, NRC, from M.P. Elliot. ML11180A188. Erwin, Tennessee: Nuclear Fuel Services, Inc. 2011a.
†NFS. "National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit for Storm Water Discharges From Industrial Activities." Permit No. TNR050000. Nashville, Tennessee: State of Tennessee. 2002.

Table 2-2b. 2009–2010 NFS Main Plant Site Storm Water Data (Radiological)*				
Parameter	2009 Sample Point A	2010 Sample Point A	2009 Sample Point B	2010 Sample Point B
Isotopic U-234 (pCi/l)	21.6	18.8	40.3	3.72
Isotopic U-235 (pCi/l)	0.659	1.11	1.65	0.161
Isotopic U-238 (pCi/l)	2.72	2.22	0.379	0.173
* NFS. ""Supplemental Information to Support Chapter 9 and the Environmental Assessment for Renewal of SNM License 124." Letter (June 24) to Director, Office of Nuclear Materials Safety and Safeguards, NRC, from M.P. Elliot. ML11180A188. Erwin, Tennessee: Nuclear Fuel Services, Inc. 2011a.				

Table 2-3a. 2007–2010 BLEU Complex Storm Water Data (Non-Radiological)*					
Parameter	Target Concentration Value† (mg/l)	2007 (mg/l)	2008 (mg/l)	2009 (mg/l)	2010 (mg/l)
Nitrate + nitrite nitrogen	0.68	0.69	4.09	0.82	0.825
Total recoverable magnesium	0.0636	4.07	0.47	1.21	1.34
Total recoverable aluminum	0.75	2.29	0.109	0.281	0.352
Total recoverable iron	5	1.71	0.103	0.22	0.276
Total recoverable copper	0.0636	0.0037	0.00368	0.00804	0.0096
* NFS. ""Supplemental Information to Support Chapter 9 and the Environmental Assessment for Renewal of SNM License 124." Letter (June 24) to Director, Office of Nuclear Materials Safety and Safeguards, NRC, from M.P. Elliot. ML11180A188. Erwin, Tennessee: Nuclear Fuel Services, Inc. 2011a. †NFS. "National Pollutant Discharge Elimination System (NPDES) Multi-Sector General Permit for Storm Water Discharges From Industrial Activities." Permit No. TNR050000. Nashville, Tennessee: State of Tennessee. 2002.					

Table 2-3b. 2007–2010 BLEU Complex Storm Water Data (Radiological)*				
Parameter	2007	2008	2009	2010
Isotopic U-234 (pCi/l)	<0.330	<0.408	<0.638	0.308
Isotopic U-235(pCi/l)	<0.451	<0.315	<0.0656	0.301
Isotopic U-238(pCi/l)	<0.330	<0.408	<0.638	0.132
* NFS. ""Supplemental Information to Support Chapter 9 and the Environmental Assessment for Renewal of SNM License 124." Letter (June 24) to Director, Office of Nuclear Materials Safety and Safeguards, NRC, from M.P. Elliot. ML11180A188. Erwin, Tennessee: Nuclear Fuel Services, Inc. 2011a.				

2.3.3 Solid Waste Management

Under the proposed action, generation of radioactive, mixed, hazardous, and nonhazardous solid wastes is expected to continue. These wastes would be managed by a combination of onsite processing, permitted onsite storage, offsite disposal, and recycling. NFS has estimated

the amounts of solid wastes that would be produced for the proposed 40-year license renewal period (NFS, 2010a)[1].

NFS produces radioactive solid waste, which is nonhazardous waste that is radioactive. Examples of radioactive wastes include process wastes and radioactively contaminated soil and sediment. This waste is packaged and sent to a licensed low-level radioactive waste facility for disposal. Currently, NFS sends waste to both the Nevada Test Site in Nye County, Nevada and to the EnergySolutions waste disposal facility in Clive, Utah. Another facility that accepts low-level radioactive waste for disposal is the Waste Control Specialists LLC (WCS) site, in Andrews, Texas. However, the WCS site is authorized only to accept such wastes from the Texas Compact (currently Texas and Vermont), and therefore, disposal of low-level radioactive waste from NFS at the WCS site would require approval of the Texas Compact Commission (TCEQ, 2011). For the proposed 40-year license renewal period, NFS estimates that the facility would produce approximately 132,000 m^3 [172,000 yd^3] of radioactive decommissioning waste, 28,000 m^3 [36,000 yd^3] of radioactive waste from commercial operations, and an additional 30 m^3 [39 yd^3] from other operational activities for a total of approximately 160,000 m^3 [208,000 yd^3] (NFS, 2010a).

NFS produces hazardous waste (i.e., waste that poses substantial or potential threats to public health or the environment based on the waste's ignitability, reactivity, corrosivity, and toxicity). Examples of hazardous wastes include solid process wastes containing polychlorobenzene and tetrachloroethylene and laboratory wastes. Under the proposed action, NFS estimates the volume of hazardous waste generated to be 84 m^3 [110 yd^3] over 40 years of continued operations. NFS temporarily stores this type of waste onsite and then ships it offsite to an authorized treatment, storage, or disposal facility.

NFS also produces mixed waste, which is hazardous waste that is also radioactive. Currently, NFS is storing 51 containers of mixed waste at the site containing a total of 10.03 m^3[13.12 yd^3] of waste (NFS, 2011a). Under NFS' current hazardous waste management permit with TDEC, NFS is authorized to store onsite 107.03 m^3 [140 yd^3] of mixed waste (NFS, 2011a). For the proposed 40-year renewal period, NFS estimates that it would produce 210 m^3 [270 yd^3] of mixed waste. Presently, there is no permitted disposal facility for mixed waste. NFS has a Hazardous Waste Management Facility permit (issued by TDEC, Division of Solid Waste Management) and a Solid Waste Management Act permit (issued by EPA) (see Table 1-1) that allow the facility to store specific kinds of mixed waste in onsite containers until a permitted disposal facility is available. The mixed waste consists primarily of radioactive waste contaminated with mercury from laboratory operations. A smaller portion of the mixed waste consists of radioactively contaminated lead, pyridine, and tetrachloroethylene. NFS also stores polychlorinated biphenyl (PCB) liquid waste that is radioactively contaminated, and this type of waste is no longer expected to be produced.

Finally, NFS generates nonhazardous solid waste. Examples of this type of waste produced at the NFS site include waste oil and paper. For the proposed 40-year renewal period, NFS estimates the volume of nonhazardous solid waste to be 410 m^3 [530 yd^3]. All of these

[1]Some of the NFS estimates of solid waste generation volumes were provided in gallons and were converted to cubic yards and cubic meters for consistency with solid volume measurements. Waste volumes generated for alternative action (10-year license renewal) would be approximately 25 percent of the volumes estimated for the 40-year license renewal. Similarly, annual waste volumes can be approximated by dividing the 40-year values by 40.

materials are recycled and/or disposed of at appropriate facilities such as landfills and recycling centers.

2.3.4 Transportation

Under the proposed action, facility-related transportation activities involving local roads (e.g., commuting workers, shipments of supplies, products, and waste materials) would continue. Table 2-4 provides the magnitude of these road transportation activities associated with current operations. In addition to road transportation, NFS uses the CSX rail line adjacent to the facility to support licensed activities including radioactive waste shipments.

Table 2-4. Estimated Vehicle Traffic Associated With NFS Activities

Cargo	Estimated One-Way Vehicle Traffic	Units	Remarks
Employee Commuting	1,658	Daily	829 NFS Employees in the Region of Influence*; Two Trips Per Day Per Employee Assumed
Radioactive Materials Shipments	267	Annually	NFS Estimate†
Hazardous Materials Shipments	74	Annually	NFS Estimate†
Nonhazardous Shipments	204	Annually	NFS Estimate†
Partial Site Decommissioning Wastes	1,732	For 40-Year Renewal Period	NFS Estimate†

*NFS. "Environmental Report." SNM License No. 124. Docket No. 70-143. Erwin, Tennessee: NFS. May 2009.
†NFS. "Response to the Request for Additional Information Regarding the Environmental Assessment for Nuclear Fuel Services, Inc. Material License SNM–124 Renewal." Letter (May 27) to Director, NMSS (NRC) from M. Elliott. Erwin, Tennessee: NFS. 2010.

2.4 Monitoring Programs

NFS conducts two environmental radiological monitoring programs to address offsite impacts of its site operations. These programs include sampling and analysis of effluents at and prior to discharge as well as sampling and analysis of various environmental media at offsite locations.

2.4.1 Environmental Radiological Monitoring Program

As discussed in Section 2.3, NFS releases both gaseous and liquid effluents to the environment. NFS has in place effluent control systems to reduce the levels and concentrations of radiological and non-radiological constituents in those effluents. These control systems include scrubbers and air filtration filters, pre-discharge treatment of liquid effluents, and action levels set by NFS to meet the ALARA requirements and the annual public dose limits in 10 CFR Part 20 (NFS, 2009a).

NFS also regularly samples and analyzes its gaseous and liquid effluents. NFS continuously samples all process stacks and vents with the potential to release airborne radioactivity at concentrations greater than or equal to 10 percent of the values in 10 CFR Part 20, Appendix B, Table 2, Column 1. NFS analyzes the samples for gross alpha and gross beta radioactivity.

Prior to discharge of treated waste water from the WWTF, NFS samples each batch and analyzes for gross alpha and gross beta radioactivity. NFS also takes a monthly composite sample and analyzes it for isotopes of uranium. NFS may analyze for other radionuclides if materials in addition to uranium are suspected to be present in the waste water at levels exceeding 10% of the concentration values in 10 CFR Part 20 (Appendix B, Table 2, Column 2) (NFS, 2009a). NFS discharges the effluents to the river if the radiological and non-radiological constituents in the effluents are below the NPDES permit limits and the constraints set forth in 10 CFR Part 20.

Additionally, NFS continuously samples wastes discharged into the sanitary sewer and analyzes these samples daily for gross alpha and gross beta radiation, and monthly for isotopic uranium. NFS collects grab samples of sludge quarterly at the Erwin POTW and analyzes for isotopic uranium to ensure radionuclides do not build up in the sewer sludge.

Table 2-5 lists the radionuclides expected in airborne and liquid effluents from the NFS site. Table 2-6 provides a summary of the NFS environmental radiological monitoring program.

Table 2-5. Regulatory Limits* for Monitored Radionuclides† in Effluents from the NFS Site‡

Radionuclide	Air Effluents (µCi/ml)	Liquid Effluents (µCi/ml)
Na-22	NM§	6×10^{-6}
Tc-99	8×10^{-9}	6×10^{-5}
Cs-137	NM	1×10^{-6}
Pb-212	NM	2×10^{-6}
Ra-224	NM	2×10^{-7}
Th-228	2×10^{-14}	2×10^{-7}
Th-230	2×10^{-14}	1×10^{-7}
Th-231	9×10^{-9}	5×10^{-5}
Th-232	4×10^{-15}	3×10^{-8}
U-232	1×10^{-14}	6×10^{-8}

Table 2-5. Regulatory Limits* for Monitored Radionuclides† in Effluents from the NFS Site‡		
Radionuclide	**Air Effluents (µCi/ml)**	**Liquid Effluents (µCi/ml)**
U-233	5×10^{-14}	3×10^{-7}
U-234	5×10^{-14}	3×10^{-7}
U-235	6×10^{-14}	3×10^{-7}
U-236	6×10^{-14}	3×10^{-7}
U-238	6×10^{-14}	3×10^{-7}
Np-237	NM	2×10^{-8}
Pu-238	2×10^{-14}	2×10^{-8}
Pu-239	2×10^{-14}	2×10^{-8}
Pu-240	2×10^{-14}	2×10^{-8}
Pu-241	8×10^{-13}	1×10^{-6}
Am-241	2×10^{-14}	2×10^{-8}

*Limits from 10 CFR Part 20 Appendix B
†NFS. "Biannual Effluent Monitoring Report July Through December 2009." Letter (February 22) to Director, Office of Nuclear Material Safety & Safeguards, NRC from D.C. Ward. ML100700519. Erwin, Tennessee: NFS. 2010.
‡Air monitoring was reported for Ac-228 and Pa-234m during 2005 and 2006. Monitoring was reported for Ac-227 in air during 2004 and 2005 and in water during 2005 and 2006. Monitoring was reported for Pa-231 in water during 2005 and 2006.
§NM = Not monitored at NFS, although regulatory limits exist for these radionuclides

Table 2-6. Summary Table of Environmental Radiological Monitoring Program*		
Sampling Point or Media	**Sample Type / Frequency**	**Parameters Analyzed**
Surface Water		
Martin Creek Upstream of Banner Spring Confluence	Grab/Quarterly	Gross Alpha Gross Beta
Martin Creek Downstream of Banner Spring Confluence	Grab/Weekly	Gross Alpha Gross Beta
Nolichucky River Upstream of Outfall 001	Grab/Quarterly	Gross Alpha Gross Beta
Nolichucky River Downstream of Outfall 001	Grab/Quarterly	Gross Alpha Gross Beta
Process Waste Water		
Waste Water Treatment Facility	Grab/Each batch	Gross Alpha Gross Beta
	Composite/Monthly	Isotopic U
NFS Sanitary Sewer	Continuous/Daily	Gross Alpha Gross Beta
	Composite/Monthly	Isotopic U
	Composite/Monthly	Insoluble Radioactivity
Blended Low-Enriched Uranium	Continuous/Daily	Gross Alpha

Complex Sanitary Sewer		Gross Beta
	Composite/Monthly	Isotopic U
	Composite/Monthly	Insoluble Radioactivity
Environmental Media		
Sludge (Erwin POTW)	Grab/Quarterly	Isotopic U

Table 2-6. Summary Table of Environmental Radiological Monitoring Program* (continued)		
Sampling Point or Media	**Sampling Point or Media**	**Sampling Point or Media**
Storm Water Pathway		
Banner Spring Branch	Grab/Quarterly	Gross Alpha Gross Beta Isotopic U
Perimeter North West Ditch	Grab/Quarterly	Gross Alpha Gross Beta Isotopic U
* NFS. "Revised Chapter 9 for renewal of License SNM-124." SNM License No. 124. Docket No. 70-143. Erwin, Tennessee: NFS. September 30, 2011. 2011c		

In accordance with 10 CFR 70.59, NFS submits semiannual effluent monitoring reports to NRC that specify the quantities of radionuclides released to unrestricted areas in gaseous and liquid effluents in the previous six months of operation and provide estimates of radiation doses to the public from those effluents.

2.4.2 Environmental Radiological Surveillance Program

NFS also samples ambient air, surface water, soil, sediment, vegetation and groundwater as part of its environmental surveillance program. The purpose of the program is to provide (1) additional validation for the environmental monitoring program; (2) early detection of trends in environmental data; and (3) additional data in the event of an offsite release of radioactive material (NFS, 2009a). Table 2-7 provides a summary of this program.

Table 2-7. Summary Table of Environmental Radiological Surveillance Program*		
Sampling Point or Media	**Sample Type / Frequency**	**Parameters Analyzed**
Ambient Air	Continuous/Weekly	Gross Alpha Gross Beta
	Composite/Quarterly	Isotopic U
	Composite/Annually	Isotopes of concern
Soil	Grab/ Quarterly	Gross Alpha Gross Beta
Silt/Sediment	Grab/ Quarterly	Gross Alpha Gross Beta
Vegetation	Grab/ Quarterly	Gross Alpha Gross Beta
Groundwater	Grab/ Quarterly	Gross Alpha Gross Beta
* NFS. "Revised Chapter 9 for renewal of License SNM-124." SNM License No. 124. Docket No. 70-143. Erwin, Tennessee: NFS. September 30, 2011. 2011c		

The approximate air, soil, and vegetation sampling locations are shown in Figure 2-1. NFS collects sediment samples along streams potentially affected by site operations. In accordance with a license condition, NFS collects groundwater samples from one upgradient well and ten downgradient wells.

NFS also has placed environmental dosimeters at onsite and offsite locations to monitor ambient external radiation doses. NFS uses the dosimeter data to monitor external dose rates in unrestricted areas, to determine doses to members of the public, and to demonstrate compliance with the dose limits in 10 CFR Part 20 (NFS, 2009a).

2.5 Employment

The number of individuals NFS employed between 2004 and 2009 is provided in Table 2-8, along with NFS's projections of annual employment for the years 2020 and 2050. As shown, NFS annual employment levels increased between 2004 and 2009, and NFS anticipates modest changes in employment levels at the site with a loss or gain of employment on the order of 150 employees over the next 40 years (NFS, 2010a). Table 2-9 provides the distribution of NFS employees by county of residence. Most NFS employees reside in Washington and Unicoi Counties in Tennessee. The average income for NFS employees in 2005 was $95,613 including benefits and $57,032 excluding benefits (NFS, 2009b).

Table 2-8. NFS Annual Employment From 2004 to 2009 With Projections to 2050

Year	Number of Employees
2004	715*
2005	711*
2006	695*
2007	730*
2008	831*
2009	829†
2020	680–980‡
2050	680–980‡

*NFS. "Environmental Report." SNM License No. 124. Docket No. 70-143. Erwin, Tennessee: NFS. May 2009.
†NFS. "NFS Facts." <http://www.nfsfacts.com/facts.html> Erwin, Tennessee: NFS. 2009. (April 2010).
‡ NFS. "Response to the Request for Additional Information Regarding the Environmental Assessment for Nuclear Fuel Services, Inc. Materials License SNM-124 Renewal." Docket No. 70-143. Erwin, Tennessee: NFS. 2010.

Table 2-9. NFS Employee Distribution by County of Residence*

Region	Year 2001	Year 2009	Change
Washington County	264	356	+92
Unicoi County	252	249	−3
Carter County	52	116	+64
Sullivan County	44	50	+6
Greene County	NA†	17	NA†

Table 2-9. NFS Employee Distribution by County of Residence*			
Region	**Year 2001**	**Year 2009**	**Change**
Other‡	NA†	33	NA†
Total in the Region of Influence	612	788	+176
Total Number of Employees	653	829	+176

*NFS. "NFS Facts." <http://www.nfsfacts.com/facts.html> Erwin, Tennessee: NFS. 2009. (April 2010).
†NA: Not Available.
‡Includes other Tennessee Counties, North Carolina, and Virginia.

2.6 Anticipated Changes to Facility Over the 40-Year Licensing Period

Because the availability of funds fluctuates with the renewal of existing contracts and obtaining new contracts, NFS does not plan for substantive maintenance activities beyond 5–10 years. NFS infrastructure replacements and improvements planned during the next 5 years include (NFS, 2010a):

(1) Replace the Building 105 lab heating, ventilation, and air conditioning system;
(2) Replace the WWTF ammonia stripping tower;
(3) Replace section(s) of the fire water supply line;
(4) Replace the 134/134A electrical substations;
(5) Construct a new shipping/receiving warehouse;
(6) Construct a new entry/exit control point;
(7) Construct new parking areas;
(8) Complete the construction of security barrier walls;
(9) Replace the process ventilation fans and Building 308 fan house;
(10) Replace the main process ventilation stack; and
(11) Construct a new pipe bridge to relocate piping and utilities off Building 111.

NFS plans to construct a retention pond to control storm water drainage during excavation and site preparation for the new warehouse, entry/exit control point, and parking areas (Items 5, 6, and 7, which relate to the physical protection and safeguarding of licensed materials). Potential impacts from these construction activities would be controlled in accordance with the State of Tennessee storm water permit requirements.

Prior to making any such change to the site, structures, processes, systems, equipment, components, computer programs, or personnel activities, NFS must determine in accordance with 10 CFR 70.72 whether an amendment to the NRC license is required at that time. In cases where a license amendment is required, NFS will submit the request to NRC and the NRC staff will perform an environmental review and a safety analysis at that time.

3.0 AFFECTED ENVIRONMENT

3.1 Land Use

The NFS site is located in Unicoi County, Tennessee (Figure 3-1), within the southwestern town limits of Erwin, on Banner Hill Road and Carolina Avenue as shown in Figure 2-1. The facility is bounded on the north by Martin Creek, on the south by residential properties along Carolina Avenue, on the southwest by Banner Hill Road, and on the northwest by the CSX railroad tracks. Interstate 26 is located beyond the railroad, northwest of the NFS property and less than 1.6 km [1 mi] from the site boundary.

NFS owns approximately 28 ha [70 acres]. About 80 percent of this acreage is used for process buildings, warehouses, offices, parking lots, and waste management areas (Table 3-1), with about 10 ha [24 acres] found within the fenced Plant Protected Area (NFS, 2009a). The remaining 20 percent of the acreage comprises open fields and undeveloped woodlands and shrub swamp. Since the last license renewal in 1999, NFS constructed the BLEU facility in 2002, comprising about 2.0 ha [5 acres] on the southern portion of the site (NRC, 2002). NFS indicates that there has been no additional change in land use within the site (NFS, 2009a,b) since 1999.

Land use within 1.6 km [1 mi] of the NFS site consists of a mix of residential, commercial, industrial, and agricultural activities (NFS, 2009b; ATSDR, 2007). The surrounding land is dominated by residential areas (Table 3-2), and about 2,800 people live within 1.6 km [1 mi] of the NFS site (NFS, 2010a).

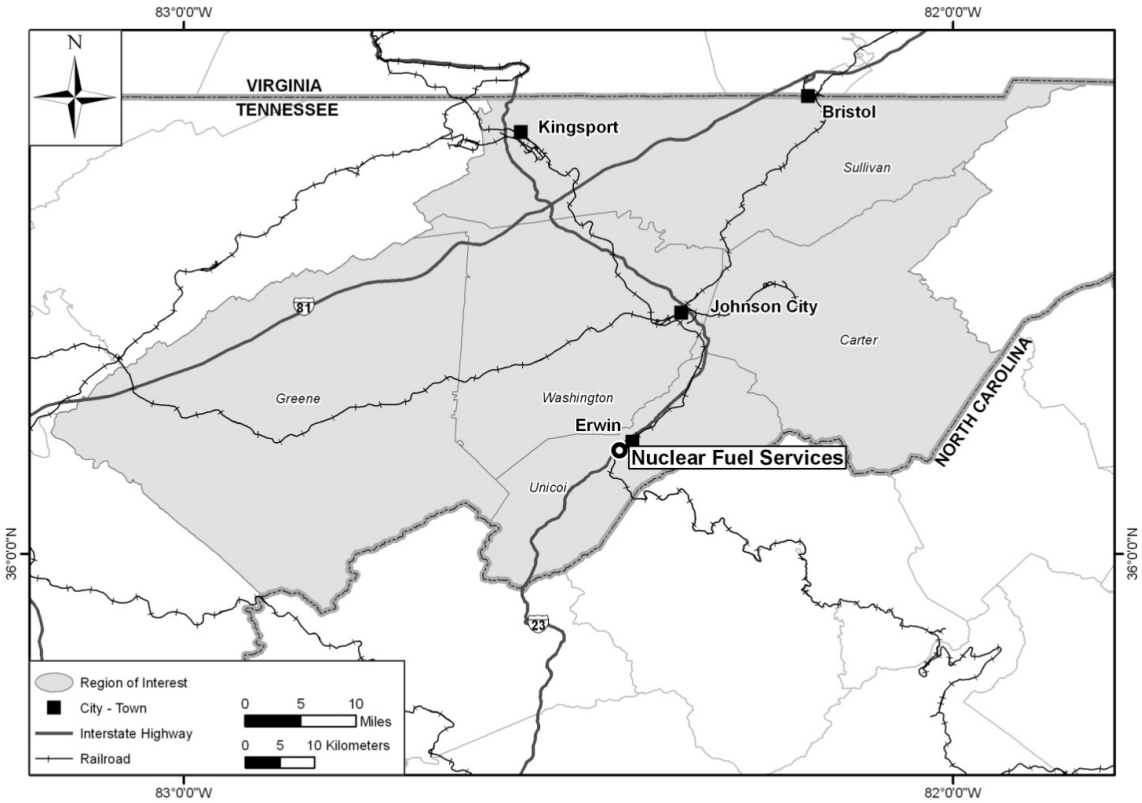

Figure 3-1. Map Showing Major Transportation Routes, Including Rail Routes and the Five Counties in the Region of Influence in the Vicinity of the NFS Site

Table 3-1. Land Use on the NFS Site*		
Use	**Size ha [acres]**	**Percent of Site**
Buildings and grounds	14.1 [34.7]	49.6
Remediated waste pond and solid waste burial ground areas	4.7 [11.6]	16.6
Woods, brush, and shrub swamp	4.2 [10.5]	15.0
Parking lots	3.9 [9.6]	13.8
Open fields	1.4 [3.5]	5.0
Total	28.3 [69.9]	100.0
*NFS. "Environmental Report." SNM License No. 124. Docket No. 70-143. Erwin, Tennessee: NFS. May 2009.		

Table 3-2. Land Use Within 1.6 km [1 mi] of the NFS Site*	
Land Use Category	**Percent of Area**
Residential	91.4
Commercial	5.9
Industrial	1.6
Farmlands	0.8
Mountainous forest	0.2
Total	100
*NFS. "Environmental Report." SNM License No. 124. Docket No. 70-143. Erwin, Tennessee: NFS. May 2009.	

Agricultural products in Unicoi County include vegetables, potatoes, berries, and tree fruit, as well as livestock, poultry, and dairy production (U.S. Department of Agriculture, 2009). Agricultural production in the county in terms of both market value and the total number of farms has declined since 2002 (U.S. Department of Agriculture, 2009). Residential vegetable gardens are common (NFS, 2009b). The Erwin State Trout Hatchery, which produces and breeds rainbow trout for distribution (Tennessee Wildlife Resources Agency, 2009) is located approximately 183 m [600 ft] upgradient of groundwater flow of the NFS site. In addition, the Erwin National Fish Hatchery (USFWS, 2007) produces fertilized and incubated trout eggs approximately 5.5 km [3.4 mi] upgradient from the site.

Currently, Unicoi County has 26 manufacturing companies, all of which are located within Erwin, Tennessee. The companies with the largest number of employees are NFS, Specialty Tires of America Inc., NN Inc., Vesuvius USA Corp., and Impact Plastics Corporation. Four of these companies (except for NFS) manufacture tires, metals, ceramic fibers and silica shrouds, and plastics (Tennessee Department of Economic and Community Development, 2009). Riverview Industrial Park, located across the railroad tracks on the west side of the NFS site, houses industrial facilities including AB Plastics, Impact Plastics Corporation, and Preston Tool and Mold. In addition, NFS stages low-level radioactive waste containers in a warehouse on property it owns at Riverview Industrial Park, prior to shipping the waste to the disposal site via railroad. The waste containers are packed and sealed at other locations before they are placed in the warehouse for storage. The CSX railroad tracks and Interstate 26 lie to the north and west as shown in Figure 2-1 (CSX, 2008). CSX Transportation, Inc. recently completed expansion of its Erwin terminal to accommodate anticipated increases in bulk freight shipments (CSX, 2008). Other nearby industrial facilities include Studsvik, a low-level radioactive waste processing facility licensed by the State of Tennessee, which is located adjacent to the NFS site southern boundary. The Nolichucky River, located approximately 100 m [330 ft] north and west of the site boundary, is used primarily for recreational purposes such as whitewater rafting,

canoeing, and fishing (Unicoi County, 2010a). The 9.6-km [6-mi] long Erwin Linear Trail, which runs parallel to the river and on the same side of the river as the NFS site, offers opportunities for walking, hiking, bicycling, arts and craft shows, and outdoor concerts (Unicoi County, 2010a).

3.2 Transportation

The main NFS site is accessed by roads. In addition, a warehouse in the Riverside Industrial Park has access to a CSX rail line. Carolina Avenue and Jackson Love Highway carry traffic from the plant to Interstate Highway 26 [a distance of approximately 2.6 km (1.6 mi)]] and to the broader national interstate highway system (Figures 2-1 and 3-1). Table 3-3 provides average annual daily traffic counts for roads near the NFS site. NFS uses the rail line to support licensed activities including radioactive waste shipments.

Table 3-3. Average Annual Daily Traffic Counts Near the NFS Site*

Road and Location	2005	2006	2007	2008	2009	2010
Jackson Love Highway Between Carolina Avenue and Interstate 26, Erwin	8,388	7,793	7,989	7,604	7,573	7,224
South Main Avenue at Tucker Street, Erwin	9,598	8,412	8,047	7,560	7,235	7,358
State Highway 107 Between North Main Avenue and Interstate 26, Erwin	6,935	6,138	6,080	5,804	6,026	6,192
North Main Avenue Between 5th and 6th Streets, Erwin	10,724	8,977	8,387	8,272	8,089	8,332
Interstate 26 West of Erwin	13,537	14,403	15,964	16,230	17,462	18,951

*Tennessee Department of Transportation. "Traffic History GIS Map Interface Data for Unicoi County from 1985 Through 2010." Nashville, Tennessee: Tennessee Department of Transportation. 2010. <http://ww3.tdot.state.tn.us/traffichistory/> (14 April 2010).

Several businesses are located in the close vicinity to NFS. As discussed in Section 3.1, Riverview Industrial Park houses AB Plastics, Impact Plastics Corporation, and Preston Tool and Mold. In addition, the Studsvik facility is located adjacent to the NFS site. In 2008, these companies and others in the Riverview Industrial Park employed 284 individuals (Tennessee Department of Economic Development, 2009). In 2008, this level of annual average daily traffic represented approximately 3 to 5 percent of the traffic on the Erwin road segments and 2 percent of the traffic on the segment of Interstate 26 traffic identified in Table 3-3.

3.3 Socioeconomics and Environmental Justice

This section discusses socioeconomic conditions for the local region surrounding the NFS site. As shown in Figure 3-1, the local region includes five counties in Tennessee—Carter, Greene, Sullivan, Unicoi (location of the NFS site), and Washington. These counties are more likely to experience socioeconomic impacts given the location of the NFS site and that most NFS employees live in one of these counties, as shown in Table 2-9. Thus, these counties comprise the region of influence (ROI) for the socioeconomic analysis. Less than 5 percent of NFS employees reside in North Carolina; therefore, no North Carolina counties were included in the

ROI. Socioeconomic factors include demographics (the distribution of the population in the ROI), employment information (the number of persons employed and unemployed), income, housing, and education.

3.3.1 Demographics

Demographics for the counties of interest are based on the 2010 U.S. Census and information from the Tennessee Advisory Commission on Intergovernmental Relations. Table 3-4 contains the population distribution for each county, the State of Tennessee, and the towns of Johnson City and Erwin. The two towns were selected because the NFS site is located in Erwin and because Johnson City is the largest city near NFS.

Table 3-4. Population Characteristics for the Region of Influence*

Region	2000 Population Census	2010 Population Census	2000 to 2010 Percent Change	2030 Population Projection	Change in Population from 2010 to 2030
Carter County	56,740	57,424	+1.2%	67,816†	+18.1%
Greene County	62,909	68,831	+9.4%	73,024†	+6.1%
Sullivan County	153,050	156,823	+2.5%	143,378†	−8.5%
Unicoi County	17,669	18,313	+3.7%	17,561†	−4.1%
Washington County	107,198	122,979	+14.7%	137,005†	+11.4%
Total Region of Influence	397,566	424,370	+6.7%	438,784	+3.4%
State of Tennessee	5,689,270	6,346,105	+11.5%	7,380,634	+16.3%
Johnson City	55,469	59,866‡	+7.9%	70,353‡	+17.5%
Erwin	5,610	5,778**	+3.0%	6,339§	+9.7%

*U.S. Census Bureau. "State and County Quick Facts." 2011. <http://quickfacts.census.gov> (11 October 2011).
†Tennessee Advisory Commission on Intergovernmental Relations (TACIR). 2009. <http://www.state.tn.us/tacir/ population.html> (23 March 2010).
‡Based on 2006 population estimate.
§Unicoi County Regional Planning Commission. "Unicoi County Tennessee Land Use and Transportation Plan 2008–2020." Unicoi, Tennessee: Unicoi County Regional Planning Commission. 2008.
** U.S. Census Bureau."ACS Demographic and Housing Estimates: 2005-2009" 2011. <http://factfinder.census.gov>

Sullivan County, which contains the cities of both Bristol and Kingsport (Figure 3-1), is currently the most heavily populated county and is projected to remain so through 2030. Washington County is expected to show the largest increased percentage change in population as projected from 2000 through 2030. The least populated county is Unicoi County, where the NFS site is located, and the county's population is expected to decline slightly from 2008 to 2030.

Overall, the estimated change in population for the counties of interest was much lower than the projected change in population for Tennessee from 2000 to 2030. This indicates that the ROI for this analysis is growing more slowly than the state population.

Selected racial characteristics for the ROI are presented in Table 3-5. The U.S. Census Bureau defines race as a self-identification data item with which individuals most closely identify themselves. The data in Table 3-5 show low diversity in the five counties of interest, with the majority of the population identified as white. The data show that the racial characteristics for the ROI differ from those of the State of Tennessee as a whole.

Table 3-5. 2010 Racial Characteristics for the Region of Influence*

Region	White	African American	Native American	Two or More Races†	Asian	Native Hawaiian and Other Pacific Islander
Washington County Percent of Total‡	91.6%	3.9%	0.3%	1.7%	1.2%	<0.1%
Unicoi County Percent of Total‡	95.8%	0.2%	0.2%	1.1%	0.2%	<0.1%
Carter County Percent of Total‡	96.4%	1.3%	0.2%	1.2%	0.3%	<0.1%
Sullivan County Percent of Total‡	95.1%	2.1%	0.3%	1.3%	0.6%	<0.1%
Greene County Percent of Total‡	95.0%	2.0%	0.2%	1.2%	0.4%	<0.1%
Johnson City Percent of Total‡§	90.1%	6.4%	0.3%	1.3%	1.2%	<0.1%
Erwin Percent of Total‡§	97.8%	0.1%	0.3%	0.8%	0.1%	<0.1%
Tennessee Percent of Total‡	77.6%	16.7%	0.3%	1.7%	1.4%	0.1%

*U.S. Census Bureau. "U.S. Census Bureau State and County Quickfacts." 2011. <http://quickfacts.census.gov> (17 October 2011).
†Includes all other responses not included in the "White," "Black or African American," "American Indian and Alaska Native," "Asian," and "Native Hawaiian or Other Pacific Islander" race categories listed above. Includes multiracial, mixed, interracial, or a Hispanic/Latino group (for example, Mexican, Puerto Rican, or Cuban).
‡Percent of total may not total 100 due to rounding.
§Based on 2000 data.

3.3.2 Employment Information

Employment information for the ROI (i.e., the number of persons employed and unemployed) is shown in Table 3-6 for the counties in the ROI and the State of Tennessee. Within the ROI, Sullivan and Washington Counties have had the highest labor force populations. However, the overall ROI experienced an increase in unemployment from 2008 to 2010. The 2008 and August 2010 unemployment rates show Greene County had the highest unemployment rate of the counties in the ROI. Overall, the unemployment rate in the ROI is consistent with the state unemployment rate.

Table 3-6. Employment Structure by County Within the Region of Influence*						
Region	2008 Labor Force Population	2008 Number of Persons Unemployed	2008 Percent Unemployed	August 2010 Labor Force Population†	August 2010 Number of Persons Unemployed†	August 2010 Percent Unemployed†
Washington County	61,618	3,372	5.5%	63,100	5,310	8.4%
Unicoi County	8,480	610	7.2%	8,460	770	9.1%
Carter County	29,781	1,917	6.4%	30,210	2,890	9.6%
Sullivan County	74,358	3,841	5.2%	75,640	6,010	7.9%
Greene County	30,370	2,773	9.1%	30,130	3,890	12.9%
Tennessee	3,050,000	204,000	6.7%	2,777,100	295,200	9.6%
Total region of influence	204,607	12,513	6.1%	207,540	18,870	9.1%

*U.S. Bureau of Labor Statistics, 2008. <http://www.bls.gov/news.release/history/srgune_02232001.txt> and <http://ftp.bls.gov/pub/special.requests/la/laucnty08.txt, http://ftp.bls.gov/pub/special.requests/la/laucnty00.txt> (24 March 2010).
†Tennessee Department of Labor and Workforce Development, 2010. <http://www.tennessee.gov/labor-wfd/labor_figures/aug2010county.pdf> (October 8, 2010).

3.3.3 Income

Income information from U.S. Census Bureau data, including income and poverty levels for the affected environment, based on data collected from state and county levels, is presented in Table 3-7 for each county in the ROI, for the State of Tennessee, and for Johnson City and Erwin. The U.S. Census Bureau defines poverty using a set of money income thresholds that vary by family size and composition to determine who is in poverty. If a family's total income is less than the family's threshold, then that family and every individual in it is considered in poverty.

Table 3-7. Economic Data by County, State, and City Within the Region of Influence*					
Region	2006–2008 Median Household Income	2006–2008 Median Family Income	2006–2008 Families Below Poverty Level (Percentage)	2006–2008 Per Capita Income	2006–2008 Individuals Below Poverty Level† (Percentages)
Carter County	$33,082	$40,696	16.9	$17,847	21.6
Greene County	$36,192	$42,381	15.8	$18,237	19.6
Sullivan County	$40,377	$52,108	11.3	$23,667	14.8
Unicoi County	$29,863	$36,871	8.7	$28,420 (2007)	13.1
Washington County	$41,023	$52,676	10.1	$23,621	15.2
State of Tennessee	$43,662	$53,653	11.9	$24,094	15.7
Johnson City	$38,205	$53,474	12.5	$24,624	19.2

Table 3-7. Economic Data by County, State, and City Within the Region of Influence*					
Region	2006–2008 Median Household Income	2006–2008 Median Family Income	2006–2008 Families Below Poverty Level (Percentage)	2006–2008 Per Capita Income	2006–2008 Individuals Below Poverty Level† (Percentages)
Erwin‡	$29,644	$37,813	7.5	$28,420 (2007)	13.0

*U.S. Census Bureau. "U.S. Census Bureau American Fact Finder." 2010. <http://factfinder.census.gov> (27 March 2010).
† ‡Tennessee Department of Economic and Community Development. "Tennessee Community Data Sheet: Erwin." Erwin, Tennessee: Tennessee Department of Economic and Community Development. 2010.

The median household income in the ROI in 2006–2008 was below that of the state, with the highest income in Washington County. The percentage of families and persons living below the poverty level in the ROI in 2006–2008 was the highest in Carter and Greene Counties. Both of these counties had higher percentages of people living below the poverty level than did the state as a whole.

3.3.4 Education

Education information is discussed for Unicoi and Washington Counties, and for the towns of Erwin and Johnson City, Tennessee, as the number of NFS employees is concentrated in these areas.

Unicoi County currently has four elementary schools, one middle school, and one high school. All of these schools are located in Erwin (Unicoi County School District, 2010). Currently, the total school population for Erwin is 2,264 students with a student-to-teacher ratio of 16-to-1 (Local School Directory, 2010a).

Washington County currently has 10 elementary schools, 2 middle schools, and 3 high schools (Washington County School District, 2010). Johnson City currently has 15 public schools.

There are approximately 8,955 students in Johnson City, with a student-to-teacher ratio of 15-to-1 (Local School Directory, 2010b).

3.3.5 Environmental Justice

In 2004, NRC published a final policy statement on the treatment of environmental justice (EJ) matters in NRC regulatory and licensing actions (NRC, 2004). The policy statement provides that one of the first steps in the EJ analysis is to identify the geographic area for which to obtain demographic information. Current staff guidance in NUREG–1748 (NRC, 2003), which the 2004 policy statement affirms, provides that the potentially affected area is normally determined to be within a 1.0-km [0.6-mi] radius of the center of the proposed site in urban areas and 6.4 km [4 mi] if the facility is located in a rural area. NFS is considered to be located in an urban area. Once the potentially affected area is identified, demographic data for the area are collected from the U.S. Census Bureau at the census block group level. The goal is to evaluate the communities, neighborhoods, or areas that may be disproportionately impacted (NRC, 2003).

Census data are obtained to identify both minority and low-income populations, if present, and this is done by determining the percentages of these populations within each of the census block groups. These percentages are next compared to percentages at the county and state levels. If the percentage of the block groups significantly exceeds that of the state or county percentage for either minority or low-income population, EJ must be analyzed in greater detail. Generally, a difference of 20 percent or more, or alternately, a block group percentage of 50 percent or more, for either minority or low-income population is considered to be significant (NRC, 2003). If these percentages or differences in percentage are not present, then a detailed EJ review is not considered to be warranted.

For the purposes of this review, the NRC staff used the population, demographic, and economic data for the Town of Erwin, Unicoi County, and the State of Tennessee, provided in Tables 3-5 and 3-7. As shown in those tables, the percentages of minority or low-income populations in Erwin do not significantly exceed the corresponding percentages for Unicoi County or for the State of Tennessee. For this reason, no further EJ analysis was conducted.

3.4 Climatology, Meteorology, and Air Quality

3.4.1 Meteorology and Climatology

The region surrounding the NFS site typically experiences warm summers and relatively mild winters. The warmer, wetter weather is associated with the air masses originating over the Gulf of Mexico and the cooler, drier weather is associated with the polar continental air masses. A previous NRC EA for license renewal (NRC, 1999) relied on climate data from the Bristol Tri-City climate station located about 32 km [20 mi] northeast of the NFS site. This EA will also utilize data from the Erwin 1 W station, which is located in the same city as the NFS site. Figure 3-2 is a map showing the location of these two climate stations.

Table 3-8 contains climate data collected from 1971 to 2000. Erwin 1 W station data collected from 1971 to 2000 generated an annual mean temperature of 13.1 ˚C [55.6 ˚F] (National Climatic Data Center, 2002). On average, July is the hottest month and January is the coldest.

From 2001 to 2008 the average annual temperatures for this station ranged between 19.5 and 21.3 ˚C [67.1 and 70.3 ˚F] (National Climatic Data Center, 2009a). The Erwin 1 W station data collected from 1971 to 2000 generated an annual mean precipitation level of 116 cm [45.7 in] (National Climatic Data Center, 2002). As depicted in Table 3-8, this precipitation is fairly evenly distributed throughout the year. On average, July is the wettest month and October is the driest. From 2001 to 2008, the average annual precipitation for this station ranged between 84.96 and 134.3 cm [33.45 and 52.89 in] (National Climatic Data Center, 2009a). Bristol Tri-City station data collected from 1971 to 2000 generated an annual mean snowfall level of 38.3 cm [15.1 in]. Snowfall can be expected to start in October and end around April. Almost two-thirds of the snow falls in January and February (National Climatic Data Center, 2004).

The prevailing wind direction is from the southwest. Data from the Kingsport, Tennessee, airport generated a 30-year average wind speed of 3.1 m/s [6.9 mph] (NFS, 2009b). Onsite wind speed data from 1991 to 1995 generated an average annual value of 3.4 m/s [7.6 mph] (NRC, 2002).

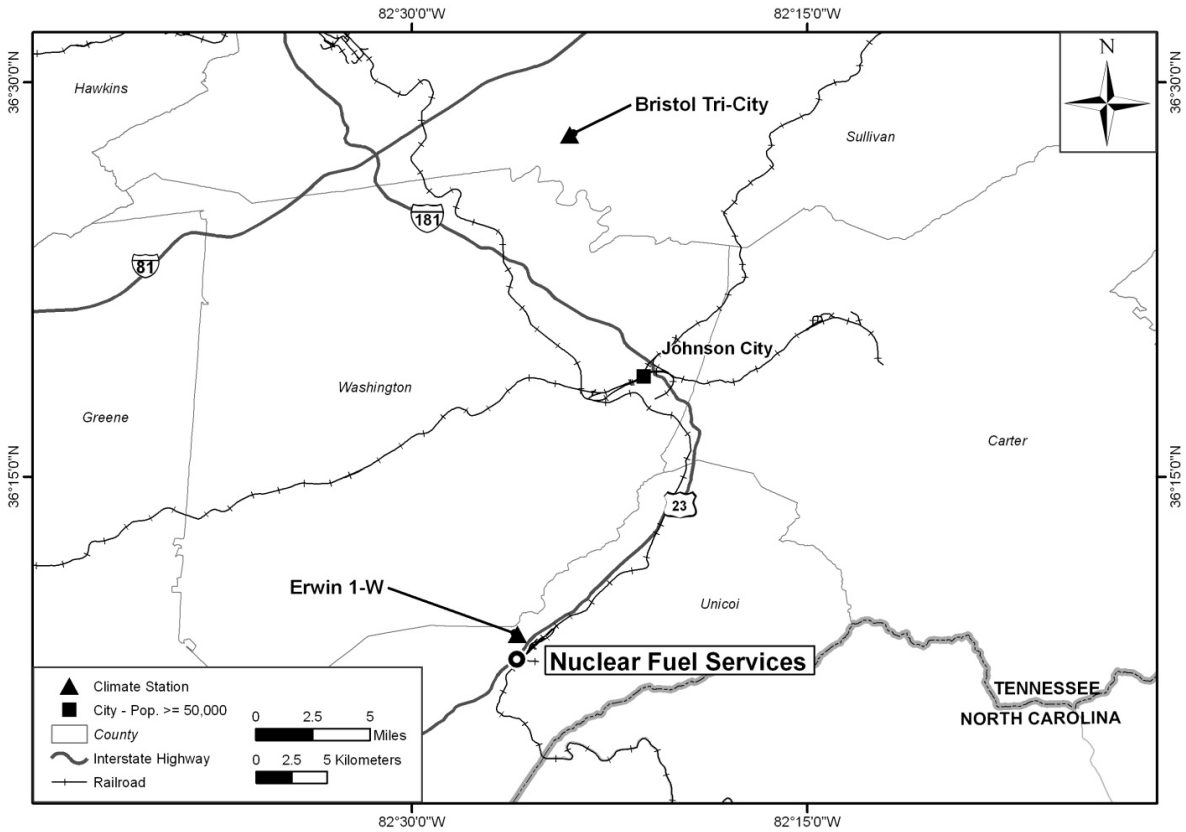

Figure 3-2. Map Showing Climate Station Locations for the Region Around the NFS Site

Table 3-8. Climate Data For the Region Around the NFS Site From 1971 to 2000

Month	Erwin 1 W* Average Temperature	Erwin 1 W* Precipitation	Bristol Tri City† Snow
January	1.9 ˚C [35.5 ˚F]	8.61 cm [3.39 in]	14.2 cm [5.59 in]
February	4.0 ˚C [39.2 ˚F]	8.66 cm [3.41 in]	10.4 cm [4.09 in]
March	8.4 ˚C [47.1 ˚F]	10.3 cm [4.05 in]	4.8 cm [1.89 in]
April	12.6 ˚C [54.7 ˚F]	9.42 cm [3.71 in]	2.3 cm [0.90 in]
May	17.1 ˚C [62.8 ˚F]	13.9 cm [5.47 in]	0 cm [0 in]
June	21.4 ˚C [70.5 ˚F]	12.2 cm [4.80 in]	0 cm [0 in]
July	23.4 ˚C [74.1 ˚F]	14.8 cm [5.83 in]	0 cm [0 in]
August	22.9 ˚C [73.2 ˚F]	9.50 cm [3.74 in]	0 cm [0 in]
September	19.8 ˚C [67.6 ˚F]	8.61 cm [3.39 in]	0 cm [0 in]
October	13.5 ˚C [56.3 ˚F]	5.49 cm [2.16 in]	0.2 cm [0.08 in]
November	8.44 ˚C [47.2 ˚F]	6.96 cm [2.74 in]	0.8 cm [0.3 in]
December	3.94 ˚C [39.1 ˚F]	7.95 cm [3.13 in]	5.6 cm [2.2 in]
Annual Average	13.1 ˚C [55.6 ˚F]	116 cm [45.7 in]	38.3 cm [15.1 in]

*Modified from National Climatic Data Center. "Climatology of the United States No. 81: Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days, 1971–2000: 40 Tennessee." Asheville, North Carolina: National Oceanic and Atmospheric Administration. 2002.
†National Climatic Data Center. "Climatology of the United States No. 20: Monthly Station Climate Summaries, 1971–2000." Asheville, North Carolina: National Oceanic and Atmospheric Administration. 2004.

The Erwin region normally does not experience severe storms. The National Climatic Data Center Storm Event Database recorded one tornado and no hurricanes or tropical storms in Unicoi County from January 1, 1950, to January 1, 2009. This database recorded 84 events in Unicoi County during the same time period. The vast majority of events (70) can be roughly divided evenly into 2 categories: winter events (blizzards) and thunderstorm and/or wind events. The remaining categories consist of flood events (six) and hail events (eight) (National Climatic Data Center, 2009b).

3.4.2 Air Quality

EPA has established air quality standards to protect human health and welfare and to protect against damage to the environment and property. These standards include the National Ambient Air Quality Standards (NAAQS) that address six common air pollutants: carbon monoxide, lead, nitrogen dioxide, particulate matter, ozone, and sulfur dioxide (Table 3-9). Regulations divide particulates into two categories: PM_{10}, defined as particulate matter smaller than 10 µm [3.9×10^{-4} in], and $PM_{2.5}$, defined as particulate matter smaller than 2.5 µm [9.8×10^{-5} in].

Table 3-9. National Ambient Air Quality Standards*

Pollutant	Primary Standard	Averaging Time	Secondary Standard
Carbon Monoxide	9 ppm	8 hours	None
	35 ppm	1 hour	None
Lead	0.15 µg/m^3 [4.1×10^{-9} oz/yd^3]	Rolling 3-month average	Same as primary
	1.5 µg/m^3 [4.1×10^{-8} oz/yd^3]	Quarterly average	Same as primary
Nitrogen Dioxide	0.053 ppm	Annual (Arithmetic Mean)	Same as primary
Particulate Matter (PM_{10})	150 µg/m^3 [4.1×10^{-6} oz/yd^3]	24 hours	Same as primary
Particulate Matter ($PM_{2.5}$)	15.0 µg/m^3 [4.1×10^{-7} oz/yd^3]	Annual (Arithmetic Mean)	Same as primary
	35 µg/m^3 [9.4×10^{-7} oz/yd^3]	24 hours	Same as primary
Ozone	0.075 ppm (2008 std)	8 hours	Same as primary
	0.08 (1997 std)	8 hours	Same as primary
Sulfur Dioxide	0.03 ppm	Annual (Arithmetic Mean)	None
	0.14 ppm	24 hours	None
	Not applicable	3 hours	0.5 ppm

*Modified from U.S. Environmental Protection Agency. "National Ambient Air Quality Standards (NAAQS)." 2009. <http://epa.gov/air/criteria.html> (25 November 2009).

EPA is in the process of implementing a revised ozone standard. The old standard of 0.08 ppm over an 8-hour averaging time is being revised with a new standard of 0.075 ppm over an 8-hour averaging time (EPA, 2009). The old standard and its implementation rules are currently enforced and will remain in place while EPA transitions from the old to the new standard.

EPA allows states to develop standards that are stricter than or supplement NAAQS. Tennessee has adopted a supplemental standard of 50 µg/m^3 [1.3×10^{-6} oz/yd^3] PM_{10} averaged

over one year. In addition, TDEC monitors airborne fluorides with regulatory thresholds expressed as hydrogen fluoride concentrations over various time intervals [1.2 parts per billion (ppb) over 30 days, 1.6 ppb over 7 days, 2.9 ppb over 24 hours, and 3.7 ppb over 12 hours (TDEC, 2006)].

Compliance with the NAAQS is determined individually for each pollutant, and an area is classified as "in attainment" when concentration levels are below NAAQS thresholds. Regions for compliance may be defined as cities, counties, or air quality control regions. An air quality control region is a federally designated area for air quality management purposes. The NFS site is located in Unicoi County, which is part of the Eastern Tennessee–Southwestern Virginia Interstate Air Quality Control Region. This region contains 27 counties in Tennessee and 13 counties in Virginia, as shown in Figure 3-3. EPA often reports NAAQS attainment status at the county or city level rather than the air quality control region as a whole. If the level of pollutants in an area is below the NAAQS, that area is considered to be in attainment. The pollutant concentration levels in Unicoi County and the three bordering counties of Carter, Washington, and Greene are in attainment for all NAAQS pollutants (cross-hatched area in Figure 3-3).

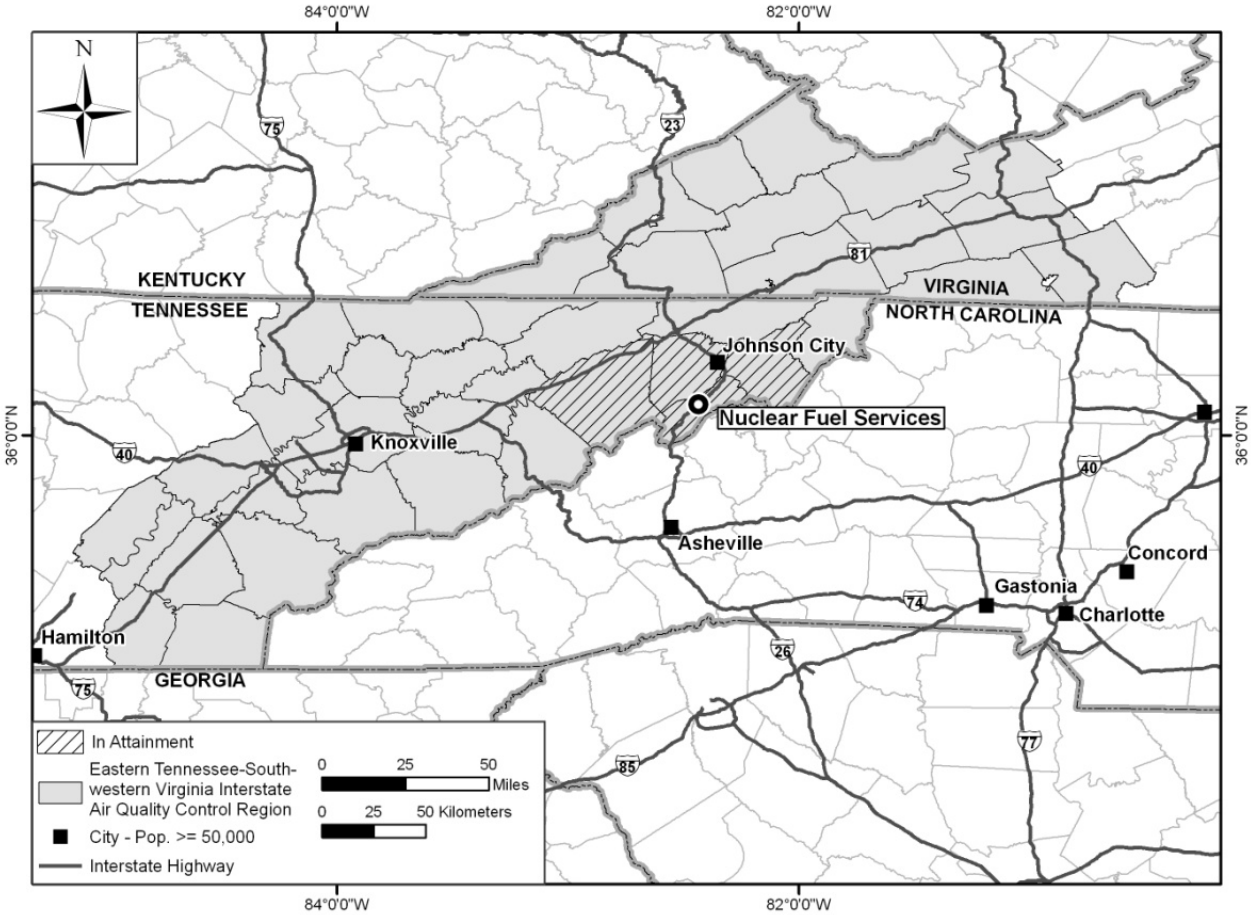

Figure 3-3. Map of the Eastern Tennessee–Southwestern Virginia Interstate Air Quality Control Region

Eight counties around Knoxville within the Eastern Tennessee–Southwestern Virginia Interstate Air Quality Control Region are not in attainment for either the 8-hour ozone and/or the $PM_{2.5}$ particulate matter (EPA, 2010b). However, these eight counties are located about 76 km [47 mi] or more from the NFS site and Knoxville is around 129 km [80 mi] from the NFS site. Thus, Unicoi County and the surrounding counties are in compliance with NAAQS. Table 3-10 contains annual air pollutant emissions from the EPA National Emission Inventory for Unicoi and nearby counties within the Eastern Tennessee–Southwestern Virginia Interstate Air Quality Control Region. The National Emission Inventory is a composite of emission estimates generated from state and local agencies, industry, and EPA.

Table 3-10. Annual Air Pollutant Emissions (Mass)* for Unicoi County and Select Nearby Counties

	Unicoi	Carter	Washington	Greene	Sullivan
Approximate Distance to Erwin (km)	Not applicable	15.3 km [9.51 mi]	1.9 km [1.2 mi]	16.9 km [10.5 mi]	28.0 km [17.4 mi]
Carbon Monoxide†	2.48 MT [2.73 T]	7.53 MT [8.30 T]	311 MT [342 T]	35.9 MT [39.6 T]	8,087 MT [8,914 T]
Nitrogen Oxides†	11.8 MT [13.0 T]	132 MT [145 T]	161 MT [177 T]	24.5 MT [27.0 T]	16,782 MT [18,499 T]
Particulate Matter (PM_{10}) †	23.9 MT [26.3 T]	152 MT [167 T]	355 MT [391 T]	279 MT [307 T]	3,246 MT [3,578 T]
Particulate Matter ($PM_{2.5}$) †	16.2 MT [17.9 T]	81.0 MT [89.3 T]	268 MT [295 T]	252 MT [278 T]	2,726 MT [3,005 T]
Sulfur Dioxide†	7.14 MT [7.87 T]	14.0 MT [15.4 T]	299 MT [330 T]	20.9 MT [23.0 T]	29,519 MT [32,539 T]
Volatile Organic Compounds†	151 MT [166 T]	336 MT [370 T]	808 MT [891 T]	1,212 MT [1,336 T]	10,732 MT [11,830 T]
Hydrogen Fluoride‡	<0.01 MT [<0.01 T]	<0.01 MT [<0.01 T]	6.37 MT [7.02 T]	<0.01 MT [<0.01 T]	175.7 MT [193.7 T]

* Metric tons abbreviated as MT, while short tons abbreviated as T.
†Modified from U.S. Environmental Protection Agency. "Emissions by Category Report—Criteria Air Pollutants for 2001." 2008. <http://www.epa.gov/air/data/emcatrep.html?st~TN~Tennessee> (10 December 2009).
‡Modified from EPA. "County Emissions Report—Hazardous Air Pollutants for 2002." 2008. <http://www.epa.gov/air/data/ntisumm.html?st~TN~Tennessee> (10 December 2009).

Prevention of Significant Deterioration (PSD) requirements as established by the EPA in 40 CFR 52.21 identify maximum allowable increases in concentration for particulate matter, sulfur dioxide, and nitrogen dioxide for areas designated as in attainment. Different increment levels are identified for different PSD classes. Class I areas are high value locations and have the most stringent standards. The Great Smoky Mountains National Park is the closest PSD Class I area located about 76 km [47 mi] southwest of NFS. Since EPA promulgated the PSD regulations in 1977, no PSD permits have been required for any emission source at NFS.

Burning fossil fuels and other agricultural and industrial processes produce greenhouse gases (GHGs). These gases can trap heat in the atmosphere. Examples of GHGs include carbon dioxide, methane, nitrous oxide, and certain fluorinated gases such as hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. These gases vary in their ability to trap heat.

GHG emission levels can be expressed as equivalent CO_2 (CO_2e), a term that accounts for the varying heat-trapping capacity of different gases. In 2005, the World Resources Institute estimated that Tennessee emitted (including the NFS facility) 145.6 million metric tons [160.5 million short tons] of CO_2e, which represents 2.1 percent of the total U.S. GHG emissions

[(World Resources Institute, 2009). NFS releases less than an average of 25, 000 metric tons [27,600 short tons] per year (NFS, 2010a).

The EPA determined that potential changes in climate caused by GHG emissions endanger public health and welfare based on a body of scientific evidence assessed by the U.S. Global Change Research Program (GCRP), the Intergovernmental Panel on Climate Change, and the National Research Council (EPA, 2009a). The EPA Administrator issued an endangerment finding based on the Technical Support Document compiled by the previously referenced scientific organizations, which indicates that, while ambient concentrations of GHG emissions do not cause direct health effects (such as respiratory or toxic effects), public health risks and impacts can result indirectly from changes in climate. Based on EPA's determination, NRC recognizes that GHGs may have an effect on climate change. GHGs were considered as an element of the existing air quality assessment.

The recent compilation of the state of knowledge of climate change by GCRP (GCRP, 2009) has been considered in preparation of this EA. This report divides the country into eight regions. Erwin, Tennessee is located within the Southeast region. None of the GHG emission scenarios used in the report to forecast meteorological changes assume the implementation of policies specifically designed to address climate change. Although GCRP did not incrementally forecast changes by decade, it did project temperature changes to the mid-century (2040–2059) and precipitation changes to the next century (2080–2099). The temperature change forecast time period matches the proposed 40-year license renewal period. However the precipitation forecast extends well beyond the proposed license renewal period. While there is general agreement in the scientific community that some change is climate is occurring, considerable uncertainty remains in the magnitude and direction of some of the changes, especially in predicting trends in a specific geographic location. For the region of Tennessee where the proposed project is located, GCRP forecasts an increase in average temperature between 1.7 and 2.5°C [3 and 4.5°F] (GCRP, 2009). The greatest temperature increases are projected to occur in the summer months. Forecasted precipitation changes vary by season. Rainfall in the summer is expected to decrease by up to 5 percent while precipitation for each of the three other seasons is expected to increase by up to 5 percent (GRCP, 2009).

3.5 Water Resources

3.5.1 Surface Water Hydrology

Features and Flow Characteristics

The major surface waters at and near the NFS facility include Banner Spring Branch, North Indian Creek, Martin Creek, and the Nolichucky River. Two of these, Banner Spring Branch and Martin Creek, are onsite surface water features. The channel of Banner Spring Branch is man-made, originates onsite, and flows through the NFS site. In 2003, it was enclosed in an underground pipe until it was within 9 m [30 ft] of Martin Creek to prevent contamination from storm water runoffs (NFS, 2009b, 2010a).

The average flow rate in Banner Spring Branch is 0.015 m^3/s [238 gal/min] (NFS, 2009b). Banner Spring Branch drains into Martin Creek at the northern boundary of the facility. Martin Creek flows westerly, parallel to the northern boundary of the facility, with an average flow rate of 0.19 m^3/s [3,012 gal/min] (NFS, 2009b). Martin Creek drains into the

Nolichucky River. The Nolichucky River flows westerly outside and along the western side of the NFS site with an average flow rate of 38.5 m^3/s [610,237 gal/min] (NFS, 2009b). This average flow rate is nearly half of the mean discharge rate of the Nolichucky River [69 m^3/s (1,093,672 gal/min)], based on 88 years of discharge data, as measured at the U.S. Geological Survey (USGS) Embreevile, Tennessee gauge station (USGS, 2010a). This gauge station is located about 13 km [8 mi] downstream of the NFS facility.

The NFS site is located within the 100-year floodplain of the Nolichucky River and Martin Creek based on the 2008 Flood Insurance Map put out by the U.S. Federal Emergency Management Administration (US FEMA, 2008). NFS has conducted past site development activities that include enlarging a culvert through which Martin Creek passes and rerouting and rechanneling Martin Creek. In taking these actions, NFS considers that it has sufficiently altered the topography of the site to protect it from a 100-year flood (NFS, 2009b).

Quality and Use

TDEC has classified surface waters at and near the facility based on water quality, designated uses, and existing aquatic biota (TDEC, 2010c). According to this classification, Banner Spring Branch, Martin Creek, and the Nolichucky River are suitable for fish and aquatic life, livestock watering, wildlife, irrigation, and recreation. The Nolichucky River is also suitable for industrial use and domestic water supply. TDEC NPDES permitting is intended to ensure that these surface waters continue to meet their respective use criteria (TDEC, 2010c).

The State of Tennessee Wildlife Resources Agency Erwin State Trout Hatchery, which is a coldwater trout hatching/rearing station (Tennessee Wildlife Resources Agency, 2009), is located within the Town of Erwin limits approximately 183 m [600 ft] upstream of NFS on Spring Branch, which empties into Martin Creek (ATSDR, 2007). The Erwin National Trout Hatchery produces fertilized, incubated trout eggs for distribution to other national hatcheries and is located approximately 5.5 km (3.4 miles) upstream of NFS on Tate Spring Branch, which empties into North Indian Creek (USFSW, 2009).

The Town of Jonesborough, located about 13 km [8 mi] downstream of the NFS outfall point, uses the Nolichucky River as a municipal water supply (Town of Jonesborough, 2011a).
The City of Greeneville, located about 48 km [30 mi] downstream of the NFS outfall point, also uses the Nolichucky River as a municipal water supply (Greeneville Water Commission, 2009).
The Town of Erwin's public water is supplied from groundwater pumped from one spring and three wells (Erwin Utilities, 2011), with the closest of these sources, the Railroad Well, located approximately 0.8 km (0.5 mi) from the NFS site (NRC, 1999) upgradient of groundwater flow at the site. Recent reports have found that the drinking water for these three communities meets EPA drinking water standards (Town of Jonesborough, 2011b, 2009, 2008; Greeneville Water Commission, 2009; Erwin Utilities, 2010, 2009).

Wetlands

Two wetlands, created by NFS decommissioning activities and identified as Wetland A and Wetland B respectively, are located on the north side of the NFS site. Wetland A, with an area of 688 m^2 [0.07 ha], is fed by groundwater, while Wetland B, with an area of 728 m^2 [0.07 ha], is fed by wet-weather springs and groundwater. In January 2010, NFS submitted an application to the U.S. Army Corps of Engineers (USACE) for a permit to excavate and fill the two wetlands as part of ongoing onsite remediation activities. USACE regulates the discharge of dredge or fill material into the waters of the United States in accordance with Section 404 of the Clean Water

Act. In March 2010, USACE authorized the NFS request to fill the wetlands under the existing Nationwide Permit 38 (USACE, 2007) provided that NFS mitigates for the 1,476 m^2 [0.14 ha] of permanent wetland impacts by purchasing 2,952 m^2 [0.28 ha] (a 2:1 ratio) of available credits at the Shady Valley Wetland Mitigation Bank (NFS, 2010a).

3.5.2 Groundwater Hydrogeology

Geologic Setting

The NFS site is located in northeastern Tennessee in the Valley and Ridge province (NRC, 2002) (Figure 3-4). The site lies in one of a series of valleys in an alternating sequence of northeast-trending valleys and ridges produced by faulting and folding. The dominant rock type is sedimentary with alternating sequences of limestone, dolomite, shale, and sandstone.

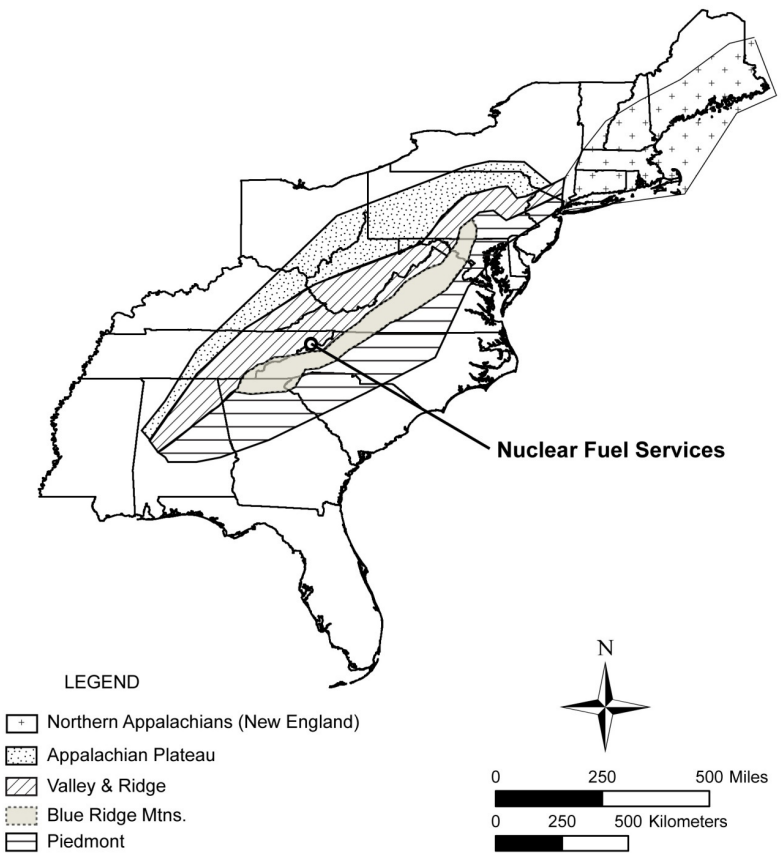

Figure 3-4. Map of the Appalachian Mountain Region (USGS, 2010a)

Moving from southeast of the NFS site, across the site, and then to the northwest away from the site, three geologic formations are encountered: the Shady Dolomite, the Rome Formation, and the Honaker Dolomite (Figure 3-5). Figure 3-6 provides a generic cross section to show these formations in relation to the NFS site and other surface features. Additional details of the groundwater hydrogeology can be found in the NRC's 1999 EA (NRC, 1999).

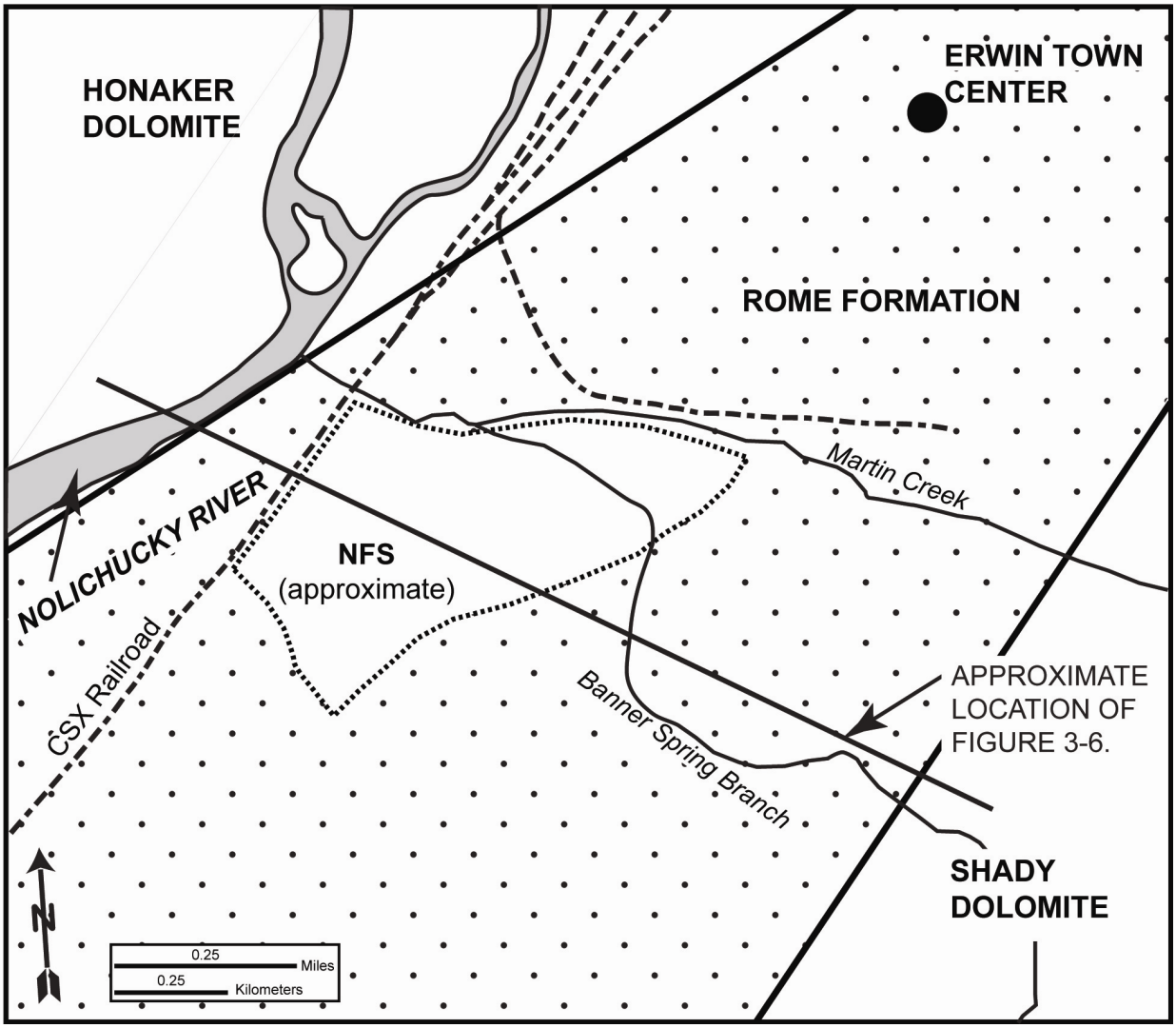

Figure 3-5. Representative Figure of Subsurface Geology of the Region Around the NFS Site

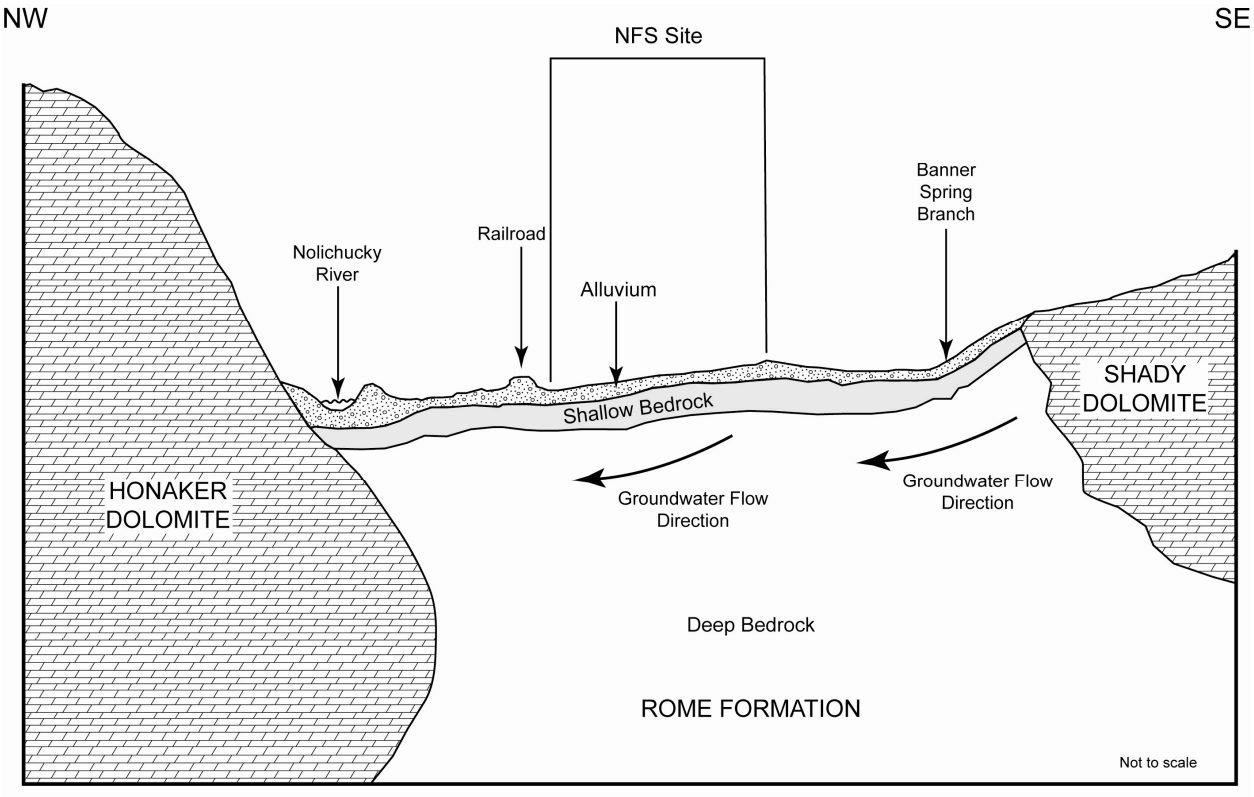

Figure 3-6. Representative Geological Cross Section—Beneath the NFS Site (Not to Scale)

The Shady Dolomite consists of alternating layers of light-gray dolomite, thinly bedded limestone, shaly gray limestone, and calcareous gray shale (USGS, 2010a). The karst terrain of the late lower Cambrian carbonates is found in the Shady Dolomite Formation (Benfield, 2008). Water follows complicated paths through the Shady Dolomite and serves as recharge to the Rome Formation (Benfield, 2008).

The bedrock beneath the NFS site is a section of the Rome Formation, composed of sandstone, siltstone, shale, dolomite, and limestone, with silty to sandy shale being the dominant rock type (NRC, 1999). The lower portion of the Rome Formation, which is found closer to the Nolichucky River, is made up of thinly bedded sandstone and sandy shale, while the upper portion of the formation nearer to the Shady Dolomite consists almost entirely of shales. The Rome Formation dips steeply for perhaps many hundreds of meters (hundreds of feet) in depth below the NFS site (NFS, 2010a) and at shallow depths, is fractured and weathered. Deep bedrock that underlies shallow bedrock predominantly consists of shale with dolomite, limestone, and mudstone.

At and around the NFS site, the bedrock is overlain by unconsolidated alluvial material (i.e., loose, unconsolidated sediments reshaped by water) consisting of clay, silt, sand, gravel, and cobbles. The thickness of the alluvial material ranges from less than 0.3 m [1 ft] to 6.4 m [21 ft] in thickness (NRC, 1999). The alluvial deposits are thickest near Martin Creek on the north and at the-extreme southern end of the facility (NFS, 2010a).

The Honaker Formation is dark-gray, medium-bedded dolomite with minor dark limestone beds, and it is locally cherty (USGS, 2010b). This formation underlies the hills and mountains to the north of and across the river from NFS as shown in Figure 3-5.

Flow Characteristics

Groundwater originating in the Shady Dolomite flows northeast through the NFS site before entering the Nolichucky River (NFS, 2010a). Beneath the NFS site, shallow groundwater occurs in the alluvium and in the shallow bedrock. There is no evidence for a laterally continuous and competent confining layer (i.e., an aquitard) between the alluvium and shallow bedrock, and therefore, both contain groundwater under unconfined conditions (i.e., not affected by confining layers) (NFS, 2010a). Groundwater flow in the alluvium and in the shallow bedrock is predominantly north/northwest toward the Nolichucky River. Groundwater is also found in the deep bedrock of the Rome Formation, and relatively sparse data from this section beneath the site indicate a more westerly groundwater flow than that in the alluvium/shallower bedrock (NFS, 2010a).

NFS identified two faults and five fractured zones beneath the NFS site and linked them to large increases in groundwater levels and production rates during pump tests (NFS, 2010a). NFS reported some evidence for limestone and dolomite dissolution features (secondary porosity) in the deep bedrock in the northern parts of the site. These karstic features and fractured zones could result in local preferential (fracture) flows through the northern area of the site. However, based on a comparison of extensive monitoring well data and the NFS groundwater flow model, NFS indicated that flow in the bedrock obeys effective porous medium flow (similar to flow through a sponge) rather than fracture flow , which is a much faster and channelized flow (similar to flow through a pipe) (NFS, 2010a).

In general, hydraulic conductivity (i.e., the ease with which water can move through pore spaces or fractures) decreases with depth at the NFS site. In the alluvium, coarse-grained (sand to boulder) layers are the most conductive zones. NFS calculated the average groundwater velocity in the alluvium to be 0.44 m/day [1.43 ft/day] based on an average hydraulic conductivity of 6.9 m/day [22.6 ft/day], an average hydraulic gradient of 0.19 m/m [0.19 ft/ft], and a porosity of 0.3. The shale, weathered dolomite, and siltstone layers of the Rome Formation are the moderate- to low-conductive zones, and competent bedrock generally displays low conductivity. NFS calculated the average groundwater velocity in the shallow bedrock to be 0.27 m/day [0.89 ft/day], based on an average hydraulic conductivity of 2.4 m/day [7.89 ft/day], an average hydraulic gradient of 0.17 m/m [0.17 ft/ft], and a porosity of 0.15. NFS calculated the average groundwater velocity in the deep bedrock to be 0.09 m/day [0.28 ft/day], based on an average hydraulic conductivity of 1.29 m/day [4.23 ft/day], an average hydraulic gradient of 0.01 m/m [0.01 ft/ft], and a porosity of 0.15 (NFS, 2010a). Although an upward hydraulic gradient from the shallow bedrock to the alluvium in the northeastern portion of the site may limit potential contamination reaching larger depths, there is also evidence of downward hydraulic gradients in other areas beneath the NFS site (NFS, 2010a).

Recharge to the alluvium and shallow bedrock is primarily from rainfall infiltration from the ground surface and upward seepage from underlying bedrock (NRC, 1999). Recharge to the deep bedrock primarily comes from subsurface flow of water from adjacent hill slopes via fractures, with downward infiltration from the alluvium/shallow bedrock a secondary source (NRC, 1999). Discharges from these aquifers occur as vertical water exchange between the aquifers and seepage areas, seepage at the ground surface, or through the beds of gaining streams (streams fed by groundwater) (NFS, 2010a). NFS identified five major water supplies

through wells and springs within 8 km [5 mi] of the facility and all these water supplies are associated with faulted or fractured rocks or karstic features (cavities formed by reactions between carbonate rocks and groundwater) (NFS, 2010a). The Town of Erwin draws its drinking water from wells located in the Honaker Formation (Erwin Utilities, 2010).

Monitoring and Quality

In addition to the groundwater environmental surveillance monitoring discussed in Section 2.4, NFS has developed an active groundwater monitoring well network across the site, with monitoring wells completed both in the alluvium/shallow bedrock and deep bedrock aquifers. The purpose of the network is to detect radionuclides at the source to prevent contamination of the groundwater, to monitor groundwater flow at the site, and to verify remediation efforts. NFS samples at least 30 wells (NFS, 2011a) on a monthly, quarterly, semiannual, or annual basis and analyzes the collected samples for various chemical parameters (NFS, 2009a).

The predominant radiological contaminant in groundwater beneath the site is uranium. Non-radiological, organic hazardous contaminants beneath the site include chlorinated solvents (e.g., tetrachloroethylene [also known as perchloroethylene or PCE], trichloroethylene), barium, cadmium, chromium, and lead (NFS 2010a). For groundwater, NFS has established and described 24 solid waste management units (SWMU) and six areas of concern (AOCs) as part of a Facility Action Plan (FAP) process that TDEC requires for the RCRA corrective action process at the site (NFS, 2010c).

NFS shares its monitoring and remediation progress with TDEC Hazardous Waste Management at the annual (as of 2010) FAP workshop, capturing this information in a FAP document (NFS, 2009d, 2010c). As shown in Table 3-11, 11 SWMU and 1 AOC require no further action pending TDEC and EPA approval. Seven SWMU and one AOC require interim measures (further corrective measures) (NFS, 2010a). Six SWMU and four AOC require institutional controls, which often include physical covering (using gravel or cement) of the particular site accompanied by posting proper signs.

Table 3-11. Solid Waste Management Units and Areas of Concern at the NFS Site, Including Current Status of Remediation Activities*

SWMU†/AOC‡	Description	Status
SWMU 1	Location of former Impoundments 1, 2, and 3	Interim measures
SWMU 2	Location of former Impoundment 4	Interim measures
SWMU 3	Building 110 complex underground storage tank	Interim measures
SWMU 4	Yard incinerator	Interim measures
SWMU 6	Abandoned Banner Spring Branch stream channel	Interim measures
SWMU 7	Location of former soil stock pile	Interim measures
SWMU 8	CSX soil excavation site	No further action
SWMU 9	Radiological burial ground trenches	Interim measures
SWMU 10	Demolition landfill	No further action
SWMU 11	Location of former CSX burial trenches	No further action
SWMU 12	Permitted hazardous waste management area	No further action
SWMU 13	Building 111 bulk chemical storage area	Institutional controls
SWMU 14	Light non-aqueous phase liquid	No further action
SWMU 15	Waste Water Treatment Facility	Institutional controls
SWMU 16	Radiological incinerator	Institutional controls

Table 3-11. Solid Waste Management Units and Areas of Concern at the NFS Site, Including Current Status of Remediation Activities*		
SWMU†/AOC‡	**Description**	**Status**
SWMU 17	Scrap recovery incinerator	No further action
SWMU 18	Building 105 underground storage tank	No further action
SWMU 19	Building 100 underground storage tank	No further action
SWMU 20	Building 130 scale pit	Institutional controls
SWMU 21	30,000 gallon diesel above ground storage tank	Institutional controls
SWMU 22	Building 304 hazardous waste unit	No further action
SWMU 23	Building 304 hazardous waste unit	No further action
SWMU 24	Building 304 hazardous waste unit	No further action
SWMU 25	Underground pipe on the west side of Building 111	Institutional controls
AOC1	Plant scrubbers	No further action
AOC 2	Building 111 1,000-gallon tank	Institutional controls
AOC 3	Building 130 cooling tower	Institutional controls
AOC 4	Storm drainage system	Institutional controls
AOC 5	Original Banner Spring Branch channel	Interim measures
AOC 6	Building 220 mercury contaminated soil	Institutional controls
AOC Groundwater	Site wide groundwater	Groundwater remediation under AOC groundwater

*NFS. "Response to the Request for Additional Information Regarding the Environmental Assessment for Nuclear Fuel Services, Inc. Materials License SNM–124 Renewal." Docket No. 70-143. ML101590160. Erwin, Tennessee: NFS. 2010.
†SWMU = solid waste management units
‡AOC = area of concern

One uranium plume and one chlorinated solvent plume identified at the NFS site contain concentrations of contaminants exceeding EPA drinking water standards (NFS, 2010a; ATSDR, 2007). The plumes originated from three unlined impoundments (SWMU 1) and the maintenance shop area (SWMU 20) located in the northern portion of the NFS site (NFS, 2010a), and both plumes extend toward the Nolichucky River. The uranium plume is confined in the alluvium and has remained onsite to date (NFS, 2010a). The chlorinated solvent plume, which includes PCE and its degradation products (trichloroethylene, 1,2-dichloroethylene, and vinyl chloride) extends vertically into the bedrock to a depth of 12 m [40 ft] below the surface and horizontally offsite (NFS, 2010a). Waste removal from the impoundments at SWMU 1 was completed in May 1994. Institutional controls were implemented at SWMU 20, and soil removal and effectiveness sampling are planned as part of the 2010 Facility Action Plan (NFS, 2010c).

The main purpose of remediation is to prevent further migration of both plumes and to enhance degradation of the chlorinated solvents (NFS, 2010a). *In-situ* enhanced anaerobic reductive dechlorination has been used for the chlorinated solvent plume and *in-situ* reductive precipitation using ferrous sulfate has been used for the uranium plume. As of 2009, ongoing remediation efforts at SWMU 20 have resulted in a continuous decrease in uranium concentration, a 76 percent reduction in the size of the uranium plume, and a 91-percent reduction in the size of the onsite chlorinated solvent plume (NFS, 2010a). To address the offsite dissolved PCE and its daughter products, NFS injected BOS 100® in 2007 to provide reductive dechlorination of the PCE and its daughters.

Additionally, technicium-99 (Tc-99) is found in the onsite groundwater (NRC, 2011). First detected in 1998, NFS employed well pumping to reduce the Tc-99 concentrations. As a result, since 2004, Tc-99 concentrations onsite have been near or below one percent of the liquid effluent release concentration limit in 10 CFR Part 20, Appendix B, and well pumping has been stopped. There is no evidence that Tc-99 has entered the Nolichucky River. Water samples from the river contain such low levels of radioactive isotopes that there is no need to specifically analyze the samples for Tc-99. In addition, monitoring wells between the site and the river have not indicated Tc-99 above 0.5 percent of the NRC limit in 10 CFR Part 20, Appendix B (NRC, 2011).

Other remediation efforts are underway. SWMU 2 (Location of the former Impoundment 4), which was used for waste storage and disposal, was closed and put under remediation in December 1996 (NFS, 2010a). Soil removal at SWMU 9 (radiological burial ground trenches) was completed and is under remediation. Further soil removal and effectiveness sampling at a number of SWMUs are planned as part of the 2010 Facility Action Plan (NFS, 2010c). These actions were and are being taken to remove the potential sources of future groundwater contamination. TDEC reviews these actions as part of the FAP process.

3.6 Seismicity

Regionally, the area is dominated by four major fault systems oriented in a northeast direction (Figure 3-7) (NRC, 1999). The NFS site is located in the Southern Appalachian Tectonic Belt, which is an area of moderate historic and recent earthquake activity (Figure 3-8) (NRC, 2002). Faults and fractures present at the site as demonstrated by the drilling show no evidence of recent fault displacement associated with capable faults (NRC, 1999).

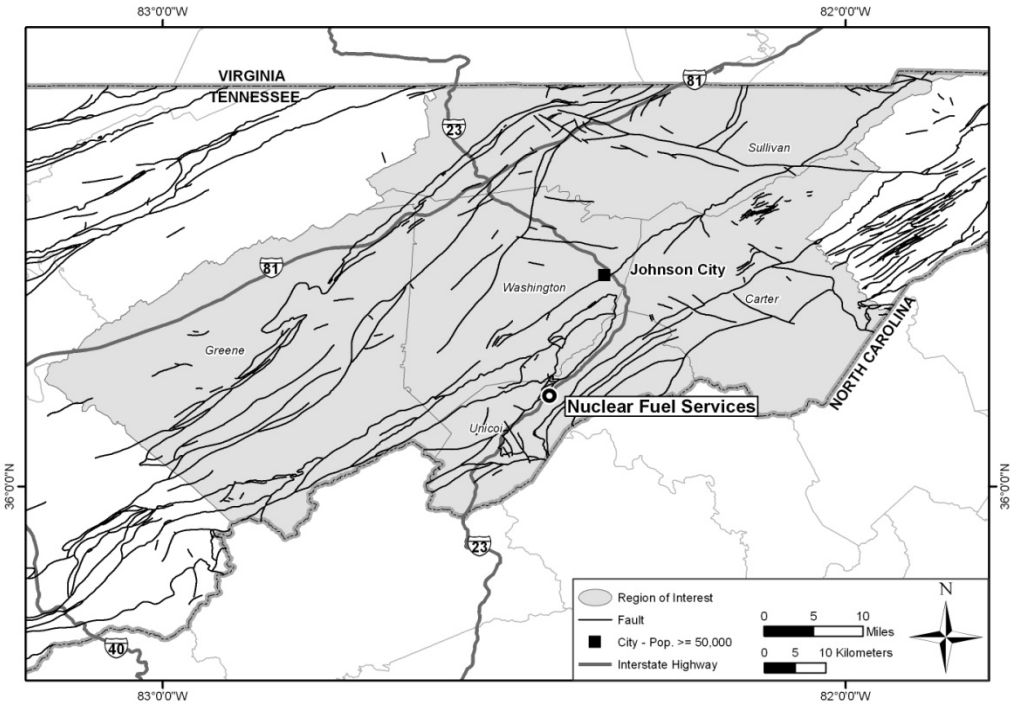

Figure 3-7. Regional Fault Map Showing Northeast Trending Faults (USGS, 2010b)

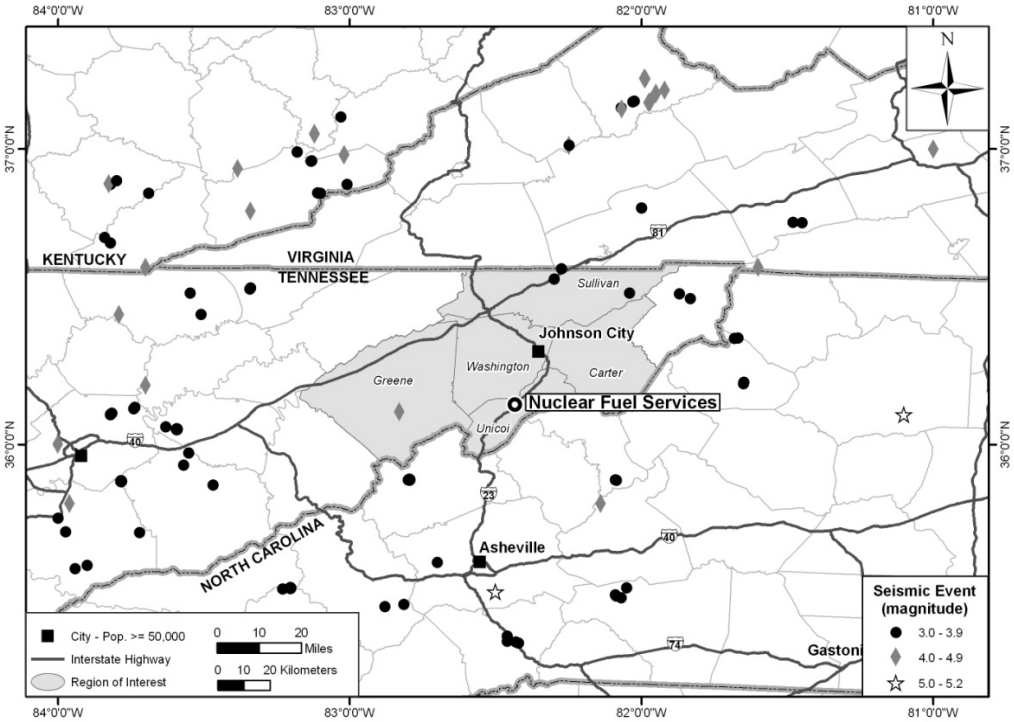

Figure 3-8. Recent and Historic Seismic Activity in the Vicinity of the NFS Site.
[Data From USGS (2010c); Northern California Earthquake Data Center (2010); Center for Earthquake Research and Information (2010), University of Memphis]

A peak ground acceleration of 60 cm/s^2 [0.06 g] with a return period of 1,000 years was calculated for the site (NFS, 2001). A slightly higher peak ground acceleration of 80 cm/s^2 [0.08 g] with a 10 percent probability of exceedance in 50 years is indicated in literature (Petersen, et al., 2008). The U.S. Geologic Survey website for the 2008 Seismic Hazard Maps shows a peak ground acceleration for Unicoi County between 0.05 g and 0.06 g for an earthquake with a 10 percent probability of exceedance in 50 years (http://gldms.cr.usgs.gov/website/nshmp2008/viewer.htm).

On August 23, 2011, a magnitude 5.8 earthquake occurred near Mineral, Virginia, in the Central Virginia Seismic Zone (CVSZ) (http://www.virginiaplaces.org/geology/quake.html). The earthquake was felt at distances up to nearly 700 km (435 mi) from the epicenter (http://earthquake.usgs.gov/earthquakes/dyfi/events/us/c0005ild/us/index.html). This earthquake was the largest observed in Virginia since a similar sized recorded earthquake in 1897 that occurred in a different seismic zone in Virginia (http://www.virginiaplaces.org/geology/quake.html).

The USGS' National Strong-Motion Project (NSMP) has the primary Federal responsibility for recording each damaging earthquake in the United States on the ground and in man-made structures in densely urbanized areas to improve public earthquake safety (http://nsmp.wr.usgs.gov/). For the August 23, 2011 earthquake near Mineral, VA, the NSMP collected monitoring information from a number of stations in the eastern U.S. This data is compiled and available on the internet at http://nsmp.wr.usgs.gov/recent_events/20110823_1751_peaks.html. The station closest to Erwin, TN that provided data on the August

23rd earthquake is located in Pearisburg, VA, about halfway between the earthquake epicenter and Erwin, TN (approximately 160 miles each way). The Pearisburg station measured a peak ground acceleration of about 2.86 cm/s^2 or 0.003 g. This measurement is an order of magnitude less than the 0.05 g to 0.06 g peak ground acceleration for Unicoi County (where the NFS facility is located) provided in the above-referenced USGS 2008 seismic hazard maps.

The August 23, 2011, earthquake is discussed further in EA section 4.11.2.

3.7 Ecology

3.7.1 Terrestrial and Aquatic

The Town of Erwin is a municipal populated area surrounded by the North Cherokee National Forest managed by the U.S. Forest Service (U.S. Forest Service, 2004). The area encompassing NFS is identified as the Appalachian/Blue Ridge Forests ecoregion (World Wildlife Fund, 2008). Previous EAs describe the species and habitats found in the valley where the NFS site is located (NRC, 1999, 2002). Appalachian oak forests, northern hardwood forests, Southeastern spruce–fir forests, shrublands, grasslands, heath balds, hemlock forests, cove hardwoods, and oak–pine communities occur in the region (Arnwine, et al., 2000). In the valley, human activities since the 1770s, has included agriculture, repeated timber harvests, and industrial and residential development, have altered vegetation, resulting in patches of regrowth (Town of Erwin, 2010). The most significant change in the regions' valleys from pre-settlement conditions has been the decrease in forest cover and the increase in open areas, such as pasture and croplands (World Wildlife Fund, 2008).

The NFS site, which is mostly developed for NRC-licensed activities, is located in an industrial zone of Erwin. Table 3-1 shows that approximately 20 percent (5.6 ha [14 acres]) of the site is open fields, woods, brush, and shrub swamp. These lands can be found along the riparian areas of Martin Creek. NFS conducted a field survey in 2002 of the then proposed BLEU complex site and found that none of the federally or state-listed rare, threatened, or endangered species were present (NRC, 2002). Otherwise, no site-specific vegetation surveys have been conducted for the NFS site and over the past 10 years, a significant amount of vegetation on the site has been removed due to decommissioning activities (NFS, 2010a). Vegetation, birds, mammals, and aquatic life that can be found in the area around the NFS site are listed in the Appendix A.

The State of Tennessee's water quality standards (TDEC, 2010b) specify which uses individual waters can support (e.g., recreation, aquatic life use support, or drinking water supply). Banner Spring Branch and Martin Creek are designated for use by fish and aquatic life, livestock watering and wildlife, irrigation, and recreation (EPA, 2010). Banner Spring Branch is entirely contained inside an underground enclosed pipe (NFS, 2009a) and therefore no longer offers habitat for wildlife.

3.7.2 Threatened and Endangered Species

The Tennessee Natural Heritage Program (2009) in the TDEC, Division of Natural Areas maintains a database of rare animal and plant species that is shared by partners at The Nature Conservancy, Tennessee Wildlife Resources Agency, U.S. Fish and Wildlife Service (USFWS), and the Tennessee Valley Authority (TVA). The database lists all state and federally threatened and endangered species, as well as state species of special concern and those deemed in need

of management. According to the Tennessee Natural Heritage Program (2009), no federally listed species are known to occur in the area depicted on the Erwin 7.5-minute USGS quadrangle map. NFS is located in the Erwin 7.5-minute USGS quadrangle map. In the area depicted on the Erwin 7.5-minute USGS quadrangle map (TDEC, 2009), eight plants and two birds are listed as state threatened or endangered, and eight plants and six vertebrate animals are listed as deemed in need of management or of special concern.

NFS is located approximately 0.8 km [0.5 mi] north of the area covered by the Chestoa 7.5-minute USGS quadrangle map. In addition to those species identified as occurring within the bounds of the Erwin 7.5-minute USGS quadrangle map, two federally listed endangered species and one federally threatened species are known to occur in the area depicted on the Chestoa 7.5-minute USGS quadrangle map and elsewhere in Unicoi County: (i) the Appalachian elktoe (*Alasmidonta raveneliana),* a mussel found in the upper Tennessee River watershed, which includes the Nolichucky River; (ii) the Virginia spiraea *(Spiraea virginiana),* a shrub found on banks of rocky streams or moist bottomlands within high gradient sections of second and third order streams such as occur in the region around the NFS site*;* and (iii) the Gray Myotis *(Myotis grisescens*), a small bat that resides in caves year round (TDEC, 2009). These species are not listed as being present in the area depicted on the Erwin 7.5-minute USGS quadrangle map, and the associated habitats do not occur on the NFS site. Also, nine plants listed as state threatened or endangered, three plants of special concern, and three vertebrate animals listed as deemed in need of management are known to occur in the area depicted on the Chestoa 7.5-minute USGS quadrangle map (TDEC, 2009).

NRC staff contacted USFWS in October 2009 regarding threatened or endangered species in the vicinity of the NFS site (NRC, 2009a). In reply, USFWS stated that, according to available records, no federally listed or proposed endangered or threatened species occur within the impact area of the project (USFWS, 2009). Rare, threatened, and endangered species known to occur in the Erwin 7.5-minute USGS quadrangle map area are shown in Table 3-12.

Table 3-12. Rare, Threatened, and Endangered Species Known to Occur in the Erwin and/or the Chestoa 7.5-Minute U.S. Geological Survey Quadrangle Map Area*

Common Name	Scientific Name	Federal Status	State Status
Vascular Plants			
Climbing Fumitory	*Adlumia fungosa*	Not Listed	Threatened
Chamomile Grapefern	*Botrychium matricariifolium*	Not Listed	Special Concern
Blunt-lobed Grapefern	*Botrychium oneidense*	Not Listed	Special Concern
Piratebush	*Buckleya distichophylla*	Not Listed	Threatened
Roan Mountain Sedge†	*Carex roanensis*	Not Listed	Endangered
Spotted Coralroot†	*Corallorhiza maculata*	Not Listed	Threatened
Pale Corydalis†	*Corydalis sempervirens*	Not Listed	Endangered
Fraser's Sedge†	*Cymophyllus fraserianus*	Not Listed	Special Concern
Pink Lady's-slipper	*Cypripedium acaule*	Not Listed	Special Concern‡
Mountain Bush-honeysuckle	*Diervilla sessilifolia var. rivularis*	Not Listed	Threatened

Table 3-12. Rare, Threatened, and Endangered Species Known to Occur in the Erwin and/or the Chestoa 7.5-Minute U.S. Geological Survey Quadrangle Map Area* (Continued)			
Common Name	**Scientific Name**	**Federal Status**	**State Status**
Vascular Plants (Continued)			
Appalachian Gentian	*Gentiana austromontana*	Not Listed	Special Concern
Dwarf Rattlesnake-plantain	*Goodyera repens*	Not Listed	Special Concern
White-leaved Sunflower†	*Helianthus glaucophyllus*	Not Listed	Threatened
Cow-parsnip	*Heracleum maximum*	Not Listed	Special Concern
Virginia Heartleaf†	*Hexastylis virginica*	Not Listed	Special Concern
Canada Lily†	*Lilium canadense*	Not Listed	Threatened
Swamp Loosestrife†	*Lysimachia terrestris*	Not Listed	Endangered
Broadleaf Bunchflower	*Melanthium latifolium*	Not Listed	Endangered
Northern Evening-primrose	*Oenothera parviflora*	Not Listed	Special Concern
American Ginseng	*Panax quinquefolius*	Not Listed	Special Concern†
Fringed Black Bindweed	*Polygonum cilinode*	Not Listed	Threatened
Rock Skullcap†	*Scutellaria saxatilis*	Not Listed	Threatened
Virginia Spiraea†	*Spiraea virginiana*	Threatened	Endangered
Clingman's Hedge-nettle†	*Stachys clingmanii*	Not Listed	Threatened
White Heath Aster†	*Symphyotrichum ericoides var.ericoides*	Not Listed	Threatened
Southern Nodding Trillium	*Trillium rugelii*	Not Listed	Endangered
Carolina Hemlock	*Tsuga caroliniana*	Not Listed	Threatened
Alleghany Cliff-fern†	*Woodsia scopulina ssp. appalachiana*	Not Listed	Special Concern
Invertebrate Animals			
Appalachian Elktoe†	*Alasmidonta raveneliana*	Endangered	Endangered
Vertebrate Animals			
Highfin Carpsucker	*Carpiodes velifer*	Not Listed	DNM **
Common Raven	*Corvus corax*	Not Listed	Threatened
Hellbender†	*Cryptobranchus alleganiensis*	Not Listed	DNM
Peregrine Falcon	*Falco peregrinus*	Not Listed	Endangered
Swainson's Warbler	*Limnothlypis swainsonii*	Not Listed	DNM
Gray Myotis†	*Myotis grisescens*	Endangered	Endangered
Eastern Small-footed Myotis†	*Myotis leibii*	Not Listed	DNM
Woodland Jumping Mouse	*Napaeozapus insignis*	Not Listed	DNM
Allegheny Woodrat	*Neotoma magister*	Not Listed	DNM

Table 3-12. Rare, Threatened, and Endangered Species Known to Occur in the Erwin and/or the Chestoa 7.5-Minute U.S. Geological Survey Quadrangle Map Area* (Continued)			
Common Name	**Scientific Name**	**Federal Status**	**State Status**
Vertebrate Animals (continued)			
Tangerine Darter	*Percina aurantiaca*	Not Listed	DNM
Weller's Salamander†	*Plethodon welleri*	Not Listed	DNM
Smoky Shrew	*Sorex fumeus*	Not Listed	DNM

*TDEC. "Tennessee Natural Heritage Program Rare Species Observations for U.S. Geological Survey 8 Digit Hydrologic Unit Code (HUC) Watersheds." Updated July 20, 2009. <http://tennessee.gov/environment/na/pdf/quad.pdf>.
†Not known to exist the Erwin Quad but identified in Chestoa Quad
‡Commercially exploited
** Deemed in Need of Management

3.8 Noise

Noise is defined as any loud, discordant or disagreeable sound or sounds. In an environmental context, noise is defined simply as unwanted sound. Certain activities inherently produce sound levels or sound characteristics that have the potential to create noise. The sound generated by existing facilities may become noise due to land use surrounding the facility. When lands adjoining an existing or proposed facility contain residential, commercial, institutional or recreational uses that are proximal to the facility, noise is likely to be a matter of concern to residents or users of adjacent lands. The three major categories of noise sources associated with facilities are (1) fixed equipment or process operations; (2) mobile equipment or process operations; and (3) transport movements of products, raw material or waste.

Noise in the affected environment is generated from many sources. Several trains pass through Erwin near the NFS site on a daily basis. NFS is located in an industrial area that is shared with companies that contribute noise to the affected area. Along with typical industrial operation noise, car and truck traffic are increased in industrial areas. Major noise sources at NFS include various industrial machines and equipment. Examples include cooling systems, transformers, engines, pumps, boilers, steam vents, paging systems, alarms, construction and materials-handling equipment, and vehicles (NFS, 2009b). The primary source of noise at the site boundary is vehicular traffic, with other sources occasionally producing noise above background levels. Although the Code of Ordinances for the Town of Erwin recognizes "offenses against the peace and quiet," Erwin does not have a specific environmental noise standard that is applicable to NFS (NFS, 2011). Further, the Code of Ordinances does not reference a decibel level that defines "excessive." NFS stated that plant wide alarms needed for employee notification would provide the greatest potential for offsite noise exposure to nearby residents, with the take-cover alarm being the loudest. Sound level surveys at various locations on the outside perimeter of the site during alarm testing did not indicate any levels above Occupational Safety and Health Administration limits (NFS, 2010a). NFS further stated it has not received complaints from the Town of Erwin regarding excessive noise.

3.9 Historic and Cultural Resources

The National Register of Historic Places (NRHP) lists three historical sites within Unicoi County (U.S. Department of the Interior National Park Service, 2009). The Clinchfield Depot is

in the Town of Erwin, about 2.7 [1.7 mi], from the NFS site, while the Tilson Farm site in Flag Pond and the Clarksville Iron Furnace on Tennessee State Highway 107 in the Cherokee National Forest both are located approximately 16 km [10 mi] from the site. There are no NRHP properties or National Historic Landmarks[2] located on the NFS site (U.S. National Park Service, 2009). The NRC staff contacted the Tennessee Historical Commission in October 2009 regarding historic or cultural sites on the NFS site (NRC, 2009b). According to the Tennessee State Historical Preservation Office, there are no historic or cultural sites on the NFS site (Tennessee Historical Commission, 2009).

3.10 Scenic and Visual Resources

The NFS site is situated in a valley locally known as the "Valley Beautiful," in Unicoi County between the Bald Mountains to the southwest and the Unaka Range to the east, both of which are part of the Appalachian Mountains (Town of Unicoi, 2010). Martin Creek runs along the northern site boundary, and Banner Spring Branch is located in the central portion of the site, although it has been re-routed and enclosed within an underground pipe on the NFS site. Martin Creek is vegetated with grass, shrubs, and trees. As detailed in Section 3.1, the area surrounding the NFS site consists of a mix of residential, commercial, industrial, and agricultural activities.

The major landscape features that are located in the immediate vicinity of the NFS site are the Nolichucky River and the forested hillsides that surround the valley in which the NFS site is located. The NFS site is approximately 0.3 km [0.2 mi] from the river. The plant elevation is about 9 m [30 ft] above the nearest point on the Nolichucky River (NFS, 2002a) and, therefore, the NFS facility may be partially seen from the river.

At its nearest point, the Appalachian Trail crosses the Nolichucky River approximately 2.8 km [1.7 mi] southwest of NFS at Chestoa Pike. The trail then follows the back side of peaks that block the site from view of the trail and continues along the state line ridge that divides Tennessee and North Carolina (Appalachian Trail Conservancy, 2010). At the point that the Appalachian Trail crosses the Nolichucky River, the elevation is about the same as the site elevation; thus, vegetation would preclude the site from being viewed from this location. On Cliff Ridge, a person hiking on the Appalachian Trail would be able to see the expanse of the Town of Erwin (Tennessee Eastman Hiking & Canoeing Club, 2010), but would not be able to identify the site from this point.

The Erwin Linear Trail is a paved recreational trail that runs parallel to Interstate 26 along North Indian Creek and the Nolichucky River (Unicoi County, 2010a). Due to the locally flat terrain, the NFS site may be only partially visible from the banks of the Nolichucky River and Linear Trail. An effluent discharge pipe from the NFS facility is visible from the Nolichucky River vantage point. Bike and walking paths located along the Nolichucky River that extend up on the hillsides would be able to see the NFS site. NFS waste storage containers located at the industrial park are also visible from limited portions of the Linear Trail and recreational areas. The Unicoi Chamber of Commerce identifies several trails in the area, but does not provide a map of the trails listed (Unicoi County, 2010b). Trail descriptions do not indicate whether the trails are located in areas that offer a recognizable view of the site. No trails within visibility of NFS were identified using an online search (Trails.com, 2010).

[2] NFS was designated a Nuclear Historic Landmark by the American Nuclear Society in 2009 (NFS, 2009e).

A 13-km [8-mi] stretch of the Nolichucky River, upstream of where it flows past the NFS site, has been recognized for its scenic, recreational, and geologic values under the Nationwide Rivers Inventory (U.S. National Park Service, 2009). The stretch extends from Poplar, North Carolina, downstream to the railroad bridge at Unaka Springs, Tennessee, which is located approximately 3.3 km [2 mi] southwest of the NFS site. The NFS site is not visible from the Unaka Springs crossing due to a mountain between the two points.

NFS noted three changes made to the site since the 1980s that could present visual impacts: (i) decommissioning of portions of the plant site that started in the mid-1980s, (ii) construction of the AREVA NP (BLEU Complex) Facility on the southwest side of the site in August 2002, and (iii) ongoing construction of a security wall around the perimeter of the main NFS site that started in 2007 (NFS, 2009b). Security wall construction also is expected to provide a visual barrier, shielding buildings and/or other structures on the NFS site from street-level view around the adjacent blocks. Additionally, NFS is located in an industrial area of Erwin. Adequate lighting for safety and security are needed for industrial facilities, and due to this need, some amount of lighting from the NFS site is visible to nearby residents.

3.11 Public and Occupational Health

3.11.1 Normal Operations

Occupational Non-Radiological and Radiological Health Hazards

As described in Section 2.1, the NFS site includes a fuel fabrication facility that produces reactor fuel for commercial and government clients. The primary operations at this site include the manufacture of a classified product containing HEU and the downblending of HEU to LEU. Risks to occupational health and safety include exposure to industrial hazards, hazardous materials, and radioactive materials. Industrial hazards for the NFS site are typical for similar industrial facilities and include exposure to chemicals and accidents ranging from minor cuts to industrial machinery accidents.

The U.S. Occupational Safety and Health Administration (OSHA) requires that NFS compile information on workplace total recordable incident rates and lost-time incident rates.[3] For comparison, the U.S. Department of Labor, U.S. Bureau of Labor Statistics (2010), reports annual incident rates for chemical facilities (North American Industry Classification System Number 3251). The incident rate is the total number of reportable accidents that occur per 200,000 hours worked and includes lost-time incidents. Lost-time incidents are those accidents that result in a worker missing one or more days because of the accident. Thus, the lost-time incident rate provides a measure of the severity of the incident. Incident rates for NFS are compared to U.S. Department of Labor statistics in Table 3-13 for the past 5 years. There have been no occupational fatalities of NFS employees during the operating history of the NFS site (NFS, 2010a).[4]

[3]Total recordable incidents are work-related deaths, illnesses, or injuries resulting in loss of consciousness, restriction of work or motion, transfer to another job, or required medical treatment beyond first aid. A lost-time incident is a recordable incident that results in one or more days away from work, days of restricted work activity, or both, for affected employees. Fatalities are the number of occupationally related deaths. The incident rate includes both the number of OSHA-recordable injuries and illnesses and the total number of man-hours worked. The incident rate is used for measuring and comparing work injuries, illnesses, and accidents within and between industries.

[4] On May 19, 2004, a contract construction worker was killed in an accident while working on a new construction project within the protected area at the NFS site (NRC, 2004).

Table 3-13. Incident Rates (Incidents Per 200,000 Worker-Hours) for 2005–2009*				
Year	NFS OSHA Total Recordable Incident Rate*	BOL Statistics Average Recordable Incident Rate†	NFS OSHA Lost Time Incident Rate*	BOL Statistics Average Lost Time Incident Rate†
2009	3.92	1.9	0.61	0.5
2008	2.90	2.2	0.66	0.6
2007	3.20	2.7	0.46	0.7
2006	1.81	2.1	0.0	0.6
2005	3.58	2.4	0.43	0.7

*NFS. "Response to the Request for Additional Information Regarding the Environmental Assessment for Nuclear Fuel Services, Inc. Materials License SNM–124 Renewal." Docket No. 70-143. Erwin, Tennessee: NFS. 2010.
†U.S. Department of Labor, U.S. Bureau of Labor Statistics. "Industry Injury and Illness Data." <http://www.bls.gov/iif/oshsum.htm> (19 May 2011)

One external study of radiation-related occupational health has been conducted since the last license renewal. In 2008, the National Institute for Occupational Safety and Health (NIOSH) published a site profile document to support evaluation of the total occupational radiation dose that can reasonably be associated with a worker's radiation exposure at the W.R. Grace and Company plant (now NFS). Site profile documents are not official determinations made by NIOSH but are general working documents that provide historic background information and guidance to help prepare dose reconstructions at particular sites. The document provided instructions for reconstructing occupational dose received by workers at W.R. Grace and Company for the years between 1958 and 1970. However, the document does not attempt to equate the dose to the workers to any occupational health effects (NIOSH, 2005).

Under 10 CFR 20.1502, NRC licensees are required to monitor exposures to radiation and radioactive materials at levels sufficient to demonstrate compliance with the occupational dose limits in 10 CFR 20.1201. Standard measures of radiological occupational health are the total effective dose equivalent (TEDE) and the committed effective dose equivalent (CEDE) received by workers. The TEDE is the sum of the CEDE (for internal exposures) and the deep-dose equivalent (for external exposures) (http://www.nrc.gov/reading-rm/basic-ref/glossary/.html).

Figures 3-9 and 3-10 respectively depict the number of NFS workers who have received annual radiation doses of 500 millirem (mrem) [5 millisieverts {mSv}], 2,000 mrem [0.02 Sv], and the annual occupational dose limit in 10 CFR 20.1201 of 5,000 mrem [0.05 Sv] between 2000 and 2010 for TEDE and CEDE. Note that in these figures, a worker who exceeds a threshold for CEDE in one calendar year will automatically exceed the same threshold for TEDE. The data displayed in these two figures comes from an annual report issued by the NRC (NUREG-0713) that details occupational radiation exposures received by employees at specific NRC licensed facilities for the previous monitoring year.

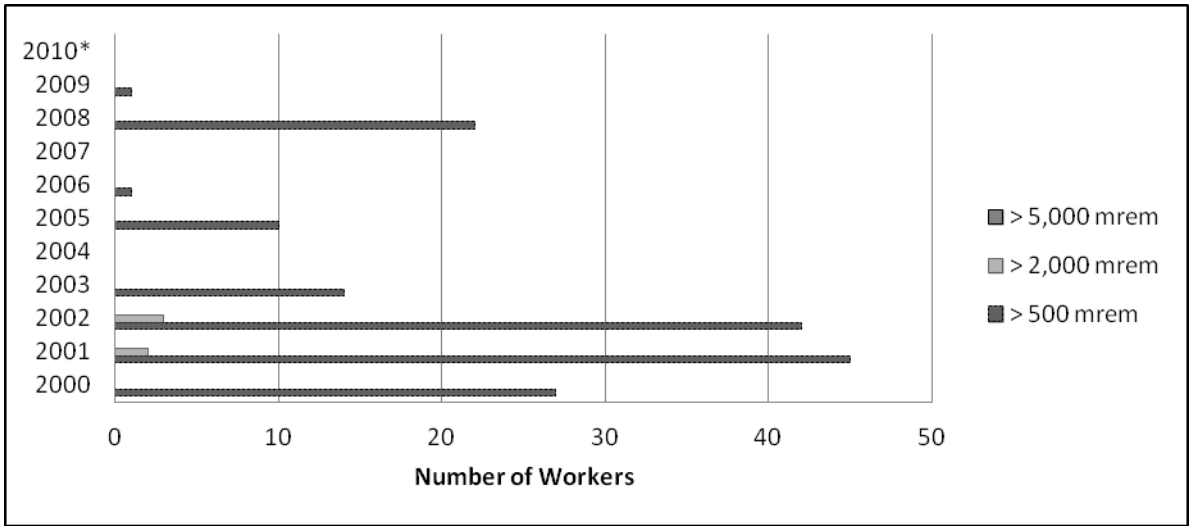

Figure 3-9. Number of Workers Exceeding Selected TEDE Values between 2000 and 2010 (NUREG–0713). [*2010 Data May Be Incomplete.]

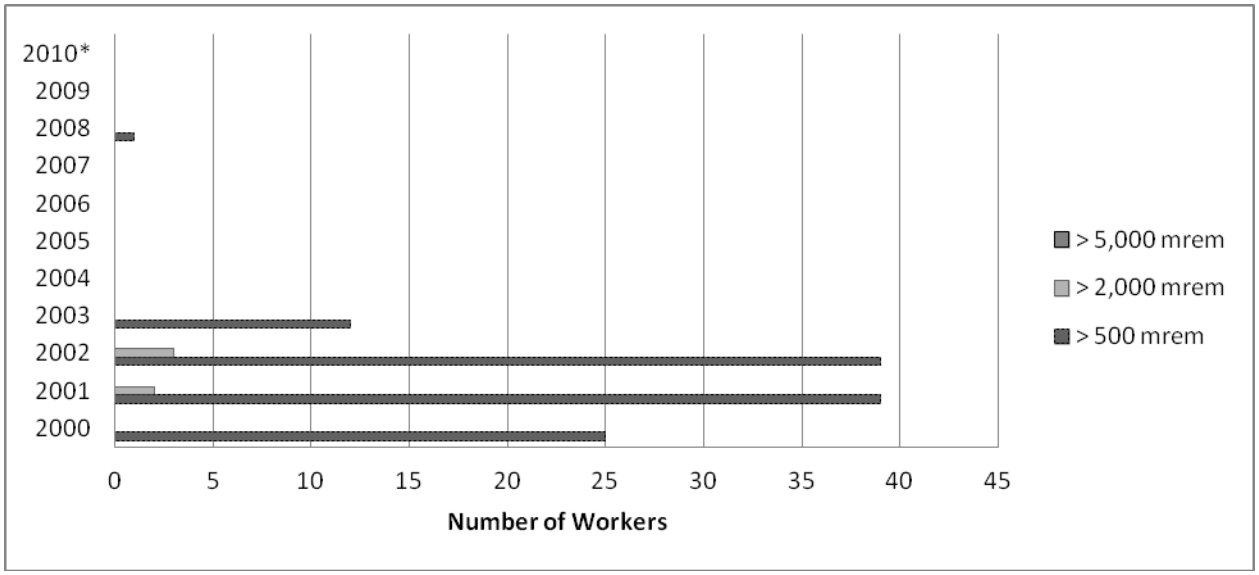

Figure 3-10. Number of Workers Exceeding Selected CEDE Values between 2000 and 2010 (NUREG–0713). [*2010 Data May Be Incomplete.]

The data in Figures 3-9 and 3-10 show three trends. First, no NFS worker exceeded the annual occupational limit of 5,000 mrem [0.05 Sv] (TEDE) between 2000 and 2010. Additionally, no NFS workers received a dose of greater than 2,000 mrem [0.02 Sv](TEDE) since 2002. Finally, only one NFS worker received a dose of greater than 500 mrem [5 mSv] (CEDE) since 2003.

Public Non-Radiological and Radiological Health Hazards

To assess impacts to public health, the NRC staff reviewed independent public health studies. Since the last license renewal, one study addressing public health and involving NFS was published. In 2007, the Agency for Toxic Substances and Disease Registry (ATSDR) published a public health study on the non-radiological contaminants from NFS that evaluated the releases of volatile organic compounds to the environment surrounding NFS (ATSDR, 2007). The study concluded that "the releases of these materials may have occurred in the 1950s, 1960s, and 1970s; there was little or no monitoring of the environmental media at that time" (ATSDR, 2007). ATSDR considered the NFS facility hazard ranking as an "Indeterminate Public Health Hazard" for past conditions, which means that critical information is lacking to support a judgment regarding the level of public health hazard from past exposures. Further, ATSDR ranked the NFS site as "No Apparent Public Health Hazard" for current and future conditions because there are no completed exposure pathways existing whereby the groundwater would be used as a source of public water. In addition, ATSDR concluded that any public exposures to airborne hazardous chemicals are not at levels likely to cause adverse health impacts. The ATSDR study did not apply to the use of radioactive materials by NFS.

NFS operations result in the use and release of several radionuclides. Table 3-14 lists radionuclides that occur in various facility effluents. The limits in 10 CFR Part 20, Appendix B for the activity in effluents differ with the radionuclide and with the type of effluent. These limits were established by calculating the TEDE for the radionuclides and types of effluents and they correspond to a level of TEDE deemed protective of public health and safety by the NRC.

Table 3-14. Radionuclides in Effluents from the NFS Site*

Radionuclide	BLEU Sewer**	Sewer**	WWTF	Gaseous‡
Na-22			X	
Tc-99	X	X	X	X
Cs-137			X	
Pb-212			X	
Ra-224			X	
Th-228	X	X	X	X
Th-230	X	X	X	X
Th-231			X	X
Th-232	X	X	X	X
U-232	X	X	X	
U-233	X	X	X	
U-234	X	X	X	X
U-235	X	X	X	X
U-236	X	X	X	
U-238	X	X	X	X
Np-237			X	
Pu-238	X	X	X	X

Table 3-14. Radionuclides in Effluents from the NFS Site*				
Radionuclide	**BLEU Sewer****	**Sewer****	**WWTF**	**Gaseous‡**
Pu-239	X	X	X	X
Pu-240	X	X	X	X
Pu-241			X	X
Am-241			X	X

*NFS. "Biannual Effluent Monitoring Report July Through December 2010." Letter (February 22) to L.A. Reyes, U.S. Nuclear Regulatory Commission from M.P. Elliott. ML110610416. Erwin, Tennessee: NFS. 2011.
** Per 10 CFR 1301(a)(1), the TEDE to an individual member of the public does not include the dose contribution from disposal of radioactive materials into sanitary sewerage in accordance with 10 CFR 20.2003.
‡Air monitoring was reported for Ac-228 and Pa-234m during 2005 and 2006. Monitoring was reported for Ac-227 in air during 2004 and 2005 and in water during 2005 and 2006. Monitoring was reported for Pa-231 in water during 2005 and 2006.

The TEDE combines committed doses from radioactivity inside the body and the dose equivalent from radioactivity outside the body to provide a measure of the overall detriment. Committed (internal) doses (from ingestion and inhalation) of radioactive materials are generally calculated from airborne radioactive effluent measurements.

For a U.S. resident, the average annual TEDE from natural background radiation sources is 300 mrem (3.0 mSv) but this annual TEDE can vary by location and elevation (NCRP, 2009). The source of this background TEDE includes cosmic radiation, radionuclides generated by interactions between the atmosphere and cosmic radiations (cosmogenic radionuclides), radiation sources in the Earth (terrestrial sources), naturally-occurring radionuclides in the air and in food (inhaled and ingested), and naturally-occurring radionuclides that reside in the body. The major natural contributor to TEDE to the public is radon gas, which is released during the natural decay of uranium, found in most rock and soil. Radon levels in Unicoi County are relative high due to the mountainous environment. The average measured indoor radon level in Unicoi County is 7.1 pCi/L in comparison to the national average radon concentration of 1.3 pCi/L (Tennessee Division of Air Pollution Control, 2011) and EPA's action level for indoor radon concentration of 4.0 pCi/L (EPA, 2011). In addition, the Town of Erwin's elevation (approximately 511 m [1,675 ft] above sea level) would tend to raise background radiation levels over those anticipated at sea level. Absent published values for background TEDE levels in Erwin, estimating the background TEDE at 300 mrem [3.0 mSv] is likely to be low, given that radon typically contributes 67 percent of the background dose. Note that this TEDE is from naturally-occurring radiation sources only and is not from operations at NFS or other man-made radiation sources. A U.S. resident receives an average TEDE of 60 mrem [0.6 mSv] per year from man-made radiation sources, primarily medical sources such as x-rays and nuclear medicine procedures, in addition to the TEDE from natural background radiation.NFS calculates committed dose to the public by establishing a location for the maximally exposed individual (MEI). For gaseous effluent, the MEI is a hypothetical member of the general public that resides at the site boundary 24 hours per day and 365 days per year. The location of the MEI varies depending on wind direction, distance, and the relative contributions of radionuclides from each onsite stack. The wind direction is based on 5-year average wind speed and direction frequencies (NFS, 2009b). The dose to the MEI is determined using a computer code that calculates the dose from each type and quantity of radioactivity in effluent air from each of the 20 stacks at NFS. Table 3-15 provides the TEDE to the hypothetical MEI from all gaseous radioactive effluents for the years 2000 through 2010. As shown, the highest airborne TEDE for this time period was 0.0362 mrem [3.62×10^{-4} mSv] in 2000, and the lowest airborne TEDE was 0.0020 mrem [2.0×10^{-5} mSv] in 2007. The NRC annual total (airborne, liquid, and external) TEDE limit to a member of the public is 100 mrem [1 mSv].

Table 3-15. Total Effective Dose Equivalent to the Hypothetical Maximally Exposed Individual From Gaseous Effluents*†		
Year	**TEDE (mrem)**	**TEDE (mSv)**
2010	0.0065	6.5×10^{-5}
2009	0.0049	4.9×10^{-5}
2008	0.0030	3.0×10^{-5}
2007	0.0020	2.0×10^{-5}
2006	0.0044	4.4×10^{-5}
2005	0.0067	6.7×10^{-5}
2004	0.0114	1.14×10^{-4}
2003	0.0200	2.0×10^{-4}
2002	0.0333	3.33×10^{-4}
2001	0.0315	3.15×10^{-4}
2000	0.0362	3.62×10^{-4}

*Compiled from multiple reports similar to Nuclear Fuel Services, Inc. (NFS). "Biannual Effluent Monitoring Report January Through June 2004." Letter (August 27) to W.D. Travers, U.S. Nuclear Regulatory Commission from B.M. Moore. Erwin, Tennessee: NFS. 2004.
†The annual public dose limit is 1 mSv (100 mrem).

For liquid effluents, the MEI is a hypothetical member of the general public who drinks water directly from the Nolichucky River at the nearest drinking water intake point at a rate of two liters per day (0.5 gallon per day). The TEDE to the MEI for liquid effluent is calculated based on data for flow in the Nolichucky River in combination with data collected for facility liquid effluents discharged to the river. Table 3-16 provides the TEDE to the hypothetical MEI from all liquid radioactive effluents for 2001 through 2010. The highest TEDE from liquid effluents for this time period was 0.028 mrem [2.8×10^{-4} mSv] in 2002.

Table 3-16. Total Effective Dose Equivalent to the Hypothetical Maximally Exposed Individual from Liquid Effluents*		
Year	**TEDE (mrem)**	**TEDE (mSv)**
2010	0.003	3×10^{-5}
2009	0.004	4×10^{-5}
2008	0.005	5×10^{-5}
2007	0.004	4×10^{-5}
2006	0.004	4×10^{-5}
2005	0.011	1.1×10^{-4}
2004	0.005	5×10^{-5}
2003	0.008	8×10^{-5}
2002	0.028	2.8×10^{-4}
2001	0.003	3×10^{-5}

*Nuclear Fuel Services, Inc. (NFS). "Supplemental Information to Support Chapter 9 and the Environmental Assessment for Renewal of SNM License 124." Letter (June 24) to Director, Office of Nuclear Materials Safety and Safeguards, NRC, from M.P. Elliot. ML11180A188. Erwin, Tennessee: Nuclear Fuel Services, Inc. 2011a.

As discussed in Section 2.4.2, NFS has placed environmental dosimeters at onsite and offsite locations to monitor ambient external radiation doses. Table 3-17 presents the maximum

measured deep dose equivalent (DDE) at the site fence line between 2000 and 2010. This DDE assumes that a hypothetical person resides at the site fence line 24 hours per day and 365 days per year. Applying an occupancy factor of 0.0625 for occasional occupancy would reduce the DDE by a factor of 16 (NCRP, 1976. Note that site fence line monitoring includes any contribution from the adjacent Studsvik facility, which is a State of Tennessee radioactive materials licensee that processes low-level radioactive wastes. The highest DDE from direct radiation for this time period was 81 mrem [0.81 mSv] in 2003. This DDE adjusted for occasional occupancy at the site boundary is 5.1 mrem [0.051 mSv].

Table 3-17. Results of Direct Radiation Monitoring at the Fence Line*

Year	DDE (mrem)	DDE (mSv)
2010	23	0.23
2009	16	0.16
2008	13	0.13
2007	22	0.22
2006	25	0.25
2005	35	0.35
2004	52	0.52
2003	81	0.81
2002	36	0.36
2001	46	0.46
2000	35	0.35

*NFS. "Supplemental Information to Support Chapter 9 and the Environmental Assessment for Renewal of SNM License 124." Letter (June 24) to Director, Office of Nuclear Materials Safety and Safeguards, NRC, from M.P. Elliot. ML11180A188. Erwin, Tennessee: Nuclear Fuel Services, Inc. 2011a.

As seen from Tables 3-15 to 3-17, direct radiation is the predominant contributor to the total (airborne, liquid, and external) TEDE to a member of the public.

NFS monitors liquid effluents, including waste water and storm water, and compares the radioactivity in water to the concentration limits in 10 CFR Part 20. Figure 3-11 shows the fraction of the 10 CFR Part 20, Appendix B liquid effluent concentration limits between 2000 and 2010 for all radionuclides added together. Only once (in the first half of 2002) did the sum of fractions for all radionuclides total greater than one, although the limit for each of the 12 individually monitored radionuclides was not exceeded. For all other reporting periods, the fraction of the Appendix B liquid effluent concentration limits for all radionuclides was less than 0.90. This demonstrates that none of the individual radionuclide limits was exceeded during the other reporting periods.

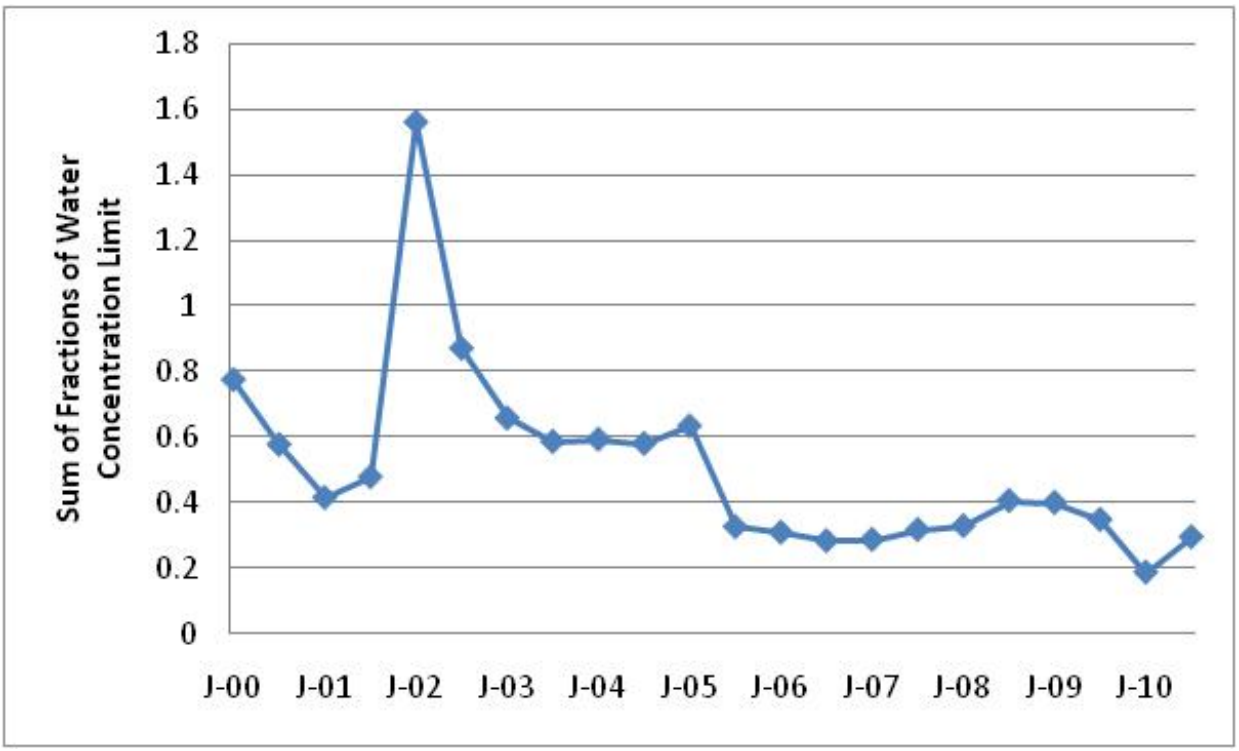

Figure 3-11. Sum of the Fractions of Water Concentration Limits in 10 CFR Part 20, Appendix B for All Radionuclides (from NFS, 2011b, and Similar Reports)

NFS demonstrates compliance for stack releases by calculating the radiation dose to the hypothetical MEI. For the purposes of comparison to the air effluent limits in 10 CFR Part 20, Appendix B (which are set for dose calculations at the site boundary), NFS calculated that between 2004 and 2010, it had released radioactivity from Main Stack 416, at levels between 1.01 and 8.74 times the air effluent limits (NFS, 2011b; 2010d; 2009f; 2008a,b; 2007a,b; 2006a,b; 2005a,b; 2004a,b; 2003b,c; 2002c,d; 2001b,c; 2000). However, dispersion of the radioactivity in the air greatly reduced the concentration at offsite locations to levels that averaged 0.02 percent of the Appendix B values for air concentration (NFS, 2011b; 2010d,e; 2009f,g; 2008a,b; 2007a,b; 2006a,b; 2005a,b; 2004a,b; 2003b,c; 2002c,d; 2001b,c; 2000). According to 10 CFR Part 20, Appendix B, the dose associated with this fraction is 0.01 mrem [0.001 mSv].

NFS operations result in the use and release of several non-radiological constituents both to the air and to water. The non-radiological constituents are listed in Table 2-1 for air emissions, in Tables 2-2a and 2-3a for storm water discharges, and in the TDEC NPDES permit for treated liquid effluents discharged from the WWTF. As discussed in Sections 2.3.1 and 2.3.2, NFS discharge of these non-radiological constituents are addressed by TDEC-issued permits. In addition, NFS uses other hazardous chemicals including ammonium hydroxide, hydrogen, nitric acid, sodium hydroxide, sodium hydrosulfide, and sulfuric acid. Further, several organic compounds are present at the NFS site, including PCE, trichloroethylene, 1,2-dichloroethylene, vinyl chloride, and tributylphosphate.

3.11.2 Accidents

The NFS Environmental Report (NFS, 2009b) described postulated accidents with the potential for offsite consequences. These accidents included (1) nuclear criticality, (2) uranium hexafluoride (UF6) release, (3) uranium solution release, (4) major fire, (5) natural phenomena, and (6) security emergency. The description is consistent with the accident analysis in the NFS Emergency Plan, which the NRC staff previously reviewed and approved. The Emergency Plan was included in the license renewal application by reference with no changes. The maximum offsite consequences from these accidents occur either at the site boundary or at the nearest resident within a few hundred meters of the plant. Protective action recommendations in the Emergency Plan include areas within 1.6 km [1 mi] of the plant and the Nolichucky River up to 16 km [10 mi] downstream from the plant.

The safety issues regarding postulated accidents will be addressed in the SER.

4.0 ENVIRONMENTAL IMPACTS

In this chapter, the NRC staff presents its evaluation of the potential environmental impacts from the proposed continuation of site activities for 40 years and from reasonable alternatives to that proposed action. In performing this evaluation, the NRC staff reviewed the NFS license renewal application and environmental report; collected information from local, state, and federal government agencies; and then independently evaluated the environmental impacts to the various resources of the affected environment. The staff applied the guidelines outlined in NUREG–1748 (NRC, 2003) in performing its evaluation.

According to the Council of Environmental Quality, the significance of impacts is determined by examining both context and intensity (40 CFR 1508.27). Context is related to the affected region, the affected interests, and the locality, while intensity refers to the severity of the impact, which is based on a number of considerations. In evaluating the significance of potential impacts in this EA, the NRC staff used the following significance levels identified in NUREG–1748, which account for context and intensity:

- SMALL—environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource

- MODERATE—environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource

- LARGE—environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource

The NRC staff's analysis of potential environmental impacts from the proposed action is based on (1) NFS's forecast of activities over the proposed 40 years, and (2) data that reflect current site conditions, activities, and effluent levels. As such, unless otherwise noted, the NRC staff is not relying on the analysis in the 1999 license renewal EA (NRC, 1999) as a basis from which impact conclusions are drawn.

In addition to the NFS proposed action, the NRC staff analyzed two alternatives: (1) the no-action alternative and (2) renewing the NFS license for 10 years. Under the no-action alternative, NRC would not renew license SNM–124, and as a result, operations at the NFS site would be required to cease. Also, NFS would be required under 10 CFR 70.38 to submit a detailed site decommissioning plan, and facility decommissioning would begin upon NRC approval of that plan. NRC's review would address both the health and safety and the environmental aspects of the proposed site decommissioning plan.

NRC also considered a 10-year license renewal period as an alternative to the proposed action. Regarding this alternative, the potential transportation and waste management impacts are addressed in the EA. The NRC staff did not separately address the 10-year alternative for the other resource areas evaluated in the EA, because the staff determined that the types of potential environmental impacts associated with site operations during the proposed 40-year license renewal period would be the same as those during a 10-year license renewal period.

Additionally, for the purposes of this EA, the NRC staff does not consider the potential impacts from NFS discharges of effluents in compliance with 10 CFR Part 20 regulatory limits and with the permit conditions issued by other federal, state, or local agencies for the 10-year alternative

to differ either in type or in magnitude with the potential impacts for the requested 40-year period. The regulatory limits in 10 CFR Part 20 and the respective permit conditions are protective of public health and safety and the environment, and so discharges in compliance with those limits and conditions would not be expected to pose undue cumulative risks to human health and the environment.

Impacts from site decommissioning are evaluated for the proposed action and the 10-year alternative, in addition to the no-action alternative. In doing so, the NRC staff recognizes that site decommissioning will be a reasonably foreseeable future action for the NFS facility and site. In conducting its evaluation, the staff also recognized that continued operations over 40 years or 10 years has the potential for increased site contamination that would need to be addressed in the detailed site decommissioning plan submitted by NFS for NRC review.

4.1 Land Use

The NRC staff's analysis of potential environmental impacts to land use consists of an evaluation of changes in land use from the proposed action, reasonable alternatives, and the no-action alternative.

Operational Impacts

Under the proposed action, NFS is planning certain infrastructure replacements and improvement during the next five years. These activities are listed in Section 2.6, and of these, construction of a new entry/exit control point and of new parking areas are the most likely to impact land use. Otherwise, NFS has not identified significant changes in onsite land use in the near future and, with renewal of the license, all major operations would continue to be conducted within the Plant Protected Area. As discussed in Section 3.1, no onsite changes to land use have occurred since the previous license renewal in 1999, other than the construction of the BLEU complex in 2002 and 2003. The NRC staff previously evaluated the environmental impacts associated with the construction of the BLEU complex (NRC, 2002).

With respect to longer term potential impacts for the proposed 40-year license renewal, any changes to the NRC-licensed activities consistent with the provisions in 10 CFR 70.72, including those that would involve either construction of new processing facilities or decommissioning of existing facilities, may require NFS to submit an amendment request for NRC review. The NRC staff would evaluate the specific environmental impacts associated with the proposed changes as part of its NEPA review process at that time. Given the construction activities identified in Section 2.6 and no other planned changes in land use identified, the NRC staff therefore determines that the impact on land use in the surrounding area for the proposed action would be SMALL to MODERATE.

Under the no-action alternative, operational impacts on land use would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. Construction activities identified in Section 2.6 of the EA would likely not occur. Potential operational impacts on land use for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific land use impacts associated with decommissioning and decontamination activities at that time. In the short term, it is anticipated that decommissioning and decontamination activities, and therefore land use impacts, would largely be confined to the existing Plant Protected Area. After the site was decommissioned and the NRC license terminated, the land would become available for other uses either with or without institutional controls on future land use options, depending on NRC conditions for license termination and the Town of Erwin zoning restrictions for the area. Long-term impacts on land use would depend on the new tenants of the site. Expected impacts on land use from decommissioning would be MODERATE, given the change in use from a nuclear fuel fabrication facility to a future indeterminate use.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Expected impacts on land use from site decommissioning would be MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

With respect to cumulative impacts, past impacts to land use included construction of the NFS and Studsvik facilities, development of the adjacent properties in the Riverview Industrial Park, and expansion of the CSX railroad facilities. While commercial and residential developments have expanded near Erwin since the facility was built in the 1950s, the surrounding area outside of the city limits remains fairly rural and undeveloped. As shown in Table 3-2, the land use area within 1.6 km [1 mi] of the site is predominantly residential, with limited commercial and industrial uses. The Unicoi County Land Use and Transportation Plan 2008 – 2020 focuses on maintaining the current land use and transportation infrastructure and changes in land use are not expected to be significant (Unicoi County Regional Planning Commission, 2008). Because NFS has not identified any major changes to ongoing operations as part of the proposed action, continued NFS site operations would not be expected to significantly change land use or development rates in the area. The NRC staff concludes therefore that the proposed action would have a SMALL incremental contribution to the cumulative impact on land use in the vicinity of the NFS site.

4.2 Transportation

The NRC staff's evaluation of transportation impacts from the proposed license renewal considers the impacts to local traffic and the non-radiological and radiological public and occupational safety impacts from incident-free transportation and from potential transportation accidents. Transportation activities associated with the license renewal are discussed in Section 2.3.4.

Operational Impacts

Under the proposed action, no changes in how NFS processes enriched uranium are planned during the license renewal period. Therefore, the type and magnitude of transportation activities are expected to be similar to those of prior operations. To evaluate the impacts of the proposed transportation on local traffic, the NRC staff compared the magnitude of proposed transportation activities with the existing traffic volumes near the site (Section 3.2). Based on the information in Table 2-4, daily workers commuting to and from the site contribute the largest number of average daily vehicles from proposed operations. As shown in Table 4-1, if the estimated 1,658 daily worker commuting trips are allocated to each road segment listed in Table 3-3, the contribution to the most recent (2008) annual average daily traffic is from 20 to 29 percent for the Erwin roads and 10 percent of the traffic on Interstate 26. Similarly, other shipping activities associated with the proposed action (approximately 588 truck shipments including annual decommissioning waste shipments), if allocated to each road segment, represent an additional 7 to 10 percent of the annual average daily traffic in Erwin and 4 percent of the traffic on Interstate 26.

Table 4-1. Contribution of NFS-Related Transportation Activities to the 2008 Average Annual Daily Traffic Count for Roads Near the NFS Site

Road and Location	2008 Traffic Count*	NFS Commuting Traffic	% of 2008 Traffic	NFS Shipping Traffic	% of 2008 Traffic
Jackson Love Highway Between Carolina Avenue and Interstate 26, Erwin	7,604	1,658	22	588	8
South Main Avenue at Tucker Street, Erwin	7,560	1,658	22	588	8
State Highway 107 Between North Main Avenue and Interstate 26, Erwin	5,804	1,658	29	588	10
North Main Avenue Between 5th and 6th Streets, Erwin	8,272	1,658	20	588	7
Interstate 26 West of Erwin	16,230	1,658	10	588	4

*Average annual daily

Because the magnitude of transportation activities associated with the proposed action is a sizeable fraction of existing traffic for local roads, the NRC staff concludes the NFS impact to local Erwin average daily traffic would be MODERATE, but the area affected should be localized around the NFS site, given the short distance from the plant site to Interstate 26 and the available capacity of the interstate. Furthermore, because NFS is not proposing major changes to the current operations license, the local transportation impacts would represent a continuation of existing levels of traffic. The percentage contribution of traffic from the proposed action to Interstate 26 traffic is small, and therefore impacts to Interstate 26 traffic would be SMALL. The NRC staff concludes that the overall impact on traffic for the proposed action would be SMALL given (i) existing site operations would continue without significant changes in transportation activities, (ii) the contribution to Erwin traffic would be localized, (iii) the impacts would be similar to ongoing conditions, and (iv) the contribution to Interstate 26 traffic would be a small fraction of existing traffic.

The potential non-radiological impacts from decommissioning transportation accidents, including traffic accident fatalities, have been previously evaluated. In the previous license renewal EA (NRC, 1999), NRC calculated less than one (0.72) fatality would be expected from shipping 2,874 shipments of contaminated soil from proposed decommissioning activities to a licensed disposal facility in Clive, Utah. Based on the lower estimated number of decommissioning shipments provided in Table 2-4 for the proposed action (1,732) and the comparable shipment distances that would be traveled (either to Clive, Utah, or to the Nevada Test Site in Nye County, Nevada), the NRC staff concludes decommissioning shipments for the proposed action would present a lower fatal accident risk than that previously calculated for the last license renewal. Therefore, the NRC staff concludes that the transportation impacts from decommissioning activities would be SMALL.

Compliance with NRC and U.S. Department of Transportation packaging and transportation regulations (10 CFR Part 71 and 49 CFR Parts 100–180) provides protection for workers and the public from exposure to unsafe levels of radiation during transport and limits the potential for releases of hazardous and radioactive materials during transportation accidents. These regulations address a variety of factors related to safety including packaging, labeling, signage (placarding), driver qualifications, routing, incident reporting, and emergency preparedness. Roles and responsibilities of shippers, carriers, first responders, and applicable state and federal agencies are established in these regulations or by other coordination actions to ensure prompt response and support is provided for incidents involving releases of hazardous (including radioactive) materials during transport. The staff concludes the existing regulatory framework and shipping practices provide adequate protection of public health and safety from potential hazards associated with the proposed continuation of radioactive and hazardous materials transportation activities.

While the existing regulations address the fundamental safety concerns associated with transportation of hazardous materials, quantitative risk calculations provide additional technical insights into the potential radiological and non-radiological risks of the proposed shipping activities. The U.S. Department of Energy (DOE) previously analyzed incident-free and accident radiological and non-radiological impacts for uranium downblending-related transportation activities (including NFS downblending activities) in a final environmental impact statement (FEIS) for Disposition of Surplus High Enriched Uranium (DOE, 1996). That analysis supported a TVA record of decision (TVA, 2001) on the uranium downblending project that concluded environmental impacts from the downblending program, which included the proposed NFS transportation activities, were small. Estimated fatalities from the entire shipping campaign were fewer than one (TVA, 2001) with the greatest contribution from non-radiological traffic accident fatalities. NRC previously reviewed the 1996 DOE FEIS and the TVA record of decision and incorporated them by reference into a prior NRC environmental review for the NFS downblending activities (NRC, 2002). Since that time, DOE has evaluated (DOE, 2007) whether the transportation impact calculations in the 1996 FEIS needed to be supplemented to address changes in parameters, assumptions, environmental conditions, or programs. DOE concluded that additional analyses would not substantially change the impact conclusions in the 1996 FEIS (DOE, 2007).

NRC has also previously evaluated the incident-free radiological risks of transporting various radioactive materials (NRC, 1977) that include materials similar to those considered in the proposed action (i.e., natural uranium oxides, uranium hexafluoride, enriched uranium hexafluoride, enriched uranium oxide, and non-irradiated fuel elements). The calculated annual radiological risk for radioactive material shipments nationwide in 1975 was small (resulting in an estimated additional 1 cancer fatality) and, when considered along with the more recent DOE

FEIS analyses, provides additional support for the conclusion that the proposed transportation activities can be conducted safely without imposing significant radiological risks to public health and safety. Therefore, the NRC staff concludes that the impact on public health and safety from transportation activities for the proposed action would be SMALL.

The 10-year license alternative would proportionally reduce the cumulative magnitude of operational transportation activities for the life of the site. Impacts for the shorter renewal period would be expected to be similar to those described for the 40-year renewal (e.g., contributions to traffic; an incremental increase in risks from incident-free and accident non-radiological and radiological transportation to workers and the public). However, the impacts would be limited in duration given the shorter license renewal period. Considering the impacts for the proposed 40-year renewal are SMALL, the NRC staff determines that the impacts from transportation for the alternative of a 10-year renewed license also would be SMALL.

Under the no-action alternative, operational impacts on transportation would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. As the shut down occurs, daily commuting trips for operational workers and operational shipping traffic would cease. Therefore, potential operational impacts on transportation for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific transportation impacts associated with decommissioning and decontamination activities at that time. NFS would be required to begin site decommissioning following NRC approval of the site decommissioning plan. Full site decommissioning could temporarily increase transportation activities at the site until decommissioning was completed. Transportation activities associated with site decommissioning include commuting workers, shipments of supplies and equipment, and shipments of waste materials including contaminated structures, equipment, and soils. Based on this information, potential impacts on transportation would be SMALL to MODERATE.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. Transportation activities associated with the decommissioning and decontamination would be similar no matter when those activities take place, although the number of the waste material shipments will account for any contamination that has occurred as the result of operations. Expected impacts on transportation from site decommissioning would be SMALL to MODERATE under each of the alternatives to the proposed action.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. Transportation activities associated with the decommissioning and decontamination would be similar regardless of when those activities take place. As stated above, the estimated number of decommissioning shipments of contaminated soil for the proposed action (1,732 or approximately 43 per year) is less than the estimated number of such shipments (2,874 or approximately 72 per year) evaluated in the previous license renewal EA (NRC, 1999). These

shipments, along with other transportation activities associated with site decommissioning (e.g., commuting workers, incoming material shipments) would have a MODERATE impact on traffic localized around the NFS site, but a SMALL impact on the interstate traffic. Therefore, expected impacts on transportation from site decommissioning would be SMALL to MODERATE under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

Cumulative impacts from transportation activities may result in increased demand on local roads due to residential growth and further development or redevelopment in the industrial sector. In December 2010, Studsvik entered into a joint venture with EnergySolutions for the processing of ion exchange resins produced at nuclear power plants at the Studsvik facility and the disposal of the packaged process residue at EnergySolutions's low-level waste disposal facility in Clive, Utah (knoxnews.com, 2011). Should this joint venture process all nuclear industry ion exchange resins as these companies hope (NRC, 2011), transportation around the facility would likely be affected given an estimated 85,000 cubic feet of resins are generated annually by U.S. nuclear power plants (Utah Department of Environmental Quality, 2010).

To further assess the potential cumulative impacts, the NRC staff evaluated local and regional transportation plans. The NFS site is located within the Johnson City Metropolitan Transportation Planning Organization (Wilbur Smith Associates, 2008) and within the Town of Erwin in Unicoi County. The Unicoi County land use and transportation plan for 2008 to 2020 (Unicoi County Regional Planning Commission, 2008) projects modest population growth for the Town of Erwin to 2025 (approximately 2.5 percent increase every 5 years). The plan does not identify any specific local capacity challenges and, given the relatively steady population of the town, existing roads are assumed to be sufficient to accommodate a continuation of planned activities at the NFS site.

The Johnson City Metropolitan Transportation Planning Organization's 2030 Long Range Transportation Plan (Wilbur Smith Associates, 2008) provides a regional transportation assessment. This plan indicates Interstate 26 (an expected route for NFS commercial shipping activities associated with the proposed action) currently provides an excellent to average level of service (where the level of service is a planning metric that considers traffic volume and roadway capacity). This level of service is projected to degrade to congested or severely congested at locations north of Erwin (from the Johnson City area northwest to Interstate 81) by 2030 if none of the currently planned road improvements are implemented. Planned road improvements are expected to mitigate some but not all of the projected congestion. The plan proposes additional improvements to Interstate 26 to further mitigate the projected congestion. Based on this plan, the staff concludes that portions of the regional transportation network would be expected to experience potentially destabilizing impacts from the cumulative increases in transportation from all sources of traffic. Proposed NFS activities would increase current average daily traffic on Interstate 26 by approximately 14 percent if all NFS traffic utilized the interstate (see Table 4-1). This would be a reasonable bounding assumption because most employees would be commuting from Carter, Washington, and Unicoi Counties, which are south of Johnson City and the primary area of concern for traffic impacts along Interstate 26. The proposed level of use would be a small contribution to the projected regional traffic impacts from all sources. The NRC staff concludes therefore that the proposed action would have a SMALL incremental contribution to the cumulative impact on transportation resources.

4.3 Socioeconomics and Environmental Justice

NRC staff considered each of the following socioeconomic factors for determining socioeconomic impacts: economic and population growth, employment levels, housing units/vacancy rates, available educational services, and health and social services.

Operational Impacts

Under the proposed action, NFS anticipates modest changes in employment levels at the site with an increase or decrease on the order of 150 employees over the next 40 years (NFS, 2010a). As such, site activities would continue to create steady employment for the affected counties. In Table 4-2, NFS employee residence locations in 2009 were compared to the 2010 labor force populations in the region of influence (ROI) counties. As shown, for all of the counties except Unicoi County, NFS employees make up less than 1 percent of the labor force for the county. For Unicoi County, NFS employees comprise nearly 3 percent of the county labor force. NFS employment levels are not expected to change significantly during the license renewal period, so these percentages are not expected to vary much unless the labor force populations for the ROI counties change dramatically.

Table 4-2. Population Distribution and Percentage Employment by NFS in the Region of Influence*

County	Total Labor Force Population in 2010†	Number of NFS Employees Residing in 2009	Percent Employed by NFS
Carter County, Tennessee	30,210	116	0.38%
Greene County, Tennessee	30,130	17	0.06%
Sullivan County, Tennessee	75,640	50	0.07%
Unicoi County, Tennessee	8,460	249	2.94%
Washington County, Tennessee	63,100	356	0.56%
Total in region of influence	207,540	788	0.38%

*NFS. "Environmental Report." SNM License No. 124. Docket No. 70-143. Erwin, Tennessee: NFS. May 2009.
†http://www.tennessee.gov/labor-wfd/labor_figures/aug2010county.pdf. (October 8, 2010).

NFS also would be expected to pay applicable local, county, and state taxes, and the facility and its employees would continue to support the local communities through purchases of various services. While the monetary amount of the tax and purchasing support may vary over time, such support would be expected to continue throughout the renewal period. Given that NFS anticipates only modest changes in employment under the proposed action and the relatively small percentage of the total labor force that NFS employees represent, the NRC staff expects impacts to available housing, education, or health and social services to be small. Therefore, the NRC staff concludes that the socioeconomic impact of the proposed action would be SMALL.

The no-action alternative could result in an adverse socioeconomic impact by reducing the number of employed professional, scientific, management, and administrative staff positions. A large portion of the 829 NFS employees (as of 2009, see Table 2-8) would be expected to lose their jobs, as the site activities would transition from operations to decommissioning.

Because more than 85 percent of NFS employees live in Washington, Unicoi, and Carter Counties (Table 2-9), these counties would more likely experience the socioeconomic impacts of final site shutdown. Further, tax revenues in the ROI would be impacted as well, especially in Unicoi County. Therefore, the NRC staff determines that the socioeconomic impact from the no-action alternative would be SMALL for the ROI but MODERATE for Unicoi County.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific socioeconomic impacts associated with decommissioning and decontamination activities at that time. During the decommissioning phase, a short-term construction labor pool would exist. Additionally, a smaller number (in comparison to operational levels) of professional, scientific, management, and administrative staff positions would be required given their knowledge of site activities, operations, and history. These professional positions also would provide oversight of site decommissioning activities and ensure that the conduct of such activities would be protective of public health and safety and the environment. Given the number of workers required for site decommissioning as compared to those employed for operations, an increase in the unemployment rate for the affected counties would not be anticipated.

During site decommissioning, NFS would be expected to pay applicable local, county, and state taxes, and the facility and its employees would continue to support the local communities through purchases of various services. Payment of taxes and purchases of services would be expected to continue until license termination. Because more than 85 percent of NFS employees live in Washington, Unicoi, and Carter Counties (Table 2-9), these counties would more likely experience the socioeconomic impacts of full site decommissioning and final site shutdown. Further, tax revenues in the ROI would be impacted as well, especially in Unicoi County. Therefore, the NRC staff determines that the socioeconomic impact site decommissioning would be SMALL for the ROI but MODERATE for Unicoi County.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Depending on the amount of contamination requiring cleanup, the length of time needed to complete decommissioning activities and therefore, the length of service needed for decommissioning workers, the magnitude of the socioeconomic effects would vary. Expected impacts on socioeconomics from site decommissioning would be SMALL to MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

Concerning cumulative socioeconomic impacts, impacts can result from future expansion or contraction of the local economies, business and industry, and population in response to local and regional economic issues. In light of this, the Town of Erwin has developed plans to take a

managed approach to future growth (Tennessee Department of Economic and Community Development, 2001). Areas for future development in Erwin, however, and in Unicoi County at large are limited given natural factors (flooding, extreme slope, and topography) that would be costly to overcome (Tennessee Department of Economic and Community Development, 2001; Unicoi County Regional Planning Commission, 2008). As a result, growth in Erwin and Unicoi County also would be expected to be limited. NFS is the largest employer in the county and is anticipating moderate changes in employment under the proposed 40-year license renewal. Thus, because the proposed action would be expected to make only a SMALL incremental contribution to cumulative socioeconomic impacts, the NRC staff concludes that the cumulative socioeconomic impact from the proposed action would be SMALL.

4.4 Air Quality

Potential impacts on air quality for the affected environment can result from gaseous effluents released from NFS activities. The effluents may contain radiological and non-radiological chemical constituents. As discussed in Section 2.3.1, non-radiological air emissions are regulated under permits issued by the Tennessee Air Pollution Control Board (Table 1-1). Permitting is the mechanism to implement plans and policies to protect the air quality and control air pollution as described in the Clean Air Act. Radiological air emission impacts are discussed in Section 4.11.

Operational Impacts

Because no significant changes in NFS' authorized operations are planned during the proposed license renewal period, air emissions and effluent treatments that have been used during the current license term would continue if the license was renewed. Table 2-1 contains the current allowable and the estimated annual NFS site air emission levels for the 17 permit-regulated pollutants. As shown in the table, the estimated site air emission levels are lower than the allowable permit thresholds for all 17 pollutants, with the percentage of estimated emission levels ranging from less than 1 percent up to 71 percent of the allowable emission levels. For 13 of the pollutants, estimated emissions are less than 50 percent of the allowable thresholds. Annual estimated site emission levels for 12 of the 17 permit-regulated pollutants are less than 1 metric ton [1.1 short tons].

Annual air pollution control inspections TDEC conducted between 2007 and 2009 found NFS to be in compliance with the air permits issued by the Tennessee Air Pollution Control Board (Tennessee Division of Air Pollution Control, 2010). NFS states that there has been no air permit violations since its NRC license was last renewed in 1999 (NFS, 2010a). Effluent controls employed at the NFS facility for gaseous emissions are described in Section 2.3.1. Additionally, NFS is not proposing any changes in operations or facilities that would require modification of the existing site air permits. Therefore, the NRC staff concludes that the non-radiological impact on air quality from the proposed action would be SMALL.

Under the no-action alternative, operational impacts on air quality would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. As the shut down occurs, gaseous effluents from operations would cease, thus reducing the potential impacts on air quality. Therefore, potential operational impacts on air quality for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific air quality impacts associated with decommissioning and decontamination activities at that time. In the short term, decommissioning could result in an increase in fugitive dust from demolition activities. However, the site would still be regulated under the state air permit(s) during this time. The NRC staff concludes that the non-radiological air quality impacts from site decommissioning would be SMALL.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. The magnitude of the decommissioning effects on air quality would vary, depending on the amount of contamination requiring cleanup and the length of time needed to complete decommissioning activities. However, NFS would be expected to comply with its state-issued air permit(s) throughout the decommissioning period. Therefore, expected impacts on air quality from site decommissioning would be SMALL, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

Cumulative impacts to air quality can result from the release of gaseous emissions into the atmosphere from any source around the NFS site. The project is located in Unicoi County, which is in an area in attainment of all NAAQS, as discussed in Section 3.4.2. The three Tennessee counties within the Eastern Tennessee–Southwestern Virginia Interstate Air Quality Control Region that surround Unicoi County are also in attainment for all NAAQS. Further, the NFS site is 76 km [47 mi] from the nearest Prevention of Significant Deterioration (PSD) Class I area (Great Smoky Mountains National Park). Information in Table 3-10 demonstrates that Unicoi County generates lower emission levels than the four nearest Tennessee counties. For the pollutants listed in Table 3-10, Unicoi County emission amounts range between 1 and 7 percent of emissions from Washington County, which is located about 1.9 km [1.2 mi] from Erwin. This contrast is even greater when compared to Sullivan County located about 28 km [17.4 mi] from Erwin. Unicoi County emission levels are under one percent of the Sullivan County emission levels for all pollutants except volatile organic compounds, which are slightly above one percent.

In summary, the area around the NFS site is classified as in attainment for NAAQS. Additionally, facility emissions are regulated under permits issued by the Tennessee Air Pollution Control Board. The Unicoi County contribution to emission levels is small relative to the surrounding counties, and no change in site operations is anticipated as part of the proposed action. Therefore, the NRC staff concludes that the proposed action would have a SMALL incremental contribution to the cumulative impact on local air quality resources.

For the purposes of climate change discussion, it is generally recognized that greenhouse gas (GHG) emissions have a noticeable but not destabilizing effect on global climate (GCRP, 2009). For the purposes of this analysis, the NRC staff considers that a meaningful approach to address the cumulative impacts of GHGs, including carbon dioxide, is to recognize that such emissions contribute to climate change and that the carbon footprint is a relevant factor in

evaluating potential impacts of an alternative. As stated in Section 2.3.1, the operations at the NFS facility generate less than 25,000 metric tons [27,558 short tons] of CO_2e, which is approximately 0.02 percent of the estimated CO_2e generated by the State of Tennessee. The NRC staff therefore considers that the proposed action would have a SMALL incremental contribution to the cumulative impact on climate change.

4.5 Water Resources

4.5.1 Surface Water

Operational Impacts

Under the proposed action, no significant changes in NFS' authorized operations are planned during the proposed license renewal period regarding the discharge of facility effluents into surface waters. Liquid effluents at the NFS site are treated first at the WWTF before they are discharged in compliance with NRC regulatory limits and state-authorized NPDES permit levels into the Nolichucky River. Storm water discharges at the NFS site is regulated under a TDEC multi-sector general NPDES storm water permit. Continued operation of NFS under the proposed action would require NFS to continue to meet NRC regulatory limits for discharge of liquid effluents and require NFS to continue to renew, as needed, its NPDES discharge and storm water management permits from the State of Tennessee. NFS is currently in the process of renewing its NPDES permit for discharge of facility effluents through Outfall 001 (Table 1-1). Therefore, the NRC staff expects the effect of site discharges of storm water and treated effluents on the quality of surface waters would be mitigated, because such discharges would occur in accordance with NRC regulatory limits and NPDES permit limits. Additionally, the NRC staff considers the ongoing decommissioning and restoration of SWMUs and AOCs (Table 3-11) would be expected to further limit the potential for radioactive constituents to reach surface waters.

As discussed in Section 3.5.1, Wetlands A and B located on the north side of the NFS site are in remediation in accordance with the USACE Nationwide Permit 38. Therefore, the NRC staff expects that any filling and excavation of the wetlands as part of remediation activities would not have adverse impacts on the water quality of wetlands under the USACE permit.

Therefore, the NRC staff concludes that the impacts on surface water quality from the continuation of NFS site activities under the proposed action would be localized and SMALL.

Under the no-action alternative, operational impacts on surface water would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. As the shut down occurs, discharge of liquid effluents from operations would cease, thus reducing the potential impacts on surface water. Stormwater discharges would continue, but would still be expected to comply with the TDEC multi-sector general NPDES storm water permit. Therefore, potential operational impacts on surface water for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific surface water impacts

associated with decommissioning and decontamination activities at that time. The NRC staff expects that site decommissioning activities would include best management practices, erosion control barriers, and discharges under approved permits. While it is expected that decommissioning activities taking place across the entire site would mitigate future potential impacts on surface waters, limited near term impacts to surface water would be expected given the breadth of full site decommissioning activities. Therefore, the NRC staff concludes that impacts on surface water from decommissioning would be SMALL to MODERATE.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. NFS would be expected to address contamination with a potential to affect surface waters. NFS construction activities occurring during any additional operation period may increase the percentage of impervious surfaces at the site. Although these activities could lead to increases in contaminants contained in stormwater discharges, NFS stormwater discharges would be expected to meet TDEC stormwater discharge permit conditions. Therefore, the NRC staff concludes that expected impacts on surface water from site decommissioning would be SMALL to MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

Future contributions to cumulative impacts on surface water resources within the Nolichucky River would generally occur from those actions that currently cause impacts (e.g., human habitation, urban and industrial development, agriculture). According to the TVA (TVA, 2004), state and federal programs authorized by the Clean Water Act, including the NPDES and Total Maximum Daily Loads permits, have been implemented in monitoring and managing the water quality of surface waters. As discussed previously, TDEC, under its regulatory authority, issues NPDES permits that serve to mitigate impacts on surface waters in the State. Given that NFS impacts on surface water would be localized and SMALL, the NRC staff concludes that the proposed action would have a SMALL incremental contribution to the cumulative impact on surface water resources.

4.5.2 Groundwater

Operational Impacts

Under the proposed action, no significant changes in NFS' authorized operations are planned during the proposed license renewal period that would affect groundwater use, monitoring, or restoration activities. There is existing groundwater contamination, cleanup of which is being conducted under the oversight of EPA and TDEC. As discussed in Section 3.5.2, a uranium plume is confined in the alluvium on site, but a chlorinated solvent plume vertically extends into the shallow or deep bedrock and laterally extends offsite toward the Nolichucky River. The alluvium, shallow bedrock, and deep bedrock are depicted in Figure 3-6. Historically, these contaminants exceeded drinking water maximum contaminant levels (NFS, 2010a). The source zones for radiochemical and chlorinated solvents (e.g., impoundments, burial grounds, maintenance shop area) and site wide groundwater have been under NFS remediation. As a result, since remediation efforts began, the uranium plume has decreased in size to 24 percent

of its maximum size and the chlorinated solvent plume has decreased to 9 percent of its maximum size (NFS, 2010a).

According to a TDEC environmental indicator memorandum for the NFS site (NFS, 2010a), the offsite excursion of the chlorinated solvent plume toward the Nolichucky River appears to be stable and controlled. Because there are no known household, public, or industrial groundwater users downgradient of the NFS site [i.e., between the site and the Nolichucky River] (ATSDR, 2007; NFS, 2009b, 2010a), the environmental indicator memorandum did not identify any potential risk. Regarding the chlorinated solvent contamination at the site, ATSDR ranked the NFS site as No Apparent Public Health Hazard, as there were no identified exposure pathways whereby the contaminated groundwater beneath the NFS plant would be used as a source of public water (ATSDR, 2007).

In summary, the NFS site has ongoing and planned decommissioning and remediation of SWMUs, including the main source areas for the uranium and chlorinated-solvent plumes. NFS has also achieved substantial reductions in the size of both uranium and chlorinated-solvent groundwater plumes as a result of ongoing aquifer remediation. TDEC has determined that the offsite-extending chlorinated solvent plume is stable and controllable and because there are no water supply wells downgradient of the NFS site, the plume does not pose a risk to drinking water. Were contaminants in the plume to reach the Nolichucky River, flow in the river would be expected to further dilute the concentrations of those contaminants. In addition, NFS maintains a groundwater monitoring network, and works with TDEC and EPA oversight to remediate contaminated groundwater. Therefore, the NRC staff concludes that the short-term impact of the proposed action on groundwater resources would be MODERATE while groundwater remediation is ongoing, whereas the long-term impact would be SMALL following completion of remediation activities.

Under the no-action alternative, operational impacts on groundwater would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. As the shut down occurs, NFS efforts to remediate existing groundwater contamination would likely continue through the change from operations to site decommissioning. Therefore, potential operational impacts on groundwater for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific groundwater impacts associated with decommissioning and decontamination activities at that time. The NRC staff expects that NFS decommissioning efforts would address known groundwater contamination and any further groundwater contamination identified during site decommissioning. The NRC staff concludes that the short-term impacts on groundwater from decommissioning would be MODERATE while groundwater remediation is ongoing, whereas the long-term impact would be SMALL following completion of remediation activities.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Therefore, the NRC staff concludes that expected impacts on groundwater

from site decommissioning would be SMALL to MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

Future contributions to cumulative impacts to groundwater resources around the NFS site would generally occur from those actions that currently cause impacts (e.g., human habitation, urban and industrial development, agriculture). As discussed previously, there are no known household, public, or industrial groundwater users located downgradient of the NFS site. Furthermore, ongoing and planned decommissioning and groundwater remediation activities would further reduce groundwater contamination beneath the NFS site, thereby limiting the potential for offsite contaminant migration. Therefore, the NRC staff concludes that the proposed action would have a SMALL incremental contribution to the cumulative impact on groundwater resources.

4.6 Geology and Soils

Operational Impacts

Under the proposed action, continued planned operations at the NFS site pose no major land use changes that could adversely affect geology and soil. Section 2.6 lists several activities that could potentially impact surficial geology (e.g., construction of a new shipping/receiving warehouse, a new entry/exit control point, new parking areas, and associated retention pond). NFS would be expected to employ appropriate soil erosion control measures as part of these construction activities. Additionally, potential impacts from these construction activities would be controlled to comply with the State of Tennessee storm water permit requirements. Therefore, the NRC staff concludes that the impact on geology from the proposed action would be SMALL.

As discussed in Sections 2.2 and 3.5.2, different areas around the NFS site have been affected by past operations. NFS is currently remediating these areas and would continue to do so to remove radiologically-contaminated soils for offsite disposal. As areas of the NFS site are decommissioned, the NRC staff expects the reduction in source area to further limit the potential for contaminants to migrate offsite. The NRC staff concludes that the impact on soils from the proposed action would be SMALL to MODERATE in areas where remediation is ongoing, but SMALL for the overall site.

Under the no-action alternative, operational impacts on geology and soils would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. Construction activities identified in Section 2.6 of the EA likely would not occur under this alternative. Additionally, NFS's activities to remediate radiologically-contaminated soils would be expected to continue through the change from operations to site decommissioning. Therefore, potential operational impacts on geology and soils for the no-action alternative would be SMALL to MODERATE in areas where soil remediation is ongoing, but SMALL for the overall site.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific geology and soil

impacts associated with decommissioning and decontamination activities at that time. Short-term soil disturbance would occur across the site as part of these activities, during which impacts would be MODERATE. Long-term impacts would depend on whether final site conditions would support unrestricted or restricted release of the site, pursuant to 10 CFR 20.1401 and 20.1402, respectively. Such impacts would be SMALL to MODERATE.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Therefore, the NRC staff concludes that expected impacts on geology and soils from site decommissioning would be SMALL to MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

Cumulative impacts to geologic and soil resources can result from current and future activities at the site and in the vicinity. As discussed elsewhere, the NFS site and the immediate surrounding area have been extensively disturbed by NFS-related and other activities. Currently, NFS is in the process of completing activities onsite to address impacts and is actively working with TDEC and EPA to design remediation strategies and to investigate onsite contamination (NFS, 2009b). While future activities may involve release of chemicals into soils, resulting in contamination, it is expected that such contamination would be remediated by NFS. Therefore, the NRC staff concludes that the proposed action would have a SMALL incremental contribution to the cumulative impact on geology and soils.

4.7 Ecology

Operational Impacts

Under the proposed action, potential impacts to ecological resources may result from discharge of storm water and effluents into streams and from ongoing localized decommissioning activities. NFS's planned construction activities over the next 5-10 years are listed in Section 2.6. Among these activities, construction related to the new entry/exit point and expansion of parking areas may affect the site footprint, but in areas that had been previously disturbed. Therefore, these activities would not be expected to affect local ecology.

As shown in Table 3-1, approximately 20 percent of the NFS site is undeveloped land (i.e., open fields, woods, brush, and shrub swamp). These areas, located mostly near the northern site boundary, could serve as wildlife habitat and provide resources, especially for area birds that can easily travel on and off of the site. However, the area surrounding NFS is dominated by residential development to the northeast, east, and south and by commercial and industrial development to the west. As a result, there are no adjacent large tracts of land connected to the undeveloped areas at the NFS site. Additionally, the enclosed Banner Spring Branch does not provide habitat or resting areas for water fowl.

Because of the existing site development and ongoing human activity at the site, terrestrial animals are unlikely to spend their lifespan and completely depend on food sources and the nesting habitat found in the relatively small amount of undeveloped land on the site. Additionally, most regional species would not be expected to occur in the developed portion of

the site because of extensive disturbance, lack of natural habitat, and availability of suitable habitat in the area surrounding the NFS site.

During the proposed license renewal term of 40 years, undeveloped areas that are not mowed or thinned, especially along Martin Creek, would be expected to continue to evolve into a forest community that may attract a variety of plants and animals that are not currently present. Potential impacts to local streams from construction or localized decommissioning runoff and siltation and the development of undeveloped areas would require mitigation plans and erosion control. Future liquid effluents produced by processing and localized decommissioning activities would be discharged in accordance with NPDES discharge permits and would not be expected to have an adverse affect on wildlife. Future planned localized decommissioning activities would likely take place on land that has already been developed. Any future NSF expansion plans involving major construction activities would be assessed by NRC in a license amendment request at which time potential ecological impacts would be analyzed. Therefore, the NRC staff has determined that the impact on ecological resources from the proposed action would be SMALL.

As discussed in Section 3.7.2, no federal- or state-listed threatened or endangered species are known to occur within the bounds of the Erwin 7.5-minute USGS quadrangle map (which includes the NFS site), while three federal- and state-listed threatened or endangered species (the Appalachian elktoe, the Virginia spiraea, and the Gray Myotis) are known to occur within the bounds of the adjacent Chestoa 7.5-minute USGS quadrangle map. According to available USFWS records, no federally listed or proposed endangered or threatened species occur within the impact area of the proposed action (TDEC, 2009; USFWS, 2009) as shown in Table 3-12. Therefore, the proposed action is not expected to affect threatened and endangered species.

Under the no-action alternative, operational impacts on ecology would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. Construction activities identified in Section 2.6 of the EA likely would not occur under this alternative. Additionally, NFS's localized decommissioning activities would be expected to continue through the change from operations to site decommissioning. The NRC staff expects that the no-action alternative would not affect threatened and endangered species. Therefore, potential operational impacts on ecology for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific ecological impacts associated with decommissioning and decontamination activities at that time. Decommissioning activities under this plan may result in environmental impacts (e.g., increases in the noise levels due to the demolition activities, and impacts to stream banks and increased sedimentation) that could affect the local ecology. Terrestrial species would be expected to avoid the loud noises and activity associated with decommissioning. Earth-moving equipment and activities could cause increased sediment to be washed into the creeks and affect the water quality, potentially affecting the plants and aquatic animal species. Increased use of vehicles and machinery could increase the amount of dust in the air, which could settle on forage, making the plants less edible or inedible for animals. It is expected that a site decommissioning plan would address potential impacts such as these. Following the completion of site decommissioning and subsequent license termination, the site would become available for other uses or could remain

unoccupied depending on use restrictions. Therefore, the NRC staff expects that impacts on ecological resources from site decommissioning would be SMALL to MODERATE.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Therefore, the NRC staff concludes that expected impacts on ecology from site decommissioning would be SMALL to MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

With respect to cumulative impacts to ecology, anticipated land use and socioeconomic changes in the Town of Erwin and in Unicoi County are discussed in Sections 4.1 and 4.3. Planning documents show that growth will be managed and that land use changes that could affect ecology are expected to be limited (Tennessee Department of Economic and Community Development, 2001; Unicoi County Regional Planning Commission, 2008). Regarding local waters that serve as habitat for aquatic plants, fish, and waterfowl, state and federal programs authorized by the Clean Water Act (including the NPDES and Total Maximum Daily Loads permits) have been implemented in monitoring and managing the water quality of surface waters (TVA, 2004). TDEC, under its regulatory authority, issues NPDES permits that serve to mitigate impacts to surface waters in the State. The Tennessee Wildlife Resources Agency Erwin State Trout Hatchery is located approximately 183 m [600 ft] upstream of the NFS site on Spring Branch, a tributary to Martin Creek. The hatchery operates under a TDEC-issued NPDES discharge permit with limitations of settleable and suspended solids (TDEC, 2011). Sedimentation from the hatchery is expected near the point of discharge or at nearby points downstream. The NRC staff therefore considers that the proposed action would have a SMALL incremental contribution to cumulative impacts on ecological resources, including threatened or endangered species.

4.8 Noise

Operational Impacts

Under the proposed action, NFS is proposing the continuation of currently authorized operations with no significant expansion of, or change in, activities. Therefore, the NRC staff does not expect noise levels to increase. NFS plans for its facility and site are identified in Section 2.6. These plans include completing construction of the security barrier walls, and constructing a new shipping/receiving warehouse, a new entry/exit control point, and new parking areas. As discussed in Section 3.8, current noise levels around the site are primarily associated with vehicle traffic noise, which contributes to the noise levels one would expect in an industrial area of a city. Sound level surveys at various locations on the outside perimeter of the site during facility alarm testing did not indicate any levels above Occupational Safety and Health Administration (OSHA) limits (NFS, 2010a). Therefore, the NRC staff concludes that the proposed action would have a SMALL impact on noise levels.

Under the no-action alternative, operational impacts on noise levels would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. Noise levels would be expected to

be reduced given the lower level of activity as compared to full operational status. Facility alarm testing would be expected to continue and would be expected to generate noise levels below OSHA limits. Therefore, potential operational impacts on noise for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific noise impacts associated with decommissioning and decontamination activities at that time. Decommissioning activities under this plan may result in environmental impacts (e.g., increases in the noise levels due to building demolition activities and the operation of heavy equipment). The NRC staff has determined that the impact on noise levels from site decommissioning would be SMALL to MODERATE.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Depending on the amount of contamination requiring cleanup, the length of time needed to complete decommissioning activities and therefore, the duration of decommissioning impacts on noise levels, the magnitude of the noise effects would vary. However, NFS would be expected to comply with OSHA limits for noise levels throughout the decommissioning period. Therefore, expected impacts on noise levels from site decommissioning would be SMALL to MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

Cumulative impacts to noise would include noise emissions from surrounding facilities, traffic noise from the adjacent roadways, and industrial noise from neighboring manufacturing businesses. Riverview Industrial Park is nearing its capacity (Tennessee Department of Economic and Community Development, 2001) and there are no plans for expansion of the industrial park. Given the SMALL impacts on noise levels expected from the proposed action, the NRC staff considers that the proposed action would have a SMALL incremental contribution to cumulative impacts on noise levels.

4.9 Historic and Cultural

Operational Impacts

As discussed in Section 3.9, NFS property is not on the National Register of Historic Places (NRHP) listing nor does the site have any National Historic Landmarks. The nearest NRHP sites are located more than 2.4 km [1.5 mi] from the NFS site and are unaffected by NFS operations. The proposed action will not result in expansion of NFS facilities or operations onto undisturbed land, and therefore the NRC staff finds that the impacts on potential historic or cultural resources would be SMALL.

Under the no-action alternative, operational impacts on historic and cultural resources would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. Activities associated with site shut down would take place on previously disturbed areas, and the construction activities identified in Section 2.6 of the EA likely would not occur under this alternative. Therefore, potential operational impacts on historic and cultural resources for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific historic and cultural resource impacts associated with decommissioning and decontamination activities at that time. The NRC staff does not expect that site decommissioning activities would require disturbance of undisturbed areas that may contain historic or cultural properties. Therefore, the NRC staff has determined that the impact on historical and cultural resources from site decommissioning would be SMALL.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. The NRC staff expects that such contamination would likely occur in areas previously disturbed by site operations. Therefore, the NRC staff concludes that expected impacts on historic and cultural resources from site decommissioning would be SMALL, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

No prehistoric or historic archaeological sites have been identified on the NFS site (NFS, 2009b). According to the Tennessee State Historical Preservation Office, there are no historic or cultural sites on the NFS site (Tennessee Historical Commission, 2009). Therefore, the NRC staff considers that the proposed action would have a SMALL incremental contribution to cumulative impacts on historic and cultural resources.

4.10 Scenic and Visual

Operational Impacts

The site is within a parcel of land zoned as industrial in the town limits of Erwin, Tennessee. Because of its industrial nature with little undeveloped land, the aesthetic and scenic quality of the NFS site is currently low and does not provide a favorable landscape for viewing. No scenic areas are located within the immediate area of the site, although scenic sections of the Nolichucky River and the Appalachian Trail are located within 3.3 km [2 mi]. As discussed in Section 3.9, regional historic properties would not be disturbed by the proposed action, because of their distance from the site. Ongoing construction of a security wall around the perimeter of the main NFS site started in 2007 (NFS, 2009b). The planned construction activities listed in Section 2.6 are consistent with current facilities at NFS for the proposed action. Additionally, due to the industrial character of the site and vicinity, NFS employs adequate lighting for safety

and security purposes. NFS is proposing no changes in lighting requirements with its license renewal application. Therefore, the NRC staff concludes that the impact on scenic and visual resources for the proposed action would be SMALL.

Under the no-action alternative, operational impacts on scenic and visual resources would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. No changes in visual character of the site would occur as construction activities identified in Section 2.6 of the EA likely would not take place under this alternative. Therefore, potential operational impacts on scenic and visual resources for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and the NRC staff would evaluate specific scenic and visual impacts associated with decommissioning and decontamination activities at that time. The NRC staff would evaluate the potential visual and scenic impacts that would result from site decommissioning activities, such as structure demolition, decontamination activities that alter the landscape, and the use of equipment onsite. As site decommissioning proceeds, the site over the short term would be in various stages of disarray, with buildings being de-constructed, demolition materials being staged and then loaded for offsite disposal, and the equipment involved in decommissioning moving across the site. For these reasons, the scenic and visual impacts during site decommissioning would be MODERATE. After the site is decommissioned and the NRC license terminated, the scenic and visual impacts would depend on the property use and construction plans of the next occupant. Therefore, the long-term impact on scenic and visual resources from site decommissioning cannot be specified.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Remediation of such contamination would be addressed during site decommissioning and thus be part of the various stages of disarray in which the site would be placed. Therefore, the NRC staff concludes that expected impacts on scenic and visual resources from site decommissioning would be MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

Cumulative impacts of past visual changes include construction of the NFS site and development of the adjacent properties. While some expansion of commercial and residential developments has occurred in the Erwin Extra Territorial Jurisdiction since the site was established in the 1950s, the surrounding area outside of the city limits remains fairly rural and undeveloped. Opportunities for the Town of Erwin or surrounding communities to expand in the valley where the NFS site is located are primarily restricted to the lower, flat valley bottom from where a direct view of the NFS site is limited. Continued NFS operations during the license renewal term are not expected to change scenic or visual resources in the area. As a result of these factors, the NRC staff has determined that the proposed action would have a SMALL incremental contribution to cumulative impacts on scenic and visual resources.

4.11 Public and Occupational Health

4.11.1 Operational Impacts – Normal Operations

Occupational Non-Radiological and Radiological Health Impacts

By license, NFS is required to implement radiological monitoring and safety programs that comply with 10 CFR Part 20 requirements to protect the health and safety of workers and the public. NRC periodically inspects the NFS programs and has assigned two onsite resident inspectors to inspect for compliance. Worker and public radiological safety at the NFS site is maintained by implementation of a radiation protection program that complies with the regulations in 10 CFR Part 20. The NRC detailed review of that program will be documented in the NRC staff's SER.

A measure of the occupational health impact of NFS operations compared to other chemical facilities can be obtained by comparing the recordable and lost-time incident rates at NFS to the average rates for all chemical facilities throughout the nation. The incident rates for 2005 through 2009 are given in Table 3-13. Between 2005 and 2009, the NFS recordable incident rate has varied between 1.81 and 3.92 per 200,000 worker hours. This range is consistent with the average recordable incident rate range for all chemical facilities in the United States of 2.1 to 2.7 per 200,000 hours worked. The lost-time incident rate at NFS ranged from 0 to 0.66 per 200,000 hours worked and is consistent with the national average range of 0.6 to 0.7 per 200,000 hours worked. Operations at NFS include decommissioning activities that involve the use of heavy equipment that is normally associated with the construction industry. The recordable and lost-time incident rates for construction are 4.7 and 1.7 per 200,000 hours worked (U.S. Department of Labor, BOL, 2010), which are much higher than those for strictly chemical facilities. The data indicate that the incident rates at NFS are not significantly higher than the rates that are expected for a chemical facility and are lower than those expected from construction. Therefore, the NRC staff concludes that the non-radiological impact on occupational health from NFS operations would be SMALL.

A measure of the radiological occupational health impact of NFS operations can be obtained by analyzing the TEDE (total effective dose equivalent) and CEDE (committed effective dose equivalent). As shown in Figures 3-9 and 3-10, no workers at NFS exceeded the regulatory annual occupational dose limit of 5,000 mrem [50 mSv] (TEDE) between 2000 and 2010. Additionally, no workers exceeded an annual occupational dose of 2,000 mrem [20 mSv] (TEDE) since 2002, and since 2003, only one worker exceeded an occupational dose of 500 mrem [5 mSv] (CEDE). These data demonstrate that the radiological impact of NFS operations on occupational health is SMALL.

Given that the non-radiological impacts on workers from the past five years and the radiological impacts on workers from the past 10 years have been SMALL, the NRC staff finds that continued operations of the NFS facility for 40 years (i.e., the proposed action) would be expected to have SMALL impacts on the occupational health of workers.

Under the no-action alternative, operational occupational radiological and non-radiological impacts would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. Recordable and lost time incidents and occupational doses would be expected to be similar to

or less than during full operations. Therefore, potential operational occupational radiological and non-radiological impacts for the no-action alternative would be SMALL.

Public Non-Radiological and Radiological Health Impacts

One public health study was conducted in the last 10 years. As described in Section 3.11, the ATSDR-conducted study ranked the NFS site as No Apparent Public Health Hazard and concluded that chemical exposures are not at levels likely to cause adverse health impacts (ATSDR, 2007). Therefore, the NRC staff concludes that the impact on public health from chemical emissions at NFS would be SMALL.

Public health impacts could occur if sufficient quantities of hazardous or radioactive materials are transported from the NFS site and enter the environment through air, surface water, groundwater, and solid wastes. The potential radioactive contaminants include uranium and other radionuclides listed in Table 3-14 and hazardous chemicals associated with NFS site operations. As described in Chapter 2, an effluent monitoring program is in place at NFS to ensure releases of radioactive materials to the environment are within federal and state regulations and are maintained as low as reasonably achievable.

Public health impacts through air include direct radiation from sources on the site and release of radioactive materials from stacks. Results of direct radiation monitoring at the site boundary (Table 3-17) demonstrate that annual radiation levels at the site boundary are a small fraction of naturally occurring radiation doses in Tennessee. The highest annual direct dose equivalent (DDE) measured at the site boundary between 2000 and 2010 was 81 mrem [0.81 mSv]; the DDE adjusted for occasional occupancy at the site boundary was 5.1 mrem [0.051 mSv]. Comparing these values to the estimated background TEDE from naturally-occurring radiation of 300 mrem [3.0 mSv] demonstrates that the maximum dose at the site boundary from direct radiation is less than one percent of that estimated background dose. As discussed in Section 3.11.1, direct radiation is the predominant contributor to the total (airborne, liquid, and external) TEDE to a member of the public, and the total TEDE to a member of the public for the years 2000 to 2010 is approximately equal to the DDE. For comparison purposes, the annual dose limit specified in 10 CFR 20.1301(a) for a member of the public is 100 mrem [1 mSv].

Results of the NFS radioactive stack emission monitoring are reported to the NRC semiannually as required by 10 CFR 70.59 (NFS, 2011; 2010d, e; 2009f, g; 2008a, b; 2007a, b; 2006a, b; 2005a, b; 2004a, b; 2003b, c; 2002c, d; 2001b, c; 2000). As shown in Table 3-15, the annual radioactive emissions from all stacks combined for the calendar years 2000 to 2010 contributed a TEDE to the maximally exposed individual (MEI) that ranged from 0.002 to 0.0114 mrem [0.00002 to 0.000114 mSv].

As shown in Figure 3-11 for calendar years 2000 through 2010, the concentration of radioactivity in treated liquid effluents was below the liquid effluent concentration limits in 10 CFR Part 20, Appendix B. As shown in Table 3-16, the TEDE from liquid effluent between 2001 and 2010 ranged from 0.003 to 0.028 mrem [0.00003 to 0.00028 mSv].

NFS discharges certain wastes to the sanitary sewers under Erwin Utilities POTW permits, as discussed in Section 2.3.2. Additionally, these discharges must meet the requirements in 10 CFR 20.2003. Pursuant to 10 CFR 20.1301(a), the calculation of the TEDE to individual members of the public does not include dose contributions from the disposal of radioactive materials into sanitary sewerage.

Based on this analysis of measurement data, radiological doses to members of the public from site operations at NFS are significantly below the 10 CFR Part 20 annual limits for dose to the public. Historical and ongoing decommissioning activities have not shown an incremental impact to the MEI or to the population, and their impact is the same as the impact from the proposed action. Therefore, the NRC staff concludes that the impact of radiological operations on public health would be SMALL.

Routine air monitoring is not currently performed for non-radiological criteria and hazardous air pollutants. Table 2-1 indicates that NFS estimates of pollutants to the environment are in compliance with applicable guidelines and regulations. However, estimated emissions for several of the compounds are at or marginally below the allowable limits. NFS would be expected to perform monitoring to verify that the actual emissions of vinyl chloride, perchloroethylene, trichloroethylene, Bid-2-ethylhexylphthalate, and mercury do not exceed allowable limits.

A concern about health impacts is that radiological exposures from operation of nuclear facilities can cause cancer in populations living in proximity to such facilities. Nuclear facilities licensed by the NRC can sometimes release very small amounts of radioactivity during normal operations. These releases are a very small fraction of background radiation and the amount of radiation the average U.S. citizen receives in a year from all sources. The NRC's regulations require that plant operators monitor and control these releases to meet specified radiation dose limits, and plants must publicly report these releases to the NRC. Some communities have expressed concern about the potential impact of these releases on the health of citizens living near nuclear facilities. To help address these concerns, the NRC has asked the National Academy of Sciences (NAS) to perform a study on cancer risk for populations living near NRC-licensed nuclear facilities. In this NRC-sponsored study, NAS will use its expertise to update a 1990 study conducted by the National Cancer Institute (NCI), "Cancer in Populations Living Near Nuclear Facilities." This 1990 study showed no increased risk of death from cancer for people living in the 107 U.S. counties containing or closely adjacent to 62 nuclear facilities, including all of the nuclear power reactors operational before 1982. The NCI study report showed that, in comparison with the control counties, some of the study counties had higher rates of certain cancers and some had lower rates, either before or after the facilities came into service. None of the observed differences were linked to the presence of nuclear facilities.

The objective of the new NAS study is to provide the NRC with an analysis of the latest cancer mortality and incidence data for populations living near NRC-licensed or proposed nuclear power and fuel-cycle facilities. The NAS will study nuclear power plants that generate electricity, as well as facilities that create the nuclear fuel used in the power plants, and will conduct its study in two phases. In phase 1, the NAS will determine whether it is feasible to develop a technically defensible approach to meet the goals of the study request. The phase 1 results will be used to inform the design of the cancer risk assessment that will be carried out in the NAS study's second phase. The NAS is expected to issue its report of the phase 1 results in the December 2011 – January 2012 timeframe, and it plans to provide a two-month public review period. The review comments collected by the NAS will be provided to the NRC for consideration in how best to design the phase 2 cancer risk assessment.

Based on the analysis of existing measurement data discussed above, radiological doses to members of the public from site operations at NFS are below the 10 CFR Part 20 annual limits for dose to the public. Historical and ongoing decommissioning activities have not shown an incremental impact to the MEI or to the population, and their impact is the same as the impact from the proposed action. Therefore, the NRC staff finds that continued operations of the NFS

facility for 40 years (i.e., the proposed action) would be expected to have SMALL impacts on public health.

Under the no-action alternative, operational public radiological and non-radiological impacts would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. The discharge of both process-related gaseous and liquid effluents would cease, and so radiological and non-radiological impacts to members of the public would be reduced. Therefore, potential operational occupational radiological and non-radiological impacts for the no-action alternative would be SMALL.

4.11.2 Operational Impacts – Accidents

The NRC staff assessed the potential environmental impacts of postulated accidents based on the accident analysis information provided in the NFS Environmental Report (NFS, 2009b). Reviews of related safety issues will be documented in the SER.

For each of the postulated accidents described below, workers located close to the accident site could receive radiation doses and/or chemical exposures resulting in serious injury or death. Because of the risk to workers, controls have been established to reduce the risk and make the on-site consequences highly unlikely. Some controls reduce worker risk by preventing the accident and other controls reduce worker risk by mitigating the consequences. Because the risk to workers at an industrial facility cannot be eliminated completely, the staff determines the on-site impact to be MODERATE. Under the proposed action, the following accidents could occur:

1. Nuclear Criticality — An accident involving an uncontrolled, nuclear chain reaction (criticality accident) is possible in several locations at the NFS facility. The accident would produce a sudden release of energy in the form of a high intensity radiation pulse and radioactive fission products that could become airborne. The energy released would disrupt the nuclear chain reaction shortly after it began; however, in liquid systems, fissile material can settle over time and produce additional pulses. Of the various locations where a criticality accident could occur, the WWTF has the greatest potential for offsite consequences due in part to being located nearer the site boundary than are the other facility locations where a criticality accident could occur. The analysis for the WWTF calculates a 20 rem [200 mSv] dose at the site boundary and a 6.6 rem [66 mSv] dose to the nearest resident. No immediate health effects are expected from an acute radiation dose less than 25 rem [250 mSv] (NRC, 1991). No immediate health effects are expected from the calculated doses from a criticality accident. However, the NRC staff concludes that the environmental impact of a criticality accident would be MODERATE based on the need for follow-up medical evaluations.

2. UF_6 Release — UF_6 is a solid at room temperature. It sublimes to a gas when heated and, if released, the gas can react with water vapor in the air to produce a very corrosive acid (HF) and a soluble form of uranium (UO_2F_2). The accident analysis assumes that a cylinder containing approximately 25 kg [55 lb] of UF_6 is engulfed in a fire which ruptures the cylinder. The analysis calculates a 0.38 rem [3.8 mSv] dose at the site boundary. This is much less than the 25 rem [250 mSv] threshold for immediate health effects (NRC, 1991). The analysis calculates an intake of 0.88 mg [1.2×10^{-7} oz] of uranium. This is much less than the 8 mg [1.1×10^{-6} oz] intake threshold for transient renal injury

(NRC, 1991). In addition, the analysis calculates an HF concentration of 0.4 ppm at the site boundary. This is much less than the 25 ppm concentration that could be tolerated for 30 minutes without any escape-impairing symptoms or any irreversible health effects (NRC, 1991). The NRC staff concludes that the environmental impact of a UF_6 release would be SMALL to MODERATE.

3. Uranium Solution Release — Many of the processes at NFS handle uranium dissolved in liquid solutions. The accident analysis evaluated uranium solution releases from several systems. The largest offsite radiation dose was calculated to be 0.23 rem [2.3 mSv] at the site boundary. This is much less than the 25 rem [250 mSv] threshold for immediate health effects (NRC, 1991). The largest offsite intake of uranium was calculated to be 30 mg [4×10^{-6} oz] at the site boundary. This is greater than the 8 mg [1.1×10^{-6} oz] intake threshold for transient renal damage, but less than the 40 mg [6×10^{-6} oz] intake threshold for permanent renal damage (NUREG–1391). Based on the need for medical treatment if an individual has a significant uranium intake, the NRC staff concludes that the environmental impact of a uranium solution release would be MODERATE.

4. Major Fire — A major fire is defined as a fire which cannot be controlled by local personnel and equipment. The accident analysis evaluated major fires in several areas. The largest offsite radiation dose was calculated to be 0.55 rem [5.5 mSv] at the site boundary. This is much less than the 25 rem [250 mSv] threshold for immediate health effects (NRC, 1991). The largest offsite intake of uranium was calculated to be 8.8 mg [1.2×10^{-6} oz] at the site boundary. This is slightly greater than the 8 mg [1.1×10^{-6} oz] intake threshold for transient renal damage, but much less than the 40 mg [6×10^{-6} oz] intake threshold for permanent renal damage (NRC, 1991). Based on the need for medical treatment if an individual has a significant uranium intake, the NRC staff concludes that the environmental impact of a major fire would be MODERATE.

5. Natural Phenomena — The accident analysis considered an earthquake, a tornado, a hurricane, and a flood. The analysis concluded that natural phenomena could result in any of the previously described accidents. Therefore, the NRC concludes that the environmental impact of natural phenomena would be SMALL to MODERATE.

6. Security Emergency — The accident analysis considered sabotage, area intrusion, aircraft crash, train derailment and missile attack. As with natural phenomena, a security emergency could result in any of the previously described accidents. Therefore, the NRC staff concludes that environmental impact of a security emergency would be SMALL to MODERATE.

As discussed above, the potential environmental impacts of postulated accidents were evaluated, and accidents caused by natural phenomena (including earthquakes) were considered. Natural phenomena could result in any of the postulated accidents (i.e., nuclear criticality, UF_6 release, uranium solution release, major fire). The August 23, 2011, earthquake near Mineral, Virginia (see Section 3.6 of the EA) did not result in any of these postulated accidents. The earthquake was felt at the NFS site. Following the earthquake, NRC resident inspectors conducted a walk-down of the site. No leaks or other effects to NFS equipment or structures were found by the NRC resident inspectors or by site personnel. The earthquake did not disrupt normal licensed operations at the site. The results of the NRC resident inspector walk-down will be documented in an NRC inspection report to be issued in October 2011.

NRC safety regulations require that accidents with high consequences must have controls identified and maintained to make such accidents highly unlikely, as will be discussed in the SER. Note that the accident scenarios take no credit for these controls. Additionally, the authority to possess HEU requires NFS to maintain stringent security measures which also make security emergencies unlikely. Based on the impacts from the described accidents, the NRC staff concludes that the overall environmental impact from accidents would be MODERATE.

NRC regulations require that accidents with high consequences must have controls identified and maintained to make such accidents highly unlikely. Note that the accident scenarios take no credit for these controls. Additionally, the authority to possess HEU requires NFS to maintain stringent security measures which also make security emergencies unlikely. Based on the impacts from the described accidents, the NRC staff concludes that the overall environmental impact from accidents would be MODERATE.

Under the no-action alternative, operational occupational and public radiological and non-radiological impacts from accidents would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. The accidents described in this section of the EA could still occur, but they would become less likely as the site shuts down and material is removed from the site. Controls established to reduce the risk of accidents and make the on-site consequences highly unlikely would remain in effect during and following site shut down. Therefore, potential operational occupational and public radiological and non-radiological impacts from accidents for the no-action alternative would be SMALL.

4.11.3 Decommissioning Impacts – Normal Operations

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and at that time, the NRC staff would evaluate specific radiological and non-radiological impacts to workers and members of the public from the decommissioning and decontamination activities. Site decommissioning would eliminate further generation of operational processing wastes and effluents. However, site decommissioning activities would be expected to generate emissions of radioactive and hazardous constituents to both water and air as the site is decommissioned and the facility buildings are demolished. Decommissioning activities would be expected to slightly increase public and worker exposures to these hazards for the short term, but it is not expected that the exposures would be greater than annual public or occupational dose limits or permitted levels. Long term impacts to public health should be limited because the NRC-approved site decommissioning standards would be protective of public health and safety, no matter the future use of the site after decommissioning. Therefore, the NRC staff concludes that the impact on public and occupational health for site decommissioning (normal operations) would be SMALL.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Remediation of such contamination would be addressed during site decommissioning. Therefore, the NRC staff concludes that expected impacts on public and occupational health from site decommissioning would be SMALL to MODERATE, under the proposed action and each of the alternatives to the proposed action.

4.11.4 Decommissioning Impacts – Accidents

During site decommissioning, NFS would be required to stop processing operations, to ship licensed material offsite to an authorized recipient, and to decommission the site. The accidents described in this section of the EA could still occur, but they would become less likely as material is removed from the site. Additionally, controls established to reduce the risk of accidents would be expected to remain in effect as needed during site decommissioning. Therefore, the NRC staff concludes that the environmental impacts of accidents from site decommissioning (accidents) would be MODERATE in the near term and SMALL as site decommissioning concludes.

The NRC staff expects the impacts from accidents during site decommissioning would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will address the potential for accidents as part of the proposed decommissioning activities. Therefore, the NRC staff concludes that expected impacts on public and occupational health from accidents during site decommissioning would be SMALL to MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

With regard to cumulative radiological impacts, NFS conducts monitoring of ambient air, surface water, soil, sediment, vegetation and groundwater at offsite locations as part of its environmental surveillance monitoring program (see Section 2.4.2). TDEC also samples these same environmental media at locations in the vicinity of the NFS site and the sludge from the Erwin POTW (TDEC, 2010d). Depending on the sampled media, TDEC analyzes the samples on a monthly, quarterly, or annual basis for alpha radiation, gamma radiation, or total uranium or for two or all three (TDEC, 2010d).

In addition, two nuclear facilities licensed by the State of Tennessee are located within 80 km [50 mi] of the NFS site: (1) Studsvik, which is adjacent to the NFS site, and (2) Aerojet Ordnance Tennessee (Aerojet), which is located in Washington County near Jonesborough approximately 16 km [10 mi] from NFS. Radiological monitoring data collected by NFS at its fence line, as shown in Table 3-17, reflect the contribution from both Studsvik and Aerojet. These data show that for the years 2005 to 2009, the highest annual TEDE from direct radiation was 35 mrem [0.35 mSv]. For comparison, the annual public dose limit in 10 CFR 20.1301 is 100 mrem [1 mSv]. Therefore, the NRC staff concludes that cumulative radiological impacts from the proposed action would be SMALL.

4.12 Waste Management

Operational Impacts

Under the proposed action, NFS operations would generate a variety of wastes, including radioactive, hazardous, mixed radioactive and hazardous, and nonhazardous solid waste. The proposed NFS waste management practices and waste streams are described in Section 2.3. Because no significant changes in NFS' authorized operations are planned during

the proposed license renewal period, waste generation and waste management practices that have been used during the current license term would continue if the license was renewed.

Worker and public radiological safety for waste management operations at the NFS site are maintained by implementation of a radiation protection program that complies with the regulations in 10 CFR Part 20. The NRC staff's review of that program will be documented in the SER. The potential environmental impacts from plant effluents to air and surface water are evaluated in Sections 4.4 (air quality), 4.5.1 (surface water), and 4.11 (public and occupational health), and the environmental impacts of waste-management-related transportation are evaluated in Section 4.2.

NFS-generated wastes are either (i) treated and discharged to air or surface water in accordance with applicable state permits, (ii) shipped offsite for recycling or disposal at regulated disposal facilities, or (iii) stored onsite temporarily until a permitted disposal facility is available. Some waste streams require temporary onsite storage as part of the waste management processes. For liquid waste storage, NFS employs secondary containment structures around liquid waste storage tanks or implements administrative volume limits to contain contents in the event of leaks or spills. Liquid hazardous wastes stored in containers are stored on containment skids that provide secondary containment in case of leaks or spills (NFS, 2010a).

Solid radioactive wastes are stored in approved containers until they are shipped to a licensed disposal facility. Solid hazardous wastes are temporarily stored onsite in a manner that complies with applicable regulations.

Mixed waste that consists of PCB-contaminated remediation waste or mercury laboratory wastes that are contaminated with radioactive materials are stored for an indeterminate period until a permitted disposal facility becomes available. A TDEC-administered state permitting process regulates mixed waste storage. Radioactive and mixed wastes that are stored in the 310 Warehouse Part B Storage Area are labeled, sealed, and containerized in locked and controlled storage (NFS, 2010a). Because onsite storage of waste includes a combination of physical containment measures, state oversight, and compliance with applicable regulations and permits, the NRC staff has determined that the impact from onsite storage of waste materials for the proposed action would be SMALL.

For the proposed action, NFS is expected to annually generate approximately 4,000 m^3 [5,200 yd^3] of radioactive wastes that would require offsite disposal. Based on the data in Section 2.3.3, approximately 3,100 m^3 [1,100 yd^3] of this waste would be disposed at the Nevada Test Site as DOE waste and the remainder would be disposed at the EnergySolutions facility in Clive, Utah as commercial waste. This represents less than one percent of the volume of Class A low-level radioactive waste that is disposed annually at EnergySolutions. The EnergySolutions facility is estimated to have capacity available under its current license to dispose of low-level radioactive waste until approximately 2023 (GAO, 2004). Another facility that accepts low-level radioactive waste for disposal is the Waste Control Specialists LLC (WCS) site, in Andrews, Texas. However, the WCS site is authorized only to accept such wastes from the Texas Compact (currently Texas and Vermont), and therefore, disposal of low-level radioactive waste from NFS at the WCS site would require approval of the Texas Compact Commission (TCEQ, 2011). The DOE low-level waste management program at the Nevada Test Site is expected to have available capacity to dispose of low-level radioactive waste until the year 2070 (DOE, 2009). While additional uncertainty exists for disposal of commercial low-level radioactive waste beyond 2023, the NRC staff considers onsite storage to be a safe

alternative should there be a future temporary interruption in available disposal capacity. Therefore, based on the available waste management options, the NRC staff concludes that the radioactive waste management impact from the proposed action would be SMALL.

NFS would generate approximately 84 m^3 [110 yd^3] of hazardous wastes during the proposed 40-year renewal period {approximately ten 208 L [55-gal] drums per year}. These wastes include common industrial wastes that are accepted for disposal at a variety of permitted facilities. The NRC staff expects disposal capacity for these wastes would continue to be available in the future, and the waste management impacts therefore would be SMALL.

Regarding the generation of mixed (radioactive and hazardous) waste, NFS currently is storing onsite 51 containers of mixed waste containing a total of 10.03 m^3[13.12 yd^3] of waste (NFS, 2011a). As discussed in Section 2.3.3, under NFS' current hazardous waste management permit with TDEC, NFS is authorized to store onsite 107.03 m^3 [140 yd^3] of mixed waste (NFS, 2011a). NFS estimates that for the 40-year license renewal period, approximately 210 m^3 [270 yd^3] of mixed waste would be generated, which is equal to about twenty-four 208 L [55-gal] drums per year, or 980 drums, and as a result, NFS would need to have the onsite storage limit increased for this permit. As discussed previously, the NRC staff considers that this material can be stored safely, based on the process that is regulated by a TDEC-administered state permit, until a disposal facility becomes available. Additionally, TDEC conducts periodic inspections of the NFS site, sometimes accompanied by EPA, to evaluate NFS's handling and storage of hazardous and mixed wastes. For these reasons, the NRC staff considers impacts from mixed waste during the proposed 40-year license renewal period would be SMALL.

For nonhazardous solid waste disposal, the regional landfill NFS uses (the Iris Glen landfill located in Johnson City, Tennessee) is expected to be operational until 2022 and has potential for expansion (Draper Arden Associates, 2004). The landfill has been reported to receive 1,360 metric tons [1,500 tons] of waste per day (EPA, 2004). The staff converted this rate to 820,000 m^3 [1.07 million yd^3] per year based on the present operating schedule of 5.5 days per week and assuming operations for 52 weeks per year and a municipal waste conversion factor of 0.47 metric tons/m^3 [800 lb/yd^3]. The estimated annual nonhazardous solid waste generated from the NFS site is approximately 0.001 percent of the annual waste volume the Iris Glen landfill receives. Because the waste volume is a small fraction of the annual volume of waste received at the regional landfill, the NRC staff concludes the waste management impacts from nonhazardous solid waste generation would be SMALL.

The staff also reviewed the waste minimization practices NFS employs. This review evaluated whether proposed operations employ measures to reduce the quantities of waste materials and therefore limit potential environmental impacts associated with generating wastes that consume permitted offsite disposal capacity. The staff's review found that waste at the NFS site is minimized by onsite treatment of a variety of liquid wastes at the WWTF, reuse of processing solutions and wastes, decontamination of process equipment, use of distillation and evaporation to reduce the volume of liquid wastes, and application of compaction and recycling to limit the volume of solid waste (NFS, 2009b). Based on the preceding evaluation of the types and volumes of wastes the proposed renewal generates and the available waste management options and capacities, the staff concludes the overall impacts on waste management resources would be SMALL.

The 10-year license alternative would proportionally reduce the cumulative totals of operational waste volumes for the life of the site. The operational waste volumes described in Section 2.3.3 would be reduced by a factor of approximately four. The nature of the impacts for the shorter

renewal period would be expected to be similar to those described for the 40-year renewal, including waste storage, handling, and generation of wastes that require offsite disposal. The impacts, however, would be more limited in duration based on the shorter operational period. With a 10-year operational period, the likelihood that future disposal capacity for low-level radioactive waste would be limited is lower than for the 40-year renewal period. Similarly, the amount of mixed waste that would be generated and stored onsite pending disposal would be reduced by a factor of approximately four. Considering that the impacts for the proposed 40-year renewal would be SMALL, the NRC staff concludes that the impacts on waste management for the 10-year license alternative also would be SMALL.

Under the no-action alternative, operational waste management impacts would be limited since under the alternative, site operations would cease as the facility shuts down in a manner protective of the environment, and public health and safety. Wastes would continue to be controlled and disposed as described for the proposed action, although the generation of additional wastes would cease as the site operations shut down. Therefore, potential operational waste management impacts for the no-action alternative would be SMALL.

Decommissioning Impacts

When it ceases operations, NFS will be required under 10 CFR 70.38(d) to prepare a detailed decommissioning plan for the site to allow for subsequent license termination. This plan would be submitted for NRC review, and at that time, the NRC staff would evaluate specific waste management impacts from the decommissioning and decontamination activities. Site decommissioning would generate substantial quantities of low-level waste (e.g., radioactively contaminated structural materials, equipment, and soils) from decommissioning operations. Additionally, NFS would need to transport stored mixed wastes to another storage facility if no available disposal site were permitted by the time decommissioning is completed. Because of the unavailability of a mixed waste disposal site, the NRC staff concludes that the impact on waste management for site decommissioning would be MODERATE.

The NRC staff expects that potential environmental impacts would be similar for the proposed 40-year license renewal, the 10-year license renewal alternative, and the no-action alternative. When it ceases operations, NFS will be required to submit a detailed site decommissioning plan. The decommissioning plan will account for any contamination that has occurred as the result of operations. Remediation of such contamination would be addressed during site decommissioning, and the NRC staff expects that wastes generated by remediation would be handled and disposed in a manner protective of public health and safety and the environment. A larger amount of mixed waste would require disposal under the proposed action as compared to the amounts for the no-action and 10-year alternatives. Because of the current unavailability of a mixed waste disposal site, the NRC staff concludes that expected waste management impacts from site decommissioning would be MODERATE, under the proposed action and each of the alternatives to the proposed action.

Cumulative Impacts

The NRC staff evaluated the cumulative waste management impacts associated with the proposed license renewal and the impacts from other past, present, and reasonably foreseeable future actions. Based on the previous analysis of waste management impacts for the proposed 40-year renewal, the NRC staff considers generation of low-level radioactive waste to be the waste management activity that would most likely contribute to cumulative impacts. The current

information regarding low-level radioactive waste volumes that are presently being generated and disposed nationally has been quantified but is still considered somewhat uncertain (GAO, 2004). Future projections at the national level are even more uncertain. As more facilities are decommissioned, the volumes of low-level radioactive waste would be expected to increase. Increases in low-level waste volumes associated with nuclear power plant and DOE site decommissioning have been documented in previous years and future waste volumes that are generated will largely depend on decisions DOE and nuclear utilities make (GAO, 2004).

As previously mentioned, the existing licensed commercial low-level waste disposal capacity at the EnergySolutions facility is projected to be available for the next 13 years and DOE capacity is expected to be available to 2070. These lifetime estimates account for expected commercial and federal waste generation volumes at the national level (GAO, 2004; DOE, 2009). The radioactive waste the proposed renewal generates would create small incremental annual contributions to the national quantities of commercial and federal low-level radioactive wastes that are generated annually. Based on the present and future available waste disposal capacity, the NRC staff expects sufficient capacity will be available for future disposal of the proposed wastes for the next decade or longer. Future shortfalls in disposal capacity could also be addressed safely by temporary onsite storage of wastes. Based on the potential for future increases in low-level radioactive waste generation and uncertainty in commercial disposal capacity beyond 2023, the staff concludes the potential cumulative low-level waste management impacts would be MODERATE over the next 40 years. The proposed action would incrementally contribute a SMALL impact to this MODERATE cumulative low-level radioactive waste management impact over the next 40 years. The cumulative waste management impacts for the 10-year license renewal also would be SMALL because current commercial low-level waste disposal capacity is expected to remain available in the next 10 years. The proposed action would contribute a SMALL incremental addition to this SMALL cumulative low-level radioactive waste management impact.

5.0 AGENCIES AND PERSONS CONSULTED

The NRC staff consulted with other agencies regarding the proposed action in accordance with NUREG–1748 (NRC, 2003). These consultations are intended to (i) ensure that the consultation requirements under Section 7 of the Endangered Species Act and under Section 106 of the National Historic Preservation Act are met, and (ii) provide the designated state liaison agency the opportunity to comment on the proposed action.

The NRC staff contacted USFWS by letter dated October 28, 2009, requesting USFWS assistance in identifying the presence of endangered or threatened species or critical habitat at the NFS site and in the vicinity. By letter dated December 2, 2009, USFWS notified NRC that, from the information available to USFWS, no federally listed or proposed endangered or threatened species occur within the area to be affected by the proposed action of renewing the NFS license.

By letter dated October 28, 2009, the NRC staff contacted the Tennessee Historical Commission (THC), requesting THC assistance in identifying historic properties that may be affected by the proposed action of renewing NFS' NRC license. The THC responded, by letter dated November 19, 2009, notifying the NRC of the Commission's determination that there were no NRHPs or eligible properties affected by the proposed action.

A copy of the Draft EA was sent to the State of Tennessee liaison officer in the TDEC Division of Radiological Health with the issuance of that document for public comment. No comments were received from the State of Tennessee.

6.0 CONCLUSION

Based on its review of the proposed action relative to the requirements set forth in 10 CFR Part 51, the NRC staff has determined that renewal of NRC license SNM-124, authorizing continued operations at NFS's nuclear fuel fabrication facility in Erwin, Tennessee for a period of 40 years will not significantly affect the quality of the human environment. In its license renewal request, NFS is proposing no changes in how it processes enriched uranium, and no significant changes in NFS' authorized operations are planned during the proposed license renewal period. The impacts of ongoing and planned construction actions – including those related to the physical protection and safeguarding of licensed materials – are not expected to significantly affect the quality of the human environment. Gaseous emissions and liquid effluents would continue to be treated prior to discharge and monitored in accordance with applicable license and permits and would be expected to remain within regulatory limits for non-radiological and radiological components. Public and occupational radiological dose exposures would be expected to remain below 10 CFR Part 20 regulatory limits. Therefore, based on this assessment, in accordance with 10 CFR 51.31, preparation of an EIS is not required for the proposed action, and pursuant to 10 CFR 51.32, a FONSI is appropriate.

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APPENDIX A

REPRESENTATIVE FLORA AND FAUNA IN THE REGION AROUND THE NUCLEAR FUEL SERVICES, INC. SITE

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Table A–1. Vegetation in the Region Around the NFS Site	
Common Name	**Scientific Name**
Pines*	*Pinus,* species unspecified
Oaks*	*Quercus,* species unspecified
Maples*	*Acer,* species unspecified
Sweet Gums*	*Liquidambar styraciflua*
Black Walnuts*	*Juglans nigra*
Weeping Willow*	*Salix sepulcralis*
Persimmon*	*Diospyros virginiana*
Hickory‡	*Carya,* species unspecified
Hemlock‡	*Tsuga canadensis*
Yellow Poplar‡	*Liriodendron tulipifera*
American Beech‡	*Fagus grandifolia*
Sycamore‡	*Platanus occidentalis*
Birches‡	*Betula,* species unspecified
Sphagnum‡	*Sphagnum,* species unspecified
Ferns‡	*Pteridophyta*
Sedges‡	*Carex,* species unspecified
Willows‡	*Salix,* species unspecified
Rhododendron‡	*Rhododendron,* species unspecified
Privet‡	*Ligustrum vulgare*
Cane‡	*Arundinaria,* species unspecified
Button Bushes*	*Cephalanthus,* species unspecified
Goldenrod*	*Solidago*
Sweet Gale*	*Myrica gale*
Goldentop*	*Euthamia,* species unspecified
Pussy Willows*	*Salix,* species unspecified
Swamp Milkweed*	*Asclepias incarnata*
Cardinalflower*	*Lobelia*
Giant Ironweed*	*Vernonia gigantea*
Sweetscented Joe Pye Weed*	*Eupatorium purpureum*
Hazel Alder†	*Alnus serrulata*
Velvet Ash†	*Fraxinus,* species unspecified
Spinulose Woodfern†	*Dryopteris carthusiana*
Philadelphia Fleabane†	*Erigeron philadelphicus*
Blackberry Bushes†	*Rubus,* species unspecified
Tall Fescue*	*Festuca arundinacea*
Switchgrass*	*Panicum virgatum*
Eastern Gamagrass*	*Tripsacum dactyloides*
Orchardgrass*	*Dactylis glomerata*
Bermudagrass*	*Cynodon dactylon*
Johnsongrass*	*Sorghum halepense*
Crabgrass*	*Digitaria,* species unspecified
Sericea Lespedeza*	*Lespedeza cuneata*
Sumac†	*Rhus,* species unspecified
Wild Plum†	*Prunus Americana*
Blackberry†	*Rubus fruticosus*

*NFS. "Response to the Request for Additional Information Regarding the Environmental Assessment for Nuclear Fuel Services, Inc. Materials License SNM–124 Renewal." Docket No. 70-143. Erwin, Tennessee: NFS. 2010.
†Tennessee Native Grasslands Workshop. "The State of the State." January 24, 2007.

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Table A–2. Birds in the Region Around the NFS Site

Common Name	Scientific Name	Habitat
Black-Throated Green Warbler*	*Dendroica virens*	Forest
Worm-Eating Warblers*	*Helmitheros vermivorus*	Forest
Swainson's Warblers*	*Limnothlypis swainsonii*	Forest
Ovenbirds*	*Seiurus aurocapillus*	Forest
Mourning Doves*	*Zenaida macroura*	Forest
European Starling*	*Sturnus vulgaris*	Forest
Northern Cardinal*	*Cardinalis cardinalis*	Forest
Carolina Chickadee*	*Poecile carolinensis*	Forest
Prairie Warbler*	*Dendroica discolor*	Forest
Field Sparrow*	*Spizella pusilla*	Forest
Louisiana Waterthrushes*	*Seiurus motacilla*	Forest
Ruby-Throated Hummingbird*	*Archilochus colubris*	Forest
Acadian Flycatcher*	*Empidonax virescens*	Forest
Wood Thrush*	*Hylocichla mustelina*	Forest
Blue-Headed Vireo*	*Vireo solitaries*	Forest
Red-Eyed Vireo*	*Vireo olivaceus*	Forest
Scarlet Tanager*	*Piranga olivacea*	Forest
Golden-Winged Warblers†	*Vermivora chrysoptera*	Grasslands
Prairie and Chestnut-Sided Warblers†	*Dendroica pensylvanica*	Grasslands
Northern Bobwhite†	*Colinus virginianus*	Grasslands
Field Sparrow†	*Spizella pusilla*	Grasslands
Yellowbreasted Chat†	*Icteria virens*	Grasslands
Indigo Bunting†	*Passerina cyanea*	Grasslands
Wild Turkey†	*Meleagris gallopavo*	Unfenced Areas
Ruffed Grouse†	*Bonasa umbellus*	Unfenced Areas
Sharp-Shinned Hawk†	*Accipiter striatus*	Small mammal habitat
Cooper's Hawk*	*Accipiter cooperii*	Small mammal habitat
Broad-Winged Hawk*	*Buteo platypterus*	Small mammal habitat
Red-Tailed Hawk*	*Buteo jamaicensis*	Small mammal habitat
Great Horned Owl*	*Bubo virginianus*	Small mammal habitat
Barred Owl*	*Strix varia*	Small mammal habitat

*Tennessee Ornithological Society. "Birdfinding in the Cherokee National Forest, Tennessee." Excerpted with permission from Birdfinding in Forty National Forests and Grasslands. Colorado Springs: American Birding Association. 1994. <http://www.tnbirds.org/birdfinding/ CNFbirding.htm#Unaka> (26 March 2010).
†Hunter, C., R. Katz, D. Pashley, and B. Ford. "Partners in Flight Bird Conservation Plan for the Southern Blue Ridge (Physiographic Area 23)" Version 1.0. Atlanta, Georgia: American Bird Conservancy. 1999. <http://www.blm.gov/wildlife/plan/pl_23_10.pdf> (13 November 2009).

Table A–3. Mammals in the Region Around the NFS Site	
Common Name	**Scientific Name**
Eastern Cottontail Rabbit*	*Sylvilagus floridanus*
Meadow Jumping Mouse*	*Zapus hudsonius*
Raccoon*	*Procyon lotor*
Eastern Gray Squirrel*	*Sciurus carolinensis*
Opossum†	*Didelphis virginiana*
White-Tailed Deer†	*Odocoileus virginianus*
Gray Fox†	*Urocyon cinereoargenteus*
*U.S. Forest Service. "Final Environmental Impact Statement for the Revised Land and Resource Management Plan." Cleveland, Tennessee: U.S. Department of Agriculture, Forest Service Southern Region. January 2004. <http://www.fs.fed.us/r8/cherokee> (24 March 2010). †Hunter, C., R. Katz, D. Pashley, and B. Ford. "Partners in Flight Bird Conservation Plan for the Southern Blue Ridge (Physiographic Area 23)." Version 1.0. Atlanta, Georgia: American Bird Conservancy. 1999. <http://www.blm.gov/wildlife/plan/pl_23_10.pdf> (13 November 2009).	

Table A–4. Aquatic Species in the Region Around the NFS Site	
Common Name	**Scientific Name**
American Brook Lamprey*	*Lampetra appendix*
Longnose Dace*	*Rhinichthys cataractae*
Rainbow Trout*	*Oncorhynchus mykiss*
Brown Trout*	*Salmo trutta*
Mottled Sculpin*	*Cottus bairdii*
Western Blacknose Dace*	*Rhinichthys obtusus*
Central Stoneroller*	*Campostoma anomalum*
Northern Hogsucker*	*Hypentelium nigricans*
White Sucker*	*Catostomus commersonii*
Creek Chub*	*Semolitus atromaculatus*
Banded Sculpin†	*Cottus carolinae*
Rock Bass†	*Ambloplites rupestris*
Redhorse†	*Moxostoma,* species unspecified
Tennessee Shiners†	*Notropis leuciodusa*
Telescope Shiners†	*Notropis telescopes*
Warpaint Shiners†	*Luxilus coccogenisa*
River Chub†	*Nocomis micropogon*
Bigeye Chub†	*Hybopsis amblops*
Blotched Chubs†	*Erimystax insignis*
Stargazing Minnow†	*Phenacobius uranops*
Gilt Darter†	*Percina evides*
Greenside Darter†	*Etheostoma blennioides*
Banded Darter†	*Etheostoma zonale*
Greenfin Darter†	*Etheostoma chlorobranchium*
Smallmouth Bass†	*Micropterus dolomieu*
*U.S. Forest Service. "Final Environmental Impact Statement for the Revised Land and Resource Management Plan." Cleveland, Tennessee: U.S. Department of Agriculture, Forest Service Southern Region. January 2004. <http://www.fs.fed.us/r8/cherokee> (24 March 2010). †Tennessee Wildlife Resources Agency. "Fisheries Report 09-01, Region IV, Trout Fisheries Report 2008." Nashville, Tennessee: Tennessee Wildlife Resources Agency. March 2009. <http://www.twra4streams.org/2008trout.pdf> (29 March 2010).	

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APPENDIX B

PUBLIC COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE NUCLEAR FUEL SERVICES, INC. LICENSE RENEWAL APPLICATION AND U.S. NUCLEAR REGULATORY COMMISSION RESPONSES

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ACRONYMS/ABBREVIATIONS

ATSDR	Agency for Toxic Substances and Disease Registry
BLEU	Blended Low-Enriched Uranium
CEDE	committed effective dose equivalent
DDE	direct dose equivalent
DOE	U.S. Department of Energy
EA	environmental assessment
EJ	environmental justice
EPA	U.S. Environmental Protection Agency
FEIS	final environmental impact statement
FONSI	Finding of No Significant Impact
GCRP	U.S. Global Change Research Program
GHG	greenhouse gas
HEU	high-enriched uranium
LEU	low-enriched uranium
MEI	maximally exposed individual
NAAQS	national ambient air quality standards
NCRP	National Council on Radiation Protection and Measurement
NEPA	National Environmental Policy Act of 1969
NFS	Nuclear Fuel Services, Inc.
NPDES	National Pollutant Discharge Elimination System
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
POTW	Publicly Owned Treatment Works
PSD	Prevention of Significant Deterioration
RAI	request for additional information
RCRA	Resource Conservation and Recovery Act
SCUBA	Safety Culture Board of Advisors
SER	safety evaluation report
SNM	special nuclear material
SWMU	solid waste management units
TDEC	Tennessee Department of Environment and Conservation
TEDE	total effective dose equivalent
TVA	Tennessee Valley Authority
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
USACE	U.S. Army Corps of Engineers

WWTF	waste water treatment facility

PUBLIC COMMENTS ON THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE NUCLEAR FUEL SERVICES LICENSE RENEWAL APPLICATION AND U.S. NUCLEAR REGULATORY COMMISSION RESPONSES

B.1 Overview

This appendix discusses the public participation process for the U.S. Nuclear Regulatory Commission (NRC) staff's environmental review of the Nuclear Fuel Services, Inc. (NFS) application to renew its NRC license for the NFS facility located in Erwin, Tennessee (TN). NFS is requesting that its NRC license be renewed for a period of 40 years. This appendix also summarizes the comments received on the NRC staff's draft Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) regarding the NFS proposed license renewal and provides the NRC staff's response to those comments.

B.2 Public Participation

This section describes the opportunities afforded the public to participate in the NRC staff's development of the EA. Public participation is an essential part of the NRC staff's environmental review process.

B.2.1 Notice of Receipt and Opportunity for Hearing

On October 6, 2009, the NRC staff published a Notice of Receipt of the NFS license renewal application and an Opportunity to Request a Hearing in the *Federal Register* (74 FR 51323). The initial deadline provided for hearing requests was December 7, 2009; however, in response to public requests for more time, the NRC staff extended the deadline to December 21, 2009. No hearing requests were received.

An electronic copy of the Commission Order extending the deadline for hearing requests can be found through the NRC Agencywide Documents Access and Management System (ADAMS) on the NRC web site (http://www.nrc.gov/reading-rm/adams.html) by using the Accession Number ML093380964.

B.2.2 Public Participation Activities

In November 2009, the NRC staff met with federal, state, and local agencies and authorities as part of a site visit to the NFS facility and vicinity. The purpose of this visit and these meetings was to gather additional site-specific information relevant to the NRC staff's environmental review of the NFS license renewal application. As part of this information gathering effort, the NRC staff also contacted public interest groups in person. A summary of this visit and the meetings can be found though the NRC ADAMS website by using the Accession Number ML100040445.

B.2.3 Issuance and Availability of the Draft EA and Draft FONSI

On October 15, 2010, the NRC staff published a Notice of Availability (NOA) of the draft EA and draft FONSI in the Federal Register (75 FR 63519). By this notice, the staff requested public review and comment on the draft EA and draft FONSI and set November 13, 2010, as the closing date for submitting public comments.

Electronic versions of the draft EA, draft FONSI, and supporting information were made accessible through the NRC ADAMS website and the Federal Rulemaking web site (www.regulations.gov). The public also had the opportunity to examine and have copied, for a fee, the draft EA, draft FONSI, and other related publicly available documents from the NRC Public Document Room. Finally, copies of the draft EA and the draft FONSI were also made available at public libraries in Erwin, Jonesborough, and Greeneville, TN.

B.2.4 Public Comment Period

In the October 15, 2010 NOA, the NRC staff invited members of the public to submit comments on the draft EA and draft FONSI either electronically to the Federal Rulemaking web site or by email, regular mail, or facsimile to addresses provided in the NOA. On November 19, 2010, the NRC staff extended the public comment period to December 31, 2010 (75 FR 70952), in response to public requests for a time extension.

During the public comment period, the NRC staff hosted a public meeting on October 26, 2010, in Erwin, TN. The purpose of this meeting was to afford the public an opportunity to provide oral comments on the draft EA and draft FONSI. The proceedings of this meeting were transcribed and an electronic copy of the transcript is available through the NRC ADAMS website by using the Accession Number ML103270697.

B.3 Comment Identification and Review Methodology

The NRC staff identified a total of approximately 375 comments from 35 comment documents delivered by email or regular mail, and from the October 26, 2010, public meeting transcript. Each of the identified comments are included in the following comment summaries and addressed in the corresponding NRC staff responses.

To aid in the identification and sorting of comments, the NRC staff used a two-part numbering system. The first part of a specific comment's number corresponds to the document within which the comment was identified. Roman numerals were used for comment documents sent by email or regular mail, with the number increasing consecutively as each comment document was received by NRC (i.e., the first document received is identified as "01" and the last document received as "35"). For comments identified from the meeting transcript, the letter "T" is followed by a number (starting with "36") given consecutively to each of the speakers at the meeting. The second part of a specific comment's number identifies its relative order within the comment document. Comments were numbered consecutively, beginning with "01," as they were identified by the NRC staff from each document or from the transcript for each speaker. The comment count would restart at "01" for each new document or subsequent transcript speaker. The first and second parts of a specific comment's number are separated by a dash ("-"). Therefore, for example, Comment 01-02 identifies the second comment (-02) in the first email or regular mail document received by NRC (01-), while T41-06 identifies the sixth comment (-06) made by the sixth member of the public who provided oral comments at the October 26, 2010 public meeting.

Table B.3-1 lists the commenter names, their affiliations (when provided), the comment document number assigned to their comment letter, and the ADAMS Accession Number for the commenter letter. Readers can use the ADAMS Accession Numbers provided in this table to electronically search for the comments on NRC's public website. Table B.3-2 provides similar information as that provided in Table B.3-1 but sorted by comment document number in the first column. This table also identifies the number of comments identified by NRC in the comment document.

Table B.3-1. Public Commenter Names with Affiliation, When Provided, and Comment Document Number

Last Name	First Name	Affiliation	Comment Document Number	ADAMS Accession Number
Brown	Lee	Erwin Utilities	02	ML103510001
Carson	Hartwell	Western North Carolina Alliance	06 T46	ML103540161 ML103270697
Davies	Buzz	Erwin Citizens Awareness Network	09 T45	ML103540167 ML103270697 ML103280163*
Fettus Cochran	Geoffrey Thomas	Natural Resources Defense Council	08 17	ML103540165 ML103570132 ML110060288*
Fuller	Trenny	NAI†	01	ML103500246
Groom	Donna	NAI	11 T41	ML103540169 ML103270697
Gruhot	Valerie	NAI	T49	ML103270697
Higgins	Alvin	NAI	T38	ML103270697
Hite	Kristen	NAI	18	ML110030007
Hobbs	Suzanne	NAI	12	ML103540170
Honeycutt	Mary Ellen	NAI	14	ML110120404
Jacoby	Karen	NAI	10	ML103540168
Lamberts	Frances	NAI	28 T47	ML110060285 ML103270697 ML103350554*
Leasure	Linda	NAI	32	ML103270697
Lochbaum	David	Union of Concerned Scientists	20 T44	ML102930253 ML103270697
Long	James	NAI	T40	ML103270697 ML103400326*
Modica	Linda	Sierra Club	31	ML110070202 ML110341042*
Modica Seeman	Linda Joan	Sierra Club	05	ML103540159
Norris	Jerry	NAI	27	ML103560020
Nudsker	Alma	NAI	24	ML103230051
Olson	Mary	NAI	T48	ML103270697

*Indicates an ADAMS ascension number for a duplicate document or a document that did not state a new comment
†NAI: No Affiliation Identified

Table B.3-1. Public Commenter Names with Affiliation, When Provided, and Comment Document Number (continued)				
Last Name	**First Name**	**Affiliation**	**Comment Document Number**	**ADAMS Accession Number**
O'Neal	Barbara	Erwin Citizens Awareness Network	23 25 29 30 33 34 35 T39	ML103210481 ML103350279 ML110070200 ML110070201 ML103050499 ML103060168 ML103060167 ML103270697 ML103540180*
Overall	Park	NAI	T36	ML103270697
Pafford	Ronald	NAI	21	ML103120561
Parrack	Donna	NAI	15	ML103540181
Parrack	Dick (DR)	NAI	16	ML103540182
Rogers	Emily	NAI	03	ML103510002
Rovira	Brian	NAI	07	ML103540162
Smith	E.B.	NAI	T37	ML103270697
Spice	Dan	NAI	13	ML103540171
Tipton	Chris	NAI	26 T42	ML103370041 ML103270697
Von Bramer	Jim	NAI	22	ML103200269
Wallack	Trudy	NAI	04 19 T43	ML103540157 ML103540158* ML110030008 ML103270697 ML103280237*
*Indicates an ADAMS ascension number for a duplicate document or a document that did not state a new comment †NAI: No Affiliation Identified				

Table B.3-2. Comment Document Number with Commenter Name and Affiliation, When Provided				
Comment Document Number	**Last Name**	**First Name**	**Affiliation**	**Number of Comments**
01	Fuller	Trenny	NAI*	1
02	Brown	Lee	Erwin Utilities	5
03	Rogers	Emily	NAI	2
04	Wallack	Trudy	NAI	1
05	Modica Seeman	Linda Joan	Sierra Club	2
06	Carson	Hartwell	Western North Carolina Alliance	1
07	Rovira	Brian	NAI	8
08	Fettus	Geoffrey	Natural Resources Defense Council	6
09	Davies	Buzz	Erwin Citizens Awareness Network	3
10	Jacoby	Karen	NAI	4
11	Groom	Donna	NAI	5
12	Hobbs	Suzanne	NAI	4
13	Spice	Dan	NAI	5
14	Honeycutt	Mary Ellen	NAI	3
15	Parrack	Donna	NAI	1
16	Parrack	Dick (DR)	NAI	2
17	Fettus Cochran	Geoffrey Thomas	NAI	19
18	Hite	Kristen	NAI	27
19	Wallack	Trudy	NAI	31
20	Lochbaum	David	Union of Concerned Scientists	9
21	Pafford	Ronald	NAI	6
22	Von Bramer	Jim	NAI	4
23	O'Neal	Barbara	Erwin Citizens Awareness Network	1
24	Nudsker	Alma	NAI	4
25	O'Neal	Barbara	Erwin Citizens Awareness Network	77
26	Tipton	Chris	NAI	12
27	Norris	Jerry	NAI	6
28	Lamberts	Frances	NAI	12
29	O'Neal	Barbara	Erwin Citizens Awareness Network	5
30	O'Neal	Barbara	Erwin Citizens Awareness Network	10
31	Modica	Linda	Sierra Club	35
32	Leasure	Linda	NAI	2
33	O'Neal	Barbara	Erwin Citizens Awareness Network	4
34	O'Neal	Barbara	Erwin Citizens Awareness Network	0
35	O'Neal	Barbara	Erwin Citizens Awareness Network	0
T36	Overall	Park	NAI	2
T37	Smith	E. B.	NAI	1
T38	Higgins	Alvin	NAI	1
T39	O'Neal	Barbara	Erwin Citizens Awareness Network	14

T40	Long	James	NAI	3

Table B.3-2. Comment Document Number with Commenter Name and Affiliation, When Provided (continued)

Comment Document Number	Last Name	First Name	Affiliation	Number of Comments
T41	Groom	Donna	NAI	1
T42	Tipton	Chris	NAI	5
T43	Wallack	Trudy	NAI	11
T44	Lochbaum	David	Union of Concerned Scientists	3
T45	Davies	Buzz	Erwin Citizens Awareness Network	2
T46	Carson	Hartwell	Western North Carolina Alliance	2
T47	Lamberts	Frances	NAI	8
T48	Olson	Mary	Nuclear Information Resource Service	2
T49	Gruhot	Valerie	NAI	1

* NAI: No Affiliation Identified

Following the identification and numbering of comments, each comment was assigned a topic category based on the content and issues raised in the comment. This allowed the NRC staff to facilitate sorting and reviewing comments that raised similar issues. The topic categories used are those provided as headings and subheadings in Section B.5.

When appropriate, the NRC staff consolidated the same or similar comments received either from an individual commenter or from multiple commenters within each topic to develop responses. This approach allowed multiple comments, the same or similar in nature, to be addressed with a single response to avoid duplication of effort and to enhance readability of this appendix. The NRC staff developed a response for each comment or group of comments and indicated as part of that response whether the EA was modified as a result of the comment or comments.

The NRC staff acknowledges the comments made on the draft EA and draft FONSI and appreciates the public participation in the NRC staff's environmental review process.

B.4 Major Issues and Topics of Concern

The majority of comments received specifically addressed items within the scope of the EA. Topics raised included a variety of concerns about:

- the purpose, need, and scope of the EA
- regulatory issues
- NEPA-related concerns
- land use
- groundwater

- surface water
- ecology
- air quality
- socioeconomics and environmental justice
- public and occupational health
- waste management
- cumulative effects

Other comments addressed topics and issues that are not part of the NEPA review process for the proposed action. Those comments included general statements of support for, or opposition to, renewing the license; and evaluation of the NRC regulatory program or licensing process.

B.5 Comment Summaries and NRC Responses

Detailed comment responses are provided in this section. The structure of this section is based on the comment topics provided. Within each topic-specific subsection, the detailed presentation of comment and response information includes the applicable comment identification numbers, comment summaries, and the NRC staff response.

B.5.1 General Opposition

The comments addressed in this subsection are those that are limited to expressing opposition in some manner to the proposed NFS license renewal.

Comments 01-01, 03-01, 10-04, 13-01, 14-01, 15-01, 16-01, 18-01, 18-21, 19-31, 20-08, 21-01, 22-01, 24-01, 27-06, 30-08, T39-13, and T47-08

Some commenters were not in support of the proposed action and several commenters objected to a 40-year license renewal. One commenter stated that NFS could not be trusted with the health of the public. Another commenter stated that consideration of a 40-yr license renewal for NFS is unconscionable and irresponsible. Several commenters stated support for a 1- or 2-year renewal instead of a 10- or 40-year renewal.

***Response**: NRC has the responsibility for licensing and regulating special nuclear material through statutory requirements of the Atomic Energy Act of 1954 (AEA), as amended and federal regulations. NRC will issue or renew a license only if the applicant or licensee complies with NRC's regulatory requirements for ensuring the protection of public health and safety and the environment.*

The EA does not approve or deny the application for license renewal, but rather describes the potential environmental impacts of the proposed action and the alternatives. As discussed in Section 1.1 of the EA, the NRC decision whether to renew the license as proposed will be

based on the EA and the staff's Safety Evaluation Report (SER) that addresses the licensee's compliance with 10 CFR Parts 20 and 70.

No changes were made to the EA in response to these comments.

Comments 03-02, 11-01, and 32-01

One commenter asked that the NRC not allow continuation of environmental degradation. Specifically, the commenter stated that while the existing environmental damage could not be undone, the NRC could certainly stop it from happening in the future. Another commenter stated that everyone has a right to clean air and water and to feel safe in their community but it is not possible with NFS, who has polluted the environment and is killing people. A third commenter stated that approval of NFS license renewal application will allow contamination of water and air for 40 years.

***Response**: NRC acknowledges that past operations have resulted in adverse impacts. When adverse impacts have been identified, NRC and other regulatory agencies have required corrective actions. Although some corrective actions are ongoing, the actions have been effective in mitigating the adverse impacts (see Sections 2.2 and 3.5.2 of the EA). Many of the operations that caused the impacts have been discontinued.*

NRC regulations establish limits for releasing radioactive material to the environment. The NRC staff considers these limits protective of the public and the environment. The limits are defined in 10 CFR Part 20 Appendix B for each isotope of uranium and plutonium as well as for other radionuclides.

Non-radiological contaminants discharged into the environment are regulated by the Environmental Protection Agency (EPA) and the Tennessee Department of Environmental Conservation (TDEC) under various permits that are listed in Table 1.1 of the EA. Additionally, under its NRC license, NFS is required to inform the NRC within 30 days of receipt of a violation notice from the State of Tennessee Division of Air Pollution or Water Pollution Control, or receipt of modified requirements of the State-issued National Pollutant Discharge Elimination System (NPDES) permit" (see condition S-23 of NRC license SNM-124).

No changes were made to the EA in response to this comment.

Comment 20-09

One commenter stated that NRC must not approve the license renewal at NFS based on what the commenter considers to be a defective draft EA. The commenter further stated that NRC should revise the draft EA to remedy its many shortcomings and re-issue the corrected draft for public comment.

***Response**: The EA has been revised in response to comments and information received during the comment period on the draft EA, which ran from October 15, 2010 to December 31, 2010. Changes to the EA in response to the comments and information did not result in a change in the NRC staff's assessment of potential environmental impacts from the proposed action or from reasonable alternative actions. Therefore, the NRC staff has determined that the EA does not need to be reissued for public comment.*

Comment 25-37

One commenter stated that a 40-year license renewal should not be granted if NFS cannot plan substantive maintenance beyond a 5- to 10-year period.

Response*: By its application, NFS is requesting that its NRC license be renewed for a period of 40 years. Based on this request, the NRC staff is evaluating the potential impacts to public health and safety and the environment, and documenting the results of its review in this EA and a separate SER.*

Section 2.6 of the EA lists certain maintenance activities identified by NFS for the next 5 to 10 years. As discussed there, NFS does not plan substantive maintenance past a 5- to 10-year timeframe because the availability of funds fluctuates with the renewal of existing contracts and the obtaining of new contracts. NRC regulations do not require licensees to have a substantive maintenance plan. The activities listed in Section 2.6 are identified for the purposes of assessing potential impacts to the environment.

No changes have been made to the EA beyond the information provided in this response.

Comment 25-76

One commenter stated that NFS does not deserve a 10- or 40-year license renewal based its lack of compliance and safety culture, inability to manage its facility, and environmental contamination.

Response: *As stated in Section 1.1 of the EA, the NRC decision concerning renewing the NFS license will be based on the results of the staff's evaluations found in the EA and the SER.*

No changes were made to the EA in response to this comment.

Comment 26-02

One commenter stated that the EA did not follow the scientific method and is not an objective scientific study.

Response*: The NRC staff does not agree with the comment. The NRC staff prepared the EA in accordance with NRC guidance in NUREG-1748 (NRC, 2003) and is consistent with NRC's regulations in 10 CFR Part 51, which implement NRC's NEPA provisions. Sections 1.5.2 and 8.0 of the EA identify the data and information that the NRC staff reviewed in its preparation of the EA. The NRC staff's evaluation of potential environmental impacts from the proposed action and reasonable alternatives is based on its independent assessment of this data and information.*

No changes were made to the EA in response to these comments.

B.5.2 General Support

Comments 02-02, 12-04, and T40-01

Three commenters expressed general acceptance for the results in the draft EA. One commenter supported the findings. One commenter stated that nuclear power is beneficial to

the environment and questioned the motivation of anti-NFS groups. A third commenter stated that NFS is a good neighbor and has given back to the community.

***Response**: No changes were made to the EA in response to these comments.*

B.5.3 NEPA Process Implementation

B.5.3.1 EIS Should Be Prepared

Comments 07-08, 08-02, 17-01, 18-03, 18-22, 25-03, 26-01, 28-03, 31-02, 31-10, and T39-14

Several commenters stated that an Environmental Impact Statement (EIS) should be prepared versus an EA. Two commenters stated that the EA and subsequent Finding of No Significant Impact (FONSI) are unlawful. One commenter stated that NRC should withdraw the FONSI. Several commenters stated reasons why an EIS should be prepared, to include: (1) substantive maintenance cannot be planned past 10 years; (2) destruction of Banner Spring Branch by enclosing it is an example of "irreversible and irretrievable commitment of resources" to be subject of an EIS; (3) an impartial, uninfluenced EIS is needed to supply public confidence in an NRC renewal action (without a prearranged conclusion); and (4) climate change needs to be addressed. Finally, one commenter stated that safety issues (e.g., lack of a safety culture, falsification of records) and environmental justice concerns warranted preparation of an EIS.

***Response**: The EA was prepared in accordance with 10 CFR Part 51. 10 CFR 51.20 provides criteria for and the identification of licensing and regulatory actions that require an EIS. The proposed action of renewing the NFS license for 40 years does not meet any of the criteria under this regulation. The NRC staff therefore prepared an EA to assess the potential environmental impacts and to determine whether to prepare an EIS or a FONSI for the proposed action. Based on the NRC staff's evaluation of the proposed action as documented in this EA, a FONSI is warranted and an EIS will not be prepared.*

No changes were made to the EA in response to these comments.

B.5.3.2 Issues Outside the Scope of the EA

Comments addressed in this section concern issues identified in Section 1.5.3 of the draft EA as being outside the scope of the EA.

General Comments

Comments 07-03, 08-05, 17-05, 18-06, 19-24, 25-12, 25-73, 31-16, T39-06, T39-10, T43-08, and T47-04

Several commenters expressed concern about issues identified in Section 1.5.3 of the draft EA, as being considered "out of the scope." The commenters stated that these areas should be included in the analysis of the EA.

***Response**: The EA was prepared in accordance with the regulations set forth in 10 CFR Part 51 and NRC staff guidance in NUREG-1748. As discussed in Section 4.2.3 of NUREG-1748, among the objectives of the scoping process are (1) defining the scope of the proposed action and (2) identifying and eliminating from detailed study, issues that are*

peripheral or that are not relevant for the purposes of assessing potential environmental impacts.

Based on the NRC staff's review of (1) Sections 3.0 and 5.0 of NUREG-1748, (2) past environmental documents prepared for the NFS site, and (3) information gathered from stakeholders during a November 2009 visit to the NFS site and vicinity, the NRC staff determined the issues listed in Section 1.5.3 to be out of the scope of the EA. As discussed in Section 1.5.3, the NRC determined that many of these topics addressed issues which are to be evaluated in the NRC's safety review.

However, in response to these comments, the NRC staff has revised Section 1.5.3 to further clarify why the topics identified were determined to be out of the scope of the EA.

Material Control and Accounting

Comment 17-07

One commenter felt that the draft EA should include information related to location and amounts of HEU onsite, HEU balance areas, inventories and inventory differences.

Response: *The NRC staff considers the information identified by the commenter to be sensitive, security-related information because it could be useful to an adversary planning an attack. Therefore, the NRC does not release this information to the public.*

No changes were made to the EA in response to this comment.

Equipment Failures

Comment 25-38

One commenter quoted the 2010 Safety Culture Board of Advisors (SCUBA) team report in which it stated that: "NFS continues to tolerate recurring equipment problems, operational burdens and workarounds, and degraded infrastructure issues." and "equipment problems that have become accepted on a basis of 'run to failure' philosophy." Based on this, the commenter stated that unless the 53-year old plant is completely rebuilt, then it is doubtful that anything will ever change and safety issues will continue to exist.

Response: *As stated in other comment responses, NRC has an ongoing inspection process for the facility, including two onsite resident inspectors, to ensure NFS compliance with NRC regulations and its NRC license.*

With respect to the SCUBA report identified by the commenter (NFS, 2010e), NFS and NRC have taken actions to address the findings of this safety culture assessment. On November 16, 2010, the NRC issued to NFS a Confirmatory Order (NRC, 2010b) requiring, in part, that NFS develop and implement a new safety culture improvement plan to address the findings of the 2010 SCUBA report, and that NFS perform additional safety culture assessments every 24 months until NRC concludes that the actions are fully effective. NRC has been and will continue conducting special inspections until NFS demonstrates sustained improvement.

No changes were made to the EA in response to this comment.

Plant Building Stability

Comment 19-21

One commenter asked what seismic standards were used for the NFS facility and have there been any retrofits in response.

Response: *Regulations in 10 CFR Part 70 do not impose any specific seismic qualification requirements on fuel fabrication facilities such as NFS. Buildings were constructed in accordance with the Standard Building Code in effect at the time of construction. Buildings constructed recently were designed to meet the 1999 Standard Building Code. This code allows designs to meet the seismic load resistance specified in American Society of Civil Engineers (ASCE) Standard 7, Minimum Design Loads for Buildings and Other Structures.*

Regulations in 10 CFR 70.64 require that new processes in existing facilities meet baseline design criteria, which include environmental and dynamic effects. The design must provide for adequate protection from environmental conditions and dynamic effects associated with normal operations, maintenance, testing, and postulated accidents. For example, before the new CD Line process was installed, NFS upgraded the structure of Building 301.

No changes were made to the EA in response to this comment.

Seismic Risk Analysis (Likelihood)

Comments T39-09 and T39-10

One commenter stated that seismic risk analysis is environmentally related.

Response: *In Section 4.11.2 of the EA, natural phenomena (to include earthquakes) are identified as possibly resulting in other accidents analyzed in that section. However, as stated in Section 1.5.3, seismic risk analysis (likelihood) was determined to be out of scope of the EA. The seismic hazards analysis will be addressed in the SER. Further, the Integrated Safety Analysis (ISA) summaries submitted by NFS with its license renewal application provide the results of risk assessments for all potential accidents, including accidents caused by earthquakes. The assessments concluded that the risk of significant consequences from accidents caused by an earthquake is low. The NRC staff previously has reviewed the ISA summaries and found them acceptable, and NFS is proposing no changes that would affect its seismic risk analyses.*

No changes were made to the EA in response to these comments.

Safety Culture

Comments 10-01, 13-04, 25-75, 29-01, and T39-12

Three commenters addressed NFS' safety record, license violations, and record keeping. One commenter stated that NFS has an atrocious safety record. Another commenter stated that there is distrust of NFS due to a history of license violations, enforcement actions, and falsification of records. A third commenter stated that NFS has a long record of questionable compliance and concern for safety and stated current and previous NRC reports which included specifics on inspections were not completed by NFS (e.g., fire suppression system).

Response: *As discussed in Section 1.5.3 of the EA, the NRC staff determined these topics are outside the scope of the EA because they pertain solely to safety issues.*

Section 1.5.3 of the EA has been revised to more clearly identify the reasons why certain topics there were determined to be out of scope for the EA.

Comment 02-04

One commenter stated that they were encouraged by the new safety culture at NFS and had firsthand knowledge of the new safety procedures at the plant as utility personnel often work inside the plant on water and electrical services.

Response: *No changes were made to the EA in response to this comment.*

Comments 18-19 and 28-09

Two commenters expressed concerns about the adequacy of the NFS ALARA program. One of the commenters stated that the history of spills and exposures at the NFS facility, leading to operational suspensions, indicates either that the NFS ALARA program has not been followed or that it is inadequate to ensure no significant impact. The other commenter requested that the EA should discuss in explicit terms the NFS' ALARA program, with data demonstrating effluent reduction.

Response: *NRC regulations in 10 CFR 20.1101 require that licensees use, to the extent practical, procedures and controls that keep radiation doses as low as reasonably achievable (ALARA). In addition, NRC licensees are required to conduct periodic reviews of their radiation protection program content and implementation. NRC inspections of the ALARA program at NFS have found that the program complies with these requirements. The ALARA program is only one of the programs the NRC staff must find acceptable before it renews the NFS license.*

Twice a year, NFS submits effluent monitoring reports to the NRC in accordance with 10 CFR 70.59. These reports specify the quantities of the principal radionuclides released to unrestricted areas in air and liquid effluents during the preceding six months and any other information needed to estimate the maximum annual radiation doses to the public resulting from effluent releases. NRC inspectors review these semiannual reports and conduct inspections of the environmental monitoring program at NFS. These inspections include walking down discharge lines and observing NFS employees in the process of taking samples. As discussed previously, results of these NRC inspections are publicly available.

Effluent data is provided in Chapters 2 and 3 of the EA and used in the evaluation of potential environmental impacts in Chapter 4.

Chapters 2 and 3 of the EA were updated to provide additional effluent data and environmental monitoring data.

Comments 09-02, 31-19, 31-20, and T45-01

Two commenters stated that NFS should be required to meet the requirements in 10 CFR Part 50, Appendix B, including the need for a quality assurance program. One of the commenters stated that these requirements should be met if NFS is reprocessing fuel. The other commenter stated that NFS could not legally be issued a license without meeting that requirement. This commenter also considered that NRC's failure to require a formal nuclear quality program at NFS contributed to the spills, effluent releases, and accidents at the facility and to the lack of statistical process control that this commenter believes resulted in large quantities of rejects at great costs to the federal government.

Response*: For the operations at NFS, the NRC requires a formal quality assurance program which complies with regulations in 10 CFR Part 70. These regulations are similar, but not identical, to power reactor requirements in 10 CFR Part 50 which the commenter prefers. The NRC staff believes it has imposed correctly the requirements that apply to the activities authorized at NFS.The regulations in 10 CFR Part 50 apply to production facilities and utilization facilities. Under 10 CFR 50.2, a "utilization facility" is defined as "any nuclear reactor other than one designed or used primarily for the formation of plutonium or U-233." NFS does not operate a nuclear reactor.*

In Part 50, a "production facility" includes any facility used for processing irradiated materials containing special nuclear material, with certain exceptions. One exception is facilities in which the only special nuclear materials contained in the irradiated material to be processed are uranium enriched in the isotope U-235 and plutonium produced by the irradiation, if the material processed contains not more than 10^{-6} grams of plutonium per gram of U-235 and has fission product activity not in excess of 0.25 mCi of fission products per gram of U-235. The NFS license imposes these limits on the uranium used at the site. Therefore, NFS is not a production facility and the requirements of 10 CFR Part 50 do not apply.

In addition, the NRC staff notes that it regulates the safety and security program, not the product quality program. The quality of contracted services is a contracting issue between NFS and its customers.

No changes were made to the EA in response to these comments.

Comment 25-26

One commenter stated that NFS should not have the choice of adapting its ALARA program to reflect new-found information.

Response: *In Section 2.4 of the draft EA, the text states that "[a]s necessary, NFS may adapt the ALARA program to address new-found information." This is consistent with NRC regulations at 10 CFR 20.1101, which require in part:*

> *"(b) The licensee shall use, to the extent practical, procedures and engineering controls based upon sound radiation protection principles to achieve occupational doses and doses to members of the public that are as low as is reasonably achievable (ALARA).*
>
> *(c) The licensee shall periodically (at least annually) review the radiation protection program content and implementation."*

It is the NRC licensee's decision whether or not to adapt its ALARA program to address new-found information and to make necessary changes when appropriate. NRC inspectors will verify that the changes made are reasonable and maintain doses as low as reasonably achievable.

Section 2.4 of the EA was revised to more clearly describe NFS environmental monitoring programs.

Comment 25-34

One commenter stated that when concentrations of radioactive materials greater than background are measured, it appears that the limits exceeded are explained away as accounting or paperwork errors, and oftentimes a license amendment is quickly requested to simply raise the limits.

Response: *When problems are reported, investigations are performed and inspectors follow up on the investigation results. If the investigation concludes that the initial report contained incorrect information such as a laboratory analysis error, the error is noted and actions are considered to prevent future errors. If the investigation concludes that there is an exceedance over the limit, they may chose to increase their sampling frequency or report to their management. If the investigation concludes that a limit should be changed, licensees have the option of requesting a license amendment authorizing the change. The amendment will be approved if the NRC determines the change is authorized by law, the change will not endanger life or property or the common defense and security, and the change is otherwise in the public interest.*

No changes were made to the EA in response to this comment.

Comment 25-68

One commenter referenced the 2010 SCUBA report which stated that NFS does not routinely drill its Emergency Response Organization to ensure it will operate well in an actual accident or event, and that essentially, there is only one trained team and no back-up team in the event of an emergency.

Response: *NRC inspections have found that the NFS emergency response program complies with requirements in 10 CFR 70.22(i) for training and exercises.*

No changes were made to the EA in response to this comment.

Comment 25-74

One commenter referenced the 2010 SCUBA report which stated that the infrastructure at the NFS facility is degraded. The commenter stated that this confirmed her own findings from NRC inspection reports. The commenter additionally stated that many of the buildings cannot comply with fire codes.

Response: *NRC fire safety reviews and inspections have found that the buildings comply with applicable fire codes.*

No changes were made to the EA in response to this comment.

Comments 21-02, T36-02, T39-07, and T39-08

Four commenters expressed general concern with operations at the NFS facility. One commenter stated that NFS had had many malfunctions in the past. Another commenter felt that NFS is rough shod. A third commenter stated that NFS has a standard of minimal regulatory compliance, and that NFS' safety culture fails to meet regulatory expectations.

Response: *NFS operates its facility under a license granted by the NRC. The NRC inspects the NFS programs and has assigned two onsite NRC resident inspectors to the NFS facility. The results of the staff inspections are documented in inspection reports, the content of which is generally available to the public. Where NRC has identified violations, NFS must take corrective actions.*

In addition, NFS and NRC have taken actions to address the findings of the safety culture assessments. The NRC staff reviewed the action plan to address findings of the first assessment, and NRC comments resulted in changes to the plan. Over the last few years, NRC inspectors have conducted special inspections of program improvements. On November 16, 2010, the NRC issued to NFS a Confirmatory Order requiring, in part, a new safety culture improvement plan to address the findings of the second assessment, and additional safety culture assessments to be performed every 24 months until NRC concludes that the actions are fully effective. Special inspections will continue until NFS demonstrates sustained improvement.

No changes were made to the EA in response to these comments.

Comment 21-05

One commenter stated that since NFS conducts its own monitoring, employees might knowingly non-report or alter results.

Response: *Deliberate misconduct is an issue that NRC takes very seriously. The penalties can be severe. Not only can an employer fire the individual, but NRC can issue an order banning the individual from participating in any NRC-licensed activity for several years. In addition, the US Department of Justice can file criminal charges that may result in fines and imprisonment. Any reports or inspection findings that indicate a potential for deliberate misconduct are referred to the NRC Office of Investigations. Investigators in this office have special authority to conduct investigations, including the ability to issue subpoenas.*

In addition, the NRC holds its licensees responsible for the actions of its employees, whether willful or not. Willful violations may subject licensees to escalated enforcement action.

No changes were made to the EA in response to this comment.

Comment 19-06

One commenter asked why no action had been taken to address all facets of the SCUBA I and SCUBA II reports.

Response: *NFS and NRC have taken significant actions to address the findings of the safety culture assessments. The NRC staff reviewed the action plan to address findings of the first assessment, and NRC comments resulted in changes to the plan. Over the last few years,*

NRC inspectors have conducted special inspections of program improvements. On November 16, 2010, the NRC issued to NFS a Confirmatory Order requiring, in part, a new safety culture improvement plan to address the findings of the second assessment, and additional safety culture assessments to be performed every 24 months until NRC concludes that the actions are fully effective. The new improvement plan is being evaluated. Special inspections will continue until NFS demonstrates sustained improvement.

No changes were made to the EA in response to this comment.

Terrorism

Comment 17-06

One commenter stated that NRC should consider terrorism and nuclear proliferation in the EA. The commenter stated that such issues have been a part of NEPA decisions since the 1970s, citing *Scientists' Institute for Public Information, Inc. v. Atomic Energy Commission*, 481 F.2d 1079 (D.C. Cir. 1973) and *NRDC v. NRC*, 539 F.2d 824 (2nd Cir. 1976) in support.

Response: *Neither of these decisions address the issue of whether impacts related to terrorism and nuclear proliferation are within NEPA's scope, and the latter decision was vacated and remanded by the Supreme Court (434 U.S. 1030 (1978)). The NRC staff in the EA does not consider these types of impacts for the following reasons.*

Regarding nuclear proliferation, the Commission has ruled that NEPA does not require the NRC to consider such impacts in its licensing decisions. See Louisiana Energy Services, L.P. (National Enrichment Facility), CLI-05-28, 62 NRC 721 (2005). The Commission found that achieving nuclear non-proliferation goals depends on the independent future actions of the President, Congress, and other nations, and that non-proliferation issues "span a host of factors far removed from" and "far afield from" the issues the NRC is required to consider in its licensing decisions. CLI-05-28, 62 NRC at 724.

Further, the Atomic Energy Act (AEA) does not contain any provisions making a nuclear proliferation assessment a prerequisite to licensing. The NRC's safety regulations that are related to information and material control do address non-proliferation concerns. The NRC has adopted a comprehensive regulatory infrastructure, and implements an integrated set of activities directed against the unauthorized disclosure of information and technology considered important to common defense and security, and the diversion of nuclear materials inimical to public health and safety and the common defense and security. The NRC's key regulations in this area (10 CFR Parts 73, 74, and 95) provide comprehensive requirements governing the control of, and access to, information, physical security of materials and facilities, and material control and accounting. As appropriate, the NRC may supplement these requirements by order consistent with its statutory obligation under the AEA to protect the common defense and security and public health and safety.

Given the NRC's comprehensive regulatory framework, ongoing oversight, and active inter-agency cooperation, it is the NRC's current view that a formal nuclear nonproliferation assessment would not provide any additional benefit to protection of the common defense and security.

Similar to the nuclear proliferation issues, the Commission has ruled in a series of adjudicatory decisions that NEPA does not require the NRC to consider the environmental impacts from

hypothetical terrorist attacks. See Amergen Energy Co., LLC (Oyster Creek Nuclear Generating Station), CLI-07-8, 65 NRC 124 (2007). The Commission position rests on Supreme Court NEPA decisions that require a showing of a close causal relationship – analogous to the "proximate cause" requirement in tort law – between agency action and environmental consequences that require NEPA analysis. The Commission has found that there is no such relationship between NRC licensing actions and terrorism. The federal courts are split on the issue, with the Third Circuit upholding the Commission's view, and the Ninth Circuit disagreeing with it. Hence, for facilities located in the Ninth Circuit, the NRC does perform a NEPA-terrorism review. As stated above, the Commission has ruled that for facilities such as NFS that are not located in the Ninth Circuit, the NRC will not perform a NEPA-terrorism review.

No changes were made to the EA in response to this comment.

NRC Enforcement Actions

Comment 11-03

One commenter suggested that NFS should be shut down so that repairs can be made and the buildings rebuilt if necessary to make it a safe place to work and safe for those living around it.

Response: *NFS operations have been shut down when necessary to implement corrective actions. The most recent example is documented in Confirmatory Action Letter (CAL) No. 2-2010-001 that was issued by NRC to NFS on January 7, 2010 (NRC, 2010c). The CAL confirmed commitments made by NFS to suspend special nuclear material processing operations associated with specified facility process lines until NFS had completed corrective actions. The CAL also stated that NFS would provide NRC sufficient time to perform inspections that confirmed the corrective actions were adequate. As of September 1, 2011, NFS has restarted all process lines following NRC confirmatory inspections, and NRC is in the process of closing the CAL.*

Section 4.11 of the EA discusses the potential environmental impacts of NFS operations to workers and the public. The NRC staff determined that the potential impacts to public and occupational health from NFS operations would be SMALL.

No changes were made to the EA in response to this comment.

Comments T38-01 and T44-01

One commenter stated that NFS was conducting unmonitored and uncontrolled releases from the site. Another commenter, in hearing the first commenter's statement, stated that this sounded like a matter to be handled under the NRC's formal allegation process.

Response: *NRC inspectors annually inspect the NFS effluent control and environmental monitoring programs. NRC inspections since the previous license renewal in 1999 have not documented any unmonitored or uncontrolled releases. These inspections involve reviews of sample results and the semiannual effluent reports, accompaniments of NFS employees taking environmental samples for analysis, and walk-downs of liquid effluent discharge lines. The results of the staff inspections are documented in inspection reports, the content of which is generally available to the public.*

The NFS programs concerning pre-discharge treatment and monitoring of liquid effluents are discussed in Sections 2.3.2 and 2.4 of the EA. As discussed there, NFS processes liquid effluents at the WWTF and treats the effluents to ensure that waste water is below limits in 10 CFR Part 20 and in compliance with the facility's NPDES permit prior to discharge of the waste water to the Nolichucky River.

In response to the second commenter, the transcript of the public meeting, including these comments, was forwarded to the NRC's Office of the Inspector General.

No changes were made to the EA in response to these comments.

Comment 25-19

One commenter expressed a lack of confidence in NFS estimates of air pollutant discharges given NFS's falsification of records as documented in the 2010 SCUBA report.

Response: *The NRC takes seriously apparent falsification of records by licensees. The 2010 SCUBA report referred to falsification of fire damper inspection records. A November 16, 2010, Confirmatory Order issued by NRC to NFS, documents the results of the NRC's investigation of the referenced cases at NFS involving the falsification of fire damper inspection records (NRC, 2010b). The Confirmatory Order also provides the corrective actions taken by NFS, as well as additional actions to be taken by NFS to address the issues raised by the falsification of the inspection records.*

Additionally, NRC periodically inspects the NFS programs and has assigned two onsite NRC resident inspectors to the NFS facility. NRC inspectors review the facility semiannual environmental monitoring reports and additionally, once a year, perform an environmental inspection that focuses on the environment and effluents.

No changes were made to the EA in response to this comment.

Comment 33-01

One commenter questioned whether NFS has violated an NRC Confirmatory Order for eight years. In making the comment, the commenter referred to a May 16, 2008, NFS response to an NRC notice of violation.

Response: *The NFS correspondence identified by the commenter (NFS, 2008b) included reference to a July 20, 2000, Confirmatory Order Modifying License (COML) issued by NRC to NFS. In June 2007, NRC conducted an inspection of NFS's physical security protection programs. During this inspection, the inspectors noted some unresolved issues concerning changes made to those programs, and these changes related to the 2000 COML. One of these unresolved issues was later determined by NRC to be a violation, the response to which is the subject of the NFS correspondence identified by the commenter. NFS took corrective actions which the NRC verified by inspection in June 2009. The NRC considers this matter closed.*

NRC correspondence and documents mentioned in this response are not available to the public as they contain sensitive, unclassified security-related information.

No changes were made to the EA in response to this comment.

Comments 19-20 and 33-02

Two commenters had comments concerning resident inspectors. The first commenter asked how many US nuclear facilities have two resident inspectors. The second commenter stated that NFS is only fuel facility that uses two full-time resident inspectors.

Response: *The NRC has established a Resident Inspectors Office at many of the facilities that the NRC licenses. The vast majority of these licensed facilities have two resident inspectors, while at some reactor sites with multiple units, more than two resident inspectors have been assigned. Given the materials handled at the NFS facility, the NRC has elected to assign two resident inspectors to the site. Currently, there are two fuel cycle facilities at which two resident inspectors are present: NFS and USEC Paducah.*

No changes were made to the EA in response to this comment.

Comment 33-03

One commenter questioned whether NFS violations are classified.

Response: *The results of NRC inspections are documented in inspection reports, the content of which is generally available to the public. Depending on the sensitivity of the information in a report, certain portions may be classified and therefore, not publicly available. The existence of NRC-licensee violations and unclassified descriptions of the violations are almost always available to the public.*

No changes were made to the EA in response to this comment.

Comment 13-05

One commenter stated that NRC has failed to address safety issues at NFS, considering it to be reminiscent of government oversight of British Petroleum. The commenter stated that safety issues and critical plant problems and NFS' checkered history must be addressed. The commenter requested that NRC do its job to protect public health and safety and reject the license renewal request.

Response: *License violations and reportable events have been identified. NFS has been required to conduct investigations and take corrective actions. NRC has evaluated the adequacy of corrective actions, and NRC inspections have confirmed that corrective actions have been completed. Enforcement actions have been taken where warranted.*

As an example of a recent enforcement action, on November 16, 2010, the NRC issued to NFS a Confirmatory Order (NRC, 2010b) requiring, in part, that (1) NFS incorporate into its license a corrective action plan; (2) NFS develop and implement a new safety culture improvement plan to address the findings of the 2010 SCUBA report; and (3) NFS perform additional safety culture assessments every 24 months until NRC concludes that the actions are fully effective. NRC has been and will continue conducting special inspections until NFS demonstrates sustained improvement.

No changes were made to the EA in response to this comment.

Comments 19-02 and 19-03

One commenter asked if NRC considered the falsification of fire damper inspections by NFS a critical concern and did this case represent a criminal action.

Response: *NRC was very concerned with the deliberate misconduct identified in this case. The violations resulted in a November 16, 2010 Confirmatory Order issued by NRC to NFS, requiring extensive corrective actions. The Confirmatory Order and related materials can be found on the NRC's public website at www.nrc.gov/reading-rm/adams.html using the accession number ML103210213. The fire damper inspections were not considered by the NRC Staff in the EA.*

No changes were made to the EA in response to these comments.

Comment 25-66

One commenter questioned whether the NRC's Official Use Only (OUO) policy was invoked to hide safety issues.

Response: *As discussed in SECY–07–0129 (August 7, 2007), the purpose of NRC's policy was to protect sensitive and security-related information and not to hide safety issues as the commenter suggests. SECY–07–0129 can be found on the NRC's public website at <http://www.nrc.gov/reading-rm/doc-collections/commission/secys/2007/secy2007-0129/2007-0129scy.pdf.> In SRM–07–0129 (August 31, 2007), the Commission directed the staff to implement a revised safety policy for withholding information. This staff requirements memorandum also is available on the NRC's public website, at <http://www.nrc.gov/reading-rm/doc-collections/commission/srm/2007/2007-0129srm.pdf>.*

No changes were made to the EA in response to this comment.

Other Issues

Comments 25-61 and 31-08

Two commenters stated that the public should know if NFS product is being used to produce nuclear weapons. One commenter requested that details of NFS contracts should be provided including: (1) the names of federal agencies supporting NFS operations; (2) the general terms of the contracts; and (3) in general terms, the classified products made for the government agencies.

Response: *The NRC does not have copies of NFS contracts and cannot provide the details of those contracts. The NRC license authorizes NFS to conduct activities associated with producing fuel for nuclear reactors, not nuclear weapons. These activities include converting surplus uranium from U.S. Department of Energy (DOE) facilities into fuel for commercial nuclear reactors.*

No changes were made to the EA in response to these comments beyond the information provided in this response.

Comment 25-18

One commenter stated an understanding that NFS was given a sizable amount of government funds to decommission the site of the former plutonium building in the past, but instead used the funds for further business development. The commenter believes this is supported by a finding documented in the 2010 SCUBA report.

Response: *The NRC staff is not aware of any such misuse of funds. The commenter may want to forward the information to the Inspector General of the government agency that allocated the funds.*

No changes were made to the EA in response to this comment.

Comment 17-11

One commenter felt that the draft EA should have provided a discussion of the implications of the high rate of alcohol abuse by agents responsible for transporting nuclear weapons and weapon-usable materials.

Response*: Section 4.2 of the EA addresses the potential non-radiological and radiological impacts on transportation from NFS-related activities. This analysis included the evaluation of (1) the potential non-radiological impacts from transportation accidents involving shipments of decommissioning wastes offsite for disposal and (2) the accident radiological and non-radiological impacts for uranium downblending-related transportation activities. Accidents considered in these analyses could be caused by any reason, including a driver's misuse of alcohol. The NRC staff determined that accident impacts on public health and safety from NFS-related transportation activities would be SMALL.*

Additionally, fitness for duty requirements are established in 10 CFR Part 26 and transportation security requirements are established in 10 CFR Part 73. The NFS program to comply with those requirements is evaluated in the SER.

No changes were made to the EA in response to this comment.

Comment 31-13

One commenter felt that NRC staff SERs for recent NFS license amendment requests did not adequately document NFS compliance with NRC regulations, in part because the SERs were, in the commenter's opinion, too short.

Response: *As stated in Section 1.1 of the EA, the purpose of the NRC staff's SER is to document the staff's detailed safety analysis of, in this case, the proposed license renewal to assess compliance with 10 CFR Parts 20 and 70. The length of the SER may vary depending on the complexity of the review and the extent of the discussion needed to document compliance. The NRC staff disagrees with the commenter's assertion that an SER is inadequate simply because it is short.*

No changes were made to the EA in response to this comment.

B.5.3.3 Segmentation

Comments 19-25, 25-05, 31-12, T39-05, T43-09, and T47-07

Several commenters stated that the draft EA was segmented. One commenter stated that they felt the reason for the segmentation was because the Safety Evaluation Report (SER) is not included in the EA. Another commenter stated the EA is segmented because NRC tries to segment topics to reduce their impact. Another commenter stated that is segmented because it omits critical information.

Also, three commenters raised concerns that the SER is not included in the EA. Two of the commenters commented that the EA references the SER but the public will not see the SER. Another commenter believes the SER should be included in the EA.

Response*: Section 1.1 of the EA states that the purpose of the EA is to assess the potential environmental impacts of the proposed action and of any reasonable alternatives. In identifying the scope of the EA, the NRC staff determined that certain topics were out of the scope of the EA and were more appropriately addressed in the NRC staff's safety review (see Section 1.5.3). The purpose of the safety review is to assess NFS compliance with NRC regulations and requirements in 10 CFR Parts 20 and 70, and the NRC staff documents that review in a separate SER. The SER is prepared in parallel with the EA, and with the EA, forms the bases for the NRC decision whether to renew the NFS license as proposed.*

With respect to the omission of critical information, the NRC staff assessed the information identified by the commenter, and determined, as is discussed elsewhere in this appendix, that this information did not change the NRC's evaluation of potential environmental impacts from the proposed action.

In response to these and other comments, the NRC staff has revised Section 1.5.3 to further clarify why the topics identified were determined to be out of the scope of the EA.

Comment 18-18

One commenter stated the staff's SER had not been adequately considered in the draft EA preparation. Therefore, it was premature to issue a FONSI until the SER is incorporated into the assessment of impacts.

Response: *As discussed in Sections 1.1 and 1.5.1 of the EA, the NRC staff is preparing in addition to the EA, an SER to evaluate NFS compliance with the regulations in 10 CFR Parts 20 and 70. The purpose of the EA is to meet NRC regulations in 10 CFR Part 51 that implement the National Environmental Policy Act of 1969, as amended. The EA and the SER will be the bases for the NRC decision concerning the renewal of the NFS license.*

Although the EA and the SER are prepared for different purposes, the EA does address the potential environmental impacts of certain aspects of NFS' radiation protection program that is described and assessed in the SER. For example, Section 4.11 of the EA discusses the potential impacts to public and occupational health, including (1) potential impacts related to radiation doses expected to be received by workers and individual members of the public from continued operation of the NFS facility; and (2) potential impacts related to potential accidents at the facility. The EA also discusses, as does the SER, the effluent control and environmental

monitoring programs being implemented by NFS to ensure protection of public health and safety and the environment.

No changes were made to the EA in response to this comment.

B.5.3.4 Need for Facility

Comments 08-06 and 17-17

Two commenters stated that the need for the facility was not addressed in the EA. The commenters stated that the following information should be considered in developing the need: (1) whether the U.S. Navy should be planning to phase out the use of High Enriched Uranium (HEU) to fuel naval propulsion reactors, (2) the amount of HEU used annually, (3) the amount of HEU stored on site routinely, (4) the chemical and physical form of the HEU stored and used on site, and (5) whether the facility activities should be moved given that people, agricultural, and industrial activities are within one mile of the site.

***Response**: The need for the proposed action is discussed in Section 1.3 of the EA. As discussed in this section, NFS is seeking to renew its NRC license to continue NRC-authorized activities at the site. As discussed in Section 1.1 of the EA, the NRC staff prepared the EA in accordance with staff guidance in NUREG-1748, and in Section 3.4.4 of that guidance document, alternatives to the proposed action should, in part, achieve the same objective or need as does the proposed action. Of the topics identified by the commenters, the potential impacts of phasing out the use of HEU and moving the facility activities to another site are in essence addressed in the no-action alternative (i.e., denial of the license renewal, cessation of site activities, full site decommissioning). The other issues related to the amounts and forms of HEU stored and used onsite are not directly related to the need for the proposed action and are issues of a sensitive, security nature not appropriate for discussion in a public forum.*

No changes were made to the EA in response to these comments.

B.5.3.5 Alternatives

Comments 17-04 and 31-11

Two commenters stated that the draft EA did not consider all reasonable alternatives to the proposed action. One commenter felt that NRC should have considered the alternative of consolidating the highly enriched uranium (HEU) related functions performed at the NFS Erwin Facility, at the proposed new Uranium Processing Facility adjacent to the US Department of Energy's (DOE's) Highly Enriched Uranium Material Facility at the Y-12 Natural Security Complex at Oak Ridge, Tennessee. Doing so, the commenter felt, would enable the government to select the alternative that provides the best material physical protection, control and accounting (MC&A) of HEU. The second commenter stated that NRC should include a 1-to-2-year license renewal alternative, which the commenter stated was the Canadian model of nuclear regulation.

***Response:** Alternatives assessed in the EA are presented in Section 1.4 (Alternatives to the Proposed Action). Were NFS's operations moved elsewhere, the potential environmental impacts for doing so would include not only the impacts from site decommissioning of NFS but also impacts from the construction, operation, and decommissioning of an entirely new facility. As such, the combined environmental impacts for this proposed alternative would greatly*

exceed impacts for the proposed action and the reasonable alternatives assessed in the EA. Therefore, this alternative is not a reasonable alternative and was not considered for detailed assessment by the NRC staff in this environmental review. Additionally, the NRC has determined, through routine inspection and licensing, that the MC&A of HEU at the NFS facility is adequate.

With respect to the comment that a 1-to-2-year license renewal alternative should be assessed, the assessment of potential environmental impacts for a 10-year license is consistent with the need for the proposed action discussed in Section1.3 of the EA and sufficient for the NRC to make an informed decision regarding a shorter license term than that proposed by NFS.

No changes were made to the EA in response to these comments.

Comments 18-23, 20-02, and T44-03

Two commenters stated that the environmental impacts from site wide decommissioning should be considered as part of all three alternatives considered by NRC in the draft EA. Both commenters considered that the NFS facility would cease activities at some future time, and that decommissioning should, therefore, be part of the 40-year and the 10-year license renewal alternatives, and not just of the "no-action" alternative. Both commenters also felt that in not assessing decommissioning as part of the two license renewal alternatives, NRC had improperly evaluated the environmental impacts from those alternatives in comparison to impacts from the "no-action" alternative.

Response: *Alternatives assessed in the EA are presented in Section 1.4 (Alternatives to the Proposed Action) of the EA. As stated by the commenters, the potential environmental impacts of site decommissioning were not evaluated in the draft EA for either the 40-year license renewal period proposed by NFS or the 10-year license renewal alternative. The NRC staff considers that the impacts of site decommissioning are a foreseeable impact of the proposed action, and therefore, the EA has been revised to address the impacts from site decommissioning for the proposed action and for the 10-year license renewal alternative.*

Changes were made to Chapters 1 and 4 of the EA in response to these comments.

Comments 25-09, 26-04, and 31-09

Three commenters expressed concern with the draft EA statement that the site operations at the NFS facility and the types of potential environmental impacts would be expected to be the same for the 10-year and the 40-year license renewal alternatives. These commenters brought up examples of recent site events, of ongoing release of effluents from the facility, of changes in facility operations, and differences in estimated waste shipments to support their respective comment. The commenters stated that differences between the two license renewal periods were obvious and that a determination of similarity between the two was arbitrary and capricious.

Response: *As stated by the commenters, Section 1.4.2 of the EA states that site operations and the types of potential impacts during a 10-year license renewal period would be expected to be the same as for the proposed 40-year license renewal period. The NRC staff considers this statement to be accurate in that NFS is proposing no changes to its current operations in its license renewal application. Therefore, for the purposes of evaluating potential impacts, the staff considered site operations to be unchanged during both the proposed 40-year license*

renewal period and the 10-year alternative. The staff also considers the types of potential impacts to the environment would not change during these two renewal periods. However, the NRC staff does recognize that the magnitude of the potential impacts can vary and considers that it has accounted for this variation in its evaluation. An example of this accounting for the difference in the magnitude of the potential impacts can be found in Section 4.12, "Waste Management," of the EA.

Sections 1.4.2 and 4.0 of the EA were revised to further clarify the discussion of this issue.

B.5.3.6 Adequacy of NEPA Analysis

Comments 19-29, 20-07, 25-01, and 31-34

Several commenters stated that the draft EA was deceptive and contradictory, filled with baseless assertions, and lacked independent research, facts, and hard science. One of the commenters additionally requested that the EA include a decommissioning plan.

Response*: The NRC staff does not agree with the comments.*

As discussed in Chapter 1 of the EA, the NRC staff has conducted its independent analysis of the potential environmental impacts of NFS' proposal to renew its NRC license for 40 years and alternatives to that proposal. The NRC staff has documented this analysis in the EA, providing the bases for its evaluation in Chapter 4. In making its environmental determinations, the NRC staff relied on (1) information provided by NFS in its license application, accompanying environmental report, and responses to NRC requests for additional information; (2) information and data collected independently by NRC and its contractor from publicly-available published reports; (3) previous EA performed by the NRC staff for the NFS facility; and (4) information and data provided and gathered from federal, state, and local agencies.

Additionally, as discussed elsewhere in this comment response report, NFS is not required to submit a detailed site decommissioning plan until it decides to cease operations or until the expiration or termination of its license, pursuant to 10 CFR 70.38. As discussed in a prior comment response, the NRC staff has analyzed the potential impacts of site decommissioning for the proposed action, the 10-year alternative, and the no-action alternative.

No changes were made to the EA in response to these comments.

Comment 21-06

One commenter stated that EAs don't address potential health hazards or worst case scenarios.

Response: *Section 4.11 of the EA addresses potential public health and occupational health impacts. This section includes a discussion of potential accidents (Section 4.11.2) that could occur at the facility. Additionally, NEPA does not require a worst case analysis.*

No changes were made to the EA in response to this comment.

B.5.3.7 License Amendments and References

Comments 31-17 and T43-05

One commenter stated that license amendments during the renewal period were not addressed in the EA. Another commenter stated that the EA should summarize past environmental review documents in the EA. Another commenter stated that the past environmental review documents should be included in the EA, to reduce public burden.

Response*: Section 1.5.2 of the EA states that many aspects of the proposed action and of the affected environment have been addressed in previous NRC environmental review documents and so to limit redundancy, the NRC refers readers to those previous environmental documents identified in the section. The documents identified are EAs prepared by the NRC staff for major licensing actions for which subsequent NRC approval was granted. The NRC recognizes that other licensing actions resulting in amendments to the NFS license also were granted during the prior licensing review period (i.e., since 1999). However, the NRC staff considers that under the proposed action, NFS is requesting a continuation of current NRC-authorized operations that is reflective of such licensing actions. For this reason, the NRC staff considers that these past license amendments have been addressed in this EA.*

With respect to past environmental review documents, these are incorporated into the EA by reference, and when appropriate, information has been summarized from these documents in the EA. Each of the prior NRC environmental review documents cited in the EA is identified in the References section of the EA, which includes the NRC ADAMS Accession Number for the document. The ADAMS Accession Number can be used by readers of this EA to obtain with electronic or paper versions of the cited document. Electronic versions of supporting information are accessible to the public through the NRC website at http://www.nrc.gov/reading-rm/adams.html. The public also has the opportunity to examine and have copied, for a fee, the related publicly available documents from the NRC Public Document Room.

No changes were made to the EA in response to these comments.

B.5.3.8 Use of NFS Data

Comments 07-01, 07-02, 18-16, 19-01, 19-11, 25-72, 26-03, 27-02, and T42-03

Several commenters expressed concern that the EA was based only on NFS data, estimates, plans, and intentions. One commenter stated that NFS is not forthcoming about negative environmental impacts. Another commenter stated that there was no independent assessment done for the EA.

Response*: Section 1.5.2 of the EA identifies the main documents and information used by the NRC staff in preparing the EA. As a starting point for the environmental review, the NRC staff did rely on various NFS submittals to include: (1) the license renewal application (NFS, 2009a) and accompanying environmental report (NFS, 2009b); (2) NFS responses to NRC staff requests for additional information (NFS, 2010a, b); and (3) NFS semiannual effluent monitoring reports submitted to NRC in accordance with 10 CFR 70.59 (NFS, 2011b; 2010c, d; 2009c ,d; 2008a, b;* 2007a, b; 2006a, b; 2005a, b; 2004a, b; 2003a, b; 2002a, b; 2001a, b; 2000*). While the data provided in these submittals are collected by NFS, the NRC has an inspection program and two resident inspectors to regularly inspect NFS activities, including the environmental*

monitoring program to ensure that samples are collected and analyzed in accord with approved procedures and relevant NRC guidance.

In addition to the information submitted by NFS, the NRC staff also reviewed (1) previous NRC EAs for the NFS site (NRC, 2002a; 1999); (2) information gathered from NFS and stakeholders during site visit; and (3) additional information and data from other sources (see Section 8.0 "References" of the EA). The NRC staff also consulted with relevant federal, state, and local agencies (Section 5.0 "Agencies and Persons Consulted" of the EA) to obtain information and data specific to each agency's expertise.

The NRC staff used all of the information identified in its independent analysis of the potential environmental impacts of the proposed action and reasonable alternatives, in accordance with NRC regulations found in 10 CFR Part 51. Discussions of potential impacts are provided in Section 4.0 of the EA.

No further changes were made to the EA in response to these comments beyond the information provided in this response.

B.5.3.9 Objection to the Use of "Estimates" and "Beliefs"

Comments 19-10, 25-22, 26-08, T42-05, and T43-06

A number of commenters objected to the use of the terms "estimates" and "beliefs" In the draft EA. One commenter stated that the EA was not based on facts, because estimates or beliefs were used in the EA.

***Response**: In response to the comments, the NRC staff reviewed the draft EA and notes that the word "believes" is used two times in reference to NFS actions. The first instance in Section 2.3.2 of the EA referred to NFS's analysis of the consistency of elevated concentrations of three constituents with concentrations observed by NFS in local surface and ground waters. Since the NFS finding was based on its sampling and analysis, the word "believes" in this instance has been changed to "determined." The second instance refers to NFS actions taken to address the potential for site flooding (see Section 3.5.1 of the EA) that NFS felt protected the site from a 100-year flood. The word "believes" in this case has been changed to "considers" to more clearly reflect NFS's determination.*

The words "estimates" or "estimated" appears numerous times in the draft EA. In cases where a more accurate term (e.g., "calculates") is appropriate, the text has been changed [e.g., in discussing dose to the maximally exposed individual (MEI)]. However, the text has not been changed in cases where the term "estimate" is appropriate (e.g., when discussing [1] pollutant concentrations for which sampling is not required, [2] groundwater flow parameters, and [3] future volumes of waste to be generated).

Sections 2.3.2 and 3.5.1 of the EA has been changed as discussed in this response.

B.5.3.10 Assessment of Environmental Impacts

Comments 16-02, 31-01, and 31-07

Two commenters stated their concern of how the EA fails to discuss environmental impacts over a 40-year period. One commenter stated that there is an inability to predict environmental impacts. Another commenter stated that NRC glossed over NFS site activities in an attempt to avoid assessing their impacts.

***Response**: In the EA, the NRC staff has evaluated the potential environmental impacts from the continuation of currently authorized operations at the NFS facility for 40 years. To do so, the NRC staff relied on information and monitoring data collected over the previous 10 years of operation, and specifically data relevant to demonstrating compliance with (1) NRC's regulatory requirements in 10 CFR Part 20 for radiological doses to workers and members of the public, and concentration limits for airborne and liquid radiological effluents; and (2) State of Tennessee-issued licenses and permits for control of radiological source materials, National Pollutant Discharge Elimination System (NPDES) discharges, and storm water and sanitary sewer discharges. The NRC staff bases its assessment of environmental impacts from the proposed action on effluent and monitoring data from the previous 10 years of site operations as that data is more representative of the proposed site operations and expected effluent levels than data obtained prior to 1999. Potential environmental impacts are identified and discussed in Chapter 4, "Environmental Impacts," of the EA.*

No changes were made to the EA in response to these comments.

Comments 18-27, 25-02, and 26-09

Three commenters raised concerns related to environmental significance levels.
One commenter stated that the EA does not consider what is "significant," because the impact rating scale that is used (i.e., SMALL, MODERATE, or LARGE) fails to account for the accumulation of impacts over time. Another commenter stated the NRC's definition of "significant" does not meet her definition, and that identifying the continuation of impacts for an additional 40 years as "insignificant" does not pass the common sense test. A third commenter stated that the NRC's assessment of environmental impacts does not adequately define or consider what is "significant." A third commenter stated that it is not clear what SMALL and MODERATE actually apply to or what "not detectable" means.

***Response**: As discussed in Section 1.1 of the EA, the NRC staff prepared the EA in accordance with NRC staff guidance in NUREG-1748 (NRC, 2003). Section 4.2.5.3 of NUREG-1748 addresses the evaluation of significance, and notes that the standard of significance established by NRC (i.e., SMALL, MODERATE, or LARGE) accounts for the Council on Environmental Quality's (CEQ's) regulations concerning the determination of the significance of potential impacts. The CEQ's regulations at 40 CFR 1508.27, and thus the NRC's standard of significance, address both the context and the intensity of the potential impacts.*

When referring to potential impacts that are "not detectable" (i.e., in the definition of a SMALL impact), such environmental effects would not be detected either due to a lack of or low contamination levels measured using economically and technically feasible monitoring and detection techniques and equipment.

In the EA, the NRC staff evaluated the potential environmental impacts of continued operations at the NFS site for 40 years. Additionally, the EA includes a discussion of cumulative impacts, which, according to the CEQ's regulations at 40 CFR 1508.7, are the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable future actions. Thus, the EA does account for the accumulation of potential impacts over time, both from the proposed action and from other past, present, and reasonably foreseeable future actions. Based on the NRC staff's evaluation, the potential environmental impacts from the proposed actions were SMALL to MODERATE, depending on the resource impacted.

Section 4.0 of the EA has been modified to address the relationship of the NRC's standard of significance to the CEQ's regulations concerning significance of impacts.

Comment 25-17

One commenter stated that if NFS intended to restart excavation of plutonium-contaminated soil in the former Building 234 area in 2010, as stated on page 2-2 of the draft EA, then NFS would have had about one month remaining in 2010 to start the work.

***Response**: The commenter is correct. Excavation of contaminated soil was restarted in December 2010.*

Section 2.2 of the EA has been revised in response to this comment to provide the updated start date for the activities involved in decommissioning the former Building 234 area.

Comments 19-28, 20-01, 25-08, T39-03, T43-11, and T44-02

Three commenters stated that the draft EA assessment of impacts from site wide decommissioning is simply speculation as no detailed decommissioning plan has been submitted by NFS for the site and facility. Absent the NRC's review of a detailed site decommissioning plan, the commenters considered the impact analysis to be counter-intuitive and unsupported and the NRC staff's FONSI absent such a plan to be unfathomable. The commenters specifically questioned the comparison of impacts from the "no action" alternative that included decommissioning to the license renewal alternatives that did not, and also the expectation that jobs would be lost if decommissioning occurred.

***Response**: The NRC staff agrees that assessing the potential impacts of decommissioning requires some assumptions to be made using best estimates based on current knowledge and expertise. However, the NRC staff disagrees that a detailed decommissioning plan is required before an assessment of potential environmental impacts can be performed. NRC reports and prior experience with decommissioning projects throughout the industry provide the staff with appropriate assumptions and adequate information to allow the NRC staff to generally identify and assess potential environmental impacts of decommissioning.*

In response to these and other comments on this topic, Section 1.4.1 of the EA has been revised to identify Volume 1 (Revision 2) to NUREG–1757, "Consolidated Decommissioning Guidance: Decommissioning Process for Materials Licensees" (NRC, 2006) as the basis for identifying the general task to be performed during site decommissioning. Additionally, impact discussions in Chapter 4 of the EA were revised to include the impacts of site decommissioning for the proposed action and for the 10-year alternative.

The NRC staff notes that under 10 CFR 70.38(d), NFS would have 12 months to submit a decommissioning plan after it notifies NRC of a decision to cease principal activities at the site.

Comment 17-10

One commenter felt that the draft EA should have described the extent of on-site contamination beyond the areas currently being "decommissioned." Doing so, in the commenter's opinion, would have allowed involved agencies and the affected public the opportunity to comment in a meaningful fashion.

***Response**: Ongoing site decommissioning activities and groundwater contamination remediation efforts are discussed in Sections 2.2 and 3.5.2 of the EA. These sections provide the current understanding of existing and former onsite contamination and the decommissioning and remediation activities being taken to address that contamination. Additionally, NFS is required to have a program in place to ensure that public and occupational doses are as low as is reasonably achievable (ALARA), and this program includes keeping contamination levels low. NFS calculations of public and occupational doses during the prior 10 years are provided in Section 3.11 of the EA.*

No changes have been made to the EA in response to this comment.

B.5.3.11 Public Involvement

Comments 04-01, 05-01, 06-01, 08-01, and 23-01

Several commenters requested the comment period on the NFS draft EA be extended to provide interested stakeholders sufficient time to review the draft EA adequately. Some commenters referred to the unprecedented nature of the 40-year renewal period and the perceived omission of past information from previous NFS EAs. Other commenters cited a report that was to contain the results of extensive soil and water sampling that had not yet been published. Other commenters simply stated that additional time was needed to review the draft EA. Commenters also referred to a report that was expected to be released after the original comment period expired.

***Response**: On October 15, 2010, in accordance with NRC regulations, the NRC staff published a Notice of Availability (NOA) of the draft EA in the Federal Register (75 FR 63519). In this notice, the NRC staff provided information on how to either access or obtain a copy of the draft EA and draft FONSI. Electronic versions of the draft EA, draft FONSI, and supporting information were made accessible through the NRC ADAMS database on the NRC website (http://www.nrc.gov/reading-rm/adams.html). The public also had the opportunity to examine and have copied, for a fee, the draft EA and other related publicly available documents from the NRC Public Document Room. Copies of the draft EA and draft FONSI were also available at public libraries in Erwin, Jonesborough, and Greeneville, Tennessee.*

In the publication of the NOA of the draft EA on October 15, 2010 (75 FR 63519), the NRC staff stated that public comments on the draft EA and draft FONSI should be submitted by November 13, 2010. Members of the public were invited and encouraged to submit related comments electronically to the federal rulemaking website or send in comments by email or facsimile. On November 19, 2010 (75 FR 70952), the NRC staff extended the public comment period to December 31, 2010, in response to public requests for an extension submitted in comment letters and e-mails.

No changes were made to the EA in response to these comments.

Comment 28-01

One commenter supported the NRC decision to extend the public comment period.

***Response**: Section B.2.4 of this appendix discusses extension of the public comment period on the draft EA and the draft FONSI in response to requests from members of the public.*

No changes were made to the EA in response to this comment.

Comments 19-09 and T47-02

Two commenters felt that aspects of the draft EA placed a burden on the public. One commenter considered the burden high to read the draft EA, while the other commenter stated that, by referencing past environmental review documents rather than disclosing past environmental analyses, the public was frustrated as they did not have access to the past analyses. This second commenter requested that the NRC should make an exception to guidelines and regulations concerning the reduction in waste paper, and instead make available past detailed descriptions and analysis as either a part of the EA or accompanying it.

***Response**: In Section 1.5.2 of the EA, the NRC staff identified the main documents used as the bases for the staff's independent assessment of the potential environmental impacts associated with the NFS request to renew its NRC license. Among the list of document identified were previous EAs issued in 1999 [for the prior license renewal] and in 2002 [for the Blended Low-Enriched Uranium (BLEU) project]. These documents are publicly available and can be found at the NRC public website, www.nrc.gov/reading-rm/adams.html, using the Accession Numbers ML050540096 and ML050600258, for the 1999 EA and the 2002 EA, respectively.*

When necessary, the NRC staff summarized information from these documents in the EA in discussing site activities and the affected environment. The NRC staff considers that the information in the EA was sufficient for the evaluation of potential environmental impacts from the proposed action and reasonable alternatives.

No changes were made to the EA in response to these comments.

Comments 19-30 and 25-13

Two commenters stated that the public should be allowed to review and comment on the NRC's SER. One commenter stated that the public should have this opportunity given the continuing safety issues, the lack of a safety culture at NFS, and the importance of the SER as an important part of NRC's review of the NFS license renewal application. The other commenter requested the SER be part of the EA and made available for public comment.

***Response**: As discussed in Section 1.1 of the EA, the NRC staff is preparing a SER to document NFS compliance with the requirements in 10 CFR Parts 20 and 70. The SER is being prepared in parallel with preparation of the EA, which documents the potential environmental impacts of the proposed action in accordance with the provisions of 10 CFR Part 51. While in this case, the NRC staff determined to make the draft EA and draft FONSI available for public comment consistent with the provisions set forth in 10 CFR Part 51, it is not*

NRC practice to make draft SERs available for public comment. However, the NRC staff has made publicly available, when possible, the license renewal correspondence between the NRC and NFS, and also has conducted open public meetings to allow the public to provide input to the NRC staff and to have a meaningful role in the NRC decision-making process.

No changes were made to the EA in response to these comments.

Comment 25-04

One commenter stated that, in preparing the draft EA, the NRC had put the burden of proof on the public to demonstrate that an EIS should be prepared.

***Response**: NRC's regulations at 10 CFR Part 51.21 direct the NRC staff to prepare an EA for licensing actions for which an EIS is not required, and a categorical exclusion is not applicable. Because the proposed action of renewing the NFS operating license is not identified under 10 CFR 51.20 as requiring an EIS and no categorical exclusion is applicable, the NRC staff has prepared an EA.*

As discussed in Section 1.1 of the EA, the purpose of the staff's preparation of the EA is to determine if significant environment impacts would result from the action proposed by NFS, i.e., renewal of its NRC license for a period of 40 years. Based on its independent assessment of information provided by NFS, gathered from other federal, state, and local agencies, and identified in public comments on the draft EA, the NRC staff has determined that significant impacts to the quality of the human environment would not result from the continuation of operations at the NFS facility for 40 years, and has determined that a FONSI is appropriate. Therefore, preparation of an EIS for this licensing action is not warranted.

No changes were made to the EA in response to these comments.

Comment: 27-01

One commenter questioned why the NRC had "no public comment" when its representatives attended the October 26, 2010 meeting in Erwin, Tennessee.

Response: *On October 26, 2010, the NRC staff hosted a meeting in Erwin, Tennessee to gather public comments on the NRC's draft EA and draft FONSI. At that meeting, the NRC staff gave opening presentations on the NRC's environmental review process and the preliminary findings documented in the draft EA. The NRC staff then opened the meeting up to allow members of the public the opportunity to present oral comments on the draft EA and draft FONSI. An official transcript of the meeting's proceedings, the slides used by the NRC staff in its presentations, and public comments that were hand-delivered to the NRC staff at the meeting can be found at the NRC's public website at http://pbadupws.nrc.gov/docs/ML1104/ML110410419.html.*

As shown in the transcript, although the purpose of the meeting was to accept comments from the public, the NRC staff did respond to individual questions from members of the public.

No changes were made to the EA in response to this comment.

Comment 30-09

One commenter questioned how the public could have confidence in the NRC when, in her opinion, NRC representatives at every public meeting on the NFS facility since 2007 were either unwilling or unable to answer the simplest questions posed to them by members of the public.

***Response**: As part of each public meeting that NRC conducts, time is provided for members of the public to ask questions of the staff before, during, and after the meeting. The NRC staff members answer all questions to the best of their knowledge and ability.*

Because no EA topics were identified, no changes were made to the EA in response to this comment.

B.5.4 Federal and State Oversight

Comments 17-18, 20-03, and 25-11

Several commenters raised concern over federal and state oversight of the facility.
Two commenters stated that they feel NRC cannot predict adequacy of all federal and state oversight 40 years into the future, because NRC does not have complete regulatory oversight of all activities on site. Another commenter stated that NRC should review the adequacy of the TDEC NPDES permit.

***Response**: As discussed in Section 1.5.1 of the EA, various federal and state agencies have licensing and permitting authority over particular aspects of operations at the NFS site, with the governing legislation for these agencies dictating the respective roles and responsibilities of the agencies at the site. Table 1-1 shows the licenses and permits that NFS has with these agencies.*

The bases of NRC's environmental assessment of the NFS proposal to continue operations for 40 years are (1) previous environmental analyses performed by the NRC [NRC, 1999; NRC, 2002]; (2) environmental and effluent monitoring data for the prior 10 years of site operations [i.e., since the last license renewal in 1999]; and NFS compliance with the permits issued by other federal and state agencies. The NRC license for the NFS facility also includes a license condition that requires NFS to inform the NRC within 30 days of receipt of a violation notice from the State of Tennessee Division of Air Pollution or Water Pollution Control, or receipt of modified requirements of the State-issued National Pollutant Discharge Elimination System permit" (condition S-23 of license SNM-124).

Section 1.5.1 of the EA has been revised to clarify the bases for the regulatory authority of the respective federal, state, and local agencies from whom NFS has been granted a permit or license.

Comment 17-15

One commenter asked whether NRC, EPA or TDEC make adequate environmental measurements to distinguish when different enrichments of HEU are released.

***Response**: The NRC has jurisdiction over the uses of enriched uranium, which includes HEU. The NRC license requires NFS to take environmental measurements that demonstrate compliance with limits in 10 CFR Part 20 for the discharge of uranium isotopes in airborne or*

liquid effluents. NRC considers the measurements taken by NFS to be adequate. The NRC staff notes that NRC regulations in 10 CFR Part 20, Appendix B limit the concentration of uranium-235 (U-235) in effluents released to the environment. The limit is independent of uranium enrichment. If uranium highly enriched in U-235 is released, the limit will be reached much sooner than releases of uranium with lower enrichments.

No changes were made to the EA in response to this comment.

Comment 18-13

One commenter stated that emissions of state-regulated contaminants below permit levels may have an environmental impact.

***Response**: As discussed in Section 1.5.1 of the EA, for the purposes of its NEPA reviews, the NRC assumes that regulations that exist are applied, as appropriate, by other Federal, State, and local regulatory agencies. NRC also assumes that the licensee would comply with regulatory requirements and license and permit conditions issued by these agencies when evaluating the potential environmental impacts from issuing an NRC license. The NRC staff agrees that emissions below permit levels may have an environmental impact, but given that such emissions would be within permitted limits, the NRC staff considered such impacts to be SMALL.*

No changes were made to the EA in response to this comment.

Comment 18-14

One commenter stated that NFS' NPDES permit may have expired during the time the NRC issued the draft EA, referencing Table 1-1 of the EA.

***Response**: The NRC has updated Table 1-1 to provide the current status of the NPDES permit and other licenses and permits granted to NFS. NFS submitted to TDEC an application to renew its NPDES permit in February 2010, and at present, the renewed NPDES permit has not been issued.*

Comment 19-13

One commenter expressed concern over who has possession and responsibility for NFS liquid effluents of HEU until it leaves the NFS outfall or pipe. The commenter further questioned NRC's goal and mission related to HEU discharges, and asked if NRC left HEU to be dealt with by TDEC.

***Response**: NFS is responsible for the uranium it uses and releases to the environment. NRC regulates the discharges of HEU to the environment. The NRC regulations in 10 CFR Part 20, Appendix B limit the concentration of uranium-235 (U-235) that may be released in liquid effluents to the environment. If uranium highly enriched in U-235 is released, the limit will be reached much sooner than releases of uranium with lower enrichments.*

No changes were made to the EA in response to this comment.

Comment 19-16

One commenter questioned the apparent lack of cooperation by federal and state agencies on responding to public concerns about contamination of drinking water supplies.

***Response**: The NRC staff considers that the federal and state licensing and permitting processes, supported by inspection and independent sampling activities, in concert with treatment and analysis programs by local drinking water authorities, demonstrate a cooperative concern for the quality and availability of drinking water for local communities.*

As discussed in Section 2.3.2 of the EA, NFS is authorized by its NRC license to discharge liquid effluents generated from various facility processes. However, before discharges can be made into the local surface waters, the effluents are treated in the WWTF, sampled, and analyzed to meet the limits set forth in 10 CFR Part 20 and limits in the NPDES permit issued by the State of Tennessee.

Additionally, the NRC inspectors review NFS' semiannual effluent reports. NRC inspectors also perform an environmental inspection once a year, focusing on the environment and effluents. Inspection activities include (1) walk-down of the discharge line to the Nolichucky River, (2) inspection of the onsite environmental laboratory and WWTF, (3) observance of various sample collections and analyses, (4) a detailed review of the input data that feeds the effluent report, and (5) discussions with various environmental technicians regarding the health of the environmental monitoring program.

Separately, the NRC staff understands that TDEC regularly inspects NFS activities under TDEC licenses and permits, and conducts a split-sampling program with NFS regarding offsite environmental monitoring of ambient air, surface waters, and sanitary sewers. Additionally, local communities, such as Jonesborough and Greeneville, that use the Nolichucky River for drinking water supplies, sample and analyze the water prior to use within those communities to ensure that the water meets EPA drinking water standards.

In response to this comment, discussion of annual reports on drinking water quality issued by local community drinking water authorities has been added to Section 3.5.1 of the EA.

Comment 20-04

One commenter stated that NRC should analyze and assess likelihood of non-compliance with other federal and state permits. The commenter also stated that there is likely a greater probability of non-compliance over a longer period of operation.

***Response**: Assessing the likelihood of non-compliance with the regulations of other agencies is not required and is not necessary to estimate the potential environmental impacts of the proposed action and the alternatives. It is reasonable to assume that regulatory agencies will require corrective actions when violations are identified, and impose penalties if violations have safety significance.*

No changes were made to the EA in response to this comment.

Comment 25-23

One commenter expressed concern over the non-radiological discharges of nitrate/nitrite, total recoverable magnesium (Mg), and total recoverable aluminum (Al) flowing into the river.

***Response**: As discussed in Section 2.3.2 of the EA, elevated levels of nitrate/nitrate, total recoverable Mg, and total recoverable Al had been measured by NFS in storm water samples at least since 1999. These measurements by NFS were made in accordance with the multi-sector general NPDES storm water permit issued by TDEC (see Table 1-1 of the EA). In 2003, NFS notified TDEC of NFS' sampling and analysis that indicated the nitrate/nitrite and Mg concentrations were due to naturally occurring background levels in surface waters and groundwater in the vicinity of the NFS site, but that an aluminum contributor could not be found (NFS, 2003). A recent letter from TDEC to NFS on the NFS NPDES permit renewal application indicates that TDEC is perhaps seeking to resolve this issue in the renewed NPDES permit (TDEC, 2010a).*

Section 2.3.2 of the EA has been revised to include the recent TDEC letter on the NFS NPDES permit renewal application.

Comments 13-03 and 25-30

One commenter questioned the veracity of the monitoring data to show that liquid discharges were below NPDES and 10 CFR Part 20 limits, and questioned whether any independent sampling and verification was performed by NRC or TDEC. One commenter stated that testing of Nolichucky River should never be done by NFS alone because they have a long record of questionable compliance.

***Response**: As discussed in Sections 2.3.2 and 2.4 of the EA, NFS treats liquid effluents in the WWTF and samples and analyzes the effluents prior to discharge to ensure that the radiological and non-radiological constituents in the effluents are below the limits in 10 CFR Part 20, Appendix B and in the TDEC NPDES permit. Twice a year, NFS submits effluent monitoring reports to the NRC in accordance with 10 CFR 70.59. These reports specify the quantities of the principal radionuclides released to unrestricted areas in air and liquid effluents during the preceding six months and any other information needed to estimate the maximum annual radiation doses to the public resulting from effluent releases.*

NRC inspectors review these semi-annual reports and conduct inspections of the environmental monitoring program at NFS. Results of these NRC inspections are publicly available on the NRC's public website at http://www.nrc.gov/materials/fuel-cycle-fac/fuel-fab/nfs-inspection-reports.html.

Additionally, TDEC representatives regularly accompany NFS employees during environmental sampling events and split samples with NFS, so as to perform an independent analysis of the samples. Should the results of TDEC's analysis differ from the NFS results, it is the NRC staff understanding that TDEC and NFS take further actions to investigate the reason for the difference and to resolve it to ensure public health and safety.

No changes were made to the EA in response to these comments.

Comment 31-15 and T47-01

One commenter expressed concern about previously identified concerns about nature and volume of NFS effluents and how this is not in the spirit of national or state water laws. A second commenter stated that NRC assumes that other federal and state permit limits are protective, in citing information from state agencies NPDES and storm water discharge permits, when NFS data shows otherwise.

***Response**: The NRC's review found that NFS effluents are authorized by various regulatory agencies, and the NRC staff believes the permits and licenses are consistent with the authority granted to the agencies by Federal and State legislation. In meeting these licensing requirements and permit limits, NFS is operating in compliance with national and state water laws.*

No changes were made to the EA in response to this comment.

Comment 31-14

One commenter stated that the 1998 Emergency Plan identified 20 license and permits for the NFS facility while the draft EA listed only 11.

***Response**: The NRC staff has reviewed the most recent update of the Emergency Plan for the NFS facility and has updated Table 1-1 appropriately.*

B.5.5 Adequacy of NRC Regulation of NFS

Comments 09-03, 10-03, 11-02, 19-26, 25-71, 27-04, 32-02, T39-02, T43-10, T45-02

Several commenters expressed their concerns about the adequacy of NRC's regulatory oversight of operations at the NFS facility. Some felt that NRC was in collusion with NFS, and that NRC had been paid monies or kickbacks in return. Others stated that, in not adequately regulating NFS, NRC has not been fulfilling its mission to protect public health and safety and the environment. Still others stated that, in preparing the draft EA, the NRC showed obvious bias and favoritism toward NFS.

***Response**: Concerns raised by the commenters have been referred to the NRC Inspector General. No changes were made to the EA in response to these comments.*

Comments 17-12, 22-04, 29-05, and T43-02

Several commenters stated their opinion that NRC has failed to adequately regulate NFS in the past. One commenter felt that, while some cleanup was acknowledged in the draft EA, there was no mention of NRC's failure to adequately regulate environmental releases in the past. Another commenter stated that NRC had not done a good job of regulating as too many people were getting seriously sick and having cancer. A third commenter stated that the public cannot have confidence in NRC as a regulator given various safety concerns at NFS and NFS' environmental contamination. The fourth commenter stated that NRC simply applied "duct tape" in its approach to regulating NFS.

***Response**: As stated in Section 1.1 of the EA, the NRC decision concerning renewal of the NFS license will be based on (1) an assessment of NFS compliance with the NRC's regulations*

in 10 CFR Parts 20 and 70, and (2) an evaluation of the potential environmental impacts prepared in accordance with 10 CFR Part 51, NRC's NEPA implementing regulations. NRC regulates operations at the NFS facility under the provisions of 10 CFR Part 70. Under its current NRC license, NFS is authorized to release radioactive effluents into the air, surface waters, and sewer so long as such releases are in compliance with 10 CFR Part 20. As discussed in Section 3.11 of the EA, doses to members of the public from NFS-related airborne and liquid releases of radioactive effluents have been within the regulatory limits in 10 CFR Part 20.

No changes were made to the EA in response to these comments.

Comments 19-08 and T43-03

One commenter stated that information in the draft EA could not be trusted given NFS's apparent history of falsification of records.

***Response**: As stated in Section 1.1 of the EA, the NRC decision concerning renewal of the license for the NFS facility will be based on (1) an assessment of NFS compliance with the NRC's regulations in 10 CFR Parts 20 and 70, and (2) an evaluation of the potential environmental impacts prepared in accordance with 10 CFR Part 51, NRC's NEPA implementing regulations. Assessing the safety culture of a facility can identify worker attitudes that affect the performance of the facility. However, the requirements for approving a license application in Part 70 do not include demonstrating good attitudes in the applicant's work force. Licenses are based on compliance with existing regulations.*

The NRC staff notes that, in addition to NRC regulations, NFS is subject to a Confirmatory Order which requires safety culture assessments and other improvement efforts to continue until NFS demonstrates sustained improvement in its safety and security program.

The NRC conducts regular inspections of the NFS facility and its operations, and has assigned two resident inspectors to the facility to review and inspect day-to-day operations. Additionally, the NRC takes seriously concerns related to apparent wrong-doing of NFS employees and implements a formal allegation process to assess reports of such apparent wrong-doing.

No changes were made to the EA in response to these comments.

Comment T39-11

One commenter expressed the opinion that findings in inspection reports from NRC resident inspectors at the NFS facility were "negotiable, manipulated, minimized or simply swept under the rug" when the findings reached upper management at NRC headquarter and regional offices.

***Response**: The NRC staff acknowledges that initial inspection findings at any NRC-licensed facility may change after further review. NRC inspection and enforcement processes require management review of apparent violations. In addition, licensees are allowed to provide additional information for NRC to consider before final action is taken on apparent violations. The NRC considers these processes are necessary to produce high quality documents which are complete and accurate.*

The transcript of the public meeting, including this comment, was forwarded to the NRC's Office of the Inspector General.

No changes were made to the EA in response to this comment.

B.5.6 Regulatory Issues

Comment 07-07

One commenter questioned that since NFS is the only facility that operates its classified processes for the government, would NRC therefore automatically grant the renewed license, for expediency, no matter the community or environmental impacts?

Response: *The NFS license renewal application will be approved only if NRC can make the findings required by 10 CFR 70.23 and 70.66 for approval of applications.*

No changes were made to the EA in response to this comment.

Comments 05-02 and 08-03

Two commenters stated that the NFS application to renew its license for 40 years was unprecedented and one of the commenters stated that the renewal period demanded a significantly higher level of scrutiny than that given in the draft EA.

Response: *NRC regulations and internal procedures for the review of license renewal applications do not impose more stringent requirements for longer term licenses. For the purposes of this environmental review, the NRC staff is preparing the EA following NRC regulations at 10 CFR Part 51 that implement the National Environmental Policy Act of 1969, as amended, and pursuant to NRC staff guidance in NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." This EA documents the NRC staff's independent assessment of the potential environmental impacts of the NFS proposed action to renew its NRC license for 40 years. The staff's assessment is based on (1) information provided by NFS; (2) prior NRC environmental reviews; (3) information gathered and provided by other federal, state, and local agencies; and (4) information provided by members of the public in public meetings and by regular and electronic mail. Based on the EA, the NRC staff has determined that the renewal of the NFS license for 40 years would not result in significant impacts to the human environment and that a FONSI is appropriate.*

No changes were made to the EA in response to these comments.

Comments 17-03 and 17-19

One commenter stated its views of what it perceives to be an artificial and unlawful separation of the NRC's NEPA review from the agency's licensing process. Specifically, the commenter considered NRC's hearing process to be unfair and prejudicial in that it asks the public to intervene shortly after NRC's receipt of the license renewal application. The commenter felt that the public should be provided the opportunity to intervene after NRC has prepared a draft EA or draft EIS. The commenter also considered NRC regulations for late filed contentions to be very high procedural hurdles and resource prohibitive for most every member of the public.

Response: *The comment raises issues outside the scope of the EA. NRC regulations concerning NRC's hearing process are found in 10 CFR Part 2, "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders." If the commenter wishes to see this regulation revised, the commenter should follow the provisions in 10 CFR 2.802 that address petitions for rulemaking.*

No changes were made to the EA in response to these comments.

Comment 18-12

One commenter stated that the draft EA's view that "accordance with regulations means no environmental impact" is based on a number of flawed assumptions. First, the commenter considered that this view incorrectly assumes that discharges of pollutants or contaminants into the environment will have "no environmental impact" simply if they are occur in accordance with a government permit. The commenter felt that a government permit cannot erase or nullify the effects of the discharge of a pollutant or contamination; it can simply allow (or "permit") such discharges to occur, thus opening the door to negative environmental impacts that should be analyzed.

***Response**: The NRC staff agrees with the commenter that effluents from site operations have the potential to impact the environment, but disagrees with the premise that no environmental impact is the applicable standard. The purpose of the NRC's environmental review of the NFS proposal to renew its NRC license for a period of 40 years is to assess the significance of the impacts associated with that proposal, including impacts from effluent releases.*

Table 1-1 of the EA identifies the license and various permits issued to NFS and the issuing regulatory agency. Under conditions in the license and permits, NFS is allowed to release both radiological and non-radiological constituents into the air and local surface waters. As stated in the EA, the license and permits were issued pursuant to the governing authority of the regulatory agency over the relevant constituents. The agency issuing the permit is doing so in compliance with their governing authority and that the permit conditions are reflective of that authority. Therefore, the release limits in the permit would be expected to be protective of public health and safety. Additionally, the license and permits granted to NFS must be renewed on a periodic basis and would account for any changes in the governing regulations and as a result, future authorized releases would remain protective of public health and safety.

Based on its assessment in the EA, the NRC staff considers that effluent releases will have a minor, or SMALL, impact on the environment.

No changes were made to the EA in response to this comment.

Comments 11-04, 18-15, 19-17, 27-03, and 29-04

Several commenters questioned NRC's reliance on NFS for self-monitoring of effluents and questioned why NRC did not conduct its own independent monitoring. One commenter stated that since NFS data could not be trusted and NRC was not collecting its own independent data, the public must collect the data it could within its means to do.

***Response**: By its NRC license, NFS is required to implement radiological monitoring and safety programs that comply with 10 CFR Part 20 requirements to protect the health and safety of workers and the public. NRC periodically inspects the NFS programs and has assigned two*

onsite resident inspectors to inspect for compliance. Worker and public radiological safety at the NFS site is maintained by implementation of a radiation protection program that complies with the regulations in 10 CFR Part 20. Semiannual effluent reports are submitted to the NRC in accordance with 10 CFR 70.59 and reviewed by the NRC staff.

Additionally once a year, NRC inspectors perform an environmental inspection that focuses on the environment and effluents. Note that NRC inspectors recently completed this inspection in November 2010 under inspection procedure 88045, "Effluent Control and Environmental Protection." Activities included: (1) the walk-down of the discharge line to the Nolichucky River, (2) inspection of the onsite environmental laboratory and WWTF, (3) observance of various sample collections and analyses, (4) a detailed review of the input data that feeds the effluent report, and (5) discussions with various environmental technicians regarding the health of the environmental monitoring program. An electronic copy of the November 2010 inspection report can be found on the NRC's ADAMS website (www.nrc.gov/reading-rm/adams.html) using the Accession Number ML110280474. No findings of significance were identified during that portion of the inspection.

The NRC does not have the resources to routinely take confirmatory samples at every site it licenses. However, the NRC may take confirmatory samples when needed to confirm compliance with NRC regulations.

No changes were made to the EA in response to these comments.

Comment 19-14

One commenter stated that NFS may discharge effluents daily and may exceed the authorized regulatory or permit limits on any given day, but that NFS, however, cannot exceed the annual regulatory or permit limits. The commenter questioned why the NRC does not require NFS to monitor, record, and meet "daily" limits.

***Response**: NRC regulations impose annual rather than daily effluent limits. To the extent that the commenter seeks changes in NRC requirements, the comment raises issues that are outside the scope of the EA. If the commenter wishes to see the effluent limit requirements revised, the commenter should follow the provisions in 10 CFR 2.802 that address petitions for rulemaking.*

10 CFR Part 20 establishes standards for the protection of workers and members of the public against ionizing radiation resulting from activities conducted under licenses issued by the NRC. For members of the public, the annual total effective dose equivalent from licensed operation shall not exceed 100 mrem (1.0 mSv). The effluent limits in 10 CFR Part 20, Appendix B were derived in a way to ensure that the effluent discharges did not exceed the 100 mrem (1.0 mSv) limit. In addition to meeting the annual dose limits, an NRC licensee is required to have a program with the goal of achieving doses that are as low as reasonably achievable (ALARA).

As discussed in its license renewal application, NFS implements an effluent control program to keep airborne and liquid effluent releases ALARA. The program includes routine monitoring and measurement, comparison of results to action levels set by NFS procedural guidance, and reporting of results to NFS management and the NRC, as appropriate. As discussed in Section 2.4 of the EA, part of this program includes an effluent monitoring program for the purposes of sampling and analyzing effluents to the air, sewer, and water. Depending on the effluent being monitored, NFS may conduct sampling continuously, daily, quarterly, or on a

batch basis, with an analysis for radioactive constituents conducted monthly, quarterly, or annually.

No changes were made to the EA in response to this comment.

Comment 30-01

One commenter stated it appears that the action level for gross alpha from discharges into the Nolichucky River has been set by NFS and not NRC, and that this action level (3E-07) is equal to the annual discharge limit for "high enriched uranium" allowed by NRC.

***Response**: In 10 CFR Part 20, Appendix B, Table 2, the concentration values given in columns 1 and 2 are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent (TEDE) of 0.5 mSv [50 mrem]. As shown in Table 2-5 of the EA, the uranium isotopes U-232, U-233, U-234, U-235, U-236, and U-238 can be found in liquid effluents originating from NFS. For all but U-232, the 10 CFR Part 20 effluent concentration limit in water is set at 3E-07 (it is 6E-08 for U-232).*

NFS implements a radiation protection program in accordance with the provisions in 10 CFR Part 20. As part of that program, NFS sets internal action limits for effluent monitoring that if exceeded, would involve further actions by NFS to include if appropriate, notification of the NRC. Although NFS may change an action limit, it is still required to meet the annual effluent concentration limits in 10 CFR Part 20, Appendix B. In its license renewal application (NFS, 2009a), NFS states that the action levels for liquid effluents are at or below the concentrations listed in 10 CFR Part 20, Appendix B, Table 2, Column 2.

No changes were made to the EA in response to this comment.

Comments 30-02 and 31-32

Two commenters expressed concern about plutonium being discharged from the NFS site. One commenter was not able to determine from current or past EAs the amount of plutonium that NFS is allowed to discharge into the Nolichucky River. The other commenter, noting that plutonium is being allowed to be discharged from the site, questioned why the Agency for Toxic Substances and Disease Registry (ATSDR) would warn the public to leave the area if they knew or suspected that plutonium had been released into the air.

***Response**: As identified in Tables 2-5 and 3-14 of the EA, NFS discharges isotopes of plutonium into the air, sewer, and surface waters. NFS has identified these discharges in its semiannual effluent reports submitted to NRC in accordance with 10 CFR 70.59. As shown in these semiannual reports, the levels of plutonium released to the environment are small fractions of the effluent concentration limits found in 10 CFR Part 20, Appendix B. Radionuclide effluent concentrations below these limits are considered protective of public health, and therefore, discharge of effluents in compliance with these limits would be expected to have a SMALL potential impact on public health.*

No changes were made to the EA in response to these comments.

Comment 31-06

One commenter felt that the contractor who had assisted the NRC staff in preparing the draft EA should be acknowledged in a byline in the document.

***Response**: In Section 7.0 of the EA, the names of the EA preparers are identified and include staff from the Center for Nuclear Waste Regulatory Analyses (CNWRA) and other subcontractors. In so identifying these individuals, the NRC is recognizing the contributions each made to the preparation of the EA.*

No changes were made to the EA in response to this comment.

Comments 09-01, 17-02, 19-07, 22-02, and 22-03

Several commenters questioned whether NRC could grant NFS a 40-year extension to its license. One commenter stated that a 40-year extension was unprecedented, unnecessary, and unwarranted, and that to the commenter's knowledge, no nuclear fuel cycle facility had previously been granted a 40-year extension to its NRC license. A second commenter wondered how NRC could even consider a 40-year license renewal given the findings of the two SCUBA reports. A third commenter stated that the 40-year permit process was way too long, and that the NRC had not shown the process to be safe for people living in the vicinity of the NFS site. The final commenter stated that the NFS facility did not have the system components to operate for 40 years and that it did not fit the criteria or the need to be issued a license for that length of time.

***Response**: In SECY-06-0186 (dated August 24, 2006), the NRC staff proposed increasing the maximum term of a license for certain fuel facilities licensed under 10 CFR Part 70. On September 26, 2006, the Commission in SRM-06-0186 authorized the staff to issue licenses for up to 40 years if the licensee is required to conduct an ISA. NFS is required by 10 CFR part 70 subpart H to conduct an ISA, and is thus eligible to be granted a renewed license of up to 40 years. Both SECY-06-0186 and SRM-06-0186 are available on the NRC's public website at http://www.nrc.gov/reading-rm/doc-collections/commission/. Since the issuance of the SRM, the NRC has granted a 40-year license extension to two fuel fabrication facilities: AREVA NP's facility in Richland, Washington and Global Nuclear Fuel – Americas' facility in Wilmington, North Carolina.*

By letter dated June 30, 2009, NFS requested that NRC license SNM-124 be renewed for 40 years. For the purposes of this EA, the NRC staff analyzed the potential impacts of a 40-year license renewal as the proposed action and also the potential impacts of a 10-year license renewal as an alternative. On October 15, 2010, the NRC staff made the draft EA and draft FONSI available for public comment in part, because, if granted as proposed by NFS, this would be the first 40-year license renewal for a Category I fuel fabrication facility.

The decision whether or not to renew the NFS license, and if renewed what the license term will be, will be based on this EA and the NRC staff's SER that addresses NFS compliance with NRC regulations in 10 CFR Parts 20 and 70.

No changes were made to the EA in response to these comments.

Comments 25-07, 25-70, 25-77 and 31-05

Two commenters questioned why NFS had not submitted a detailed site decommissioning plan. One of the commenters additionally stated that a detailed site decommissioning plan should be submitted before the license is renewed.

***Response**: Under 10 CFR 70.38(d), NFS would have 12 months to submit a site-wide decommissioning plan after it notifies NRC of a decision to cease all principal activities at the site. Until NFS decides to cease all principal activities at the site, it is not required to submit a site-wide decommissioning plan. However, NFS has submitted a decommissioning funding plan which outlines the tasks that must be completed whenever final decommissioning is later performed.*

In response to these and other comments on this topic, Section 1.4.1 of the EA has been revised to identify Volume 1 (Revision 2) to NUREG–1757, "Consolidated Decommissioning Guidance: Decommissioning Process for Materials Licensees" (NRC, 2006) as the basis for identifying the general tasks to be performed during site decommissioning.

B.5.7 Cooperating Agencies and Consultations

Comments 08-04 and 17-16

One commenter stated that relevant federal and state agencies were not provided the opportunity to comment on the draft EA. The commenter identified the following agencies as those apparently not consulted with or provided the opportunity to comment: the U.S. Department of State, the U.S. Department of Energy, the National Nuclear Security Administration, the Department of Homeland Security, the Department of Defense, the U.S. Navy, the U.S. Geological Survey, the U.S. Fish and Wildlife Service, the Tennessee Department of Environmental Conservation. The commenter considers such inter-agency communication to be fundamental to NEPA and considers the apparent lack of such communication on the draft EA to run counter to NEPA's admonition to "look-before-you-leap."

***Response:** In Chapter 5 of the EA, the NRC discusses its consultation with other federal, state, and local agencies. As stated there, the NRC interacted with the U.S. Fish and Wildlife Service and the Tennessee Historical Commission and sent a copy of the draft EA to the State of Tennessee for review and comment.*

The NRC staff does not consider it necessary to have consulted with the other federal agencies identified by the commenter. As discussed in Section 1.1 of the EA, the decision before the NRC is whether or not to renew the NRC license for operation of the NFS facility. The NRC made the draft EA available for public comment from October 15, 2010 to December 31, 2010. No comments were received from the other agencies identified by the commenter.

No changes were made to the EA in response to these comments.

B.5.8 Environmental Resource Areas

B.5.8.1 Transportation

Comment 18-11

A commenter stated that the draft EA should consider impacts from transportation accidents based on the full volume of waste shipments for the proposed 40-year renewal period rather than for annual impacts.

Response*: The transportation impact analysis in Section 4.2 of the EA evaluated potential non-radiological accident impacts of radioactive waste shipments for the duration of the requested 40-year renewal period and evaluated the potential radiological accident impacts for all radioactive material shipments associated with the NFS highly enriched uranium downblending activities, including waste shipments. The non-radiological accident impact analysis considers the applicant's cumulative estimate of all decommissioning waste shipments for the 40-year period. NFS indicated the decommissioning waste shipments represented the majority of shipping miles traveled over this period of time, and therefore the staff considered the estimate representative of cumulative shipment activity. The Tennessee Valley Authority (TVA) risk estimates discussed in Section 4.2 of the EA for the uranium downblending program are reported for the entire program and are not annual estimates. The radiological risks from downblending transportation, including waste shipments, were low and the highest estimated risks from the analysis were from non-radiological accidents (i.e., the common physical effects of fatal truck accidents). Based on the above information, the NRC staff has determined that the evaluations of potential waste accident impacts consider shipments that are representative of cumulative shipping over the requested 40-year renewal period and for long term project work conducted at the NFS facility.*

No changes were made to the EA in response to this comment.

Comment T47-06

One commenter expressed concern about the potential hazards from radioactive materials transport, particularly the potential for release due to earthquakes, fires, and terrorist attacks during transport. The commenter referred to congressional testimony regarding a fire in a Baltimore rail tunnel in 2001, and one congressional presenter's estimates of projected consequences had the rail cars involved in the accident been carrying radioactive materials. The commenter also expressed concerns that an attack using a common military demolition device on a truck carrying radioactive material would perforate transportation casks and result in similar consequences. The commenter stated that such accidents would overwhelm local emergency response capacity in most communities.

Response*: Section 4.2 of the EA evaluates the potential hazards from radioactive material transportation for the proposed license renewal and alternatives. In general, for accident conditions involving release of radioactive material, the magnitude of the risk associated with radioactive material transportation depends on the properties of the materials that are released and the amount of material released into the environment. In risk analyses, the severity of an accident affects the amount and type of material that would be released. As discussed in Section 4.2, the potential incident-free and accident radiological and non-radiological transportation risks have been previously evaluated by NRC, DOE, and TVA for the types of materials to be transported to and from the NFS site. The NRC staff has not identified any new*

or significant additional information during its review that would change the conclusions from the prior analyses. Therefore, the NRC staff has determined that additional detailed transportation risk analyses are not needed to further quantify the potential risks for the transportation activities involved with the proposed action.

No changes were made to the EA in response to this comment.

B.5.8.2 Socioeconomics and Environmental Justice

Comment 02-01

One commenter stated that NFS has been a customer of Erwin Utilities for over 50 years and is one of the utilities' largest customers. The commenter further stated that large customers like NFS help to keep utility rates low for the utility's residential customers.

***Response**: The assessment of socioeconomics in the Sections 3.3 and 4.3 of the EA focused on demographics, employment, income, and education. The NRC staff did not address the issue of NFS's impact on utility rates given the uncertainty in attributing to NFS the contribution it makes relative to other large industrial customers in affecting the rates. The NRC staff does identify other large industrial employers in Erwin in Section 3.1 of the EA.*

No changes were made to the EA in response to this comment.

Comments 02-03, 12-01, and 12-02

One commenter stated that NFS is the largest single employer in Erwin and has a comprehensive community outreach program. Another commenter stated that many Unicoi County citizens are employed by NFS and loss of those jobs would have a significant impact on the community.

***Response**: The assessment of socioeconomics in the Section 3.3 of the EA focused on demographics, employment, income, and education. Table 3-6 of the EA described the employment structure for the region of interest and Table 2-8 of the EA provides employment information for NFS. NRC staff has determined that the information in Tables 2-8 and 3-6 provide adequate information to assess the potential impact on employment from the proposed action and the reasonable alternatives. The outreach program at NFS was not included in the socioeconomic impact assessment in the EA. As discussed in Section 4.3 of the EA, denial of the proposed license renewal and subsequent closure of the NFS site would be expected to have an adverse impact on socioeconomics through the ultimate loss of about 800 full-time jobs.*

No changes were made to the EA in response to these comments.

Comment 25-36

One commenter stated that a majority of NFS workers were not local and, therefore, Erwin/Unicoi County residents were sacrificing to provide jobs to non-county workers.

***Response**: In the NRC assessment of socioeconomic impacts from NFS, the region of influence was defined as five counties in Tennessee - Carter, Greene, Sullivan, Unicoi, and Washington. This region of influence was chosen because approximately 95 percent of NFS*

employees live in these counties. Based on the assessment, NRC determined that the potential impact on socioeconomics from the proposed action was SMALL. Because Erwin is in Unicoi County, the potential impacts on Erwin residents have been assessed.

No changes were made to the EA in response to this comment.

Comment T49-01

One commenter requested clarification on how many NFS employees live in Erwin and in Unicoi County.

***Response**: Table 2-9 of the EA provides employment information for NFS for Unicoi County. Potential impacts to socioeconomics in a smaller area were not assessed, thus data on the number of NFS employees living in Erwin was not collected. NRC staff has determined that the information in Tables 2-8, 2-9, 3-6, and 3-7 of the EA provide adequate employment information to assess the relevant potential impacts, and need not be supplemented with the additional information referenced by the commenter..*

No changes were made to the EA in response to this comment.

Comment 25-45, 31-26, and 31-27

Two commenters questioned the environmental justice (EJ) analysis in the draft EA. One commenter questioned why a more detailed EJ analysis was not performed given the rural, low-income, low-education, Appalachian community present. The other commenter suggested that the median incomes for Unicoi County and Erwin were not analyzed properly. This commenter stated that if the NRC staff had compared the median household income in Unicoi County and in Erwin to the Tennessee average for 2006-2008, the staff would have found that the household incomes in Unicoi County and Erwin amounted to only 68% of the State average. Likewise, in 2006-2008, Unicoi County's median family income was only 69% of the Tennessee average while Erwin family incomes were only 70.5% of the State average. This commenter felt that the environmental justice conclusion in the EA was arbitrary and wrongly concluded.

***Response**: As discussed in Section 3.3.5 of the EA, the NRC staff's EJ analysis followed NRC's 2004 final policy on EJ matters and NRC staff guidance on EJ in NUREG-1748 (NRC, 2003). As stated in Appendix C to NUREG-1748, an environmental justice analysis is based on the percentage of minority or low-income populations in an affected area as compared to corresponding percentages in the county and state. As shown in Tables 3-5 and 3-7 of the EA, the percentages of minority and low-income populations in Erwin as compared to those in Unicoi County and the State of Tennessee did not trigger the need for a detailed EJ analysis.*

Minor editorial changes were made to Section 3.3.5 of the EA in response to this comment.

B.5.8.3 Meteorology, Climatology, and Air Quality

Comments 19-19 and T43-07

One commenter asked what existing or current conditions require the main stack to be replaced.

***Response**: As discussed in Section 2.6 of the EA, NFS anticipates replacing the main process ventilation stack in the next 5 to 10 years. NFS will be replacing the main stack as a proactive*

measure given the need to work on the ventilation fans (NFS, 2011a). The main stack was installed in the 1980s and is not failing (NFS, 2011a).

No changes were made to the EA beyond the information provided in this response.

Comment 17-08

One commenter requested that the EA include more detailed meteorological data, specifically mentioning wind rose data that compiles the distribution of wind speed and direction over time.

***Response**: Section 3.4 of the EA provides general background information and data on the meteorology, climatology, and air quality in the region around the NFS site. As discussed there, the prevailing wind direction is southwest, with an annual average speed of 3.4 m/s (7.6 mph) based on NFS onsite data. Wind direction and speed are used in the evaluation of air impacts from site operations.*

The commenter's request for additional meteorological information did not establish an associated need to support analysis of potential impacts on air quality. NRC staff has determined that a greater level of detail of the historical climate data is not needed to support the analysis and that the current description found in Section 3.4 of the EA is adequate.

No changes were made to the EA in response to this comment.

Comment 19-12

One commenter stated that the routine air monitoring is not conducted and air emission compliance is based on NFS estimates. The commenter questioned the use of estimates when determining compliance and stated that this is an unacceptable practice for protecting public safety.

***Response**: For radiological constituents, NFS conducts routine air monitoring and analysis, as discussed in Section 2.4 of the EA. For non-radiological constituents, compliance monitoring is an activity conducted to ensure that operations are meeting emission standards or thresholds. Under the Clean Air Act, EPA was given the primary responsibility to set standards and implement monitoring and compliance requirements through the permit program. EPA has delegated the permitting responsibility to TDEC. EPA does not always require actual emission measurements to ensure compliance. Estimating emission levels is one of the acceptable compliance monitoring methods as determined by the regulating authority. Compliance monitoring can be performed by parametric monitoring where a key indicator (i.e., parameter) of the production process or the air pollution control device is used to relate to the level of air emissions. Many factors are considered when determining the appropriate frequency or method of compliance monitoring. These include but are not limited to the following: the type of pollutant emitted, the compliance status of area where the source is located, the levels of pollutant emitted, the variability of the emission levels over time, feasibility of conducting direct monitoring, and the adequacy of any pollution control devices. As stated in Section 2.3.1 of the EA, the NFS facility operates under an air permit issued by the Tennessee Air Pollution Control Board and provides compliance information based on the permit conditions.*

No changes were made to the EA in response to this comment.

Comment 28-02

One commenter stated that the EA does not adequately address climate change for all aspects of the proposed action. The commenter questioned the comprehensiveness and integrity of the greenhouse gas emission estimates. Also, the commenter stated that the climate data in the EA is insufficient, misleading, and contrary to local experience when examined from a perspective of tracking temperature changes over time to characterize climate changes and related impacts. Finally, the commenter stated that potential climate change impacts to the region (the southeastern states, including Tennessee) over the period of the proposed license renewal (40 years) are not discussed in the EA. The commenter also referenced an unidentified study in a local newspaper warning about the serious nature of these impacts to the southeastern states.

***Response**: The NRC staff agrees in part and disagrees in part with this comment. In conducting its analysis of climate change and the potential impacts of the proposed action, the NRC staff considered existing EPA regulations and also NFS facility emissions relative to those regulations. As discussed in Section 2.3.1 of the EA, EPA has promulgated rules to address thresholds for mandatory reporting of greenhouse and non-greenhouse gases and also the phased approach to the monitoring and reporting of greenhouse gases from stationary sources.*

Under 40 CFR 98.30 Subpart C, NFS is classified as a "Stationary Fuel Combustion Source" because the facility contains natural-gas-fired steam boilers, comfort heating furnaces, water heaters, clothes dryers, and space heaters. To determine whether the facility would require mandatory greenhouse gas reporting to the EPA under this rule, NFS conducted an inventory and then calculated the total maximum rated heat input capacity for all stationary combustion units. The total maximum rated heat input capacity was less than 52.7 million kilojoules [50 million British thermal units] per hour which means that NFS emits less than 25,000 metric tons [27,558 short tons] of CO_2e and is not subject to the greenhouse gas reporting rule (NFS, 2010). Based on the level of greenhouse gases emitted from NFS stationary sources and the EPA thresholds for mandatory greenhouse gas reporting, the EA finds the proposed action would be a minor contributor of such gases and the EA therefore addresses climate change with the appropriate level of detail.

The NRC staff acknowledges, as pointed out by the commenter, that vehicles also produce greenhouse gases. EPA reports that 28% of greenhouse gas emissions nationwide are from mobile sources (EPA, 2009BAW1). Based on the level of traffic associated with the proposed action as discussed in Section 2.3.4 of the EA and the relative contribution of mobile emissions to the overall national greenhouse gas levels, the NRC staff has determined that there is no need to alter the level of climate change analyses as determined by the initial screening based on EPA regulations for stationary sources.

As stated in Section 3.4.2 of the EA, the World Resource Institute estimated that Tennessee emitted 146 million metric tons [160 million short tons] of CO_2e in 2005. The most recent information available from the EPA website estimated that in 2007, Tennessee produced 128 million metric tons [142 million short tons] of CO_2 from fossil fuel combustion (EPA, 2009BAW2). This EPA estimate is limited in two manners: (1) it only considers CO_2 and excludes other greenhouse gases included in the CO_2e calculation; and (2) the only emission source considered was from fossil fuel combustion. NFS emits less than 25,000 metric tons [27,600 short tons], or approximately 0.02% of approximately 146 million metric tons [142 million short

tons} for the entire State of Tennessee. Thus, NRC staff determined that the current description of the emission estimates for the facility and the state of Tennessee are adequate.

The historical meteorology and climate data presented in Section 3.4.1 of the EA was intended to provide basic information on local conditions, not to characterize climate change. The source of the information was the National Climatic Data Center and therefore is considered accurate. A characterization of the affected environment for climate change appropriate for this proposed action would look forward in time and consist of the predicted conditions for the area over the timeframe of the proposed license period. Section 3.4.2 of the EA was revised to provide such a characterization. In preparing this portion of the EA, the NRC relied on the current state of knowledge of climate change as consolidated by the U.S. Global Change Research Program (GCRP), a federal advisory committee.

The last topic concerns the potential impacts to the region (i.e., the southeastern states including Tennessee) over the period of the proposed licensee renewal (40 years). Section 4.4 of the EA was revised to provide such an analysis. In preparing this portion of the EA, the NRC relied on the GCRP data.

Comments T47-03 and T47-05

One commenter stated that the draft EA seems to assume that potential impacts over a 40-year period would be the same as those expected over a 10-year period. The commenter believes that climate change is one area where this would not hold because of an increase in the frequency and intensity of natural disasters. Phenomena identified by the commenter included floods, wildfires, drought, volcanic eruptions, and earthquakes. The commenter questions who will guarantee that such extreme events experienced throughout the world will not occur in east Tennessee over the next 40 years and states that scientific journals such as *Global and Planetary Change* report that climate change could flatten cities.

***Response**: The commenter's statement that the 10-year and 40-year potential climate change impacts are the same is based on the discussion in Section 1.4.2 of the EA. The potential climate change impacts over a 40-year period could be greater than those expected over a 10-year period. However, the impacts over the 40-year period are expected to provide a bounding case for impacts from the shorter time period. Therefore, potential climate change impacts over a 40-year period were evaluated in the EA.*

In response to this comment, NRC staff reviewed the current climate change data as consolidated in the recent report by the GCRP (GCRP, 2009). This report divides the country into eight regions. Erwin, Tennessee is located within the Southeast region. This response will address only the phenomena identified by the commenter that are also identified as potential climate change impacts for the Southeast region: drought and wildfire. According to this report, temperature increases likely lead to an increase in the frequency and intensity of both droughts and wildfires.

Although the GCRP did not incrementally forecast changes by decade, they did project temperature changes for the near-term (2010-2029) and the mid-century (2040-2059). While there is general agreement in the scientific community that some change in climate is occurring, considerable uncertainty remains in the magnitude and direction of some of the changes, especially in predicting trends in a specific geographic location. For Tennessee, the GCRP forecasts an increase in average temperature for the near term at 1.1°C [2°F] and for the mid-century between 1.7 to 2.5°C [3 to 4.5°F] (GCRP, 2009). Temperature increases in the next

couple of decades will be primarily determined by past greenhouse gas emissions. Temperature increases after that will be determined by future emissions. None of the greenhouse gas emission scenarios used in the report to forecast meteorological changes assume the implementation of policies specifically designed to address climate change. Therefore, the mid-century temperature forecasts could be high if climate change policies are implemented. However, the impacts as discussed in the report are based on the temperature forecasts without climate change mitigation policies. Therefore, the mid-century impacts would bound the near-term impacts. NRC staff has determined that the current EA discussions and analyses in sections 2.3.1, 3.4, and 4.4 of the EA are adequate.

The last topic is the commenter's question as to who will guarantee that such extreme events experienced throughout the world will not occur in east Tennessee over the next 40 years. Given the uncertainties in climate change as referenced above, the NRC staff would not anticipate that any government organization affiliated with climate or meteorology (e.g., the National Oceanic and Atmospheric Administration, the National Climatic Data Center) would be able to provide such guarantees.

No changes were made to the EA in response to these comments.

B.5.8.4 Surface Water Resources

Hydrologic Characterization

Comments 07-04 and 31-18

A commenter questioned the hydrologic characterization of surface waters in and around the NFS Site, because the characterization states that Martin Creek flows into North Indian Creek prior to emptying into the Nolichucky River. Another commenter raised concerns over assessment of the 100-year flood zone and its potential impacts due to altered topography at the NFS Site.

***Response**: The main flow directions and average flow rates of surface waters within and in the vicinity of the NFS Site are discussed in Section 3.5.1 of the EA. Discussion and maps found in the NFS Environmental Report (NFS, 2009b) and in previous NRC staff EAs (NRC, 1999; 2002) indicated that Martin Creek flows into North Indian Creek, which then emptied into the Nolichucky River. The 2011 U.S. Geological Survey (USGS) Erwin quadrangle map shows that Martin Creek flows directly into the Nolichucky River (USGS, 2011).*

As discussed in Section 3.5.1 of EA, the NFS site appears within the 100-year floodplain of the Nolichucky River and Martin Creek on the 2008 Flood Insurance Map prepared by the U.S. Federal Emergency Management Administration. However, NFS considers that past development activities (e.g., the rerouting and rechanneling of Martin Creek, the 1990 enlargement of a culvert through which Martin Creek passes), have sufficiently altered the topography to protect the NFS site from a 100-year flood of the Nolichucky River. Section 4.11.2 of the EA addresses potential environmental impacts from natural phenomena, including flooding, and states that the potential impacts from natural phenomena would be SMALL to MODERATE.

Section 3.5.1 of the EA was revised to correct the flow path of Martin Creek.

Contamination of Surface Waters

Comments 07-05, 07-06, 10-02, 13-02, 14-02, 19-27, 25-15, 25-46, and 30-05

A commenter stated that NFS activities have been polluting local waters. Several commenters raised concerns over degradation of water qualities in Banner Spring Branch and Martin Creek and stated that enclosing of Banner Spring Branch does not prevent contaminant discharges into Martin Creek and North Indian Creek. Several other commenters raised concerns over radioactive (mainly uranium from multiple sources at the NFS site) contamination of Nolichucky River and its impacts on downstream communities, especially where Nolichucky River is used locally for drinking water. Another commenter raised concerns over potential migration of groundwater plume from the Impacts Plastic Site towards Nolichucky River.

Response*: As discussed in Section 2.3.2 of the EA, liquid effluents at the NFS Site are treated first at the WWTF to meet discharge limits specified in 10 CFR Part 20 and in the TDEC-authorized NPDES permit before the effluents are discharged into the Nolichucky River. Moreover, discharge of storm water and surface runoff at the NFS site are regulated under a TDEC multi-sector general NPDES permit. Because discharges of treated process effluents and storm water runoff into surface waters would be expected to continue to occur under state-approved permits and in accord with NRC regulatory limits, the chemical and radiological content of liquid effluents would not be expected to adversely affect the quality of onsite and offsite surface waters.*

As discussed in Section 2.3.2 of the EA, surface runoff from the main plant area is collected in Banner Spring Branch, from which the runoff eventually flows into the Nolichucky River. In 2003, NFS re-routed and also enclosed Banner Spring Branch in an underground pipe in an effort to prevent contamination from North Site decommissioning activities affecting storm water runoff in the area. Furthermore, as discussed in Section 4.5.1 of the EA, NFS actions taken to remove contaminated soils and groundwater in the North Site decommissioning area are expected to further limit the potential for radioactive constituents to reach surface waters.

The potential risk associated with offsite excursion of the chlorinated solvent toward the Nolichucky River was discussed in Section 4.5.2 of the EA. Briefly, according to a TDEC environmental indicator memorandum for the NFS site, the offsite excursion of the chlorinated solvent plume toward the Nolichucky River appears to be stable and controlled. Because there are no known household, public, or industrial groundwater users located downgradient of the NFS site, the environmental indicator memorandum did not identify any potential risk.

Concerns related to drinking water are addressed in the next comment response section.

No changes were made to the EA in response to these comments.

Comment 25-54

One commenter stated that NRC gives permission to NFS to discharge uranium, plutonium, thorium, as well as hazardous chemicals into the Nolichucky River. The commenter then asked if, in allowing offsite releases from NFS into the Nolichucky River, whether NRC is also allowing NFS to contaminate property all along the river.

***Response**: As discussed in Sections 2.3.2 and 2.4 of the EA, NFS discharges liquid effluents that eventually reach the Nolichucky River. Prior to discharge, NFS treats the effluents to meet the regulatory limits in 10 CFR Part 20 and the conditions of the NPDES permit.*

Additionally, due to dilution in the Nolichucky River, the NRC staff would not expect significant settling of radioactive constituents from NFS liquid effluents along the river shoreline.

NRC does not regulate the concentrations of hazardous chemicals in wastewater. The State of Tennessee issues permits for discharging hazardous chemicals in wastewater. The permits are listed in Table 1.1 of the EA.

No changes were made to the EA in response to this comment.

Drinking Water

Comments 02-05, 18-04, 19-15, 21-03, 24-03, 25-47, 26-12, 31-28, and T36-01

A commenter stated that the EA did not adequately assess risk to public drinking water. Commenters raised concerns that NFS activities caused radioactive and chemical contamination of public drinking water sources (including also Erwin's offsite springs) in Erwin, Greeneville and Jonesborough, and at local sites where Nolichucky River is used for drinking water. Commenters wanted information regarding the process of removing high-enriched uranium from drinking waters, if it contaminates drinking water sources, and also whether drinking water wells are being tested for chlorinated solvents. A commenter questioned whether NRC had independently confirmed that the chlorinated solvent plume extends only 40 feet below the surface. The same commenter also wanted to know if drinking water wells within five miles of the NFS site are tested for chlorinated solvents. Another commenter claimed that drinking water has not been tested for nine years. But another commenter stated that according to the Erwin Utilities' monitoring program, radiological constituents in drinking water sources have not exceeded the federal maximum contaminant limits.

***Response**: The NRC staff recognizes the commenters' concerns regarding the risk posed to local drinking water supplies from NFS site operations. As discussed in Sections 2.3.2 and 2.4 of the EA, liquid effluents from NFS operations that are discharged into the Nolichucky River must be treated to meet NRC regulatory limits in 10 CFR Part 20 and are also subject to NPDES permit limits. Additionally, storm water and surface runoff at the NFS site are discharged under a TDEC multi-sector general NPDES permit.*

As discussed in Section 4.5.2 of the EA, there are no known household, public, or industrial groundwater users downgradient of the NFS site (i.e., between the NFS site and Nolichucky River). The current source of public drinking water for the Erwin Utility system is upgradient from the NFS Site (ATSDR, 2007). As discussed in Sections 3.5.2 and 4.5.2 of the EA, the groundwater uranium plume at the NFS site is confined in the alluvium, has remained on-site to date, and is being remediated. Therefore, the NRC staff considers that the uranium plume does not pose an immediate threat to public water supplies. Moreover, ongoing site and groundwater remediation efforts by NFS, under the oversight of the EPA and TDEC, have significantly reduced the extent of the uranium and the chlorinated solvent plumes at the site.

As described in Section 3.5.2 of the EA, NFS has detected chlorinated solvents (i.e., TCE/PCE and associated daughter products), in the shallow alluvium groundwater beneath the site. NFS has determined based on its monitoring that the plume extended to a vertical depth of 12 meters

[40 feet] below ground surface and horizontally offsite (NFS, 2010). NFS' actions to remediate this contamination are carried out under the RCRA corrective action process for the site, and NFS reports the progress of remediation in periodic Facility Action Plan workshops with the TDEC. The NRC staff has not independently determined the extent (vertical and horizontal) of the chlorinated solvent plume, but considers TDEC oversight of the remediation actions taken by NFS to be sufficient to address the commenter's concerns.

The municipal water supplying agencies for the Towns of Erwin and Jonesborough and for the City of Greeneville regularly monitor their drinking water supplies and issue annual reports on the quality of the drinking water for their respective communities. Recent annual drinking water quality reports are available directly from these agencies (Town of Jonesborough, 2009, 2008; Erwin Utilities, 2009; Greeneville Water Commission, 2009), and also have been made electronically available through the NRC's public website at http://www.nrc.gov/reading-rm/adams.html using the ADAMS accession numbers shown in the Section 8.0, "References," of the EA. As shown in these reports, drinking water in these communities meets EPA drinking water standards.

The NRC staff has revised Section 3.5.1 of the EA to include the City of Greeneville, TN, as another local community that uses the Nolichucky River as a municipal water source and to provide references to recent drinking water quality reports for Erwin, Jonesborough, and Greeneville. No further changes were made to the EA in response to these comments.

Comment 25-10

One commenter asked for the inclusion of Erwin POTW permit numbers in Table 1-1 of the EA.

***Response**: The Erwin Industrial Pretreatment Permit numbers are 013 and 019. This information has been added to Table 1-1 of the EA.*

Comment 25-44

One commenter stated that the EA did not identify Jonesborough and Greeneville as using the Nolichucky River for drinking water.

***Response**: Section 3.5.1 of the EA has been revised to include the city of Greeneville, TN, as another local community that uses the Nolichucky River as a municipal drinking water source. The town of Jonesborough, TN is already identified there.*

B.5.8.5 Groundwater Resources

Groundwater Flow Characteristics

Comment 25-49

A commenter asked for independent analysis for verification of groundwater flow characteristics at the NFS Site.

***Response:** A combination of groundwater sampling and numerical models has been used to characterize groundwater flow beneath the NFS Site. Numerical simulations using field data have been conducted by a third-party, ARCADIS Geraghty & Miller, Inc., (NFS, 2010a) under contract to NFS. The NRC staff is unaware of any evidence indicating that either these models*

or the recent numerical simulations are inadequate. Therefore, NRC staff has determined that an independent analysis for verification of groundwater flow characteristics at the NFS Site is not necessary.

No changes were made to the EA in response to this comment.

Groundwater Contamination

Comments 25-16, 25-35, 25-51, and 25-52

One commenter raised concerns over radionuclide contamination in groundwater below the facility. The commenter stated that uranium would be the major contaminant at the NFS site, but would not be confined only to the alluvial aquifer. The commenter also stated that plutonium contamination in groundwater, specifically beneath former Bldg 234, and the depth of the plutonium plume and its offsite migration were not addressed. The commenter finally stated that groundwater monitoring wells at the NFS Site are too shallow to detect groundwater contamination accurately.

Response*: As discussed in Sections 3.5.2 and 4.5.2 of the EA, cleanup of the existing groundwater contamination is being conducted under the oversight of the Environmental Protection Agency (EPA) and TDEC. As discussed in Section 3.5.2 of the EA, uranium is the dominant radiological component in groundwater contamination at the NFS Site. The uranium plume is confined in the alluvium and has remained on-site to date. Uranium concentrations historically exceeded drinking water maximum contaminant levels. However, NFS has been taking actions to address the source zones for radiochemicals (e.g., impoundments, burial grounds, maintenance shop area) and groundwater contamination since the 1990s. As a result, the uranium plume has been decreased in size by 76 percent from its maximum extent. Although plutonium contamination in groundwater is part of existing groundwater contamination on the NFS Site, NRC is not aware of any information indicating that offsite migration of a plutonium plume is occurring.*

Removal of source zones and groundwater remediation efforts resulted in a 91-percent reduction in the chlorinated solvent plume from its maximum extent. As discussed Section 4.5.2 of the EA, an independent study conducted by the ATSDR concluded that the chlorinated solvent plume originating at the NFS site, including chlorinated solvent contamination, does not pose an apparent public health hazard.

As discussed in Section 3.5.2 of the EA, NFS has an active groundwater monitoring well network across the site, and wells are monitored both in the shallow alluvium aquifer and in the deeper bedrock aquifer. For example, monitoring wells at the solid waste management unit 20/maintenance shop site monitor groundwater in four hydrostratigraphic zones: across the water table in the shallow alluvium, in the deep alluvium, in shallow bedrock, and in the intermediate depth bedrock. NFS samples these wells on an annual, semiannual, quarterly, or monthly basis (depending on the chemical parameter being monitored), and reports the results to TDEC Hazardous Waste Management.

No changes were made to the EA in response to these comments.

Comments 19-18 and 25-53

One commenter requested that the EA discuss the Impact Plastics Corporation lawsuit to emphasize offsite groundwater contamination. Another commenter wanted to know what information the NRC has concerning the confinement of the groundwater plume that is the subject of the Impact Plastics Corporation lawsuit. In addition, the commenter wanted to know what role the NRC played in that lawsuit.

***Response**: The NRC was not involved in the lawsuit between Impact Plastics Corporation and NFS. The lawsuit involved the contamination of groundwater by the chemical perchloroethylene (PCE) Groundwater contamination at the NFS site – including the PCE contamination -- is discussed in Section 3.5.2 of the EA, which reflects that chemical contamination issues are regulated by Tennessee. The lawsuit was settled in 2005.*

No changes were made to the EA in response to these comments.

B.5.8.6 Geology and Soils

Comment 20-05

One commenter asserted that, given the recent NRC Information Notice 2010-18, Generic Implications of Updated Probabilistic Seismic Hazard Estimates in Central and Eastern United States on Existing Plants that the NRC should (i) include seismic risk analysis as part of the scope of the draft EA and (ii) reevaluate the environmental consequences of seismic issues and risks with respect to the NRC Information Notice 2010-18.

***Response**: As stated in Section 1.5.3 of the EA, seismic risk is evaluated as part of the NRC safety review and such risk is therefore beyond the scope of the EA. Although the commenter identified Information Notice 2010-18, the staff notes that the NRC issued a separate information notice, IN 2010-19, on September 16, 2010, specifically for nuclear fuel cycle facilities such as the NFS facility. The USGS website link in IN-2010-19 compares the peak ground acceleration as estimated by the USGS in 2002 to that estimated in 2008 for the return period of 10% in 50 years. This comparison shows a decrease in estimated peak ground acceleration for the region of Tennessee where NFS is located (http://earthquake.usgs.gov/ hazards/products/conterminous/2008/maps/ratio/ceus/ceus.pgaratio.jpg.)*

A description of the tectonic activity in the region around the NFS site can be found in Section 3.6 of the EA. A discussion of the potential environmental impacts from an earthquake is presented in Section 4.11.2 of the EA.

Section 3.6 of the EA was revised to reflect the August 23, 2011, earthquake in central Virginia.

Comment 33-04

One commenter described the impacts from a large New Madrid earthquake and stated that Unicoi County is at moderate risk of being affected.

***Response**: There have been decades of research by federal, state, university, and environmental consultants on the New Madrid seismic zone. While there has been some evidence that the New Madrid region is becoming more stable, the USGS has maintained there is a 10 percent chance of an earthquake comparable in size to that of the 1811-1812 New*

Madrid earthquake series. The damage for this type of event would be widespread with the focus in Missouri, Arkansas, and western Tennessee (predominately Memphis and the surrounding metropolitan area) (Frankel, 2009). Unicoi County is located in eastern Tennessee approximately 800 km [500 mi] from Memphis and according to the USGC seismic hazard map is at a small, not moderate, risk of being affected (Petersen, et al., 2008).

No changes were made to the EA in response to this comment.

B.5.8.7 Ecology

Comment 18-24

One commenter suggested that the NRC staff's endangered species analysis should have considered whether enclosing Banner Spring Branch removed a potential habitat for the elktoe mussel (*Alasmidonta raveneliana)*.

Response: *In the 2002 BLEU EA, the NRC staff evaluated the potential impacts of a previous licensing action at the NFS site on the Appalachian elktoe. In that analysis, the NRC staff concluded that no potential impacts to this species would be expected, because the species was located upstream of the planned onsite activities and effluent discharge locations.*

Additionally, as discussed in Section 3.5.1 of this EA and in previous NRC EAs (i.e., the 1999 license renewal EA and the 2002 BLEU EA), the channel of Banner Spring Branch was completely man-made. Habitat features essential to the survival of the Appalachian elktoe include (i) small to large rivers with moderate- to fast-flowing, cool, well-oxygenated water; (ii) stable substrate of stream channels and banks; (iii) riffles and runs within the channel and shallow flowing pools; (iv) relatively silt-free, stable sand, gravel, cobble, boulder, and bedrock substrates; (v) moderate to high stream gradient; (vi) periodic natural flooding; and (vii) fish hosts, with adequate living, foraging, and spawning areas for them (http://www.fws.gov/nc-es/es/cntylist/yancey.html). Therefore, it is not expected that Banner Spring Branch would have provided suitable habitat for the Appalachian elktoe.

No changes were made to the EA beyond the information provided in response to this comment.

Comment 25-57

One commenter stated that it is doubtful that NFS would report the presence of threatened or endangered species on the NFS property.

Response*: While the NRC staff initially relies on applicant-provided information, the staff then confirms important attributes of the license application and environmental report through visits to the proposed site location and vicinity, independent research activities, and consultations with appropriate federal, tribal, state, and/or local agencies. As discussed in Section 3.7.2 of the EA, the NRC staff reviewed information from the Tennessee Natural Heritage Program and consulted with the US Fish and Wildlife Service (FWS) to obtain the most recently published information regarding threatened and endangered species in the vicinity of the NFS site.*

No changes were made to the EA in response to this comment.

Comment 28-11

One commenter stated that the draft EA did not capture the diversity of plant life in the vicinity of the NFS site, identifying several flowering and plant species present in the Blue Ridge Mountains Region that were not listed in the EA. Additionally, the commenter stated that a vegetation survey was not conducted as part of the license renewal action and called into question the adequacy of the biological assessment in the draft EA.

***Response**: As discussed in Section 3.7.2 of the EA, the Tennessee Natural Heritage Program maintains a database of rare animal and plant species, which includes all federal and state threatened and endangered species and state species of special concern. This database documents over 200 rare plant species alone in Blue Ridge Mountain physiographic province in which the NFS site is located. For the purposes of this environmental review, NFS provided site and vicinity vegetative survey information in response to an NRC request for additional information.*

The NRC staff finds that to document each vegetative species in the Blue Ridge Mountains Region would not enhance NRC's analysis because most of these species are present outside the area to be potentially affected by the proposed action. Thus, this information would not change the conclusions in this EA. For the purposes of evaluating potential environmental impacts to vegetative species, the NRC staff considers that sufficient site-specific information was collected and reviewed to support the impact conclusions in this EA.

No changes were made to the EA in response to this comment.

Comments 25-56 and 28-12

One commenter suggested that the region of influence considered for ecological resources should be expanded, and that there are many rare and threatened plant species in the adjacent counties that are not listed in the draft EA. Another commenter stated that they find the description of the federally listed species present in the project area to be deceptive especially regarding birds since birds can easily fly across expansive areas.

***Response**: Section 3.7 of the EA describes the area surrounding the NFS site as the Appalachian/Blue Ridge Forests ecoregion and provides examples of vegetative communities that occur in the region. Appendix A, Table 1in this EA provides a list of typical vegetation on the NFS site and in vegetative communities of the southern Appalachian region. Section 4.7 of the EA evaluates the ecological resources in the vicinity of the NFS facility. The region of influence considered for threatened and endangered species is the area comprised of the Erwin and Chestoa 7.5-minute USGS quadrangle maps, which is approximately 300 km^2 [116 mi^2]. The region of influence was chosen because it represents the rare and endangered plants and animals that are likely to occur at the NFS site. The TDEC database currently contains over 14,000 rare species, including all federally listed plant and animal species, and plant community occurrence records from information gathered by program biologists (http://tn.gov/environment/na/data.shtml). There are over 200 rare plant species alone in Blue Ridge Mountain physiographic province where the NFS site is located (http://tn.gov/environment/na/pdf/plant_list.pdf).*

NRC staff recognizes that birds can fly across great distances. However, the NRC staff considers that the listing of each species in each of the six counties adjacent to Unicoi County would not provide information that would enhance NRC's analysis because most of these

species occur outside of the potentially affected environment. Thus, this information would not change the conclusions in the EA. The plant and animal species recorded by TDEC biologists and documented in the EA as present in the area represented by the Erwin and Chestoa 7.5-minute USGS quadrangle maps represent a complete list of the most likely species that could be affected by the proposed NFS license renewal. The NRC staff does not agree that the EA's description of the federally listed species present in the project area is deceptive.

No changes were made to the EA in response to these comments.

B.5.8.8 Noise

Comment 20-06

One commenter stated that the noise impact analysis in the EA, in comparing impacts from the proposed action to those from the 10-year license renewal and the no-action alternatives, unfairly disadvantaged the no-action alternative by implicitly using the Town of Erwin's standards to find the speculative full site decommissioning activities to be too noisy.

***Response**: As discussed in other comment responses contained in this appendix, the NRC staff has revised the EA to address the impacts of site decommissioning for the proposed action and the 10-year alternative. Section 4.8 of the EA states that noise impacts would be addressed in the site decommissioning plan that NFS would submit to NRC, when NFS ceases site operations. The decommissioning plan will account for any contamination that has occurred in the additional operation period. Increases in noise levels (for example, from building demolition activities and the operation of heavy equipment) would be expected. However, NFS would be expected to comply with OSHA limits for noise levels throughout the decommissioning period. Therefore, expected impacts on noise levels from site decommissioning would be SMALL to MODERATE, for the proposed action and the alternatives.*

No changes were made to the EA in response to this comment.

Comment 25-58

One commenter did not consider the NFS "take-cover" alarm to be "noise" given that such an alarm would also serve to alert nearby property owners.

***Response**: The NRC staff identified the "take-cover" alarm in Section 3.8 of the EA to be the loudest of the NFS plant alarms potentially to be experienced and so having the greatest potential for offsite noise exposure. The NRC staff recognizes that nearby property owners also would be alerted by this alarm.*

Minor revisions were made to Section 3.8 of the EA to clarify the assessment of noise in response to this comment.

Comment 31-29

One commenter stated that the noise analysis doesn't include noise generated by NFS employees at the firing range in Washington County.

***Response**: The commenter is correct. The noise generated at NFS does not include noise generated by individuals practicing at the Washington County firing range. However, noise from*

the firing range is intermittent and NFS employees are not likely to be the only users of the firing range. Inclusion of noise from the firing range would not change the potential impacts associated with noise from the proposed action. Therefore, NRC staff has determined that the firing range would have a SMALL impact on noise.

No changes were made to the EA in response to this comment.

B.5.8.9 Scenic and Visual Resources

Comment 25-43

One commenter stated that the NFS storage containers located at River View Industrial Park impact visual resources.

***Response**: As described in Section 3.1 of the EA, NFS stages low level radioactive waste at Riverview Industrial Park prior to shipping the waste to the disposal site via railroad. NRC understands that the NFS storage containers located at the industrial park can be viewed from limited portions of the linear trail and recreational areas. As explained in Section 4.10 of the EA, the site is zoned as industrial, as well as the industrial park. Industrial facilities have low aesthetic and scenic qualities. The presence of the NFS waste containers does not significantly increase the unfavorable visual aspect of the NFS site or industrial park. Therefore, the presence of waste containers does not change the determination that the potential impact on scenic and visual resources for the proposed action would be SMALL.*

Section 3.10 of the EA was revised to state that the industrial park area where the NFS waste storage containers are kept may be seen from limited portions of the Linear Trail and recreational areas.

Comment 25-59

One commenter stated that although the site is not visible from the river, the plant liquid outfall (001) is visible to those on the river.

***Response**: The commenter is correct. By the provisions of its NPDES permit issued by TDEC, the outfall must be placarded at the river, thereby drawing notice to the outfall from those who may be on the Nolichucky River. However, Outfall 001 was placarded when the 1999 EA (NRC, 1999) was published, and the EA found that the potential impact on visual and scenic resources was small. The TDEC requirement to placard the outfall has not changed since the last license renewal and therefore, NRC staff has determined that the potential impact on scenic and visual resources for the proposed action would be SMALL.*

Section 3.10 of the EA was revised in response to this comment to reflect the presence of a placard at Outfall 001.

Comment 25-60

One commenter stated that the NFS site is not secure because it is visible from many different locations.

***Response**: NRC recognizes that the NFS facility is visible from many points of higher elevation. The EA evaluates potential visual and scenic impacts that the NFS facility may have on the surrounding environment in Section 4.10 of the EA.*

As stated in Section 1.1 of the EA, NRC staff is concurrently performing a detailed safety analysis of the NFS proposal and will document its analysis in a SER. Further, Section 1.5.3 of the EA identifies terrorism as being outside the scope of the EA. This section of the EA has been revised to state that the adequacy of the security of the facility from external threats is evaluated as part of the NRC safety evaluation rather than as part of the environmental review.

Section 1.5.3 of the EA was revised to reflect the response to this comment.

Comment 31-30

One commenter stated that the draft EA did not address the potential light pollution impact from the NFS facility watch tower, spot lights, and security lights. The commenter stated that light pollution creates a large adverse impact on scenic and visual resources.

***Response:** As described in Section 3.1 of the EA, NFS is located in an industrial area of Erwin. Adequate lighting for safety and security are needed for industrial facilities and an industrial designation would include some amount of lighting. The NRC staff is not aware of any significant changes in lighting at NFS and no changes in lighting requirements have been proposed in the current license application. Therefore, NRC staff has determined that potential impacts on visual and scenic resources are SMALL.*

Sections 3.10 and 4.10 of the EA were modified to specifically address the issue of light pollution in response to this comment.

B.5.8.10 Public and Occupational Health

Comment 31-04

One commenter stated that the NRC has requested that the National Academy of Sciences (NAS) perform a study of cancer risk around nuclear facilities, and that nuclear fuel facilities - NFS specifically - would be included in the study. In the interest of public health and community trust, the license renewal process should be stopped until the NAS has completed its study.

***Response**: As indicated by the commenter, the NRC has asked the NAS to perform a study on cancer risk for populations living near NRC-licensed nuclear facilities. In this NRC-sponsored study, NAS will use its expertise to update a 1990 study conducted by the National Cancer Institute (NCI), "Cancer in Populations Living Near Nuclear Facilities~~,~~." This 1990 NCI study showed no increased risk of death from cancer for people living in the 107 U.S. counties containing or closely adjacent to 62 nuclear facilities.*

The objective of the new NAS study is to provide the NRC with an analysis of the latest cancer mortality and incidence data for populations living near NRC-licensed or proposed nuclear power and fuel-cycle facilities. Phase 1 of the NAS study will determine whether it is feasible to develop a technically defensible approach to meet the goals of the study request. The phase 1 results will be used to inform the design of the cancer risk assessment that will be carried out in the NAS study's second phase. The NAS is expected to issue its report of the phase 1 results in the December 2011-January 2012 timeframe, and it plans to provide a two-month public

review period. The review comments collected by the NAS will be provided to the NRC for consideration in how best to design the phase 2 cancer risk assessment.

At this time it is not known when the NAS will complete its phase 2 cancer risk assessment, and it is not known whether the findings of the NAS study will differ from those of the 1990 NCI study. The NRC thus does not have an adequate basis to suspend the license renewal process at this time. When the results of the NAS cancer risk assessment are available, the NRC will evaluate that information to determine what action, if any, is appropriate, including whether to suspend NFS facility operations.

The NRC staff has revised sections 1.5.3 and 4.11.1 of the EA in response to this comment. EA section 4.11.1 now includes a discussion of the cancer issue and the plans to determine whether the 1990 NCI study results remain valid.

Comments 11-05 and T41-01

One commenter stated that runoff from NFS is causing cancer in the local community. The commenter reported personal health issues and referred to a personal study that identified 27 people with cancer or who have died of cancer within 5 miles of the facility.

***Response**: The NRC staff has reviewed public health studies that have been completed since the last license renewal. Section 3.11 of the EA provides a discussion of these studies. The studies did not find any link between NFS operations and the incidence of cancer in the surrounding area, and did not make any findings that there is an abnormally high cancer rate in this area (ATSDR, 2007).*

The NRC staff also discusses in Section 3.11 the estimated radiation doses to the public from NFS site operations. These doses were found to be below the 10 CFR 20.1301 annual public dose regulatory limits.

No changes were made to the EA in response to this comment.

Comment 14-03

One commenter stated that NFS should be shut down to protect the environment and the public health.

***Response**: As discussed in Section 2.4 of the EA, NFS monitors and samples airborne and liquid effluents to ensure radiation doses to the public are below the annual dose limits in 10 CFR Part 20 from airborne emissions, water discharges, and direct radiation. The NRC considers the regulatory dose limits in 10 CFR Part 20 to be protective of public health and safety.*

No changes were made to the EA in response to this comment.

Comment 21-04

One commenter stated that health effects from radiation are not always immediate, but are deadly over time.

***Response**: The commenter is correct in that the health effects from radiation are not always immediate. However, as discussed in Section 4.11 of the EA, NFS has maintained doses to the public below the dose limits in 10 CFR Part 20 from airborne emissions, water discharges, and direct radiation. Regulatory dose limits are considered to be protective of public health and are approximately 1/3 of the background radiation dose rate. Consequently, NRC staff has determined that potential impacts to the public and workers health and safety from the proposed action are SMALL.*

No changes were made to the EA in response to this comment.

Comments 24-02 and 24-04

One commenter stated that residents don't want to eat, breathe, or drink the contamination and that nuclear waste kills the immune system. The commenter also stated that, since the nuclear industry came to town, the area has the nation's highest cancer rate.

***Response**: The NRC staff knows of no information supporting the statement that the NFS area has the nation's highest cancer rate.*

Public health studies published since the last license renewal have not shown an elevated level cancer rate in the area around NFS, in Unicoi County, or in eastern Tennessee compared to the average rate in the United States.

No changes were made to the EA in response to this comment.

Comments 25-27 and 31-25

One commenter asked if there are more radionuclides released from NFS than those identified in Table 2-5 of the EA. Another commenter stated that Table 2-5 of the EA does not identify Ac-227 or Pa-231 although these radionuclides are cited in 2005-2009 effluent reports. This commenter also requested that time series of air and water effluents, by radionuclide, from 2000 to 2009 be included in the EA. The commenter also requested that similar information be placed in Table 3-13 of the draft EA.

***Response**: Table 2-5 of the EA contains the list of radionuclides that NFS has monitored since 2000, as documented in its semiannual monitoring reports. However, monitoring for four other radionuclides was performed for a limited time between 2001 and 2006. Air monitoring was reported for Ac-228 and Pa-234m in 2005 and 2006. Monitoring was reported for Ac-227 in air in 2004 and 2005 and water in 2005 and 2006. Finally, monitoring was reported for Pa-231 in water in 2005 and 2006. Monitoring for these radionuclides was begun and stopped in accordance with process-specific operations.*

The conclusions drawn in the EA were not based on a time series of emissions to air and water. Instead, the conclusions were based on the calculated dose to a hypothetical MEI (for air emissions) and concentrations of radionuclides in water (for water effluents). In both cases, the dose and water concentrations were below regulatory requirements. Therefore, time series of air and water effluents are not included in the EA.

A footnote containing the information in this response was added to Tables 2-5 and 3-14 of the EA.

Comment 25-42

One commenter stated that the NFS low-level waste staging area at Riverview Park is adjacent to the Linear Trail used by children and retirees and that, therefore, this population may receive radiation dose.

***Response**: Waste containers staged at the low-level waste staging area must conform to Department of Transportation shipping requirements. Those requirements include a maximum dose rate limit of 5 mrem/h at the surface of the container and 2 mrem/h at a distance of 1 m (39 in) from the container. People using the Linear Trail would be exposed to much lower radiation levels than these limits because users of the linear trail would be much farther away than 1 m (39 in). Users of the Linear Trail would be restricted from coming within 1 m (39 in) of the canisters by fencing around the staging area and the presence of railroad tracks between the Linear Trail and the staging area. Given the distance from the industrial park, radiation levels at the Linear Trail would be expected to be at background levels.*

No changes were made to the EA in response to this comment.

Comment 25-62

One commenter stated that the statement in Section 3.11 of the EA concerning industrial hazards at the NFS site should also include radioactivity.

***Response**: The NRC staff notes that in Section 3.11 of the EA the preceding sentence to that referenced by the commenter reads as follows: "Risks to occupational health and safety include exposure to industrial hazards, hazardous materials, and radioactive materials."*

No changes were made to the EA in response to this comment.

Comment 25-63

One commenter took exception to the statement in the EA that materials "may have been released." The commenter stated that radioactivity and chemicals were released.

***Response**: The referenced statement, found in Section 3.11 of the draft EA, is based on one of the conclusions from the ATSDR report, which stated "the releases of these materials may have occurred in the 1950s, 1960s, and 1970s; there was little or no monitoring of the environmental media at that time" (ATSDR, 2007). The draft EA did not directly quote the ATSDR report.*

Section 3.11 of the EA was modified in response to this comment to include a direct quote from the ATSDR report.

Comments 25-64 and 25-65

One commenter criticized the use of estimates in determining dose to the public from NFS operations. In addition, the commenter suggests that the EA emphasize that the MEI is off site.

***Response**: Because the concentration of radionuclides in airborne effluent that reaches the site boundary is very small compared to naturally occurring radiation levels, it is not possible to measure and distinguish the radiation dose from NFS and that from natural sources. Consequently, the dose to the hypothetical MEI must be calculated. As described in*

Section 3.11 of the EA, NFS uses the effluent concentration for each radionuclide at each stack to calculate the dose to the MEI at the site boundary. This value is also reported in the semiannual effluent report and is provided in Table 3-15 of the EA. The NRC staff has determined that the statement, "the MEI is a hypothetical member of the general public that resides at the site boundary," which is found in Section 3.11 of the EA, is sufficient to demonstrate that the MEI resides off site.

No changes were made to the EA in response to these comments.

Comment 26-10

One commenter stated that NFS calculations of doses to the MEI do not rely on actual emission measurements from the stacks. The commenter suggested that the EA quantify the difference between the calculations and the actual emissions from the stacks, outfall pipe, plumes, and ponds.

***Response**: NFS is required to maintain airborne effluents below regulatory limits using either the emission rate from each stack or by calculating the dose to the MEI using accepted codes. NFS demonstrates compliance with regulations by calculating the dose to a hypothetical MEI at the site boundary from actual emissions from stacks at the site and comparing the dose to the annual public dose limit of 1 mSv (100 mrem). Semiannual effluent reports submitted by NFS demonstrate that some effluent concentrations are occasionally above the values published in 10 CFR Part 20, Appendix B. However, as shown in Table 3-15 of the EA, the maximum annual dose to the MEI is one percent or less than the public dose limit.*

No changes were made to the EA in response to this comment.

Comments 26-11 and 31-31

One commenter stated that the draft EA's use of the ATSDR finding of Indeterminate Public Health Hazard is faulty, as ATSDR did not have sufficient data to draw the conclusion and no radioactive study was allowed. Another commenter stated that the finding of an indeterminate health hazard by ATSDR was a "serious finding [that] indicates that NRC's past EAs & FONSIs missed, glossed over, or ignored major adverse impacts of NFS operations that caused NFS to become a hazard to public health."

***Response**: Section 3.11 of the EA discusses a public health study conducted by ATSDR (ATSDR, 2007). The NRC staff has interpreted the ATSDR finding of "indeterminate health hazard" to mean that the health hazard could not be determined (confirmed or denied) because no monitoring data were collected. Therefore, the NRC staff has determined that the report does not indicate a serious health finding. Because the health hazard could not be determined, the NRC staff has no information that indicates previous EAs and FONSIs were inadequate.*

In addition, the first commenter is correct in stating that the ATSDR study did not address radiological health. In Section 4.11 of the EA, the NRC staff determined that the potential radiological impacts to the public from the proposed action would be SMALL.

No changes were made to the EA in response to these comments.

Comments 28-04 and 28-06

One commenter stated that the EA's discussion of radiation hazards was unclear and confusing. The commenter made specific reference to Tables 2-2, 2-3, 2-5, 3-12, and 3-13 of the draft EA. The commenter also stated that the EA did not contain data for monthly, quarterly, and annual radiation testing, verification of data by independent parties, and the potential health impacts of exposure to the emitted radionuclides.

Response*: As stated in Section 2.3.2 of the draft EA, Tables 2-2 and 2-3 list the permitted levels and discharge levels to storm water for NFS and the BLEU complex, respectively. Table 2-5 of the EA contains the radionuclides that are expected in air and liquid effluents. This table was incorrectly referenced as Table 2-3 on page 2-9 of the draft EA. Tables 3-12 and 3-13 were incorrectly referenced on page 3-29 of the draft EA. Tables 2-2 and 2-3 should have been referenced instead. These typographical errors were corrected in the final EA.*

Tables 3-15 through 3-17 of the EA provide the TEDE to the MEI from gaseous and liquid effluents and from direct radiation. The three tables demonstrate that the TEDE to the MEI is a small fraction of the annual public dose limit, which is recognized to be protective of public health. Compliance with monthly and quarterly radiation monitoring is verified as part of the safety review. Therefore, NRC staff has determined that the EA appropriately evaluated the potential impact of radiological releases from the NFS facility on public health.

Two typographical errors were corrected in response to these comments.

Comments 31-21

The commenter questions what the health impacts are of cumulatively breathing toxic chemicals mixed with radioactive pollutants?

Response*: Concerning cumulative health impacts, there is no scientifically based method for combining the detriment to an individual exposed to radiation and chemicals. The type of damage caused by radiation (increased risk of cancer) differs from the damage caused by chemicals (injury to a specific organ or organs). Thus, in assessing the potential impacts of the proposed action, the EA compares the individual's exposure to radionuclides or chemicals to the exposure limits for that radionuclide or chemical, but does not attempt to formulate the type of composite detriment referenced above.*

No changes were made to the EA in response to this comment.

Comment 25-06

One commenter stated that NRC should assess the impacts of NFS research and development in the EA, noting that research and development are often experimental.

Response: *Section 4.11 of the EA addresses the potential environmental impacts from research and development activities. Routine research and development activities contributed to historical records of radiation doses and effluent releases. In addition, the ISA summaries address potential accidents in the research and development laboratories.*

No changes were made to the EA in response to this comment.

Comment T40-02

One commenter requested that the EA include information on the number of times airborne discharges at the site boundary have exceeded the regulatory limits. In addition, the commenter asked if the past 5 years of data were representative of the entire period since the last license renewal.

***Response**: The monitoring reports for the years 2000 through 2010 show that there were no instances when airborne discharges led to calculated doses to the hypothetical MEI above the annual public dose limit at the site boundary. This data has been added to Table 3-15 of the EA.*

Table 3-15 was expanded to include data from 2000 through 2010.

Comment T40-03

One commenter requested that the EA include information on the number of NFS employees who have exceeded the regulatory limits for airborne exposure since use of the whole body counter began. In addition, the commenter asked what percentage of the allowable worker dose limit employees are exposed to as measured by body intake.

***Response**: During the years 2000 to 2010, no workers at the NFS site exceeded the annual occupational exposure limit of 5,000 mrem [50 mSv] at 10 CFR 20.1201. Only two workers have exceeded 500 mrem [5 mSv] since 2005. Five workers were exposed to over 2,000 mrem [20 mSv] in 2001 and 2002. The maximum potential exposure to workers as measured by body intake since 2005 was 40 percent of the regulatory limit of 5,000 mrem [50 mSv].*

Section 3.11 of the EA was revised to reflect the response to this comment.

Comment T42-04

One commenter stated that the EA was not scientific or professional and cited the apparent EA statement that doses for 10 years would be the same as for 40 years.

***Response**: The commenter misreads the EA. The EA stated that the potential radiological impacts from operations at NFS over a 10-year period would be the same as the potential radiological impacts from 40 years of operation. This conclusion was based on the data in Tables 3-15 through 3-17 of the EA, which demonstrate that annual doses to the public have been below regulatory limits over the past 10 years. Given that NFS is not proposing major changes to its operations as part of its license renewal request, the NRC staff does not expect annual radiological doses to the public to increase over the next 40 years. Because radiological doses below NRC's regulatory limits are considered to be protective of public health, NRC staff has determined that the potential impact to public health is SMALL for both a 10-year license renewal alternative and the requested 40-year license renewal.*

No changes were made to the EA in response to this comment.

Comment T43-01

One commenter stated that it is not appropriate for NRC to tell the public it is acceptable "to be dosed" from effluents at NFS.

***Response**: As demonstrated in Tables 3-15 through 3-17 of the EA, the maximum possible annual dose that a member of the public has received in the years between 2000 and2010 from NFS operations is significantly lower than the annual public dose limit in 10 CFR Part 20. Thus, the NRC considers that the public health has been adequately protected during this time.*

No changes were made to the EA in response to this comment.

Comments 19-04, 19-05, and T43-04

One commenter compared the 2010 SCUBA report statement "the injury rate for the site does not compare favorably with the industry" to the EA public and occupational health discussion of occupational injury rates to show an apparent disconnect and, therefore, question the accuracy and integrity of the EA. The commenter also questioned whether the NRC considered that finding to be significant and to fall under the NRC's mission.

***Response**: Recordable and lost-time incident rates are discussed in Sections 3.11 and 4.11 of the EA. As stated there, the NRC staff found recordable and lost-time incident rates at NFS to not be significantly higher than the rates expected for a comparable chemical facility and lower than those expected from construction. For these reasons, the NRC staff concluded that potential impacts to occupational health from non-radiological operations at NFS to be SMALL.*

Occupational injuries are regulated by the U.S. Occupational Safety and Health Administration (OSHA), and not the NRC. In 1988, the NRC and OSHA entered into a Memorandum of Understanding (MOU) (October 31, 1988, 53 FR 43950) that delineates the respective responsibilities of the two agencies at facilities licensed by the NRC. Under provisions of the MOU, NRC inspectors, while not taking the role of OSHA inspectors, may identify safety concerns within the area of OSHA responsibility or receive employee complaints about OSHA-covered working conditions. In such situations, the NRC inspectors bring the matter to the attention of licensee management and can elevate OSHA-related concerns to NRC Regional management as appropriate.

No changes were made to the EA in response to this comment.

Comment T48-01

One commenter cited a 1990 NRC FRN on "below regulatory concern" in contending that the annual limit of 100 mrem is not protective of public health. The commenter also stated that the cancer mortality rate for women is 1/191 for 100 mrem and 1/10 for unborn children exposed to 100 mrem.

***Response**: Changing the annual public dose limit of 100 mrem (1.0 mSv) would require a rulemaking and is outside the scope of the EA. The purpose of the "below regulatory concern" effort was to establish a dose below which record keeping and documentation would not be necessary. That NRC action was withdrawn.*

According to the International Commission on Radiation Protection, radiation risk can be quantified as causing a 5 percent increase in the likelihood of cancer for each 1 Sv [100 rem] of dose (International Commission of Radiological Protection, 1999). Thus, a dose of 1 mSv [100 mrem] will increase the likelihood of fatal cancer in an individual by 0.005 percent, compared to the ambient cancer mortality rate of approximately 25 percent. This risk factor applies to all

members of the public, independent of sex or age. The International Commission on Radiation Protection also states that it is not justifiable to apply this risk factor to small doses to large numbers of individuals.

No changes were made to the EA in response to this comment.

B.5.8.11 Waste Management

General Waste Management Concerns

Comments 18-08, 25-24, and 30-06

Two commenters stated concerns about the storage of mixed (radioactive and hazardous) waste at the NFS site. One commenter stated that the draft EA waste disposal section of the EA did not consider the impacts of an accidental leak from the 980 55-gallon drums of radioactive hazardous waste estimated to be added onsite over the next 40 years and stored for an indefinite period of time. Another commenter stated that storing an additional 980 drums of hazardous mixed waste onsite over the proposed 40-year renewal period, in addition to an uncertain amount already onsite, is a significant impact.

Response*: As discussed in Section 2.3.3 of the EA, NFS produces mixed waste, which is hazardous waste that is also radioactive. NFS estimates that it will produce 204 m^3 [270 yd^3] of mixed waste during the proposed 40-year license renewal period, which is equal to about 980 208 L [55-gal] drums. Section 4.12 of the EA includes the NRC staff's impact analysis for mixed waste, which considered that the onsite storage of waste includes a combination of physical containment measures, NFS administrative procedures, TDEC oversight, TDEC and EPA periodic inspections, and NFS compliance with applicable TDEC regulations and permits. The NRC staff considers that these provide confidence that the mixed waste can be stored safety onsite without releases to the environment. In Sections 2.3.3 and 4.12 of the EA, the NRC staff notes that onsite storage of mixed wastes is only an interim measure until a disposal facility becomes available. The NRC staff concluded that the interim onsite storage of mixed wastes is expected to have SMALL potential environmental impact given the combination of safety measures, administrative procedures, and regulatory oversight.*

In response to this comment Sections 2.3.3 and 4.12 of the EA were revised to reflect the amount of mixed waste that is currently stored onsite.

Comment 25-25

One commenter, noting that hazardous mixed wastes are stored onsite and that there is no offsite disposal facility for such wastes, stated that it was hard to believe that NRC would find "no potential significant impact" to the area. The commenter states that the NFS location is underlain by karst topography, faults and fractures, and is located within the floodplain of the Nolichucky River and Martin Creek.

Response*: As noted by the commenter and discussed in Sections 2.3.3 and 4.12 of the EA, NFS is storing mixed wastes onsite until a disposal facility for such wastes becomes available. The NRC staff determined that these wastes can be stored safely onsite given that NFS's storage of mixed wastes is carried out under a TDEC-administered permit and that TDEC conducts periodic inspections to evaluate NFS's handling and storage of hazardous and mixed wastes. Regarding the comment about karst topography, Section 3.5.2 of the EA states that the*

NFS site is directly underlain by the Rome Formation, a non-karstic formation (although there is some evidence of dissolution features in the northern part of the site). The Rome Formation is a competent rock consisting of sandstone, siltstone, shale, dolomite, and limestone. Karst topography is present in the southeasterly Shady Formation, but that is upgradient of the NFS site. The NRC staff concluded that storage of mixed wastes onsite during the proposed 40-year license renewal period would have SMALL impacts.

No changes were made to the EA in response to this comment.

Scope of the Assessment of Waste Management Impacts

Comment 18-10

One commenter stated that the NRC draft EA relies on NFS estimates of waste shipments over 40 years and that the NRC staff has not done an independent analysis.

***Response**: As discussed below, although the NRC has relied on NFS estimates in analyzing this waste management issue, this does not mean that an independent analysis was not performed.*

The estimated NFS waste shipments cited in Section 2.3.4 of the EA are NFS' estimates of expected site decommissioning wastes that would be generated over the next 40 years. Decommissioning waste estimates for excavated contaminated soil, in particular, are uncertain prior to the start of decommissioning excavations and NFS has the most complete knowledge and data about their site-specific conditions and operations. Therefore, use of NFS' estimates is necessary when there are no other reliable sources of the information available. Even though such information comes from NFS, the estimates have been reviewed by the NRC staff prior to use and the analysis of potential impacts and impact conclusions in the EA are the independent product of the NRC staff. Based on these considerations, NRC staff concludes that the best available information has been used to support the transportation impact analysis in Section 4.2 of the EA.

No changes were made to the EA in response to this comment.

Waste Treatment and Disposal Methods

Comment 18-09

One commenter stated that the waste disposal section of the EA assumes there would be additional disposal space available for low-level radioactive waste after 2023. The commenter referenced the evaluation of low level waste disposal impacts on Page 4-19 of the draft EA, which describes a disposal facility in Clive Utah with projected capacity to operate until 2023.

***Response**: The commenter is correct that the EA assumes there would be disposal space available for low-level radioactive waste after 2023, but the EA does more than simply rely on this assumption. The staff also considers temporary on-site storage of low-level waste to be a safe contingency should there be a temporary disruption in available commercial low-level waste disposal capacity. Information provided in Section 4.12 of the EA shows that 78 percent of the proposed radioactive waste generation, including decontamination waste, from the proposed action would be considered DOE waste that would be disposed at the Nevada Test Site. DOE waste will be accepted there until 2070. Therefore, a potential future temporary*

disruption in commercial low-level waste disposal capacity, if that were to occur, would affect only 22 percent of the low-level radioactive waste generated over the next 40 years, including decontamination waste. Therefore, the staff concludes that sufficient waste disposal and storage options are available to limit potential waste management impacts from the proposed action, and that the finding of SMALL waste disposal impacts is adequately supported.

No changes were made to the EA in response to this comment.

B.5.9 Cumulative Effects

Comment 18-02

One commenter stated that the draft EA does not adequately consider cumulative effects of surface water and groundwater contamination from NFS-related radionuclides, and thus insufficiently accounts for exposure risks downriver. The commenter stated that NRC's presumption is that permits will be complied with, but the EA doesn't analyze accumulation of sediments/pollutants over time even if permits are complied with. The commenter further suggested that permits may not be renewed or complied with, and impacts are not assessed for pending permits and that an EIS should be prepared to identify existing contamination of the river. Such an EIS should provide estimates of cumulative exposure based on existing contamination, and contamination over the next 40 years.

***Response**: As discussed in Sections 2.3.2 and 2.4 of the EA, NFS discharges wastewater into the Nolichucky River following treatment of those effluents to meet the regulatory limits in 10 CFR Part 20 and the conditions in the TDEC NPDES permit. As discussed in Appendix B to 10 CFR Part 20, the concentration values given in Table 2 are equivalent to the radionuclide concentrations which, if inhaled or ingested continuously over the course of a year, would produce a total effective dose equivalent (TEDE) of 50 millirem (0.5 mSv). The total annual public dose limit is 100 mrem (1.0 mSv).*

As discussed in Section 4.11 of the EA, the annual TEDE to the MEI from NFS discharges of liquid effluents is shown to be a small fraction of 1 mrem (0.01 mSv). Given that NFS is not proposing major changes as part of its request to renew its license for 40 years, the NRC staff therefore considers that the cumulative impact from NFS discharges of liquid effluents in accord with 10 CFR Part 20 would be SMALL. Based on this information, the NRC staff would also expect doses to members of the public from prior NFS discharges of liquid effluents to be SMALL.

For the purposes of its NEPA analyses, the NRC staff does not considers potential impacts from unpermitted discharges or from discharges not made in compliance with existing permits.

As discussed previously in this appendix, the NRC staff has determined that a FONSI is appropriate and that preparation of an EIS is not warranted.

No changes were made to the EA in response to this comment.

Comment 18-25

One commenter stated that the draft EA analysis should include consideration of activities since the last renewal (e.g., the BLEU Project, the new UF_6 processing line, the enclosing of Banner Spring Branch, the decommissioning of the Bldg 234 area) and new projects. The commenter

also stated that the EA should fully consider whether these additional activities change any of the last 10-year permit analysis. As an example, the commenter referred to the discussion of the previous analysis of waste management impacts (page 4-20 of the draft EA) and questioned whether the NRC staff had evaluated additional waste considerations associated with the BLEU Project and UF_6 processing line activities.

Response: *As discussed in Section 1.5.2 of the EA, the NRC staff reviewed and considered various documents in support of its environmental analysis. Among the documents considered were (1) NFS' license application and accompanying environmental report; (2) previous NRC EAs (including those prepared for the BLEU Project); and (3) NFS' semiannual effluent reports since the last license renewal in 1999. These documents provided information to address various actions taken by NFS with prior NRC approval since 1999, the gaseous and liquid effluents generated by NFS activities from 1999, and the associated calculations of radiation doses to workers and members of the public. As such, the NRC staff considers this information to fully address existing site activities, as well as site activities added since the last license renewal.*

With respect to the assessment of waste management impacts in Section 4.12 of the EA, the NRC staff considered NFS' estimates of the volume of gaseous, liquid, and solid wastes to be generated by current NRC-approved site activities during the requested 40-year license renewal period. These estimates are discussed in Sections 2.3.1, 2.3.2, and 2.3.3 of the EA. Therefore, the NRC staff evaluation of potential waste management impacts did include wastes to be generated by the BLEU Project and the UF_6 processing line activities.

No changes were made to the EA in response to this comment.

Comment 18-26

One commenter stated that the cumulative effects of slow leakage of contaminants into groundwater may have a significant impact over time as migrating material accumulates or reacts with other chemicals in the environment.

Response*: As discussed in Section 3.5.2 of the EA, NFS is in the process of remediating existing identified onsite groundwater contamination. These actions are being taken in concert with TDEC and EPA oversight. Remediation activities to date have reduced the extent of the onsite uranium plume 76 percent from its original size, and reduced the onsite chlorinated solvent plume 91 percent from its original size. These activities are ongoing to further reduce the size of these plumes and their potential to affect offsite groundwater resources. Additionally, as discussed in Section 2.4 of the EA, NFS conducts regular monitoring of the groundwater to address the potential for any future contamination of onsite groundwater resources.*

No changes were made to the EA in response to these comments.

Comments 25-39 and 25-40

One commenter stated that the EA should have put a greater emphasis on the Studsvik site in the land use section (Section 3.1 of the EA) as it is co-located with NFS, leases its land from NFS, and is partly owned by NFS. The commenter also stated that it was noteworthy that three nuclear sites exist within a 15-mile radius of the NFS site.

***Response**: Section 3.1 of the EA describes land use around and on the NFS site. The NRC staff identified Studsvik in that section as a facility adjacent to NFS that processes low-level radioactive waste under license from the State of Tennessee. The potential impacts from operations at the Studsvik facility are addressed in the cumulative effects discussion in Chapter 4 of the EA.*

The NRC staff evaluated the combined contributions of radiation dose from NFS, the Studsvik facility, and another TDEC-licensed facility, Aerojet Ordinance Tennessee (Aerojet), which is located approximately 16 km (10 mi) from the NFS site. The results of the evaluation are presented in Section 4.11 of the EA.

No changes were made to the EA in response to these comments.

Comment 25-67

One commenter considers that the area has been "dosed" by airborne releases in the past 53 years and will continue to be dosed in the coming 40 years.

***Response**: The NRC staff acknowledges that NFS discharges gaseous effluents to the environment and that such effluents do contain radionuclides that contribute to the annual radiation doses received by the public. As discussed in Section 2.3.1 of the EA, NFS uses scrubbers and filters to remove radioactive particulates and chemicals from the effluent prior to release of the effluent through the main stack at the NFS facility. Gaseous effluents released from the NFS facility are required to meet radionuclide-specific limits in 10 CFR Part 20, Appendix B, and State of Tennessee operating air permit limits prior to release.*

As shown in Table 3-15 of the EA, the TEDE to a hypothetical MEI at the site boundary from NFS-related gaseous effluents did not exceed the public dose limit of 100 mrem/yr [1.0 mSv] between 2000 and 2010. The highest airborne TEDE for this time period was 0.0362 mrem [3.62×10^{-4} mSv] in 2000.

Tables 3-15 through 3-17 of the EA provide the calculated annual TEDE to the MEI from gaseous and liquid effluents and from direct radiation for the years 2000 to 2010. As shown in these tables, the calculated TEDE to the MEI is a small fraction of the public dose limit in 10 CFR Part 20, which is recognized to be protective of public health. Therefore, NRC staff has determined that the EA appropriately evaluated the potential impact of radiological releases from the NFS facility on public health.

Tables 3-15 through 3-17 of the EA were revised to include the TEDE data for the years 2000 through 2010 in response to this comment.

Comment T42-02

One commenter expressed concern over the cumulative impact of radioactive doses over the past 53 years and potentially for 40 more years. The commenter stated that while this may be a SMALL impact, it is still an impact.

***Response**: As discussed below, the annual NFS facility contributions to dose have been below the NRC's 10 CFR part 20 annual public dose limits, and any future NFS operations will be contingent upon continued compliance with these limits.*

The NRC staff evaluates the cumulative impacts both from multiple sources of radiation and from chronic exposure to radiation. The annual dose limit for the general public is 100 mrem (1.0 mSv). As shown in Tables 3-15 through 3-17 of the EA, in each of the years between 2000 and 2010, the dose to a hypothetical MEI from NFS process-related gaseous and liquid effluents and from direct radiation was below the annual public dose limit of 100 mrem (1.0 mSv). In evaluating the potential environmental impacts for the requested 40-year license renewal period, the NRC staff expects that annual public doses would remain below 100 mrem (1.0 mSv) given that NFS is not proposing major changes to operations or to its facilities under the proposed action.

No changes were made to the EA in response to this comment.

Comment T48-02

One commenter stated that Studsvik was to be the recipient of wastes from new U.S. reactors. The commenter also stated that Studsvik in Erwin could be a potential recipient of Canadian reactors' waste supposedly to be sent to Studsvik in Sweden.

***Response**: In Sections 4.2 and 4.11 of the EA, the NRC staff evaluated NFS' incremental contribution to the cumulative impacts on transportation and radiological doses to the public from other past, present, and reasonably foreseeable future actions. These other actions include operations at the Studsvik facility.*

The NRC is not aware of any plans to import reactor waste from Canada into Tennessee. Any such action seems highly improbable and would in any event first require the NRC to issue an import license. The impacts of doing so are deemed to be too hypothetical for consideration in the EA.

Section 4.2 of the EA was revised to include the effect of Studsvik operations on transportation.

B.5.10 Monitoring

Comment 25-48

One commenter stated that it is established by the NRC in the EA that the groundwater around NFS is contaminated. The commenter further stated that there is no certainty that the Railroad Well, a source of public drinking water, is not contaminated by a plume from the NFS site. The commenter stated finally that no one is checking to see if the Railroad Well is contaminated.

***Response**: The contamination to which the commenter refers is chemical contamination in the form of chlorinated solvents, among other chemical contaminants, and uranium contamination. These plumes and NFS' actions to remediate the affected groundwater are discussed in Sections 3.5.2 and 4.5.2 of the EA.*

Contrary to the commenter's statement, drinking water, including that drawn from the Railroad Well, is routinely tested by Erwin Utilities and those test results are published annually. The test results from Erwin Utilities indicate that all contaminants are at concentrations below drinking water limits. Section 3.5.1 of the EA has been revised to include reference to recent drinking water quality reports by Erwin Utilities that show the drinking water it provides meets EPA drinking water quality standards.

Section 3.5.1 of the EA was revised as discussed in this response.

Comments 17-13 and 17-14

One commenter stated that no effort has been made to correlate historical stack emissions with onsite and offsite ground contamination levels of U-235 and U-238. The commenter also requested that the EA provide the total offsite releases of U-235 and U-238.

***Response**: As discussed in Section 2.4 of the EA, NFS conducts environmental radiological monitoring to address offsite impacts of its site operations. These programs include sampling and analysis of gaseous effluents at discharge from process stacks as well as soil sampling and analysis at offsite locations. Under its environmental radiological monitoring program, NFS continuously samples all process stacks and vents with the potential to release airborne radioactivity at concentrations greater than or equal to 10 percent of the values in 10 CFR Part 20, Appendix B, Table 2, Column 1. As shown in Table 2-5 of the EA, U-235 and U-238 are among the radionuclides in gaseous effluents from the NFS site. NFS analyzes the stack samples for gross alpha and gross beta radioactivity (NFS, 2009a) and uses the analysis data in its offsite dose calculations to the hypothetical MEI. As discussed in Section 3.11.1 of the EA, the total effective dose equivalent from gaseous effluents for each of the last 10 years of operation were a small fraction of the annual public dose limit in 10 CFR Part 20.*

Under its environmental radiological surveillance program, NFS obtains soil samples at offsite locations on a quarterly basis and analyzes these samples for gross alpha. The purpose of the program is, in part, to provide early detection of trends in environmental data; and to provide additional data in the event of an offsite release of radioactive material (NFS, 2009a). As shown in the NFS license application (NFS, 2009b), alpha radiation levels in soil samples from one sampling location (Asheville Highway) for 2007 are consistent with levels observed at that location for the prior five years, and the alpha radiation levels in 2007 for the other sampling locations are consistent with the levels for the Asheville Highway location.

Additionally, as discussed in Section 3.11.1 of the EA, annual occupational doses from NFS site operations have been below regulatory limits in 10 CFR Part 20 for each of the past 10 years. Doses for these years received by NFS workers would have included doses from U-235 and U-238.

For these reasons, the NRC staff does not consider correlation of historical stack emissions with onsite and offsite ground contamination levels to be necessary for the evaluation of potential environmental impacts.

Figure 2-1 of the EA was revised to include the locations for onsite and offsite environmental monitoring. Section 2.4 of the EA was revised to more clearly describe NFS' environmental monitoring programs.

Comment 25-21

One commenter stated that NFS is inconsistent in its pre-discharge treatment of liquid effluents, as shown in past NRC inspection reports.

***Response**: NFS effluents to water and the pre-treatment of those effluents prior to discharge are discussed in Sections 2.3.2 and 2.4 of the EA, respectively. As discussed there, NFS pre-treats process-related liquid effluents in the WWTF and analyzes samples prior to discharge to*

ensure the limits in NRC regulations at 10 CFR Part 20 and the conditions of the TDEC NPDES permit are met.

No changes were made to the EA in response to this comment.

Comment 25-28

One commenter, in referencing Section 2.4 of the draft EA, requested more information about the "isotopes of concern" that NFS measures annually.

***Response**: For the purposes of its environmental radiological surveillance program, NFS analyzes ambient air samples on an annual basis for isotopes of concern (as based on the characterization data for material processed at the NFS facility) (NFS, 2009a). The samples are collected from the air sampling station nearest the predicted maximally exposed offsite receptor (NFS, 2009a). Tables 2-5 and 3-14 in the EA identify the radionuclides that are present in NFS process-related gaseous emissions. The isotopes of concern that NFS monitors annually are among those identified in these tables.*

No changes were made to the EA in response to this comment.

Comment 25-29

One commenter, noting that Section 2.4 of the EA mentioned alpha and beta measurements, asked if NFS measures gamma radiation as part of their monitoring program.

***Response**: As discussed in Section 2.4 of the EA, NFS analyzes gaseous and liquid effluents for alpha and beta radiation as part of its effluent monitoring program. NFS does not measure gamma radiation in these effluents (NFS, 2009a). For the radionuclides present at NFS, gamma emission is always accompanied by alpha and or beta radiation. Because the background level of gamma radiation from natural sources is relatively high and the detection efficiency of gamma radiation is low relative to alpha and beta radiation, it is difficult to measure low levels of gamma radiation in effluents. Measuring alpha or beta radiation is more efficient and lower levels of activity can be detected, because background levels of alpha and beta radiation can be shielded, virtually eliminating the background signal from these sources of radiation. Thus, the minimum detectable activity of the monitoring equipment for alpha and beta radiation is 10 to 100 times lower than the minimum detectable activity for gamma radiation.*

While NFS does not measure gamma radiation in its effluents, NFS does measure the direct radiation dose from gamma radiation at various locations at the site boundary, as discussed in Section 3.11 of the EA. The source of the gamma radiation measured at the site boundary is gamma emissions from the plant or neighboring facilities and gamma radiation from background radiation sources, including cosmic and terrestrial radiation. Background gamma radiation accounts for an annual dose of about 1 mSv/yr [100 mrem/yr].

Section 2.4 of the EA has been revised to more clearly describe NFS' environmental monitoring programs, including the measurements it takes.

Comment 25-31

One commenter requested that the EA clarify what it means to take a quarterly grab sample from each batch discharge.

***Response**: For the purposes of responding to this comment, a quarterly grab sample is a water sample taken from a batch of water once per quarter. However, the NRC staff notes that the statement in Section 2.4 of the draft EA to a quarterly grab sample from each batch was in error. As discussed in Sections 2.3.2 and 2.4 of the EA, NFS discharges liquid effluents from the WWTF on a batch basis to the Nolichucky River. Prior to discharge from the WWTF, NFS takes a grab sample from each batch and analyzes the sample for gross alpha and gross beta radiation.*

Section 2.4 of the EA has been revised to correctly describe NFS' environmental monitoring programs, including the monitoring of liquid effluents prior to discharge.

Comments 25-32 and 25-33

One commenter stated that a sentence in Section 2.4 of the draft EA should be revised to acknowledge that the sewer sludge at the Erwin POTW had been previously contaminated by NFS in 1991.

***Response**: The NRC staff acknowledges that the Erwin POTW sewer sludge had been contaminated by sewer discharges from the NFS site in 1991. As discussed in Section 2.4 of the EA, NFS takes grab samples of the Erwin POTW sewer sludge quarterly and analyzes it for isotopic uranium. This is done so that appropriate actions can be taken should analysis of the sewer sludge indicate a reason for concern.*

No changes were made to the EA in response to this comment.

Comments 25-41, 25-55, and T37-01

One commenter stated that vegetable gardens and fish at the fish hatchery near the NFS site should be tested for radionuclides and other chemicals. The commenter also asked why there is no environmental sampling of onsite vegetation or aquatic species surveys. Another commenter asked if the NRC tested the water and livestock downstream and if so where did it do so and with what results.

***Response**: As described in Section 2.4 of the EA, NFS conducts an environmental sampling program that includes analysis of air, water, soil, sediment, and vegetation samples collected offsite. The purpose of the environmental monitoring program is to provide (1) additional validation of effluent monitoring systems, (2) early detection and response to a negative trend in environmental data, and (3) support data in the event of a release of radioactive material. The program does not include sampling of edible meats (e.g., livestock downstream) and does not include onsite sampling. Sampling of vegetable gardens would not be as effective as vegetation sampling, because vegetables typically grow only for a small fraction of a year before being harvested, while other vegetation can grow for several years. Recent NFS data from the vegetation sampling program has found levels of alpha radioactivity consistent with background levels (NFS, 2009b). On the question of sampling edible meats, fish hatcheries would not be sampled because the hatcheries are located upstream from NFS and do not represent a likely location for contamination to be found.*

The NRC does not independently sample surface water or livestock. The TDEC Division of Radiological Health does collect environmental monitoring samples of ambient air, surface water, soils, and vegetation, analyzes those samples for gross alpha, gross beta, gamma

radiation, and total uranium, and compares that data with NFS by exchanging sample results (TDEC, 2010b).

Section 2.4 of the EA has been revised to more clearly describe NFS' environmental monitoring programs, including the offsite environmental monitoring program. Figure 2-1 of the EA was revised to include the locations for onsite and offsite environmental monitoring.

Comment 25-50

One commenter, noting that the draft EA stated that a majority of wells were sampled for chemical parameters, wondered why all monitoring wells aren't checked for radionuclides in addition to the chemical parameters.

Response*: NRC does not require that all monitoring wells be analyzed for radionuclides in order to demonstrate compliance with the occupational and public annual dose limits in 10 CFR Part 20. As discussed in Section 2.4 of the EA, the NFS monitoring program includes the analysis of samples taken from one upgradient well and ten downgradient wells to assess the potential impact of NFS operations on offsite groundwater. NFS conducts this monitoring in accordance with conditions in its NRC license. The ten downgradient wells are located along the plant boundary to aid in detecting potential radiological releases dissolved in groundwater emanating from the NFS site, while the upgradient well serves as the background well (NFS, 20011a). Grab samples are collected quarterly from these 11 wells and evaluated for gross alpha and gross beta. If gross alpha in a well exceeds 15 pCi/L, the sample undergoes isotopic analysis for uranium at a minimum (NFS, 2009a). NFS may perform additional analysis for isotopic plutonium, isotopic thorium, and for technicium-99 if warranted by situations or by the gross alpha/gross beta results (NFS, 2009a).*

NFS also monitors at least another 30 groundwater wells for various chemical parameters to assess ongoing remediation efforts for existing groundwater contamination (NFS, 2011a). These wells are sampled on either a monthly, quarterly, semiannual, or annual basis (NFS, 2009a) to satisfy agreements with the EPA and TDEC as part of NFS's groundwater remediation program (NFS, 2011a).

Section 3.5.2 of the EA was revised in response to this comment to state the number of wells that NFS samples and analyzes for chemical parameters.

Comment 30-04

One commenter questioned if NRC has independently verified NFS Semiannual Effluent Monitoring Reports to determine the actual volume and activity concentration of each radionuclide discharged to water by NFS was accurately accounted for. The commenter also referenced an NRC statement "NRC has not independently verified effluent monitoring results since the last license renewal in 1999."

Response: *The NRC does not routinely take its own confirmatory effluent samples, and as noted by the commenter, NRC has not independently verified NFS's effluent monitoring results since 1999 (NRC, 2010a). As the commenter indicates, NFS submits semiannual effluent reports to the NRC in accordance with 10 CFR 70.59, and the NRC staff reviews these monitoring reports. Additionally, once a year, NRC inspectors perform an environmental inspection that focuses on the environment and effluents. The last such inspection of the NFS*

site was completed in November 2010. As discussed previously, this inspection report is publicly available through the NRC public website.

By its NRC license, NFS is required to implement radiological monitoring and safety programs that comply with 10 CFR Part 20 requirements to protect the health and safety of workers and the public. NRC periodically inspects the NFS programs and has assigned two onsite resident inspectors to inspect for compliance. Worker and public radiological safety at the NFS site is maintained by implementation of a radiation protection program that complies with the regulations in 10 CFR Part 20.

No changes were made to the EA in response to this comment.

Comments 26-06 and 26-07

One commenter expressed concern that NFS testing wells are not reliable in detecting enriched uranium and that independent hydrologists are needed to assess the possibility of enriched uranium in the aquifer, the plumes, and threats to drinking water. The commenter also stated that the Town of Erwin's drinking water is blended and wanted to know how much enriched uranium is in the water, since alpha and beta are being monitored in the Railroad Well.

***Response**: The NRC staff acknowledges that uranium may be found in groundwater and surface water. As discussed in Sections 2.3.2 and 2.4 of the EA, NFS treats liquid effluents in the WWTF to meet NRC regulatory limits in 10 CFR Part 20 and TDEC NPDES permit conditions prior to discharge into the Nolichucky River. Various uranium isotopes (including uranium enriched in the U-235 isotope) are identified in Table 2-5 of the EA as being among the radionuclides present in NFS process-related liquid effluents. Additionally, as discussed in Section 3.5.2 of the EA, NFS is remediating existing onsite groundwater contamination, including a uranium plume. These remedial actions are being taken as part of the RCRA corrective action process for the site, which began in the 1990s, and to date, the extent of the uranium plume has been reduced approximately 76 percent.*

Erwin Utilities draws the drinking water for the Town of Erwin from one spring and three wells, with the three wells completed in the Honaker Formation (Erwin Utilities, 2010). The utility treats water from these sources in providing drinking water to the community (Erwin, 2011). In addition, Erwin Utilities periodically tests the drinking water and has found that it meets the National Primary Drinking Water Regulations (Erwin, 2010, 2009). Uranium is one of the contaminants identified in those regulations (EPA, 2011). Since U-235 is one constituent of uranium, U-235 concentrations are also below drinking water standards.

Section 3.5.1 of the EA was revised in response to this comment to provide references to recent water quality reports issued by Erwin Utilities.

Comment 27-05

One commenter stated that finding even a trace of uranium in the Nolichucky River is a bad sign.

***Response**: Trace levels of uranium exist in water and soil throughout the world because uranium exists naturally, so the presence of such levels in the Nolichucky River is not necessarily due to NFS operations. NFS is permitted to discharge wastewater into the Nolichucky River as long as the discharges meet NRC requirements in 10 CFR Part 20.*

As shown in Table 2-5 of the EA, uranium isotopes are present in the treated liquid effluents that NFS discharges. For these reasons, trace amounts of uranium associated with NFS operations may be in the river.

No changes were made to the EA in response to this comment.

Comment 28-08

One commenter requested a more detailed description of the offsite vegetation sampling program (e.g., the plants sampled, the radioactive elements measured, the distance from site) to address concerns over uptake and exposure.

***Response**: As discussed in Section 2.4 of the EA, NFS conducts an environmental monitoring program, which includes vegetation sampling. The EA refers the reader to the NFS license renewal application and accompanying environmental report for additional detail concerning NFS's environmental monitoring program. Tables 23B-1 and 23B-2 in the NFS environmental report (NFS, 2009b) provide vegetation sampling results for five locations for calendar year 2007. These data show that gross alpha and gross beta radiation levels are consistent with background activity levels.*

Section 2.4 of the EA has been revised to more clearly describe NFS' environmental monitoring programs, including the vegetation sampling program. Figure 2-1 of the EA was revised to include the locations for onsite and offsite environmental monitoring.

Comment 29-02

One commenter, noting that NFS is the source of air emissions from 21 stacks and the water data on an estimated 75,000 gallons of waste water discharged daily, asked if there was a chance that the public doses of radiation and water monitoring information could also be inaccurate.

***Response**: The NRC has two onsite inspectors at NFS who check the air and water effluent data collected by NFS, as documented in the NFS semiannual monitoring reports. Often, the NRC oversight actions include observing sample collection activities, and performing audits of the counting laboratory. These NRC inspection activities have not found any fabrication or manipulation of air and water effluent data by NFS, and the NRC staff has no information showing that such data is inaccurate.*

No changes were made to the EA in response to this comment.

Comment 30-03

One commenter strongly disagreed with statement on p. 6-1 of the draft EA that gaseous emissions and liquid effluents are controlled and monitored by permit and are within regulatory limits for non-radiological and radiological components. The commenter stated that semiannual effluent monitoring reports show that discharge limits are routinely exceeded.

***Response**: As discussed in Sections 2.3.1 and 2.3.2 of the EA, NFS discharges of process-related gaseous and liquid effluents are in compliance with NRC regulatory limits in 10 CFR Part 20, and TDEC air operating and NPDES permit limits. To meet the applicable limits, NFS uses filters and scrubbers to remove radioactive particulates and chemical compounds from*

gaseous effluents and pre-treats liquid effluents prior to discharge of those effluents to the environment.

With respect to gaseous emissions, the NRC staff agrees that NFS semiannual effluent monitoring reports often show a few radioactive constituents exceeding concentration limits at the stack. However, for the purposes of demonstrating compliance with the NRC annual public dose limit of 100 mrem (1.0 mSv) in 10 CFR 20.1301 and the ALARA constraint for air emissions in 10 CFR 20.1101, and in accordance with 10 CFR 20.1302, NFS measures the activity concentration averaged over each calendar month and calculates the TEDE to the MEI from each radionuclide at each emission point and compares this TEDE to the annual public dose limit in 10 CFR 20.1301. Even though the activity from a given stack for a given radionuclide may exceed the limits in 10 CFR Part 20 Appendix B, the calculated maximum TEDE to a member of the public for each of the past ten years has been less than one percent of the annual public dose limit, as shown in Table 3-15 of the EA.

Tables 3-15 through 3-17 of the EA were revised to include data for the years 2000 to 2010.

Comment 31-23

One commenter requested that the EA provide more detail and clarify information concerning discharges from the WWTF. Specifically, the commenter stated that NRC's statement on page 2-4 (in Section 2.3.2) of the draft EA implies that, for each batch of wastewater discharged, concentrations for each radionuclide in the batch are measured to ensure that the 10 CFR Part 20 limits for each isotope are met. But then page 2-9 (in Section 2.4) of the draft EA indicates that quarterly samples are analyzed only for alpha and beta radiation and not for individual radionuclides, and that only uranium isotopes are evaluated in monthly composite samples.

***Response**: As discussed in Sections 2.3.2 and 2.4 of the EA, NFS samples and analyzes wastewater to meet limits in 10 CFR Part 20 prior to discharging the wastewater on a batch basis to the Nolichucky River. NFS' analysis of the wastewater involves measurement of the alpha and beta radioactivity prior to discharge. Additionally, as discussed in Section 2.4 of the EA, NFS takes a monthly composite sample and analyzes it for isotopic uranium. The NRC staff notes that the statement in Section 2.4 to a quarterly grab sample from each batch was in error. NFS also analyzes the monthly composite for other radionuclides if materials in addition to uranium are suspected to be present in process waste water at levels exceeding 10% of the concentration limits in 10 CFR Part 20, Appendix B, Table 2, Column 2 (NFS, 2009a).*

Section 2.4 of the EA has been revised to more clearly describe NFS' environmental monitoring programs, including the monitoring of liquid effluents prior to discharge.

B.5.11 Accidents

Comments 18-05, 18-07, 18-17, 18-20, and 25-69

Two commenters raised issues concerning the analysis of accidents in the draft EA.
One commenter stated that the impacts from accidents were not adequately considered in the draft EA. The commenter felt that the impacts of combined accidents resulting from extreme weather events and a security event should be considered. The commenter further stated that, despite suspension of operations at NFS due to violations of regulations and illegal spills and discharges, NRC stated in the EA that accidents are unlikely due to regulations. The

commenter stated that the NFS history of accidents over the last 10 years have not been adequately considered in the likelihood of future accidents. A second commenter stated that, because five of the six potential accidents listed in the EA have occurred in the past, it is highly likely the accident(s) will happen again.

***Response**: The potential environmental impacts from postulated accidents are addressed in Section 4.11.2 of the EA, where the NRC staff found that such impacts would be SMALL to MODERATE, depending on the accident being assessed. However, as discussed in EA section 1.5.3, to the extent that comments on accident concerns raise safety issues, such comments are outside the EA's scope. Safety issues will be addressed in the SER.*

The first commenter referenced page 4-18 of the draft EA, in stating "NRC determined that accidents are 'highly unlikely due to the existence of NRC regulations'." The discussion of accident impacts is not found on page 4-18 in the draft EA, but on the previous page, it is stated "[i]n addition, NRC regulations require that accidents with high consequences must have controls identified and maintained to make the accidents highly unlikely." This is a reference to safety issues that will be addressed in the SER.

The NRC staff has determined that the potential environmental impacts from postulated accidents are adequately addressed in the EA. The staff in the EA doesn't assume that accidents are unlikely due to regulations.

No changes were made to the EA in response to these comments.

Comment 31-33

One commenter stated that old cylinders have isotopic separation of fluorine gas from the original uranium hexafluoride (UF_6). The commenter further stated that impacts from this gas were not included in the EA and that if a single death from fluorine gas were to occur, the Erwin community would be destabilized, resulting in a LARGE impact.

***Response**: Section 4.11.2 of the EA discusses impacts from a postulated release of uranium hexafluoride (UF_6), from a full cylinder containing 25 kg of UF_6, with the release caused by a fire when the cylinder is outside its shipping container. The NRC staff determined that the potential environmental impacts to the public would be SMALL to MODERATE from this accident.*

With respect to the potential impacts from a fluorine gas release, the NRC conducted an inspection of NFS operations between January and March 2010, in part to address NFS reports of potentially over-pressurized UF_6 cylinders. NFS conducted an in depth examination of the UF_6 cylinders and the shipping containers in which they are currently housed. This review concluded that any leakage of fluorine from the cylinders would be consumed by materials in the annulus of the shipping container and thus be contained with only minor leakage beyond the shipping containers. NRC inspectors performed their own calculations and review of this issue and concluded that the likelihood of a fluorine gas release to the environment and the consequences to workers and the public was low. An electronic copy of the NRC's inspection report is available through the NRC ADAMS website by using the Accession Number ML101180482.

No changes were made to the EA in response to this comment.

B.5.12 Other Comments

Comments 12-03, 13-02, 25-14, 26-05, 28-07, 29-03, 31-03, T42-01, T46-01, and T46-02

Several commenters referred to a report summary by Ketterer from Northern Arizona University that presented findings of HEU in the Nolichucky River with the NFS outfall as the point source and in local springs, including Whaley Springs. Commenters reported that enriched uranium was measured as far downstream as the Davy Crockett Dam, 25 miles downstream, and up to 50 miles downstream of NFS site.

***Response**: After the NRC staff issued the draft EA for public comment, an interim report summary by Professor Michael E. Ketterer from Northern Arizona University was provided to the NRC staff that described measurements in water, soil, aquatic sediments, and biota taken near the NFS facility. The purpose of the work was to determine the extent to which uranium and related contaminants have been dispersed offsite. The results of the report summary claim to "clearly indicate the presence of enriched uranium, originating from the NFS, in water and sediment samples." The report summary uses ratios of U-235 to U-238 as "signatures" of the presence of HEU derived from NFS. The measurements were obtained using mass spectrometry methods. The report summary stated that although "the total quantities of NFS-derived U present in the environment is [sic] an important concern, these data and interpretations thereof are beyond the scope of this interim report." The report summary makes the assertion that ratios of U-235 to U-238 can be used to determine the origin of uranium in water and that, if the ratio is higher than published values, then the origin is the NFS plant. The only data reflecting the concentration of uranium in the samples was "No evidence to date indicates any U concentrations exceeding 30 µg/L (the drinking water standard set by US EPA) in any surface or tap water samples."*

NFS is permitted to discharge wastewater into the Nolichucky River as long as radioactive contaminant concentrations are below regulatory limits for the radionuclide. The limits are defined in 10 CFR Part 20 Appendix B. This regulation limits the concentration of U-235 that may be released in liquid effluents. The limit is independent of how much the uranium is enriched in the U-235 isotope. The NRC staff considers that effluents with radionuclide concentrations below the 10 CFR Part 20 regulatory limits are protective of public health. The NRC staff will consider the full report when it is made available.

No changes were made to the EA in response to these comments.

B.5.13 Editorial

Comment 17-09

One commenter requested that the EA include stack and outfall locations on existing maps and provide annual release data for each location instead of the cumulative annual release.

***Response**: Figure 2-1 of the EA has been revised to include the approximate location of the outfall. However, the precise locations of individual stacks and individually labeled buildings on the NFS site are considered sensitive, security-related information because it would be useful to an adversary planning an attack. Therefore, that site-specific information is not included in any public document.*

Comments 19-22, 28-10, and 30-10

Three of the commenters identified that the tables in the Appendix were incorrectly labeled "Nuclear Field Services" due to a typographical error.

***Response**: The commenters are correct. The tables in Appendix A to the draft EA did contain a typographical error. The table titles were corrected to read "Nuclear Fuel Services."*

Comments 19-23 and 31-24

Two commenters stated that the caption on Table 2-5 of the EA was misleading because effluents travel to offsite communities and should not be represented as "Effluents at the NFS Site."

***Response**: In the title of Table 2-5 of the EA, the NRC staff was referencing the release point of effluents from NFS. The titles to Tables 2-5 and 3-14 of the EA were revised for clarity to distinguish that the radionuclides identified in the two tables are found in effluents discharged from the NFS site.*

Comment 25-20

One commenter stated that the EA should state that "continuing operations are expected to generate effluents to water" to be consistent with a similar statement for airborne effluents.

***Response**: NRC staff disagrees with the commenter's statement. The text of the EA in Section 2.3.1 of the EA stated that "Under the proposed action, continuing operations would be expected to generate airborne effluents." The text in Section 2.3.2 of the EA stated that "Effluents to water are expected to be generated under the proposed action." The NRC staff has determined that, although the sentence structure differs between the two statements, they convey an equivalent meaning.*

No changes were made to the EA in response to this comment.

Comment 28-05

One commenter identified two tables that were mislabeled in the draft EA. On page 3-29, Tables 3-12 and 3-13 of the draft EA are incorrectly stated to show the non-radiological contaminants emitted into water; however, Table 3-12 of the draft EA instead summarizes time-lost and incident rates for facility workers, and Table 3-13 of the draft EA instead summarizes the radionuclides at all effluent sites, not water alone.

***Response**: The commenter is correct. Tables 3-12 and 3-13 of the draft EA were incorrectly referenced. Tables 2-2 and 2-3 should have been referenced instead. This typographical error has been corrected in the EA.*

Comment 30-07

One commenter requested that the EA delineate between the two USGS quadrangle maps in Appendix A, Table 5. The commenter also requested that the EA include non-endangered species in the tables and provided examples of the species to be included.

***Response**: Appendix A, Table 5 of the draft EA was revised to identify which quadrangle map was associated with the rare, threatened, or endangered species. This table has been incorporated into Section 3.7.2 of the EA. Additional information on endangered species by quadrangle for the State of Tennessee can be found at* http://tn.gov/environment/na/ *pdf/quad.pdf.*

Tables 1 through 4 in Appendix A to the EA list non-endangered species known to be present around NFS. The NRC staff recognizes that the list is not exhaustive. Expanding the list to be inclusive of all species that occur in the region would require a significant amount of space in the EA, but would not affect the conclusion that the proposed action would not have a significant effect on the quality of the human environment.

Section 3.7.2 and Appendix A of the EA was revised in response to this comment.

Comments 31-22 and 31-35

One commenter stated that discussion of surface runoff and flow on page 3-13 of the draft EA and in the TDEC permit contradicted a corresponding discussion on page 2-4 of the draft EA. The commenter also stated that page 4-7 of the draft EA mentioned Section 4.11, but that section could not be found in the EA.

***Response**: Page 2-4 of the draft EA states that surface runoff water flows first into Banner Spring Branch then into other bodies of water, and finally into the Nolichucky River. Similarly, page 3-13 of the draft EA states that Banner Spring Branch drains into Martin Creek and that Martin Creek drains into North Indian Creek and ultimately into the Nolichucky River. The NRC staff has determined that the statements on the two pages are consistent. The NRC staff does note, however, that the 2011 USGS Erwin quadrangle map shows that Martin Creek flows directly into the Nolichucky River (USGS, 2011). Sections 2.3.2 and 3.5.1 of the EA have been revised to reflect this information.*

Page 4-7 of the draft EA refers the reader to Section 4.11 for a discussion of the potential impacts of radiological air emissions. Section 4.11, Public and Occupational Health, begins on page 4-14 and the discussion of potential impacts of radiological air emissions is provided on page 4-15. NRC staff has therefore determined that the reference on page 4-7 to Section 4.11 is correct.

The EA was revised as discussed in this response.

Comment T39-04

One commenter stated that the NRC makes the EA complicated for the public and cited the table on page 2-8 (Table 2-5 of the draft EA). The commenter stated that the EA did not spell it out for people.

***Response**: Table 2-5 in the draft EA contained a list of radionuclides and a check mark indicating if the radionuclide is monitored in air, water, or both.*

Table 2-5 of the EA was revised in response to this comment to provide the regulatory limits from 10 CFR Part 20, Appendix B, for each of the identified radionuclides.

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