APPENDIX A

RESCOPING SUMMARY REPORT

This appendix presents the Rescoping Summary Report that was prepared following a public rescoping meeting held on May 13, 2003, in Gore, Oklahoma. Questions on this report can be directed to Allen Fetter, U.S. NRC, Office of Federal and State Materials and Environmental Management Programs.[1]

[1] The following report has been reproduced from the best available copy.

DOCKET NO.: 40-8027

Environmental Impact Statement Rescoping Process

Rescoping Summary Report

Reclamation of the Sequoyah Fuels Corporation Uranium Conversion Facility

Gore, Oklahoma

November, 2003

U.S. Nuclear Regulatory Commission
Rockville, Maryland

1. INTRODUCTION

The Sequoyah Fuels Corporation (SFC) owns a uranium-conversion facility located near Gore, Oklahoma. In 1993, the SFC ceased its operations and notified the U.S. Nuclear Regulatory Commission (NRC) that it would pursue decommissioning of the facility. Subsequently, under Subpart E to Part 20 of Title 10 (10 CFR Part 20), the SFC conducted site characterization studies and submitted a "Final Decommissioning Alternatives Study Report" to the NRC that identifies several alternatives for SFC site reclamation. In 1999, the SFC submitted a Decommissioning Plan to the NRC. In this plan, the SFC proposed that the hazardous chemicals and radioactively contaminated material at the SFC facility be consolidated in an onsite-disposal cell. In addition, the SFC proposed that the remaining land and buildings be decontaminated, the NRC license be terminated, and sections of the property be released under restricted and unrestricted conditions.

In January 2001, the SFC requested that the NRC review whether solvent extraction process wastes could be designated as 11e.(2) byproduct material as defined in Section 11e.(2) of the *Atomic Energy Act of 1954* (AEA). A benefit of designating the wastes as 11e.(2) byproduct material is that either the U.S. Department of Energy (DOE) or the State of Oklahoma would provide the long-term custodial care for the site. In July 2002, the NRC concluded that those wastes, which comprise most of the waste at the site, could be classified as 11e.(2) material. On December 11, 2002, in response to the SFC's request[1], the NRC amended the Source Materials License SUB-1010 to authorize the SFC to possess 11e.(2) byproduct material as defined in Section 11e.(2) of the AEA[2].

The reclassification of the waste at the SFC facility transferred the regulatory oversight of the site remediation from the license termination requirements of Subpart E, 10 CFR Part 20 to the uranium mill tailings requirements of Appendix A of 10 CFR Part 40. This shift in regulatory oversight required the SFC to withdraw its Decommissioning Plan and submit, instead, a Reclamation Plan for the SFC site in January 2003. The Reclamation Plan is a requirement of Appendix A of 10 CFR Part 40, and it delineates remediation and corrective actions planned for the site. On June 12, 2003, the SFC submitted its Ground-Water Monitoring Plan to the NRC that describes the existing ground-water conditions at the site and the SFC proposed monitoring program. The Ground-Water Corrective Action Plan was submitted to the NRC in June 2003 and details the SFC strategy to remediate ground-water resources at the site.

The SFC's proposed remediation alternative continues to be an onsite-disposal cell with an engineering design similar to that previously proposed under the10 CFR Part 20 Subpart E

[1] J.H. Ellis, Sequoyah Fuels Corporation, letter to L.W. Camper, USNRC, September 30, 2002.

[2] D.M. Gillen, USNRC, letter to J.H. Ellis, Sequoyah Fuels Corporation, December 11, 2002.

process. The State of Oklahoma would provide long-term custodial care of the site, if it chose to, but DOE would be required to assume this responsibility should the State decline the role of custodian. The SFC plans to place both the 11e.(2) materials, which constitute the majority of the wastes at the site, and non-11e.(2) materials in the proposed cell. As part of its Reclamation Plan, the SFC has addressed the eight criteria of NRC Regulatory Issue Summary (RIS) 2000-23, dated November 30, 2000, for disposing non-11e.(2) material wastes in tailings impoundments. The SFC attempted to demonstrate consistency and compliance with these criteria; for this reason, the SFC made no distinction between the 11e.(2) materials and non-11e.(2) materials in the Reclamation Plan.

The NRC is preparing an environmental impact statement (EIS) on the proposed SFC site reclamation as part of its decisionmaking process. In addition to the EIS, the NRC is preparing a Technical Evaluation Report (TER) to address safety aspects of the SFC site and reclamation activities.

The NRC, the U.S. Environmental Protection Agency (EPA), the U.S. Army Corps of Engineers (ACE), the U.S. Geological Survey (USGS), the Oklahoma Department of Environmental Quality (ODEQ), and the Cherokee Nation have an interest in the proposed reclamation of the SFC site. Because the interests of these agencies are interrelated on this project, the EPA, the ACE, the USGS, the ODEQ, and the Cherokee Nation have agreed to cooperate with the NRC in the preparation of a single EIS. Although the NRC is the lead agency in the preparation of this EIS, all the cooperating agencies are involved in its development and review. The preparation of a single EIS results in more efficient use of Federal resources.

The main purpose of the proposed action is to ensure that SFC has acceptably demonstrated to the NRC that the closure and the reclamation of the SFC site, as an 11e.(2) byproduct material site, meets the performance standards and regulatory requirements of Appendix A of 10 CFR Part 40. The performance standards in Appendix A include: 1) isolation of the waste materials in a manner that protects human health and the environment, 2) reduction of the rate of radon emanating from the cover to an average of 20 pCi/square meter-second or less, 3) effectiveness of the reclamation for a long period of time (200 to 1,000 years), and 4) minimal reliance on active maintenance.

The NRC's regulations in 10 CFR Part 51 contain requirements for conducting a scoping process prior to preparation of an EIS. On October 20, 1995, the NRC published in the *Federal Register* (60 FR 54260) a Notice of Intent (NOI) to prepare an EIS for the proposed decommissioning of the SFC facility and to conduct scoping for the EIS. At that time, the NRC regulatory oversight for the site decommissioning activities was the license termination requirements (10 CFR Part 20, Subpart E). For the scoping process, the NOI invited written comments on the proposed action, announced a public scoping meeting to be held regarding the project, offered a proposed outline for the EIS, and discussed the alternatives considered. On November 15, 1995, the NRC held a public scoping meeting in Gore, Oklahoma.

Since 1993, the SFC has informed the public of its plans and gained input from potentially affected parties through its public outreach program. The SFC presented the proposed decommissioning approach in over 35 presentations, several public meetings, and site tours. In addition, the SFC distributed an information paper to the community, incorporated the public comments in the decommissioning plan, and submitted a Decommissioning Alternatives Study, a Site Characterization Report, and a Decommissioning Plan.

On June 9, 1999, the NRC published a *Federal Register* Notice stating its consideration of a license amendment request to authorize decommissioning at the SFC facility. On October 17, 2000, the NRC staff and its consultant, Advanced Technologies and Laboratories International, Inc. (ATL), visited the site and held a public meeting to update the public on the progress of the EIS and obtain additional comments on issues related to the decommissioning of the facility.

Following the NRC's 2002 reclassification of waste at the SFC facility as 11e.(2) byproduct material and transfer of the NRC regulatory oversight to Appendix A of 10 CFR Part 40, the NRC published another *Federal Register* Notice (68 FR 20033, April 23, 2003) for a rescoping meeting. On May 13, 2003, the NRC held a public rescoping meeting in Gore, Oklahoma. This meeting was part of the continuing process to keep affected stakeholders and the public informed of plans, schedules, and milestones affecting the SFC corrective action. The objectives of the meeting were to inform interested parties and the public of the changes in classification of materials at the SFC facility, discuss the reclamation of 11e.(2) byproduct material sites, define the DEIS schedule, and conduct a rescoping session for the draft EIS (DEIS). The main subject discussed during the rescoping part of the meeting was the shift in regulatory oversight of the SFC and its effect on the DEIS. The NRC conducted this meeting to complement the previous scoping and public outreach meetings held in Gore on November 15, 1995, and October 17, 2000, respectively.

Since the license amendment was granted, SFC has submitted updated documents to NRC in 2003, including a groundwater corrective action plan and a site reclamation plan. These reports are currently being reviewed by the NRC for technical merit.

Section 2 of this report summarizes the comments and concerns raised by the meeting attendees concerning the development of the DEIS and any associated concerns that may not have been addressed in the NRC's initial scoping process. Section 3 identifies the issues the DEIS will address and those issues that are not within the scope of the DEIS. Where appropriate, Section 3 identifies other places in the decisionmaking process where issues that are outside the scope of the DEIS may be considered.

2. ISSUES RAISED DURING THE SCOPING PROCESS

2.1 OVERVIEW

A total of 36 individuals attended the May 13, 2003, public rescoping meeting. During the meeting, eight individuals offered comments concerning the reclamation activities at the SFC uranium conversion facility and the development of the DEIS. Of these eight commenters, one represented a sovereign Indian tribe and the remaining seven spoke on behalf of other organizations or as private citizens. In addition, 15 written statements from various individuals were received during the public rescoping period. Most of these submissions were written statements or summaries of the verbal testimony. This active participation by the public in the rescoping process is an important component of determining the major issues that the DEIS should assess.

Individuals providing oral and written comments addressed several subject areas related to the SFC facility reclamation and the DEIS development. The comments received during the course of the rescoping meeting were categorized into the following general topics:

- Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) concerns.
- Accountability.
- Ground-water impacts.
- Cost of remediation.
- Ownership of site.
- Expansion of waste on the site.
- Reclassification of waste.
- Onsite disposal cell.
- Disposal options.
- Endangered species.
- Cherokee Nation involvement and concerns.
- Earthquake risk.
- Post-reclamation risk assessment.
- DEIS and rescoping process.

Written comments received during the rescoping period following the public rescoping meeting were categorized into the following general topics:

- Site Specific Advisory Board.
- Draft Environmental Impact Statement.
- Regulation concerns.

Attachment A to this report lists the commenters and, on the basis of the topics above, shows the subject areas covered by their comments. Note that Attachment A lists only the comments received (i.e., within or outside of the scope of this report) during the rescoping

meeting.

Section 2.2 summarizes the oral and written comments received during the public rescoping meeting and public rescoping period. Most of the issues raised have a direct bearing on the analysis of potential environmental impacts and the NRC's related decisionmaking process.

2.2 SUMMARY OF ISSUES RAISED

Following their presentations at the public rescoping meeting, NRC representatives asked the members of the public to provide comments on the DEIS that would be recorded. These comments, both oral and written, have been consolidated and categorized by topic areas.

2.2.1 UMTRCA Concerns

A commenter stated that 24 other UMTRCA sites have been completed in the United States within the past 10 to 15 years and a pool of knowledge should be available about disposal cells concerning (1) their stability and integrity, and (2) both the expected and unanticipated problems that may have occurred. The commenter encouraged the NRC to extract this information from previous experience and compare it to what is being done at the SFC site to head off any future problems.

Another commenter expressed concern that the UMTRCA regulations may not be a good fit to the SFC site due to differences in uranium contamination at mill sites compared to the SFC site. The commenter requested that the NRC require a more protective uranium soil criterion.

A commenter indicated concern about the EPA's role under an UMTRCA reclamation and questioned whether all of the criteria that apply to UMTRCA sites apply to the SFC site.

2.2.2 Accountability

A commenter asked who will be held accountable for unforeseen problems that may arise at the SFC site.

Another commenter expressed concern about accountability in the event that contamination migrates from the restricted portion to the unrestricted portion of the site.

2.2.3 Ground-Water Impacts

Several commenters expressed concerns about the impacts to ground-water resulting from proposed reclamation at the SFC facility. One commenter suggested that a leak in the proposed cell would severely impact the ground-water, and cleanup would be almost impossible if the contaminants leak into water wells, ground-water, and the waters of the Arkansas and

Illinois Rivers.

Another commenter noted the close proximity of the proposed disposal cell to the ground-water table and worried that the site has not been properly characterized. The same commenter recommended a full characterization of deep groundwater and stated that new information about ground-water contamination on the site needs to be integrated into the site reclamation plan. This information is related to sand and gravel fill under the process area and along buried lines on the site that could provide conduit paths for movement of contaminated groundwater through and possibly off the site.

A few commenters expressed concern about well contamination. One commenter stated that the reclamation plan should specify that public water wells in the area be tested at least two times per year (i.e., in the rainy and drought seasons) for hazardous constituent levels in the ground-water. Another commenter noted that deep groundwater monitoring wells were plugged after they "became contaminated," and that mostly shallow wells currently exist to characterize groundwater contamination.

Another commenter expressed concern about uranium seepage from the Kerr-McGee deep injection test well. One commenter noted that conflicting opinions about what contaminants were put into the deep injection well may require testing in the deep aquifer to determine whether there is contamination.

One commenter noted that a drop in the initial pressure at which the 26 million gallons of waste were contained in the injection well indicates that the waste has migrated. One commenter felt that the budget for the ground-water remediation plan seems very low and appears to amount to little more than a monitoring program rather than actual remediation.

A commenter asked when the full ground-water corrective plan will be available and what the NRC will require to be included in the plan.

2.2.4 Cost of Remediation

Commenters indicated various concerns about the potential cost of remediation of the SFC site. One commenter felt that the lack of available funds will be the driving factor in deciding what sort of reclamation is performed rather than what is best for the communities in the immediate vicinity of the SFC site.

Another commenter suggested that Kerr-McGee, original owner and licensee of the SFC facility, should be held responsible for the cleanup at the SFC site due to a statement made to the *Sequoyah County Times* on December 9, 1984. The commenter also stated that, in 1965, Kerr-McGee was required to deposit $200 million for cleanup, and that money was available at one time to carry out this operation. The commenter added that the NRC has already given that money back.

A commenter expressed concern that the "astronomical" cost of the site cleanup will deplete the funds available for proper cleanup, and that the resultant economic impact for the future will leave the area and cities downstream both fiscally deprived and contaminated. The commenter added that the SFC "gets off the hook" in the case that any migrating contamination is discovered on the site, and the taxpayer will be stuck with paying for whatever cleanup has to occur.

One commenter stated that the site should be cleaned up, regardless of the cost, to protect future generations. Another commenter expressed concern that offsite disposal will be considered as an option even though it would cost several times the available budget. Another commenter stated that NRC needs to assess what is the right thing to do environmentally within the financial capacity that currently exists for reclamation on the SFC site.

2.2.5 Ownership of the Site

A commenter expressed concern over the issue of subsurface rights following reclamation of the SFC site. Within the amendment, it is not clear how much of the land DOE would own after it takes ownership for long-term stewardship under the provisions of Title 2 under the Atomic Energy Act. The same commenter also indicated concern about future contaminant migration from the restricted to unrestricted portions of the site. The commenter wanted to know who would be responsible if such migration occurred, and was especially concerned about the proximity of the unrestricted area to the disposal cell.

2.2.6 Expansion of Waste on the Site

Two commenters were concerned that DOE would be able to expand the waste site and bring in more waste (up to 20 percent additional waste) from other locations. One commenter requested clarification on this issue, and expressed concern that the public would not have a right to object. Another commenter expressed concern for "imported wastes" (i.e., fly-ash) that are proposed to be brought into the site and mixed with the onsite waste to solidify it. The same commenter also indicated concern that "bootlegged" waste (i.e., hazardous material prohibited from being in a 11.e(2) disposal cell) would be brought in.

A commenter stated that tribal "lifeways" (i.e., water wells, streams, lakes, and other sources of ground-water affecting tribes) should be evaluated in the environmental review and that no contamination from outside the site should be placed in the proposed onsite cell.

2.2.7 Reclassification of Waste

A commenter noted that, upon the change from SFC's previous permit status to the current status (which authorizes possession of 11e.(2) byproduct material), the dose level to be used changes from that of the exposure level of radium 226, thorium 230, and uranium (due to uranium conversion) to that of the exposure level of only radon. The same commenter suggested that the exposure level to the public will be lessened under UMTRCA regulations,

and that this reclassification will be misleading to future generations because DOE will own the site and the public will not have the money to fight or sue for health and environmental damages. The commenter also noted that the NRC made a ruling on a change of classification (i.e., reclassification from processing to mill tailings for the SFC) prior to the end of the public comment period, and this change of classification could set a precedent.

Another commenter requested clarification as to what soil cleanup standards would apply under UMTRCA and to what constituents. The commenter was specifically concerned about standards that apply to uranium.

2.2.8 Onsite Disposal Cell

A number of commenters expressed concern and made recommendations about the proposed onsite disposal cell on the SFC site. One commenter recommended that, due to the possibility that hazardous constituents disposed of in the onsite disposal cell could have a half-life of millions of years, consideration be given for the possibility that the river could change course over time and impact the disposal cell. The same commenter also recommended that the more hazardous material be taken offsite and not disposed of in the onsite disposal cell.

Another commenter recommended that the reclamation plan look into the idea of incorporating multiple retrievable cells in the main disposal cell. In the case of cell leakage, this would enable parts of the cells that are leaking to be retrieved and removed to a place out of the ground-water table. The same commenter recommended that a lower ground-water sampling system be developed to help detect leaks in the disposal cell. In addition, the commenter suggested that a good liner of some kind be used in the disposal cell other than the compacted clay liner "that has leaked in pond 2 at this cell" and is "still leaking." The commenter also suggested that a "buffer zone" be designated (i.e., a restricted area around the disposal cell site that extends the restricted area in the case of a leak) and that "some type of vitrification system" be developed to ensure the "more contaminated materials" (i.e., the radium and thorium and the raffinate sludges) in the disposal cell cannot leach into the ground-water.

A commenter expressed concern that high concentrations of uranium products constitute a high-risk level that "calls for 20 [feet] of concrete entombment, not 4 feet of clay." Another commenter indicated his concern about the mixing of waste in disposal and suggested that barium, thorium, arsenic, and the heavy metals be separated from one another and the radiological waste in individual cells within the larger disposal cell.

A commenter requested to see a written report from the NRC on the performance of UMTRCA sites that were built in similar climates to Eastern Oklahoma (e.g., high rainfall). The same commenter pointed out the inadequacy of the plan for the liner under the cell and recommended that a plan be developed to monitor water leakage from the cell into the soil and ground-water adjacent to the cell. In addition, the commenter expressed concern that the planned vegetation on the cell cover will be incapable of absorbing the entire water load in the

time-frame of a downpour, the incline of the sides of the cell will present an excessive risk of erosion, and that safety of workers and the community may be at risk during construction of the disposal cell. The commenter also recommended a full assessment of the future possibility that the Illinois River could change course and pass through or nearer the disposal cell.

A commenter expressed concern about how liquid wastes on the site will be stabilized under the new 11e.(2) plan.

2.2.9 Disposal Options

A commenter suggested that the NRC consider in its assessment of the site a range of onsite options as was presented in the draft decommissioning plan rather than just one onsite option.

2.2.10 Endangered Species

A commenter noted that having open waterways on the SFC site endangers several animal species including the Gray Bat and the Indiana Bat.

2.2.11 Cherokee Nation Involvement and Concerns

A commenter expressed concern that the Cherokee Nation is the only tribe involved with the scoping process and asked whether the Cherokee Nation plans to submit its rescoping issues separately or at the current rescoping meeting.

Another commenter noted that the Cherokee Nation is involved and affirmed that the DEIS addresses the major environmental and socioeconomic concerns. The same commenter stated that the Cherokee Nation will provide its concerns in writing to the NRC on the DEIS and has provided its concerns to the NRC regarding the reclassification of materials on the site.

2.2.12 Earthquake Risk

Two commenters expressed concern for the risk of earthquakes. One commenter discussed the proximity of the Carlisle Fault within one mile of the site and the Warner Fault located within a half mile of the site.

2.2.13 Post-reclamation Risk Assessment

A commenter voiced concern that the post-reclamation risk assessment purposefully ignored exposure to radon, disturbance of the cell, and drinking water.

2.2.14 DEIS and Rescoping Process

A commenter asked for clarification concerning the deadline for turning in written

comments.

2.2.15 Site Specific Advisory Board

A commenter asked "about where the Site Specific Advisory Board idea stands for the SFC site."

2.2.16 Environmental Impact Statement (EIS)

A commenter asked about when the EIS will be released and how it will assess Environmental Justice impacts.

2.2.17 Transfer of Solid Materials Offiste

A commenter expressed concern over SFC's historical practice of releasing contaminated solid materials offsite for reuse. This comment was made in the context of the NRC's ongoing rulemaking for controlling the disposition of solid materials.

2.2.18 Regulation Concerns

A commenter requested that the EIS explicitly address what actions would be taken if the cost of the site cleanup were to exceed available private funds.

A commenter recommended that the NRC prohibit deregulation of all solid materials containing or contaminated with radiation that have been intentionally mined from the ground. The commenter stated that under no conditions should this contaminated material be dumped in unlicensed facilities that are not prepared to monitor for or contain radioactive waste.

Another commenter expressed concern about the current position of the State of Oklahoma and how their actions will affect this plan.

3. SUMMARY AND CONCLUSIONS

3.1 SCOPE OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

To a large extent, the general content of an EIS prepared by NRC is prescribed by the National Environmental Policy Act (NEPA) (Public Law 91-90, as amended), NRC's regulations for compliance with NEPA (10 CFR Part 51), and guidance provided by the Council on Environmental Quality regulations (40 CFR Parts 1500-1508). These regulations broadly define the areas that must be considered in the assessment of potential impacts resulting from a proposed action and its alternatives. The scoping process summarized in this report (as well as previously-held scoping processes on this issue) helped to identify and refine the project-specific issues that warrant consideration in the DEIS.

The NRC identified reasonable alternatives to the proposed action during scoping and review of the licensee's submittals. The scope of the DEIS includes consideration of both radiological and nonradiological (including chemical) impacts associated with the proposed action and the reasonable alternatives. The DEIS also identifies necessary monitoring, potential mitigation measures, unavoidable adverse environmental impacts, economic impacts, the relationship between short-term uses of the environment and long-term productivity, and irreversible and irretrievable commitments of resources. In addition, it identifies several issues that could result in significant short- or long-term impacts.

3.2 ISSUES OUTSIDE THE SCOPE OF THE DEIS

Most of the comments received were within the scope of the DEIS and relate to issues that will be analyzed in-depth in the document. Potential comments that are considered out-of-scope for the DEIS involved technical issues related to Appendix A of 10 CFR Part 40 (e.g., financial responsibility, legal issues) and are more directly addressed in that context. Other comments addressed the regulatory process and jurisdiction (e.g., re-classification to 11e.(2) byproduct material, petitions for hearing, etc.). Although such issues may be analyzed in the DEIS as part of the proposed action and alternatives assessments, decisions concerning these issues are not made within the realm of the DEIS. Concerns about the roles of other parties (e.g., Oklahoma, Cherokee Nation) are, likewise, not resolved through the DEIS process.

As indicated above, some issues raised during the scoping process may be analyzed in the TER. The DEIS and the TER are related in that they may cover the same topics and may contain similar information, but the analysis in the DEIS is limited to an assessment of potential environmental impacts. In contrast, the TER primarily deals with safety evaluations and procedural requirements or license conditions to ensure the health and safety of workers and the general public.

The NRC has made a determination that some issues are associated with small or no impacts. For this reason, these issues are not considered to be of high priority among the

proposed alternatives and will not be addressed in detail in the DEIS. They include: socioeconomic impacts during reclamation, impacts to historical and cultural resources, environmental justice issues, air quality impacts, noise, impacts to ecological resources, aesthetics issues, mineral resource issues, and cost.

Comment Subject Areas by Commenter
Oral Comments

Attachment A

Commenter/Affiliation	UMTRCA Past	Ground-Water Impacts	Remediation Cost	Site Ownership	Expansion of Waste	Reclassification of Waste	Onsite Disposal Cell	Disposal Options	Endangered Species	Cherokee Nation Concerns	Post-Reclamation Assessment	Earthquake Risk	Deregulation of Waste
Oral Comments													
Doug Brugge/Citizen	✓	✓	✓		✓		✓	✓			✓		
Don Carroll Laster/Citizen		✓	✓				✓					✓	
Nadine Barton/Citizens Action for a Safe Environment		✓	✓	✓	✓	✓	✓						
Ed Henshaw/Citizen		✓			✓		✓						
Jessie Collins/Citizen									✓	✓			
Pat Gwin/Cherokee Nation										✓			
Patricia Ballard/Nuclear Risk Management for Native American Communities							✓						
Kathy Carter-White/ ecoLaw Institute Staff Attorney													✓

Attachment A

APPENDIX B

ISSUES ELIMINATED FROM DETAILED STUDY

B. ISSUES ELIMINATED FROM DETAILED STUDY

The NRC has determined that detailed analysis of several issues is unnecessary because, after examination, they were found to have small impacts and were not considered to be potential discriminators among the proposed action and the reasonable alternatives. These issues and any associated impacts are discussed in this appendix.

B.1 Cultural Resources

B.1.1 Legislative Environment

The 1966 National Historic Preservation Act (NHPA) (Public Law 89-665, as amended by Public Law 96-515; 16 USC 470 *et seq*.) provides for the establishment of the National Register of Historic Places (NRHP) to include districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture. Section 106 of the Act requires that federal agencies with jurisdiction over a proposed federal project take into account the effect of the undertaking on cultural resources listed, or eligible for listing, in the NRHP, and afford the State Historic Preservation Officers (SHPOs) and the Advisory Council on Historic Preservation (ACHP) an opportunity to comment with regard to the undertaking. (In Oklahoma, the role of the SHPO is fulfilled by the Oklahoma Historical Society [OHS].) The NRHP eligibility criteria have been defined by the Secretary of the Interior's Standards for Evaluation (36 CFR 60).

Cultural resources are considered to be NRHP-eligible if they display the quality of significance in American history, architecture, archaeology, engineering, and culture that are present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, workmanship, feeling, and association, and:

- Criterion A: are associated with the events that have made a significant contribution to the broad patterns of American history; or
- Criterion B: are associated with the lives of persons significant in our past; or
- Criterion C: embody the distinctive characteristic of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic value, or that represent a significant or distinguishable entity whose components may lack individual distinction; or
- Criterion D: have yielded or may likely yield information important in prehistory or history.

The process of agency reviews and assessment of the effect of an undertaking on cultural resources is set forth in the implementing regulations formulated by the ACHP (36 CFR 800, Protection of Historic Properties). In addition, other laws and guidelines are applicable to cultural resource management on federal projects. These laws and guidelines include the following:

- Executive Order 11593: Protection and Enhancement of Cultural Environment (16 USC 470 [Supp. 1, 1971]);

- Native American Graves Protection and Repatriation Act (Public Law 101-601; USC 3001-3013);
- Determination of Eligibility for Inclusion in the National Register (36 CFR 63); and
- Recovery of Scientific, Prehistoric, and Archaeological Data (36 CFR 66).

In addition, Section 101(d)(6)(B) of the 1966 NHPA requires federal agencies to consult with Native American groups that have traditional cultural interest in areas of proposed federal projects in the course of government-to-government undertakings.

B.1.2 Affected Environment

This section provides a brief review of the history of the local area surrounding the SFC site and an evaluation of the potential presence of cultural resources at the site.

B.1.2.1 Prehistoric and Historic Background

The following chronology of the cultural history of the area surrounding the SFC facility is derived from Wallis (Wallis 1974) and is summarized below in Table B.1-1. Wallis draws upon three main cultural resource projects within 24 kilometers (15 miles) of the SFC site. Surveys of the Lake Tenkiller area were made during the 1940s and 1970s by the University of Oklahoma and the Oklahoma River Basin Survey; in 1965 and 1966, work was conducted on the Webbers Falls Lock and Dam Project by the Oklahoma River Basin Survey; and from 1966 to 1969, excavations were conducted by the Oklahoma River Basin Survey for the Robert S. Kerr Reservoir on the Arkansas River.

Table B.1-1 Chronological Framework for the SFC Facility Area

Occupation	Time Period
Paleo-Indian	7,000 B.C. – 3,000 B.C.
Archaic	3,000 B.C. – 1,500 B.C.
Transitional (Woodland)	1,500 B.C. – A.D. 500
Late Prehistoric (Caddoan)	A.D. 500 – 1500
Historic	A.D. 1500 – present

Source: Wallis, 1974

The Paleo-Indian period was characterized by small bands of hunter-gatherers who used distinctive spear points and hunted a variety of now-extinct mammals. The Archaic period witnessed the emergence of hunting-gathering adaptation, with a greater emphasis on vegetative and aquatic resources. Diagnostic artifacts are dart points and other tools not present at earlier sites. The Woodland, or Transitional, period is characterized by the introduction of horticulture, pottery, the bow and arrow, and rock mounds. The Late Prehistoric, or Caddoan, period is characterized by semi-permanent villages along major river valleys, large burial and temple mounds, and diversified tool kits. The Historic period witnessed large-scale forced resettlement of Indians from their traditional lands to Oklahoma (Wallis, 1974).

In 1541, Francisco Vasquez de Coronado entered the area now known as Oklahoma in search of gold. Various Caddoan peoples and at least three major Indian language groups were present in the area at that time. In the 1700s, the Comanches and Kiowas migrated south to Oklahoma. Spanish control of the area lasted until 1800, when it passed to the French, who had established trading posts and settlements in Oklahoma during the 1700s and 1800s (ODL, 2006; Britannica Concise Encyclopedia, 2006).

In 1803, the Louisiana Purchase brought the area under the control of the United States. In 1823 a Cherokee named Sequoyah (also known as George Gist) came to Oklahoma from the southern Appalachian Mountains and settled between Fort Smith and Fort Gibson. He set up a prosperous blacksmith shop and salt works and was actively involved in the politics between the U.S. government and the area, which by then was known as the Indian Territory (Davis, 1930). His cabin, which is 40 kilometers (25 miles) east of the SFC site, is listed in the NRHP and with the National Park Service as a National Historic Landmark. In 1828, Congress reserved the Indian Territory for settlement by Native Americans, and a group of more than 2,000 Cherokee moved to the area and set up their western capital at Telonteeska. The site of this capital is listed as a location of interest by the OHS. In 1838, about 16,000 Cherokee were forced out of their homes in Georgia and Tennessee and walked the "Trail of Tears" to Oklahoma, during which 4,000 died.

Waves of white immigrants began passing through Oklahoma with the establishment of military roads in 1825. Settlement was further opened when railroads were built in the area in the 1880s. In 1890, the western part of the state was reorganized as the Oklahoma Territory. In 1907, the Indian Territory was merged with the Oklahoma Territory to become the State of Oklahoma (Foreman, 1925).

Cotton, wheat, and corn farming, along with the cattle industry, became important parts of the economy of the early twentieth century in Oklahoma, and an oil boom encouraged economic development. World War I increased the demand for agricultural products, but recurrent drought, overgrazing, and overplanting led to a decrease in agricultural productivity and resulted in abandonment of unproductive farms during the "Dust Bowl" in the 1930s. Ambitious state and federal programs for water conservation led to the building of the Tenkiller Dam (1940s and 1950s) and the Kerr Dam (1970s), which improved agricultural conditions (Britannica Concise Encyclopedia, 2006).

B.1.2.2 Known Cultural Resources within the SFC Site

Due to its location on a high terrace overlooking a major river and because there are other prehistoric resources in the general area (Wallis, 1974), the SFC site is considered to have a high potential for prehistoric resources (OAS, 2000). However, during the construction and subsequent operation of the SFC facility, the site sustained extensive disturbance, particularly the integrity of its surficial soils with consequent effects on prehistoric resources.

Historic cultural resources were also affected by the construction of the SFC facility. The Carlile House, a way station for a stagecoach route between Fort Smith and Fort Gibson, was originally located on the SFC site. This house was moved to a location on U.S. Route 64 near State Highway 10 during construction of the SFC facility, where it is currently preserved as a public

attraction (SFC, 1998). Based on consultations with the Oklahoma Archeological Survey (OAS), Oklahoma Historical Society (OHS), and the Cherokee Nation, no prehistoric or historic sites are known to currently exist on the property (see Appendix C).

B.1.3 Alternatives Analysis

B.1.3.1 Alternative 1: On-Site Disposal of Contaminated Materials (the Proposed Action)

Under this alternative, SFC would excavate contaminated wastes and soils, but due to the severe disturbance of the surficial soils during the construction of the SFC facility, it is expected that no archaeological resources would be discovered. There are no historic architectural resources at the SFC facility that would be affected by site reclamation activities.

In accordance with the Section 106 process, the NRC staff began consulting with OHS and OAS in 2000. Letters dated June 2, 2000, and June 15, 2000, from the NRC staff requested a determination from OHS and the OAS, respectively, as to whether any historic properties on or near the SFC site would be potentially affected by decommissioning activities (NRC, 2000a and 2000b). In letters dated June 20, 2000, and June 27, 2000, the OAS and OHS respectively determined that the SFC facility does not contain archaeological resources or historic properties (OAS, 2000 and OHS, 2000). On August 29, 2001, the Cherokee Nation indicated that there are no significant prehistoric or historic properties in the project area and voiced no objection to the proposed action. The Cherokee Nation requested to be notified if buried archaeological materials, including human remains and associated funerary objects, are inadvertently discovered during decommissioning of the site (Cherokee Nation, 2001).

In 2005 the NRC began considering a groundwater monitoring plan for the SFC site. In a letter dated June 27, 2005, the NRC initiated consultation with OHS, referred to the previous OHS determination, and requested concurrence with "no adverse effect" determination from the OHS (NRC, 2005). In a letter dated July 26, 2005, the OHS responded to the NRC's proposed groundwater monitoring plan. The OHS stated that no known historic properties would be affected within the area of potential effect for the project. OHS also recommended that the NRC contact the OAS to determine whether prehistoric resources are present within the project area (OHS, 2005).

In letters dated November 27, 2006, and November 28, 2006, the NRC initiated a third round of consultations with OAS and OHS regarding the proposed reclamation plan at SFC (NRC, 2006a; NRC, 2006b). The NRC stated that the proposed reclamation activities are similar in scope and extent to those of the earlier proposed actions of decommissioning and groundwater monitoring and referred to the earlier responses to the NRC from OAS (2000), OHS (2000), and the Cherokee Nation (Cherokee Nation, 2001). In letters dated December 20, 2006 (OHS), and March 28, 2007 (OAS), the OHS and OAS stated that no historic properties would be affected by the proposed reclamation. Therefore, the impact on cultural resources would be SMALL.

If cultural materials are identified during site reclamation, SFC has indicated that construction activities would be halted, the appropriate NRC official would be notified, and the OHS would be consulted (SFC, 2006). Similarly, if Native American human remains or funerary objects are

discovered during reclamation, all construction activities in the area of the discovery would be halted for up to 30 days, the appropriate NRC official would be notified, and steps would be initiated to comply with the requirements of the Native American Graves Protection and Repatriation Act.

B.1.3.2 Alternative 2: Off-site Disposal of All Contaminated Materials

Contaminated soil would be excavated during implementation of Alternative 2, but it is expected that no archaeological resources would be discovered at the facility because of the severe prior ground disturbance. In addition, there are no historic properties or archaeological resources at the SFC facility (OHS, 2006). In the course of the Section 106 process, the NRC, in consultation with the OHS, OAS, and the Cherokee Nation, has determined that implementation of this alternative would have no adverse effect on historic cultural resources. Therefore, the impact on cultural resources from reclamation activities on the SFC site would be SMALL.

As previously mentioned in Chapter 2, this alternative would require SFC to construct a railroad spur to connect to the major railroad line east of the site (see Figure 2.3-1). In letters dated March 19, 2007, to the OAS (NRC, 2007a) and the Cherokee Nation (NRC, 2007b), the NRC requested concurrence on the determination that there are no cultural resources on the property traversed by the rail spur. In a letter dated March 28, 2007, the OAS recommended that an archeological survey be conducted of the spur line route if the off-site alternative is chosen (OAS, 2007). In a letter dated April 11, 2007, the OHS concurred with the OAS (OHS, 2007).

If cultural materials are identified during site reclamation, all activities would be halted, the appropriate NRC official would be notified, and the OHS would be consulted. If Native American human remains or funerary objects are discovered during reclamation, all construction activities in the area of the discovery would be halted for up to 30 days, the appropriate NRC official would be notified, and steps would be initiated to comply with the requirements of the Native American Graves Protection and Repatriation Act.

B.1.3.3 Alternative 3: Partial Off-site Disposal of Contaminated Materials

Similar to Alternatives 1 and 2, contaminated soil would be excavated during implementation of Alternative 3, but it is expected that no archaeological resources would be discovered at the facility because of the severe prior ground disturbance. In addition, there are no historic or architectural properties at the SFC facility. In the course of the Section 106 process, the NRC, in consultation with the OHS and OAS, has determined that implementation of this alternative would have no adverse effect on cultural resources. Therefore, the impact on cultural resources would be SMALL.

If cultural materials are identified during site reclamation, all activities would be halted, the appropriate NRC official would be notified, and the OHS would be consulted. If Native American human remains or funerary objects are discovered during reclamation, all construction activities in the area of the discovery would be halted for up to 30 days, the appropriate NRC official would be notified, and steps would be initiated to comply with the requirements of the Native American Graves Protection and Repatriation Act.

B.1.3.4 No-Action Alternative

If no action were taken, SFC would maintain the site as it currently exists. The impacts on cultural resources from implementation of the no-action alternative would be SMALL.

B.2 Visual and Scenic Resources and Impacts

Visual and scenic resources comprise those features that relate to the overall impression a viewer receives of an area. The value of the affected setting is highly dependent on existing land use. Therefore, the evaluation of visual and scenic resources focuses on the visibility of the site and its facilities from various locations outside the site from which the facility is visible, and how that visibility will change.

B.2.1 Affected Visual Environment

The SFC site is an industrial facility on 243 hectares (600 acres) of land; however, only 81 hectares (200 acres) were used in industrial operations. The portions of the site not used in industrial operations have been leased to local ranchers for cattle and crop production. All of the site is surrounded by a mix of forest and pastureland on a rolling topography. The area can be characterized as rural. The waterways adjacent to or near the site (the Illinois and Arkansas rivers, including the Robert S. Kerr Reservoir) are used by the public for recreation. Significant visual elements in the study area primarily include roadways (State Highway 10, I-40, and U.S. Route 64) and views from the Arkansas and Illinois rivers.

Existing buildings are one, two, or three stories high and are constructed primarily with tan or light blue metal siding. Unlike the administrative building, few of the process buildings have windows, and they show signs of neglect and disrepair. A chain-link fence topped with barbed wire surrounds the Industrial Area. Stacks of dewatered raffinate sludge of about 3 to 6 meters (10 to 20 feet) high are covered with a black tarp on the south side of the Process Area. The Process Area and associated ponds and disposal areas are surrounded by grassy areas with a few small trees.

The SFC facility is visible from State Highway 10 and, to a lesser extent, from the I-40 bridge. From State Highway 10 on the east side of the site, the view toward the site is obstructed by changes in topography and earthen berms between the road and the site. Only power lines, fencing, and the DUF4 building are visible from this location. The administration building and other buildings along the southern perimeter of the site are visible from Highway 10 south of the site (see photos). Approximately 0.01 km (35 feet) of I-40 westbound has an unobstructed view of the southern perimeter of the site.

In summary, the SFC facility itself currently contrasts with the rural and natural character of the surrounding area.

B.2.2 Alternatives Analysis

The following sections describe the potential direct and indirect impacts on visual quality resulting from the implementation of the proposed action and its alternatives.

B.2.2.1 Alternative 1: On-site Disposal of Contaminated Materials (the Licensee's Proposed Action)

Under the proposed action, SFC would demolish site buildings and equipment, remove contaminated soil and sludges, and construct an on-site disposal cell. During construction, the

Southeast side of SFC Process Area from Highway 10

Looking northwest at Proposed Disposal Cell Area from Highway 10

Looking west at Proposed Disposal Cell Area from Highway 10

site and nearby roadways would experience an increase in traffic. The movement of heavy equipment on the site would generate dust and noise, and open earth might be visible to travelers on State Highway 10, U.S. Route 64, and I-40. However, construction-related activities would be temporary. Therefore, the direct and indirect visual and scenic impacts resulting from SFC conducting its reclamation activities and the constructing the disposal cell would only be short-term and SMALL.

Following completion of reclamation activities, the only structures that would remain on the SFC site would be the administration building and the electrical substation. The licensee's disposal cell would occupy 4 hectares (10 acres) of the former Industrial Area of the SFC site, rising to about 12 meters (40 feet) above the existing grade. The top of the disposal cell would slope at 5% and the sides would slope at 20%. The cap of the cell would be covered in topsoil and planted with native grassy vegetation. The disposal cell may be visible from State Highway 10, U.S. Route 64, and the I-40 bridge. However, after reclamation, the site would contain fewer structures and all exterior equipment and tanks would be removed, improving the visual quality of the site. In addition, the site would be revegetated and generally present a rolling and grassing hillside appearance and blend into the existing natural landscape, although the surrounding fence would be visible to passersby. The direct or indirect visual or scenic impacts with implementation of Alternative 1 would be SMALL.

B.2.2.2 Alternative 2: Off-site Disposal of All Contaminated Materials

Under this alternative, SFC would demolish existing buildings and remove waste materials from the SFC site as described above for Alternative 1. However, because all wastes would be entirely removed from the site, SFC would not construct a disposal cell. Instead, SFC would construct a railroad spur to connect with the major rail line east of the site (see Figure 2.3-1) and an on-site transfer facility to load soils, sludges, sediments, and construction debris into railroad gondola cars. During the construction period, construction-related activities at the east side of the property, including increased traffic, dust, noise and the movement of heavy equipment, would be visible to travelers along State Highway 10, U.S. Route 64, and I-40. The rail line

would not be visible from , U.S. Route 64, and I-40, and operations along this rail line would likely be obstructed from most views. It is unlikely that the rail spur or rail facility would be visible from the Arkansas or Illinois Rivers. Therefore, direct or indirect visual or scenic impacts would be SMALL.

Similar to Alternative 1, after SFC completes site reclamation, the site would contain fewer structures, and all existing exterior equipment and tanks would be removed. Following removal of the structures, equipment, and contaminated materials, SFC would backfill and place topsoil on all excavations, and revegetate the disturbed areas. The administration building and the electrical substation would be retained on the site following reclamation as would the railroad line and transfer facility. The visual quality of the site would remain industrial or commercial in nature. Therefore, direct or indirect visual or scenic impacts due to implementation of Alternative 2 would be SMALL.

B.2.2.3 Alternative 3: Partial Off-site Disposal of Contaminated Materials

Under this alternative, SFC would construct an on-site disposal cell similar to Alternative 1. In addition, a portion of the waste (3%) would be taken off-site, so it is possible that the on-site disposal cell would be slightly smaller. Waste materials not placed by SFC in the on-site disposal cell would be loaded onto trucks and shipped to an off-site disposal facility licensed to accept such materials.

Following reclamation, the administration building and electrical substation and disposal cell would be visible to travelers of the nearby highways. SFC would backfill and place topsoil on all excavations, and revegetate the disturbed areas. Similar to Alternative 1, the site would contain fewer structures after reclamation and all exterior equipment and tanks would be removed; however, the visual quality of the site would remain industrial in nature. Therefore, direct or indirect visual or scenic impacts due to implementation of Alternative 3 would be SMALL.

B.2.4 No-Action Alternative

Under the no-action alternative, SFC would not demolish buildings and equipment, and the visual quality of the site would remain industrial in nature. In the long-term, the existing buildings and equipment are likely to fall further into disrepair. This alternative would likely result in a continued reduction in the visual quality of the site. In the long-term, this would represent a MODERATE direct impact on visual and scenic resources.

B.3 Geology and Soils Resources and Impacts

This section provides a brief description of the regional and local geology, including bedrock and soil characteristics. Also discussed are the frequency, intensity, and history of earthquakes and active geologic processes. The literature reviewed while preparing this section included available geologic publications pertinent to the region or site (e.g., federal and state geological survey reports), contracted geologic studies, documents submitted by SFC to regulatory agencies, and reports prepared by the NRC staff.

As described in Chapter 1 of this EIS, the NRC process for reviewing the license application includes an examination of the ability of the proposed disposal cell to withstand geologic hazards. The discussion of geology in this section, however, is not intended to support a detailed safety analysis of the proposed disposal cell. The NRC staff has documented its analysis of hazards related to geology in their Safety Evaluation Report (NRC, 2005).

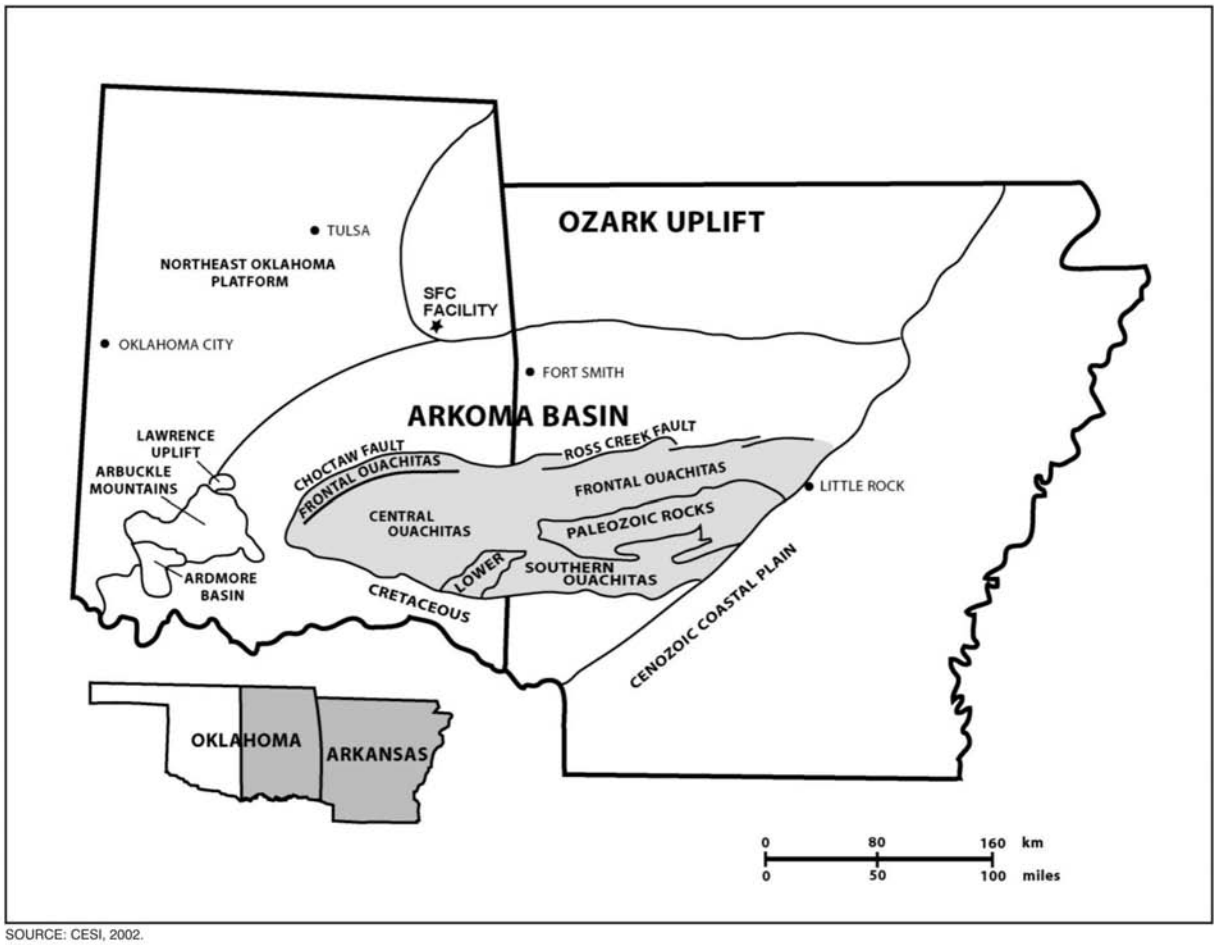
B.3.1 Affected Environment

B.3.1.1 Regional Geology, Structure, and Seismicity

The SFC site is located in the interior of the North American continent, near the boundary of three physiographic provinces (large-scale geologic features). The SFC site itself is located on the southwestern portion of a major geologic feature known as the Ozark Uplift (Luza and Lawson, 1981; Sutherland, 1988). Immediately to the south and west are two other major geologic features—the Arkoma Basin and Northeast Oklahoma Platform (see Figure B.3-1). The southwestern portion of the Ozark Uplift is characterized as generally gently dipping layers of sedimentary rock (cemented sediments). The Uplift has been and continues to be incised, or cut down, by streams, which expose the underlying bedrock. The bedrock in this region was deposited between 500 million and 280 million years ago and consists mostly of limestones, shales, siltstones, and sandstones. The region was located under a shallow sea between 500 million and 320 million years ago, during which time mainly limestone bedrock was deposited. After that time, a land mass collided with the North American continent, causing the land of this region to warp, resulting in fracturing, faulting, and folding of the bedrock. As a result, the dominant locations of sediment deposition became rivers, deltas, and tidal flats, where largely shales, siltstones, and sandstones were deposited (MFG, 2003).

The NRC staff have studied historical earthquakes and faults within the region to determine probable future earthquake activity and intensity (SFC, 2006; NRC, 2005). The details of this analysis are available in the NRC Safety Evaluation Report. The following is a summary of the findings.

The SFC site is located in the south-central part of the United States, which is not considered to be an area at risk from earthquake activity. Most earthquakes are associated with movement along faults in bedrock. The bedrock of the region is disrupted by northeast-trending faults (extensional features) and folds (compressional features) (Arbenz, 1956; Van Ardsdale, 1998). Faults that are potential sources of earthquakes may be identified from evidence of movement, association with recorded earthquakes, or by structural association with known active faults. A fault is generally considered active if it has experienced recent recurrent movement, usually



SOURCE: CESI, 2002.

Figure B.3-1 Regional Geologic Structures

within the last 11,000 years. There are no known active faults within 100 kilometers (62 miles) of the SFC site (LaForge, 1997). Another type of fault is a capable fault that may produce an earthquake. A capable fault is one that has one or more of the following characteristics (10 CFR Part 100, Appendix A, definition [g]):

- movement at or near the ground surface at least once in the past 35,000 years, or more than once in the last 500,000 years;
- earthquake recordings that clearly show a relationship to a particular fault; and
- a structural relationship to a capable fault such that movement on one could be reasonably expected to be accompanied by movement on the other.

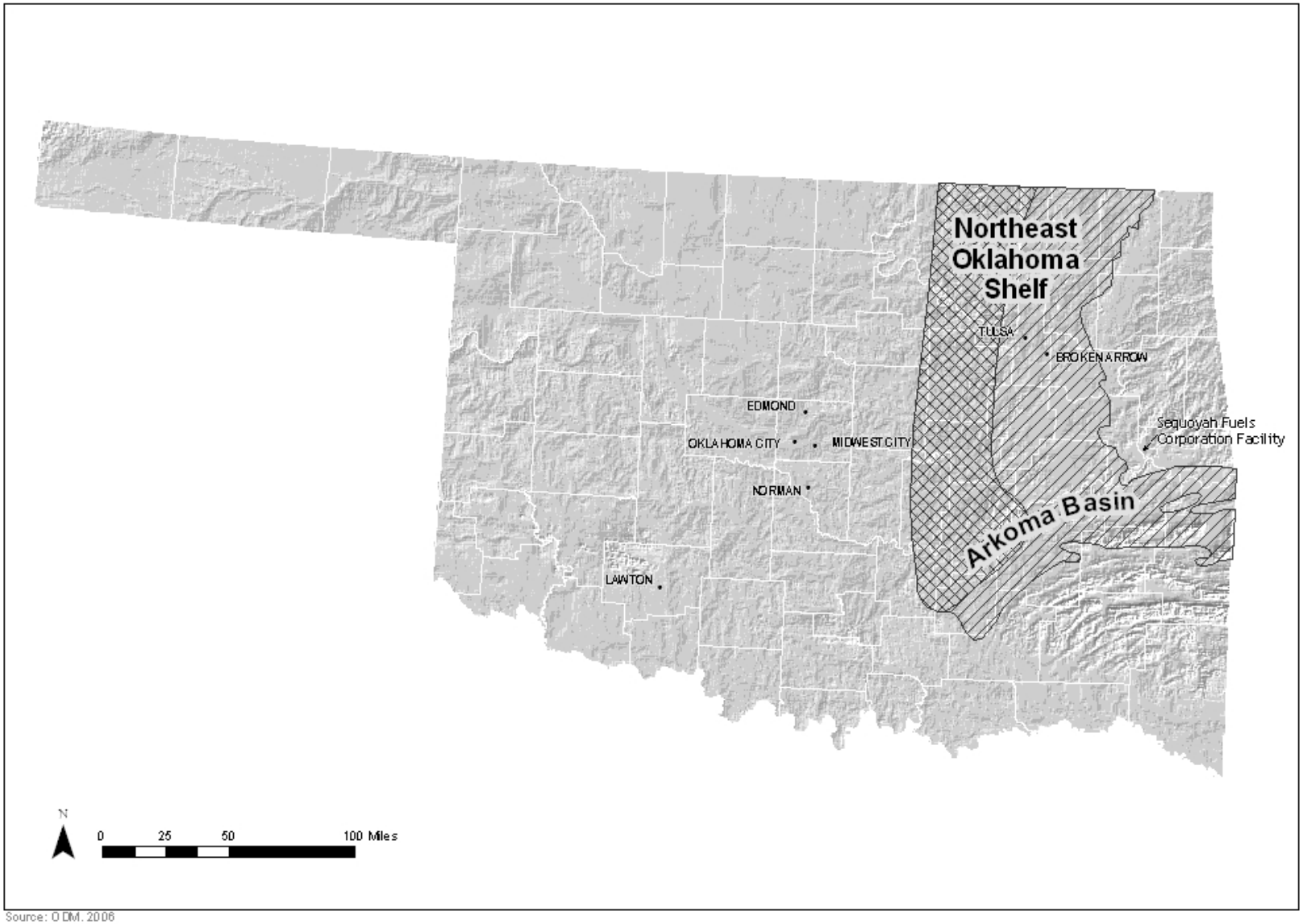
The closest known capable fault is the Meers Fault, which is located in south-central Oklahoma about 300 kilometers (186 miles) southwest of the SFC site (LaForge, 1997). The most recent movement along this fault is estimated to have occurred about 2,000 years ago. Three additional faults have been identified within a 8-kilometer (5-mile) radius of the site: the Carlile School Fault, the Marble City Fault, and the South Fault of the Warner Uplift. All three of these faults have been determined to be non-capable faults by the NRC staff according to the definition described above (NRC, 2005).

Although distant earthquakes may produce shocks strong enough to be felt in this area, the region is considered to be at minor risk for earthquakes. The earthquake history of this region includes several small and moderate earthquakes. A review of the records spanning almost 200 years for events within 640 kilometers (400 miles) of the site identified six large earthquakes, ranging in magnitude from 5.1 to 7.2 (Richter scale). The closest of these earthquakes was centered approximately 186 kilometers (116 miles) from the SFC site (MFG, 2003). The strongest and best known earthquakes to occur in the greater region were centered over 480 kilometers (300 miles) northeast of the SFC site in New Madrid, Missouri. Two earthquakes of magnitude 7.0 and 7.2 occurred there in December of 1811.

The ground motion from earthquakes (intensity) is measured as a percent of the acceleration of gravity. At 10% gravity (0.1g), some damage may occur in poorly constructed buildings. At 0.1g to 0.2g, most people have trouble keeping their footing. The NRC staff has determined that the maximum intensity earthquake likely to occur at the SFC site would produce a ground motion equal to 0.25g, with a 1 in 10,000 probability of exceeding that each year. SFC designed the proposed disposal cell to withstand a ground motion of 0.27g, which has been deemed acceptable by the NRC staff (NRC, 2005).

B.3.1.2 Minerals

Minerals in the area consist of coal, limestone/sandstone, sand/gravel from the Arkansas River floodplain, clay, and shale. The area of commercial coal production in Oklahoma surrounds the SFC site to the south and west (see Figure B.3-2). The commercial coal belt contains coal beds equal to or greater than 25.4 cm (10 inches) thick, which are considered economically mineable deposits (ODM, 2006). The coal production area nearest the SFC site (now closed) was approximately 14.5 (9 miles) to the west; several other coal mining operations are currently



Source: ODM, 2006

Figure B.3-2 Coal Belt Areas, Oklahoma

operating approximately 40 km (25 miles) southwest of the SFC site (SFC, 1998). Geologic studies conducted at the SFC site have not identified coal beds in the near subsurface.

Limestone is one of the most widely available mineral resources in Oklahoma and accounts for about 60% of the reported tonnage of all non-fuel minerals mined in the state. Three major limestone production areas exist in Oklahoma—the Tulsa-Rogers-Mayes County region in northeastern Oklahoma, the Arbuckle Mountains region of Murray County and extending into Pontotoc County, and the Wichita Mountains area of Comanche and Kiowa counties. In Sequoyah County, over 1 million metric tons (1.1 million tons) of limestone was mined in 2005. Most limestone is crushed for use as concrete aggregate for building highways and other structures, as railroad ballast, in glass manufacturing, cement production, preparation of lime, and agricultural purposes. Limestone is not present at shallow depths at the SFC site.

Sand and gravel is produced in most counties in Oklahoma from deposits that are found near the many rivers and streams. Sand and gravel are used principally in the production of concrete for highway construction and other projects, and as railroad ballast. Silica sands, used in the manufacture of various grades of glass and other chemical and industrial activities, are found chiefly in the Arbuckle Mountain region of south-central Oklahoma (ODM, 2006).

There are no known oil or gas fields in the immediate area of the SFC site (SFC, 1998). No economically valuable mineral resources that could be recovered have been identified within the site boundaries.

B.3.1.3 Site Geology

The bedrock at the SFC site is overlain with unconsolidated soils/sediments, generally to depths less than 6 meters (20 feet). These soils/sediments were largely deposited during high-water stages of the Illinois and Arkansas Rivers during the melting of glaciers at the end of the last Ice Age (approximately 10,000 years ago). Subsequent downcutting of the rivers have left these deposits above the current river elevations (SFC, 2006). The bedrock beneath the unconsolidated sediments at the SFC site includes sandstones and shales of the Atoka Formation, which extend to a depth of approximately 119 meters (390 feet) below ground surface (bgs) (MFG, 2002). The first 30.5 meters (100 feet) of this formation (bedrock of similar composition) has been studied extensively through various environmental investigations at the SFC site. Alternating layers of shale and sandstone have been encountered over this interval. A geologic cross-section of the SFC site area is provided in Figure B.3-3.

The SFC site lies on an upland surface adjacent to and east of the confluence of the Illinois and Arkansas Rivers and is approximately 30.5 meters (100 feet) above the flood-stage of these rivers (SFC, 2006; NRC, 2005). The Arkansas River is dammed below the SFC and forms the Robert S. Kerr Reservoir. The land surface drops steeply to the north, west, and southwest of the SFC facility property and is drained by short streams or gullies to the north, west, and south. (Surface water features are described in greater detail in Section 3.7.1.) These streams, as with all streams, are in a continual state of flux through erosion of their streams banks and bottoms. The NRC staff has evaluated the potential for these streams to encroach upon the proposed disposal cell through erosion; the NRC's Safety Evaluation Report details its findings.

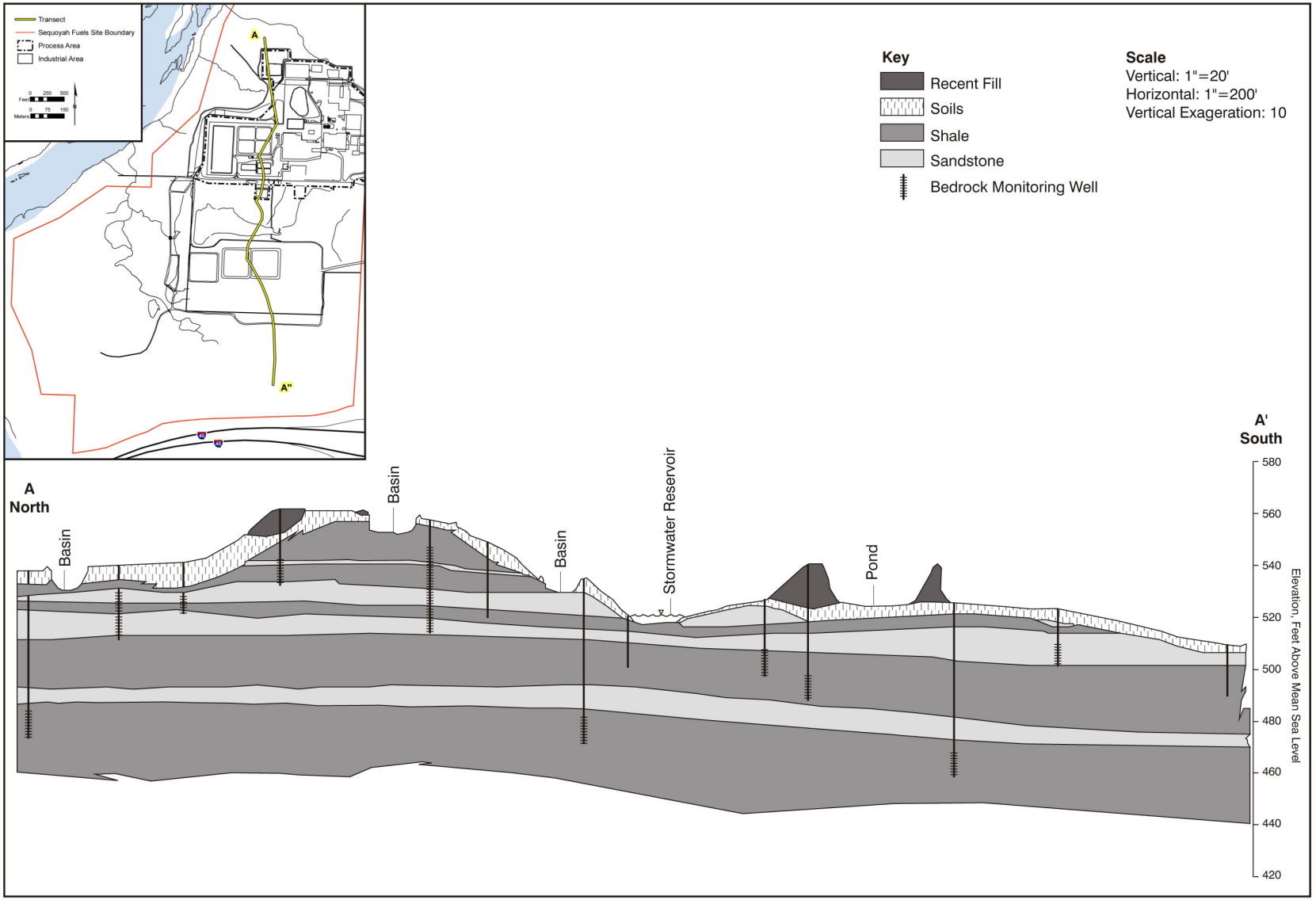


Figure B.3-3 Geologic Cross Sections and Location Map

Mitigation methods, including the installation of rock armor in stream beds, can significantly reduce the rate of erosion of stream beds.

B.3.1.4 Soils

The site is underlain by surface soils consisting of the Pickwick, Hector, Linker, Lonoke, Kiomatia, Mason, Muldrow, Robinsonville, Rosebloom, Stigler, Spiro, Ender, Brewer, Collinsville, Yahola, and Vian series (SFC, 1998). According to the U.S. Department of Agriculture (USDA) Soil Conservation Service, most of the Process Area is situated on Pickwick Series soils. The Pickwick Series consists of deep, moderately permeable, well-drained soils on uplands. The Pickwick Series and other soil types found at SFC are summarized in Table B.3-1. Surface soils at the SFC site are described as having low to high potentials for being corrosive to both steel and unprotected concrete. The Pickwick Series is moderately corrosive if in contact with uncoated steel and highly corrosive to unprotected concrete (SFC, 1998). Factors affecting corrosion of steel and concrete in soils include the pH of the soil, moisture content, stray electrical current, certain chemicals, etc. A corrosive soil can "eat away" at steel and cause spalling (breaking into pieces) in concrete (Cunat, 2001).

Table B.3-1 Soils of Interest at the SFC Site and Surrounding Area

Formation	Description
Brewer Series (Bw)	Located along the Arkansas River. Consists of deep, slowly permeable, and moderately well drained soils on bottom lands. Has a surface layer of silt loam and a subsoil of silty clay loam. Moderate corrosivity to uncoated steel, and low corrosivity to unprotected concrete.
Collinsville Series (Cn)	Formed in material weathered from sandstone. Has a surface layer of sandy loam. Below this is a thin layer of sandstone and fine sandy loam. Acid sandstone occurs at a depth of 10 inches. Low corrosivity to uncoated steel, and moderate corrosivity to unprotected concrete.
Hector Series (He) Hector-Linker-Enders complex;	Located on uplands; shallow, rapidly permeable, excessively drained. Typically fine sandy loam to about 36 cm (14 inches). Moderate corrosivity to uncoated steel, and high corrosivity to unprotected concrete.
Kiomatia Series (Cr)	Located in sandy alluvial sediments. Consists of deep, well-drained, rapidly permeable soils. Has a surface layer of fine sandy loam.
Linker Series (Ln) Linker-Hector complex; and Linker and Stigler soils	Located on upland areas from weathered sandstone. Consist of moderately deep to deep, permeable, well-drained loam; clay loam to 76 cm (30 inches). Low to moderate corrosivity to uncoated steel, and low to moderate corrosivity to unprotected concrete.
Lonoke Series (Lr)	Located on bottomlands along the Arkansas River. Consists of deep, moderately to slowly permeable, well-drained soils. Surface layer of loam or silty clay loam and a subsoil of loam. Low corrosivity to uncoated steel, and low to moderate corrosivity to unprotected concrete.

Table B.3-1 Soils of Interest at the SFC Site and Surrounding Area

Formation	Description
Mason Series (Ma)	Located in bottomlands. Deep, moderately permeable, and well-drained. Typically has a surface layer of silt loam about 30 cm (12 inches) thick, with subsoil of silty clay loam extending to 180 cm (72 inches). Typically has slopes of 0 to 2%.
Muldrow Series (Mu)	Located along the Arkansas River; seldom flooded. Consists of deep, very slowly permeable, somewhat poorly drained soils on bottom lands. Has a surface layer of silty clay loam. The subsoil consists of silty clay loam and silty clay. High corrosivity to uncoated steel, and low corrosivity to unprotected concrete.
Pickwick Series (Pc)	Located throughout most of the Process Area. Consists of deep, moderately permeable, well-drained soils on uplands; forms from weathered sandstone. Typically has a surface layer of loam from 0 to 25 cm (0 to 10 inches), with a clay loam layer from 25 to 170 cm (10 to 68 inches). Moderate corrosivity to uncoated steel, and high corrosivity to unprotected concrete.
Robinsonville Series (Ro)	Located along bottomlands of the Arkansas River. Deep, moderately rapidly permeable, and well drained. Surface soils are sandy fine loam with a subsoil of sandy loam, below which is loamy fine sand. Low corrosivity to uncoated steel, and moderate corrosivity to unprotected concrete.
Rosebloom Series (Rs)	Located along bottomland of major streams. Deep, slowly permeable, poorly drained. Typically has a subsurface layer of silt loam, and subsoil consists of silty clay loam. Has 0 to 15% slopes. Lower sloped soils occasionally flooded. High corrosivity to uncoated steel, and high corrosivity to unprotected concrete.
Rosebloom and Ennis (Ru)	Located along bottomlands of the Arkansas River. Deep, moderately rapidly permeable, and well drained. Surface soils are sandy fine loam with a subsoil of sandy loam, below which is loamy fine sand. Low corrosivity to uncoated steel, and moderate corrosivity to unprotected concrete.
Spiro Series (Sn)	Located on uplands; formed from weathered sandstone, siltstone, and shale. Moderately deep to deep, moderately permeable, and well drained. Generally consists of a silt loam surface and a silty clay loam subsoil. Low to moderate corrosivity to uncoated steel, and moderate to high corrosivity to unprotected concrete.
Stigler Series (Sr)	Located on uplands. Very slowly permeable, somewhat poorly drained. Surface layer consists of silt loam to 51 cm (20 inches) with subsoil of silty clay loam that grades to clay at 110 to 150 cm (45 to 60 inches). Severely eroded with 2% to 8% slopes. High corrosivity to uncoated steel, and high corrosivity to unprotected concrete.

Table B.3-1 Soils of Interest at the SFC Site and Surrounding Area

Formation	Description
Vian Series (Va)	Consists of deep, moderately slowly permeable, moderately well drained upland soils that form in loamy alluvium or loess. Surface layer of silt loam underlain by silty clay loam. Occurs on 1% to 5% slopes. Moderate corrosivity to uncoated steel, and high corrosivity to unprotected concrete.
Yahola Series (Ya)	Located on floodplains along the Arkansas River. Consists of deep, moderately rapidly permeable, well-drained soils on bottom lands. Has a surface layer of fine sandy loam. Low to high corrosivity to uncoated steel, and low corrosivity to unprotected concrete.

B.3.1.5 Soil Quality

The uranium recovery operations conducted by SFC at its facility involved many steps and chemical processes. During these operations, radiological and other contaminants were released to site soils through spills, leaks, and disposal operations. The following is a summary discussion of contaminants detected in SFC site soils.

Radiological Contaminants

As previously discussed, natural uranium was the primary form of uranium processed at the SFC site and is, therefore, the predominant form of uranium present as a contaminant at the site. The uranium feed material also contained the decay products of uranium, primarily radium-226 and thorium-230, but not in equal proportions. Depleted uranium was the only other form of uranium processed at the facility. Processing was essentially a dry, closed-loop process and did not result in significant releases at the SFC site (SFC, 1998).

A review of uranium contamination in soil at specific depth intervals indicates that concentrations of uranium decrease with depth. Most of the high concentrations of uranium are found in the upper 15 cm (6 inches) of soil. The uranium found in soils at depths below 3 meters (10 feet) were generally located in the area around the Solvent Extraction Building and the Main Process Building. Uranium levels in a sandstone more than 12 meters (40 feet) bgs have been measured at background concentrations. This sandstone is believed to effectively limit the vertical extent of contamination in soils and bedrock (SFC 1998). Section 3.4, Public and Occupational Health, of this report provides a detailed discussion of the extent and concentrations at which these radiological contaminants were detected.

Other Contaminants

The chemical conversion of the feed material during the uranium processing operations at the SFC facility required the use of nonradiological chemicals. The major process chemicals utilized in these steps included nitric acid, tributylphosphate, hexane, anhydrous ammonia, anhydrous hydrofluoric acid, potassium bifluoride, elemental fluorine, and calcium oxide. Ammonium nitrate, raffinate sludge, and calcium fluoride were major byproducts of this operation. SFC performed numerous environmental investigations in order to identify the extent to which contaminants were released to site soils (SFC, 1991; SFC, 1996; SFC, 1997a; SFC, 1997b; SFC,

1998). Based on the data included in SFC's 1996 Final RCRA Facility Investigation Report and 1998 Site Characterization Report, the following contaminants were detected in site soils at concentrations above USEPA Region 6 Human Health Medium-Specific Screening Levels for residential use: arsenic, nitrates, fluoride, lead, copper, lithium, nickel, iron, molybdenum, vanadium, and antimony. Section 3.4, Public and Occupational Health, of this report provides a detailed discussion of the extent and concentrations at which these nonradiological contaminants were detected.

B.3.2 Geology and Soils Impacts

This section presents the potential direct and indirect impacts on geologic resources and soils that would result from the implementation of each alternative. As described in Chapter 1 of this EIS, the NRC process for reviewing the license application includes an examination of the ability of the proposed disposal cell to withstand geologic hazards. The discussion of geology in this section, however, is not intended to support a detailed safety analysis of the proposed disposal cell. The NRC staff has documented its analysis of hazards related to geology in the Safety Evaluation Report (NRC, 2005).

The NRC staff has not identified any economically valuable mineral resources that could be recovered from the study area. In addition, the NRC staff has determined that the Sequoyah reclamation activities will not disturb or destroy any geodetic control monuments (fixed position markers used as physical reference points by surveyors). Figure B.3-4 provides the locations of the monuments in the area of the Sequoyah facility (http:/www.ngs.noaa.gov).

B.3.2.1 Alternative 1: On-Site Disposal of Contaminated Materials (the Licensee's Proposed Action)

Under the licensee's proposed action, SFC would construct an on-site disposal cell to contain all contaminated materials on-site, including soils, buildings, and equipment. SFC would excavate soils outside the footprint of the disposal cell that contain uranium, radium, or thorium in excess of the proposed site-specific cleanup criteria. The cleanup criteria for soils at the surface are:

- Uranium – 3.7 Bq/g (100 pCi/g);
- Radium – 0.18 Bq/g (5 pCi/g); and
- Thorium – 0.52 Bq/g (14 pCi/g).

SFC would also excavate soils under the footprint of the disposal cell that exceed 20.7 Bq/g (560 pCi/g) uranium. Suitable clayey soils from the southern portion of the SFC site would be excavated by SFC for use as a liner in both the base and cover layers of the disposal cell. In addition, SFC would place soils collected and stored on-site from prior cleanup activities into the disposal cell (SFC, 2006).

Erosion of soils is a common concern during any construction activity that disturbs soils and vegetation. During construction of the proposed disposal cell, SFC would use existing roads as much as possible to transport excavated soils for placement into the disposal cell. However, it may be necessary to construct short-term haul roads in order to effectively transport soils to the

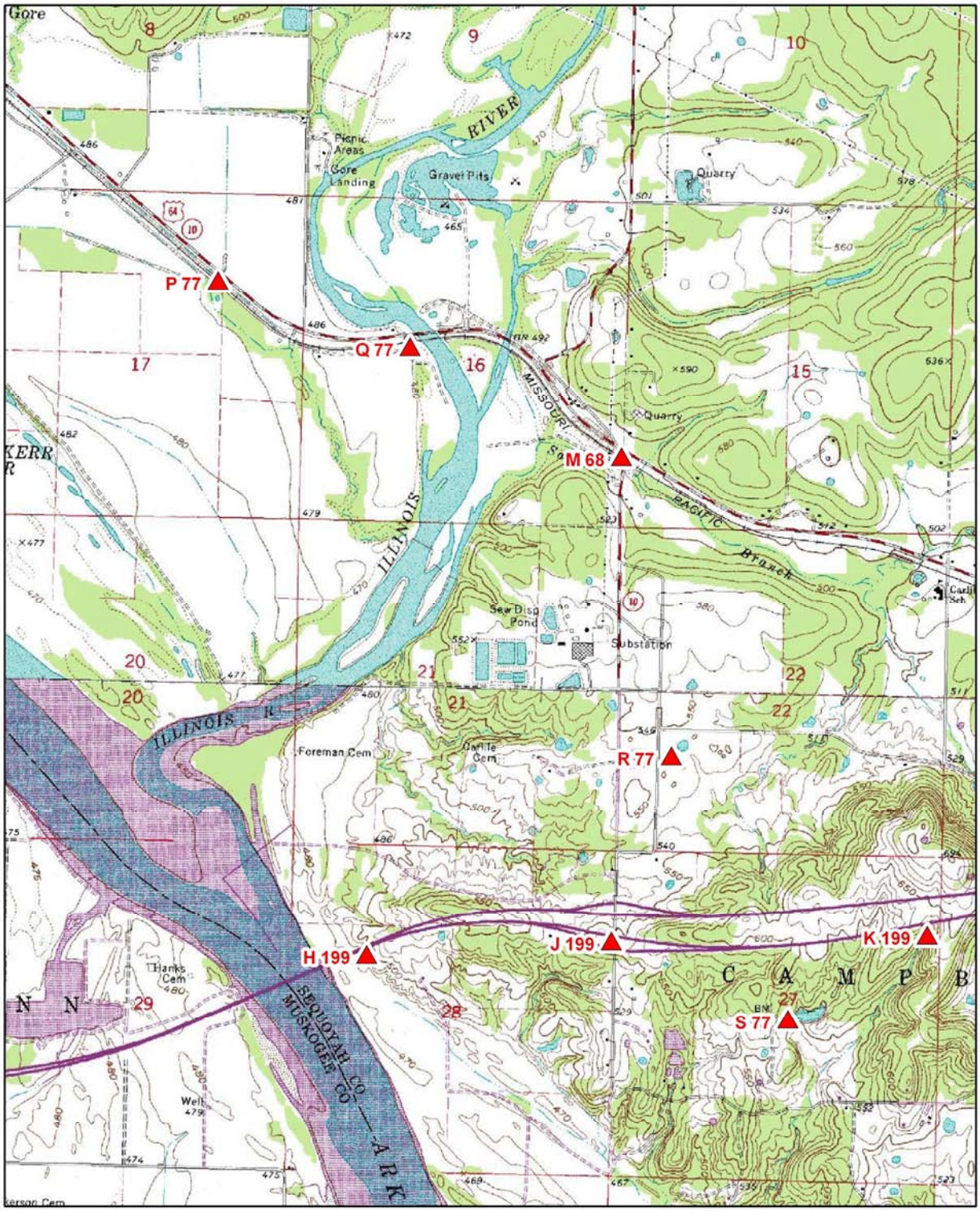


Figure B.3-4 Geodetic Control Monuments

disposal cell. Increased soil erosion could result from the action of wind and precipitation on soils stripped of vegetation in the excavation and construction areas. Short-term direct but moderate effects on soils would arise from an increase in erosion. However, SFC would employ mitigation measures in the form of best management practices (e.g., the use of earthen berms, dikes, and silt fences) to minimize this impact. The excavation areas would be backfilled as necessary, graded, and planted with native grasses, which would mitigate any long-term impacts associated with soil erosion. The long-term direct and indirect impacts of soil erosion would be SMALL.

Land use in the region surrounding the SFC site includes agriculture, primarily in the form of pasture. The proposed action would cause a permanent disturbance and burial of natural soils existing at the site and likely necessitate backfilling with non-native materials. This would not, however, preclude the future use of unrestricted areas for agriculture. The industrial operations at the site resulted in radiological and nonradiological contamination of site soils as described in Sections 3.4 and Appendix B.3 of this report. An overall improvement of soil quality at the SFC site would occur as a result of the removal of contaminated soils. Therefore, the direct and indirect impacts from excavation of native soils would be SMALL.

Compaction of soils could result from the construction of roads and the repeated use of heavy equipment in any given area. Compaction can reduce the ability of a soil to sustain vegetation or limit the types of vegetation that can grow in these areas. However, existing on-site roadways would be used, and other areas of the site where additional compaction of soils could occur would be small in comparison to the site as a whole. Therefore, the direct impacts of soil compaction would be SMALL.

The NRC staff has evaluated the potential impacts of geologic hazards on the proposed disposal cell. These hazards include potential ground motion produced by earthquakes and potential stream encroachment. A detailed discussion of these potential hazards is provided in the NRC Safety Evaluation Report (NRC, 2005). The NRC staff has determined that potential geologic hazards have been adequately addressed to protect public safety and, therefore, impacts would be SMALL.

B.3.2.2 Alternative 2: Off-site Disposal of All Contaminated Materials

Under Alternative 2, all wastes at the SFC facility would be excavated, consolidated, packaged, and transported off-site for disposal at a licensed facility. As part of this alternative, a rail spur would be constructed (see Section 2.3.2) to facilitate removal of all wastes. After the removal of contaminated soils, these areas would be backfilled (where necessary) and graded with non-native, clean soils.

Short-term impacts would arise from an increase in soil erosion during excavation, construction of the rail spur, and backfilling activities. However, SFC would employ best management practices (e.g., the use of earthen berms, dikes, and silt fences) to minimize this impact, resulting in a moderate and direct short-term impact. SFC would employ appropriate long-term erosion control measures (e.g., planting with native grasses) to minimize long-term impacts, resulting in SMALL indirect impacts.

Land use in the region surrounding the SFC site includes agriculture, primarily in the form of pasture. Alternative 2 would cause a permanent disturbance and burial of natural soils existing at the site and necessitate backfilling with non-native materials. This, however, would not preclude the future use of unrestricted areas for agriculture. In addition, the industrial operations at the site resulted in radiological and nonradiological contamination of site soils as described in Sections 3.4 and Appendix B.3 of this report. An overall improvement of soil quality at the SFC site would occur as a result of the removal and disposal of contaminated soils. The direct and indirect impacts from excavation of native soils would be SMALL.

Compaction of soils could result from construction of the rail spur, construction of haul roads, and the repeated use of heavy equipment in any given area. Compaction can reduce the ability of a soil to sustain vegetation or limit the types of vegetation that can grow in these areas. However, existing on-site roadways would be used, and other areas of the site where additional compaction of soils could occur would be small in comparison to the site as a whole. Therefore, the direct impacts of soil compaction would be SMALL.

B.3.2.3 Alternative 3: Partial Off-site Disposal of Contaminated Materials

Under Alternative 3, all wastes would be consolidated into an on-site disposal cell as described under Alternative 1 (the proposed action). However, SFC would package and transport the most contaminated materials (dewatered raffinate sludge and sediment from the North Ditch, Emergency Basin, and Sanitary Lagoon) for reuse (raffinate sludge) or disposal at an off-site facility licensed to accept such materials. It is possible that the disposal cell would be slightly smaller.

Soil erosion could occur during construction activities associated with implementation of Alternative 3. During construction of the disposal cell, SFC would use existing roads as much as practicable to transport excavated soils for placement into the disposal cell. However, it may be necessary for SFC to construct short-term haul roads in order to effectively transport soils to the disposal cell. Increased soil erosion could result from the action of wind and precipitation on soils stripped of vegetation in excavation and road construction areas. Short-term direct but moderate effects on soils would arise from an increase in erosion of soils during excavation, haul road construction, and construction of the proposed disposal cell. However, implementation of best management practices such as the use of earthen berms, dikes, and silt fences would minimize this impact. The excavation areas would be backfilled as necessary, graded, and planted with native grasses, which would mitigate any long-term impacts associated with soil erosion. The long-term direct and indirect impacts of soil erosion would be SMALL.

Land use in the region surrounding the SFC site includes agriculture, primarily in the form of pasture. Alternative 3 would cause a permanent disturbance and burial of natural soils existing at the site and likely necessitate backfilling with non-native materials. This, however, would not preclude the future use of unrestricted areas for agriculture. In addition, industrial operations at the site resulted in radiological and nonradiological contamination of site soils as described in Sections 3.4 and Appendix B.3 of this report. An overall improvement of soil quality at the SFC site would occur as a result of the removal and disposal of contaminated soils. Therefore, the direct and indirect impacts from excavation of native soils would be SMALL.

Compaction of soils could result from the construction of roads and the repeated use of heavy equipment in any given area. Compaction can reduce the ability of a soil to sustain vegetation or limit the types of vegetation that can grow in these areas. However, existing on-site roadways would be used, and other areas of the site where additional compaction of soils could occur would be small in comparison to the site as a whole. Therefore, the direct impacts of soil compaction would be SMALL.

The NRC staff has evaluated the potential impacts of geologic hazards on the proposed disposal cell. These evaluations would also apply under Alternative 3. These hazards include potential ground motion from earthquakes and potential stream encroachment. A detailed discussion of these potential hazards is provided in the NRC Safety Evaluation Report (NRC, 2005). The NRC staff has determined that potential geologic hazards have been adequately accounted for in the proposed action and, therefore, impacts would be expected to be SMALL.

B.3.2.4 No-Action Alternative

The no-action alternative would result in contaminated soils and structures remaining indefinitely at the SFC site. Contaminants in the site soil or remaining pond sludges could eventually leach to surface water or groundwater resources, causing a moderate to large impact. In addition, if the raffinate sludge packaging deteriorates over time, the sludge could leak from the package and the contaminants could leach to surface water or groundwater resources, causing a contamination and exposure hazard for site workers. These impacts could range from MODERATE to LARGE.

B.4 Climate, Meteorology, and Air Quality Resources and Impacts

This section describes the existing climatology, meteorology, and air quality in the vicinity of the SFC site and impacts resulting from implementation of the proposed action and alternatives.

B.4.1 Affected Environment

B.4.1.1 Regional Climate

Sequoyah County is part of the Great Plains and its climate is continental. The Gulf of Mexico, however, exerts an influence on the climate, bringing in warm moist air that causes more cloudiness and precipitation than in the western and northern sections of the state. Summers are long and hot, but winters are shorter and less cold than in states in the northern plains. The prevailing winds are from a south to southeasterly direction from spring through autumn. In winter, winds are from a northerly or southerly direction.

B.4.1.2 Site and Regional Meteorology

The nearest National Weather Service Class 1 station (professional staff taking hourly observations) is located approximately 64 km (40 miles) away at Fort Smith Regional Airport in Arkansas. Weather conditions are monitored and recorded continuously at this station. Some of the key meteorological parameters collected at the station include wind speed, wind direction, temperature, cloud cover, and ceiling height (cloud base above local terrain). For the period 1971 through 2000, the annual mean temperature was 16.2 degrees Celsius (61.2 degrees Fahrenheit), the annual average precipitation was 111.8 cm (43.8 inches), and the annual average snowfall was 18 cm (7.1 inches).

Tornados are frequent in Oklahoma, occurring an average of 52 time per year. Tornados can develop anytime during the year, but they occur most frequently in the spring. Hailstorms and thunderstorms in the area can be severe. Snow is infrequent, but at times conditions can lead to strong winds and large snowfalls, resulting in severe drifting and blizzard conditions.

B.4.1.3 Air Quality

The Federal Clean Air Act (CAA) (U.S.C. § 7401) requires the adoption of National Ambient Air Quality Standards (NAAQS) to protect the public health, safety, and welfare from known or anticipated effects of air pollution. Current standards are set for sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter equal to or less than 10 microns in size (PM_{10}), fine particulate matter equal to or less than 2.5 microns in size ($PM_{2.5}$), and lead (Pb). These pollutants are collectively referred to as criteria pollutants. Criteria pollutants are those pollutants for which acceptable levels of exposure can be determined and for which an ambient air quality standard has been set. The State of Oklahoma established standards that are the same as the NAAQS. The federal standards are shown in Table B.4-1.

The locations nearest the SFC site where ambient concentrations of criteria air pollutants are measured by the Oklahoma Department of Environmental Quality (ODEQ) include Muskogee, McAlester, and Lawton, Oklahoma. Air quality in the vicinity of the SFC site is within the NAAQS for all the criteria pollutants (CO, Pb, NO_2, O_3, PM_{10}, $PM_{2.5}$, and SO_2). Monitored

concentrations for the most recently available three years (2003 to 2005) are presented in Table B.4-1.

Table B.4-1 Background Ambient Concentrations Compared to NAAQS

Pollutant	Averaging Time	NAAQS (µg/m^3)		SFC Area (µg/m^3)[b]
		Primary	Secondary[a]	
Sulfur dioxide	Annual 24-hour[c] 3-hour[c]	80 365	 1,300	8 56 203
Nitrogen dioxide	Annual	100	100	17
Ozone	8-hour[d]	235 (0.08 ppm)	235 (0.08 ppm)	158
Carbon monoxide	8-hour[c] 1-hour[c]	10,000 40,000	10,000 40,000	2,677 3,376
PM_{10}[e]	Annual 24-hour[d]	50 150		140
$PM_{2.5}$[f]	Annual 24-hour[d]	15 35	15	12.8 30
Lead	3-month[g]	1.5	1.5	0.06

[a] If no value is listed, there is no corresponding standard.
[b] Source: EPA AirData database highest monitored readings for the period 2003 through 2006 with parts per million (ppm) values converted to µg/m^3.
[c] The standard cannot be exceeded more than once per year.
[d] The standard cannot be exceeded on more than 1 day/year on average over 3 years.
[e] Particulate matter less than 10 µm in diameter.
[f] Particulate matter less than 2.5 µm in diameter. To attain the 24-hour standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).
[g] Calendar quarter.

A study performed by Oak Ridge Associated Universities in 1986 during facility operations showed less-than-detectable levels of nitrogen oxides in the ambient air at sample locations around the SFC site (ORAU 1986). Since the cessation of production operations, criteria air emissions are no longer emitted from the facility.

Radiological air emissions from the site would be regulated by the federal government under NRC and National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations. Since the cessation of production operations, however, radiological air emissions from the facility and air emissions source (stack) monitoring are no longer conducted. Perimeter air samples continue to be collected by SFC at four locations along the fenceline (SFC, 2006a). Previous SFC monitoring results have shown that emissions from the facility were below established regulatory standards for radiological air emissions (SFC, 2006b). A description of radiological air emissions is incorporated in Section 4.4, Public and Occupational Health.

B.4.2 Alternatives Analysis

Air quality impacts could be caused by reclamation of the SFC facility through the use of vehicles and equipment and the disturbance of sediment and surface soils.

B.4.2.1 Alternative 1: On-site Disposal of Contaminated Materials (the Licensee's Proposed Action)

Nonradiological Impacts. SFC's proposed reclamation activities, including the construction of the disposal cell, would result in the generation of mobile-source emissions and fugitive dust. Mobile-source emissions would include engine emissions from light-duty and heavy-duty vehicles, privately owned vehicles, and heavy-duty construction vehicles. Fugitive dust would be generated by construction vehicles excavating and removing contaminated soil, dismantling buildings and equipment, placing soils in the disposal cell, and moving on paved roads or unpaved soil surfaces.

The total annual construction-related emissions that would result under this alternative were estimated to determine the potential for air quality impacts. Guidelines published by the El Dorado County, California, Air Pollution Control District (El Dorado County, 2002), which use EPA's emission standards, were used to provide guidance on the estimated types and numbers of equipment and hours of operations needed for a project of this size. Equipment to be used was determined based on the types of operations expected and detailed in the Demolition Plan (MFG, 2004). While the types and numbers of equipment will vary during the course of the project, the operation of construction equipment has been conservatively generalized, assuming that, at any given time, one of each type of equipment would be operating on the SFC site, 8 hours a day, 250 days per year. Particulate emissions from SFC site preparation activities have been estimated assuming typical construction activities and dust control. Total projected annual construction emissions are listed below in Table B.4-2. These emissions represent a SMALL direct impact on local air quality.

Table B.4-2 Projected Annual Construction-Related Air Emissions

Activity	Emissions (metric tons/year (tons per year))				
	NO_x	**VOC**	**CO**	**SO_2**	**PM_{10}**
Equipment Operation	43.84 (48.34)	4.65 (5.13)	28.87 (31.83)	2.04 (2.25)	2.32 (2.55)
Fugitive Dust	0.00	0.00	0.00	0.00	0.80 (0.88)
Total	43.84 (48.34)	4.65 (5.13)	28.87 (31.83)	2.04 (2.25)	3.11 (3.43)

Indirect emissions also would result from transportation increases associated with this action. The SFC site would be subject to a greater number of commuting construction workers, and transportation of construction materials and equipment also would result in increased emissions. The quality of traffic flow along regional roadways has been evaluated within the transportation analysis and is discussed in Sections 3.5, 4.5, and Appendix D. The increase in traffic volumes associated with implementation of this alternative would be minimal because the number of vehicles that would be involved per day (see Table 4-5.1) would cause only minor impacts on the

typically free-flowing conditions of the local highways. Air pollution resulting from the increase in transportation associated with this alternative would not be expected to have a significant impact on local air quality because the number of vehicles involved per day is relatively small compared to existing road traffic; therefore, their contribution would represent only a SMALL indirect impact on local air quality.

Some areas within the facility may contain asbestos. SFC will identify, remove, and dispose of asbestos prior to demolition of the facilities in accordance with applicable regulatory requirements. Therefore, the asbestos-related impact on local air quality would be SMALL.

SFC proposes to mitigate air quality impacts by managing dust associated with demolition and construction activities and ensuring all equipment is well maintained and operating properly. Soils from excavation areas would be transported to the disposal cell via existing roads by haul trucks or loaders. Construction of new roads is not anticipated. Haul roads, loading and off-loading areas, and disposal areas would regularly be sprayed with water to control fugitive dust in accordance with a dust and erosion control plan. Equipment and structural surfaces would be sprayed with water during demolition and removal. Perimeter air monitoring for dust and radiological contamination would be established as a part of the Site Monitoring Plan.

Radiological Impacts. Activities associated with this action have the potential to release radiological air emissions. The Department of Energy's Weldon Spring uranium conversion facility was decommissioned in the late 1990s, and the experience from this site is considered to be relevant to the reclamation of the SFC facility. The Weldon Spring site handled materials similar to the materials at the SFC site and used the same solvent extraction process. While the Weldon Spring site was larger and the final disposal volumes were higher than those at the SFC site, reclamation activities at Weldon Spring were conducted using a method similar to that proposed for the SFC site. In addition, the average wind speeds in Weldon Spring, Missouri, are reported to be higher than those in Gore, Oklahoma.

The Weldon Spring site is currently being maintained as a disposal cell. Air sampling (for radon, Rn–220, and radiological particulates) and radiological perimeter monitoring (for gamma radiation) were performed at Weldon Spring during and after remediation. Data reported in the site's Environmental Report in 1997, the year the cell was completed, showed that Department of Energy and CAA regulatory limits had not been exceeded during remediation of the project and the highest receptor activity was below the annual NESHAPSs standards of 0.1 millisievert (10 millirem) (DOE, 1997).

Quarterly isotopic analyses for uranium, thorium, and radium have been conducted at SFC since NRC approved this method to adequately monitor site activities in the license amendment in 1998 (NRC, 1998). Radiological data collected at the fenceline from 2000 to 2006 show that emissions from the site are well below current standards. The results of monitoring performed during previous decommissioning activities at the SFC site, including during placement of soils in the Interim Storage Cell and in the Pond 1 Spoils Pile, were similar to those from the Weldon Spring site (SFC, 2006a). Therefore, it is assumed that impacts at the SFC site during decommissioning would be similar to those of the Weldon Spring site and not exceed regulatory limits. Therefore, radiological air emissions would represent a SMALL direct impact on local air quality.

Following site reclamation, the final conditions at the SFC facility would include maintenance of the administration building and monitoring and site maintenance of the disposal cell and surrounding facilities. The use of vehicles and maintenance equipment during these activities would be minimal and result in SMALL impacts on air quality.

A full description of radiological air emissions and potential impacts are included in Section 4.4, Public and Occupational Health.

B.4.2.2 Alternative 2: Off-site Disposal of All Contaminated Materials

The potential air quality impacts of implementing Alternative 2 would be similar to those described above for Alternative 1; however, construction emissions from SFC's proposed reclamation activities would be less. Potential transportation impacts are discussed in Section 4.6, Transportation. Vehicle emissions and fugitive dust would be generated by vehicles operating on the SFC site. Vehicles leaving the SFC site would be thoroughly decontaminated before leaving the SFC site, thereby reducing the potential for fugitive radiological dust to be transported off-site. Air pollution associated with the increase in traffic volumes as a result of this alternative would not be expected to have a significant impact because the number of vehicles involved per day would be relatively small compared to existing road traffic; therefore, their contribution would represent only a SMALL indirect impact on local air quality.

Under this alternative, all wastes designated for disposal in the on-site disposal cell would be packaged and transported to an off-site facility licensed to accept such materials. Following decommissioning of the SFC facility, the site would be graded and seeded. Transportation impacts are discussed in Section 4.5, Transportation. Post-reclamation conditions at the SFC facility would result in SMALL direct impacts on air quality.

B.4.2.2 Alternative 3: Partial Off-site Disposal of Contaminated Materials

The potential air quality impacts from construction under Alternative 3 would be similar to those described above for Alternative 1; however, there would be an increased potential impact from additional transportation of site materials. Transportation impacts are discussed in Section 4.5, Transportation.

Final conditions at the facility under this alternative would be similar to those described for Alternative 1, including maintenance of the administration building and monitoring and site maintenance of the disposal cell and surrounding facilities. During the post-reclamation period, direct impacts on air quality would be SMALL.

B.4.7 No-Action Alternative

Under the no-action alternative, SFC would maintain the site in its current state. SFC would provide limited maintenance of the buildings and surrounding facilities. These activities would require the use of vehicles and maintenance equipment. However, direct impacts on air quality would be SMALL.

B.5 Ecological Resources and Impacts

This section describes the ecological resources on or near the SFC site, including terrestrial resources (vegetation and wildlife); rare, threatened, and endangered species; wetlands; and other environmentally sensitive areas. It also provides an assessment of the potential environmental impacts on these resources as a result of implementation of the proposed action and alternatives.

B.5.1 Affected Environment

The study area for terrestrial resources, wetlands, and environmentally sensitive areas includes the SFC site and the immediately surrounding area. Rare, threatened, and endangered species are evaluated in the context of a larger area encompassing the SFC site and surrounding portions of Sequoyah, Muskogee, and Haskell counties.

Information presented in this section is based on a review of ecological literature (Peterson, 1980; Caire et al., 1989; Choate et al., 1994; American Society of Mammalogists [ASM], 2006; U.S. Fish and Wildlife Service [USFWS], 2006); recent aerial photographs (NAIP, 2003); review of a federal agency database (USFWS, 2007a); correspondence with a state natural resource agency (OBS, 2006); and a site reconnaissance walk-over completed in 2006.

B.5.1.2 Ecological Communities

The SFC site lies in an area where three physiographic provinces converge: the Oak-Hickory Ozark Plateau, the Oak-Hickory-Pine Ouachita Highlands, and the Tall Grass Prairie-Rolling Hills). The vegetative cover in the region consists mostly of hardwood forests, grasslands, and pasturelands (Caire et al., 1989).

Approximately 200 hectares (500 acres) of the SFC site are undeveloped and include a mixture of upland and aquatic habitats. The remaining 40 hectares (100 acres) of the site are developed and largely void of vegetative cover. Ecological communities on the SFC site are described below.

B.5.1.2.1 Upland Habitats

Upland habitats on the SFC site include forestlands, pastureland/hayfields, and open fields. Approximately 60 hectares (150 acres) of forestland are present on the site, primarily along the northern and southern site boundaries. The forestland in the southern portion of the site extends along the eastern site boundary and into part of the Industrial Area. Forestlands on the site are generally secondary-growth oak-hickory forests. This community type is typically located on well-drained upland soils and is dominated by white oak and shagbark hickory.

Pastureland/hayfields cover approximately 80 hectares (200 acres) of the SFC site. A relatively large, contiguous area of pastureland covers approximately 40 hectares (100 acres) along the western site boundary; the remaining pastureland/hayfields are interspersed with the forested areas throughout the remainder of the site. The pasturelands include a mixture of Bermuda grass, rye grass, and fescue.

Open fields cover approximately 20 hectares (50 acres) of the SFC site. This community primarily occurs in small clusters adjacent to the surface water impoundments and over solid waste burial areas. The open fields are dominated by herbaceous vegetation, including ragweed and various species of goldenrod, aster, and grasses.

B.5.1.2.2 Aquatic Habitats

Aquatic habitats on the SFC site include four storm water impoundments within the Process Area; a storm water reservoir; eight man-made farm ponds; an unnamed tributary of the lower Illinois River; and several intermittent drainages that flow to the lower Illinois River. The storm water impoundments, reservoir, and farm ponds on the SFC site provide minimal aquatic habitat because of their isolated and disturbed nature. In contrast, the intermittent stream and drainages would have relatively higher aquatic habitat value because of their connection with the lower Illinois River and linear nature through upland forestlands.

B.5.1.2.3 Wetland Habitats

The USACE Tulsa District examined the SFC site in 2002 and determined that the property contains no jurisdictional wetlands (Hogue, 2002). A recent conversation with the USACE (Davison, 2006) indicated that the 2002 wetland determination remains valid through 2007. Consequently, no jurisdictional wetlands are located on the SFC site.

According to USFWS National Wetlands Inventory (NWI) maps, forested wetlands associated with the lower Illinois River floodplain are located just outside of the western site boundary. Based on a review of recent aerial photographs, these wetlands are bottomland hardwood forests likely comprised of sphagnum moss, rushes, and sedges, with an overstory of water oak, willow oak, and green ash (OCC, 1996).

B.5.1.3 Wildlife

The woodland and pastureland communities on the SFC site provide habitat for a number of wildlife species, many of which would be expected to move between the two habitats. A review of the ecological literature and published surveys indicates that wooded areas on the site likely support various passerine birds such as the Carolina wren, Carolina chickadee, Northern cardinal, wood warbler, and vireo; game birds such as wild turkey; birds of prey such as the Eastern screech owl and barred owl; woodpeckers; and small to large mammals such as the chipmunk, fox squirrel, skunk, gray fox, raccoon, white-tailed deer, and coyote. Pasturelands on the SFC site likely provide habitat for a number of ground-foraging and ground-nesting birds such as the killdeer, horned lark, meadow lark, common bobwhite, and mourning dove; waterfowl such as ducks and geese; and small mammals such as the Eastern cottontail and deer mouse. Birds of prey, including the American kestrel and Red-tailed hawk, likely forage in the pasturelands on the site. Wildlife species in the developed areas on the site are limited to those that tolerate a high degree of human disturbance and managed habitats, including the American robin, European starling, house sparrow, skunk, opossum, and gray squirrel (Peterson, 1980; Caire et al., 1989; Choate et al., 1994; ASM, 2006; USFWS, 2006).

The small size and intermittent flow of the tributary and drainages on the site likely limit the diversity of aquatic species in these habitats. However, some species of amphibians and reptiles

likely inhabit these surface waters and surrounding upland habitats. Common amphibians and reptiles that may be found in these habitats include the slimy salamander, green frog, southern leopard frog, and red-eared slider (Black et al 1993). The western boundary of the site is less than 1.6 kilometers (1 mile) from the lower Illinois River, which supports populations of large-mouth and smallmouth bass, white bass, crappies, catfish, striped bass, bream, walleye (USFWS, 2006), and warm-water aquatic invertebrates. Common mussel species found in the lower Illinois River include creepers, elktoes, and white heelsplitters (Branson, 1983).

B.5.1.4 Rare, Threatened, and Endangered Species

Endangered and threatened species are protected by the Endangered Species Act of 1973. Oklahoma has no endangered species act; however, the Oklahoma Department of Wildlife Conservation (ODWC) can list threatened or endangered wildlife under provisions of state wildlife laws (Okla. Stat. tit. 29, §5-412, 412.1; 7-206).

The Oklahoma Ecological Services Field Office (OESFO) of the USFWS and Oklahoma Biological Survey (OBS) provided data regarding the known occurrences of threatened and endangered species in the vicinity of the SFC site (USFWS, 2007a; OBS, 2006). Databases are maintained by these agencies to track species that are protected by law as well as unprotected species that are identified as species of concern. The OBS tracks species occurrences on a township level, whereas the OESFO provides a species list by county. Table B.5-1 lists the threatened and endangered species identified through the database reviews that potentially occur in the vicinity of the project.

Table B.5-1 Federally and State-Listed Threatened and Endangered Species Identified in the Vicinity of the SFC Site

Species Name	Status	Habitat
American burying beetle	Federally – Endangered Oklahoma – Endangered	Mosaic of vegetation types, from oak-hickory and coniferous forests on lowlands, slopes, and uplands to deciduous riparian corridors and pasturelands in valleys (USFWS, 1991; USFWS, 2005)
Indiana bat	Federally – Endangered Oklahoma – Endangered	Hibernation occurs in limestone caves with stable temperatures of 39 degrees to 49 degrees F. During summer, this species is found under bridges, in old buildings, under tree bark, or in hollow trees. Foraging occurs above small- to medium-sized streams (USFWS, 2007b).
Interior least tern	Federally – Endangered Oklahoma– Endangered	Islands or sandbars along large rivers for nesting. Shallow surface water is preferred for foraging (USFWS, 2007c).
Ozark big-eared bat	Federally – Endangered Oklahoma – Endangered	Hibernation occurs in caves in karst regions dominated by oak-hickory forests. Foraging occurs along forest edges (USFWS, 2007d).

Table B.5-1 Federally and State-Listed Threatened and Endangered Species Identified in the Vicinity of the SFC Site

Species Name	Status	Habitat
Bald eagle	Federally – Threatened (proposed for delisting) Oklahoma – Threatened	Nesting occurs in large trees or cliffs near waters with abundant fish. Wintering occurs along oceans, rivers, lakes, or in areas where carrion is present (USFWS, 2007e).
Piping plover	Federally – Threatened Oklahoma – Threatened	Nesting occurs on sandy beaches along the ocean or lakes and on bare areas of islands or sandbars (USFWS, 2007f).
Whooping crane	Federally – Endangered Oklahoma – Endangered	Marshes and prairie potholes in the summer; coastal marshes and prairies in the winter (USFWS, 2007g)

Based on this information, habitat does not exist on the SFC site to support nesting, hibernating, or foraging populations of Indiana bat, interior least tern, Ozark big-eared bat, bald eagle, piping plover, or whooping crane. The interior least tern is commonly present in the summer and the bald eagle is commonly present in the fall and winter in the vicinity of the SFC site on the Sequoyah NWR. The piping plover is occasionally sighted on the refuge in spring and fall (USFWS, 2007f).

Since 1995, confirmed sightings of the American burying beetle have been documented in Sequoyah, Muskogee, and Haskell counties (USFWS, 2007h). A population of this species is also known to occur in proximity to the SFC site on the Sequoyah NWR (USFWS, 2005). While the American burying beetle has been found within a variety of vegetation types in Oklahoma, sites where this species have been captured generally had the following common characteristics: well-drained, sandy-loam and silt-loam soils; level topography; and a well-formed detritus layer (USFWS, 2005).

Some of the undeveloped forestlands and pasturelands on the SFC site, such as the proposed clay borrow area, are underlain by moderately to well-drained sandy-loam soils and are characterized by level to gently rolling topography. These areas could potentially support populations of American burying beetle based on the species' habitat requirements described above and the proximity of the site to a known population on Sequoyah NWR.

B.5.1.5 Environmentally Sensitive Areas

The Sequoyah NWR is located approximately 1.6 kilometers (1 mile) south of the SFC site (see Figure 1.2-2). Approximately half of the 20,800 acres encompassing the refuge is aquatic habitat that includes an open water reservoir, the Arkansas and Canadian Rivers, an oxbow lake, wooded slough, and wetlands. The remaining habitat consists of agricultural lands, bottomland hardwoods, river bluffs, and scrub-shrub grasslands. The refuge supports high numbers of migratory waterfowl during winter and a population of nesting bald eagles (USFWS, 2006).

The potential impacts of SFC's site preparation, construction activities, and post-reclamation activities on ecological resources are described below for each of the project alternatives.

B.5.2 Ecological Resources Impacts

B.5.2.1 Alternative 1: On-site Disposal of Contaminated Materials (the Licensee's Proposed Action)

SFC's site preparation and construction of the disposal cell would take place within the Process Area next to existing structures. This portion of the SFC site is largely void of vegetation cover, the only exceptions being the area designated as the North Ditch and the area adjacent to the Emergency Basin. The vegetation community in these areas is primarily open field, with an isolated area of emergent wetland vegetation present in the North Ditch. Construction of the engineered disposal cell would remove approximately 0.8 hectare (2 acres) of this open-field habitat in the Process Area. Given the small area and previously disturbed nature of the affected habitats, this direct impact on ecological communities in the industrial area would be considered SMALL.

Construction activities would occur 1.6 kilometers (1 mile) or less from the lower Illinois River and a tributary of this water body. Site preparation and construction activities within the Process Area would result in temporary increases in erosion and sedimentation during the construction period. The runoff, if not controlled, could eventually enter the tributary and/or lower Illinois River, although the distance between the construction areas and water bodies would likely be sufficient to significantly reduce the amount of sediment that would enter these water bodies. In addition, SFC would implement various best management practices during site preparation and construction to control erosion and manage storm water runoff. Consequently, site preparation and construction activities associated with the proposed action would have SMALL direct and indirect effects on aquatic habitats.

As discussed in Section B.5.1.3, no jurisdictional wetlands are located on the SFC site. Therefore, site preparation and construction activities would have no direct effects on wetlands. Potential indirect impacts on off-site wetlands associated with erosion and sedimentation would be avoided through implementation of various best management practices during site preparation and construction. Therefore, the impacts on wetlands would be SMALL.

Some wildlife species likely use the open field habitats in the Process Area; however, overall species numbers and diversity are likely low based on the disturbed nature of these areas and their proximity to developed land. Most wildlife in these habitats would relocate to nearby suitable habitat during construction activities, thereby avoiding direct impacts. However, less mobile species, such as small reptiles and mammals, could be impacted. Due to the limited diversity of wildlife species and small area disturbed, the potential direct impacts on these less mobile species would be considered SMALL.

In addition, clay would be excavated from a proposed borrow area on the southern part of the SFC site. This clay borrow area is approximately 6.1 hectares (15 acres) in size. Prior to beginning excavation activities, the borrow area would be cleared and topsoil set aside for subsequent reclamation of the area. These activities would result in the permanent removal of clay from the area and significantly alter the existing upland woodland habitat used by migratory bird species and other wildlife. The direct and short-term impact on the ecology of the borrow area would be MODERATE. SFC would implement mitigation measures within the proposed

ICB that would help offset these impacts, such as recontouring and revegetation of the site. Clearing activities would not occur during the nesting season of migratory bird species.

Wildlife in woodland and pastureland areas adjacent to the Process Area would be intermittently disturbed by construction activity and noise over the 3- to 4-year period when the proposed action is implemented. Although noise levels would be relatively low outside the immediate area of construction, the combination of construction noise and human activity would likely displace small numbers of animals that forage, feed, nest, rest, or den in adjacent woodlands and pasturelands. Because wildlife in the area is likely already acclimated to a certain amount of disturbance from current activities on the site and because most displaced species would likely return to the area following the disturbance, indirect noise impacts on local wildlife would be considered SMALL.

Site preparation and construction activities would not impact any habitats potentially used by the federally and state-listed Indiana bat, interior least tern, Ozark big-eared bat, bald eagle, piping plover, or whooping crane. Because of the distance of the work area from the Sequoyah NWR, construction noise would not indirectly affect any populations of piping plover, interior least tern, or bald eagle that occur in the refuge in the vicinity of the site. Consequently, site preparation and construction associated with the proposed action would have SMALL impacts on these federally and state-listed species.

Suitable habitat at the SFC site that could potentially support populations of the federally and state-listed endangered American burying beetle is within the proposed clay borrow area at southern portion of the site (see Figure 2.2-4). NRC has engaged in an informal Section 7 consultation with USFWS to determine whether proposed reclamation activities might adversely affect the American burying beetle. As a result of this consultation, the USFWS has recommended that a survey for the American burying beetle be conducted at the clay borrow area prior to initiating any reclamation activities. SFC has agreed to conduct this survey. The NRC's proposed mitigation plan (see Chapter 5) is designed to minimize potential adverse effects on the endangered American burying beetle, enhance upland woodland habitat, and preserve the hydrologic gradient of the proposed clay borrow area. The plan recommends standard mitigation practices under USFWS Conservation Approach 1 (i.e., bait away and trap and relocation protocols). With implementation of a USFWS-approved mitigation plan, site preparation and construction associated with the proposed action would not be likely to adversely affect the American burying beetle and potential impacts would be SMALL.

All construction activities associated with Alternative 1 would be located within the Process Area, which is located approximately 5 kilometers (3 miles) north of the Sequoyah NWR boundary. This distance would provide a suitable buffer such that SMALL or no direct or indirect effects on wildlife or visitors to the refuge would be expected from construction activities on the SFC site.

Following site reclamation, SFC would grade and seed much of the former Process Area with native grasses and wildflowers as part of the site restoration. This in turn would provide up to approximately 34 hectares (85 acres) of additional habitat for some wildlife species in the area. Potential exposures of wildlife to radiological and nonradiological contaminants would be

reduced because sediments, sludges, and soils containing contaminants would be isolated in the disposal cell.

B.5.2.2 Alternative 2: Off-site Disposal of All Contaminated Materials

SFC's construction and demolition activities associated with the removal of contaminated materials would occur within the Process Area and along the proposed 2.6-kilometer (1.6-mile)–long new railroad spur. Since the Process Area is largely void of vegetative cover, any direct impacts on ecological communities from site preparation and construction in this area under Alternative 2 would be SMALL.

The proposed railroad spur would traverse an undeveloped area comprising a mix of pastureland/hayfield and forestland. Based on a review of recent aerial photographs (NAIP, 2003), the pastureland/hayfield community covers approximately 1.6 kilometers (1 mile), or 63%, of the route, while forestland covers approximately 1 kilometer (0.6 mile), or 27%, of the route. The forestland along the route is contiguous with the forestland on the main SFC site and so is expected to be characterized as secondary growth oak-hickory forest.

It has been estimated that the rail spur would be constructed within an approximately 30-meter (100-foot) -wide construction right of way (ROW). Establishment of this ROW would result in temporary disturbance impacts on approximately 5 hectares (12 acres) of pastureland/hayfield and temporary removal of approximately 3 hectares (7 acres) of forestland. The rail spur would occupy an approximately 12-meter (40-foot) -wide permanently maintained ROW. Establishment of this ROW would result in the permanent removal of approximately 2 hectares (5 acres) of pastureland/hayfield and 1 hectare (2.5 acres) of forestland. Both ecological communities that would be directly affected are common throughout the local area and are currently traversed by numerous roads and existing railroad lines. However, potential impacts on migratory bird species is a concern. To comply with the “no take” provisions (i.e., no bird mortalities) of the Migratory Bird Treaty Act (MBTA), SFC has agreed that the upland woodlands along the ROW for the railroad spur would not be cleared during the nesting season for migratory bird species. Consequently, the temporary and permanent impacts on the pastureland/hayfield and forestland ecological communities associated with construction and operation of the rail spur under Alternative 2 would be considered SMALL.

SFC's construction activities within the Process Area would occur 1.6 kilometers (1 mile) or less from the Lower Illinois River and a tributary of this water body. Site preparation and construction activities within this area would result in temporary increases in erosion and sedimentation during the construction period. The runoff, if not controlled, could eventually enter the tributary and/or Lower Illinois River, although the distance between the construction areas and water bodies would likely be sufficient to significantly reduce the amount of sediment that would enter these water bodies. In addition, SFC would implement various best management practices during site preparation and construction to control erosion and manage storm water runoff. Consequently, site preparation and construction associated with Alternative 2 would have SMALL impacts on the aquatic habitats associated with the Lower Illinois River and its tributary.

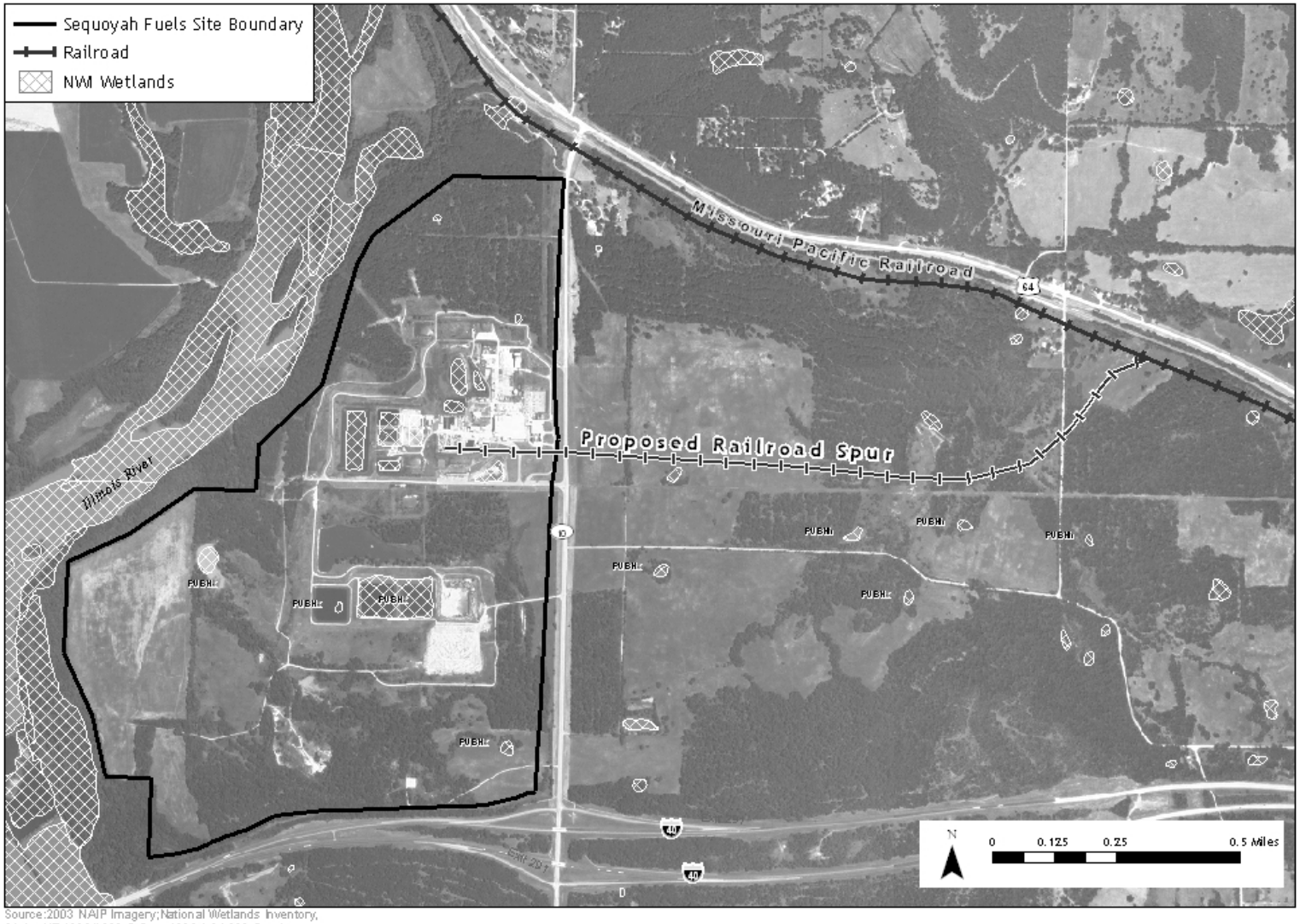
The railroad spur would cross two intermittent tributaries to Salt Branch, which is an intermittent tributary of the Lower Illinois River. Based on their small size and intermittent flow, neither of these tributaries would be expected to support a diverse aquatic community. During construction, aquatic habitats in these streams would be directly affected by increased erosion and sedimentation; however, this impact would be minimized through the use of various best management practices. Culverts would be installed in both streams to maintain the flow of water following installation of the railroad spur. This, in turn, may result in the permanent loss of less than 0.2 hectare (0.5 acre) of natural aquatic habitat. Based on the small area affected and lack of aquatic habitat diversity in both streams, this direct impact would be considered SMALL.

As discussed in Section B.5.1.3, no jurisdictional wetlands are located on the SFC site. Therefore, site preparation and construction activities within the Process Area under Alternative 2 would have SMALL impacts on wetlands. Potential indirect impacts on off-site wetlands associated with erosion and sedimentation would be avoided through implementation of various best management practices during site preparation and construction.

No NWI wetlands or hydric soils are mapped along the route of the proposed railroad spur (see Figure B.5-1) (note: the presence of hydric soils is used as an indicator to evaluate the potential occurrence of wetlands in a given area). Consequently, construction and operation of the railroad spur under Alternative 2 would not be expected to have any direct or indirect affects on wetlands. However, if Alternative 2 is selected as the preferred alternative, a field survey would be conducted prior to construction to document the absence of wetlands within the railroad spur corridor. Depending on the results of the field investigation, follow-up consultation with the USACE Tulsa District may be necessary to comply with Section 404 wetland permitting requirements.

Some wildlife species likely use the open field habitats in the Process Area; however, overall species numbers and diversity are likely low based on the disturbed nature of these areas and their proximity to developed land. Various mammals, amphibians, reptiles, and bird species likely use the pastureland/hayfield and forestland habitats along the rail spur corridor. Most wildlife in all construction areas would relocate to adjacent suitable habitat during construction activities, thereby avoiding any direct impacts. However, less mobile species such as small reptiles and mammals could be impacted. Due to the limited diversity of wildlife in the Process Area and the relatively small area that would be disturbed for construction of the railroad spur, the potential direct impacts on these less mobile species would be considered SMALL.

Wildlife in woodland and pastureland areas adjacent to the Process Area and railroad spur corridor would be intermittently disturbed by construction activity and noise over the 3- to 4-year period when Alternative 2 is implemented. Although noise levels would be relatively low outside the immediate area of construction, the combination of construction noise and human activity would likely displace small numbers of animals that forage, feed, nest, rest, or den in adjacent woodlands and pasturelands. Because wildlife in the area is likely already acclimated to a certain amount of disturbance from current activities on the site and because most displaced species would likely return to the area following the disturbance, indirect noise impacts on local wildlife would be considered SMALL.



Source:2003 NAIP Imagery;National Wetlands Inventory,
Stigler NE 1980/1982 & Gore 1980 1:24,000 Quads

Figure B.5-1 Rail Spur and USFWS National Wetland Inventory

SFC's site preparation and construction activities would not impact any habitats potentially used by the federally and state-listed Indiana bat, interior least tern, Ozark big-eared bat, bald eagle, piping plover, or whooping crane. Because of the distance of the work area from the Sequoyah NWR, construction noise would not indirectly affect any populations of piping plover, interior least tern, or bald eagle that occur on the refuge in the vicinity of the site. Consequently, site preparation and construction associated with Alternative 2 would have SMALL or no effect on these federally and state-listed species.

Much of the proposed railroad spur corridor would cross land that is considered potentially suitable habitat for the federally and state-listed endangered American burying beetle. Specifically, the railroad spur would cross secondary growth forests and open field habitats on level to gently sloping terrain underlain by loam soils. If Alternative 2 is selected by the NRC decision maker as the preferred alternative, the NRC staff would re-engage the Section 7 consultation with USFWS to determine whether construction of the railroad spur might adversely affect the American burying beetle. A survey for the American burying beetle would be conducted in this area prior to initiating any construction activities. SFC has agreed to conduct this survey, if needed. A mitigation plan, similar to that previously described for Alternative 1, would be prepared by SFC. The plan would include standard mitigation practices under USFWS Conservation Approach 1 (i.e., bait away and trap and relocation protocols). With implementation of a USFWS-approved mitigation plan, site preparation and construction associated with the proposed railroad spur would not be likely to adversely affect the American burying beetle and potential impacts would be SMALL.

All construction activities associated with Alternative 2 would be at least 5 kilometers (3 miles) north of the Sequoyah NWR boundary. This distance would provide a suitable buffer such that SMALL impacts on wildlife or visitors to the refuge would be expected from construction activities on the SFC site.

Under the off-site disposal alternative, SFC would excavate and remove from the Process Area all contaminated soil, equipment, and structures. After removal, SFC would backfill and revegetate all the affected areas. Restoration of the Process Area would result in up to approximately 34 hectares (85 acres) of new herbaceous habitat in an area mostly void of vegetative cover. This in turn would provide additional habitat for some wildlife species in the area. In addition, potential exposures of wildlife to radiological and nonradiological contaminants would be reduced because sediments, sludges, and soils containing contaminants would be transported off-site.

B.5.2.3 Alternative 3: Partial Off-site Disposal of Contaminated Materials

SFC's construction activities associated with the partial off-site disposal alternative would occur within the Process Area. Since the Process Area is largely void of vegetative cover, any direct impacts on ecological communities from site preparation and construction in this area under Alternative 3 would be SMALL.

Construction activities would occur 1.6 kilometers (1 mile) or less from the Lower Illinois River and a tributary of this water body. Site preparation and construction activities within the Process Area would result in temporary increases in erosion and sedimentation during the construction

period. The runoff, if not controlled, could eventually enter the tributary and/or Lower Illinois River, although the distance between the construction areas and water bodies would likely be sufficient to significantly reduce the amount of sediment that would enter these water bodies. In addition, SFC would implement various best management practices during site preparation and construction to control erosion and manage storm water runoff. Consequently, site preparation and construction associated with the proposed action would have SMALL impacts on aquatic habitats.

As discussed in Section B.5.1.3, no jurisdictional wetlands are located on the SFC site. Therefore, site preparation and construction activities would have no direct effects on wetlands. Potential indirect impacts on off-site wetlands associated with erosion and sedimentation would be avoided through implementation of various best management practices during site preparation and construction.

Some wildlife species likely use the open field habitats in the Process Area; however, overall species numbers and diversity are likely low based on the disturbed nature of these areas and their proximity to developed land. Most wildlife in these habitats would relocate to nearby suitable habitat during construction activities, thereby avoiding direct impacts. However, less mobile species such as small reptiles and mammals could be impacted. Due to the limited diversity of wildlife species and small area disturbed, the potential direct impacts on these less mobile species in this industrial area would be SMALL.

In addition, clay would be excavated from a proposed borrow area on the southern part of the SFC site. This clay borrow area is approximately 6.1 hectares (15 acres) in size. Prior to beginning excavation activities, the borrow area would be cleared and topsoil set aside for subsequent reclamation of the area. These activities would result in the permanent removal of clay from the area and significantly alter the existing upland woodland habitat used by migratory bird species and other wildlife. The direct and short-term impact on the ecology of the borrow area would be MODERATE. SFC would implement mitigation measures within the proposed ICB that would help offset these impacts, such as recontouring and revegetation of the site. Clearing activities would not occur during the nesting season of migratory bird species.

Wildlife in woodland and pastureland areas adjacent to the Process Area would be intermittently disturbed by construction noise over the 3- to 4-year period when the proposed action is implemented. Although noise levels would be relatively low outside the immediate area of construction, the combination of construction noise and human activity would likely displace small numbers of animals that forage, feed, nest, rest, or den in adjacent woodlands and pasturelands. Because wildlife in the area is likely already acclimated to a certain amount of disturbance from current activities on the site and because most displaced species would likely return to the area following the disturbance, indirect noise impacts on local wildlife would be SMALL.

SFC's site preparation and construction activities would not impact any habitats potentially used by the federally and state-listed Indiana bat, interior least tern, Ozark big-eared bat, bald eagle, piping plover, or whooping crane. Because of the distance of the work area from the Sequoyah NWR, construction noise would not indirectly affect any populations of piping plover, interior

least tern, or bald eagle that occur on the refuge in the vicinity of the site. Consequently, potential impacts on federal and state listed endangered species.

Suitable habitat at the SFC site that could potentially support populations of the federally and state-listed endangered American burying beetle is within the proposed clay borrow area at southern portion of the site (see Figure 2.2-4). NRC has engaged in an informal Section 7 consultation with USFWS to determine whether proposed reclamation activities might adversely affect the American burying beetle. As a result of this consultation, the USFWS has recommended that a survey for the American burying beetle be conducted at the clay borrow area prior to initiating any reclamation activities. SFC has agreed to conduct this survey. The NRC's proposed mitigation plan (see Chapter 5) is designed to minimize potential adverse effects on the endangered American burying beetle, enhance upland woodland habitat, and preserve the hydrologic gradient of the proposed clay borrow area. The plan recommends standard mitigation practices under USFWS Conservation Approach 1 (i.e., bait away and trap and relocation protocols). With implementation of a USFWS-approved mitigation plan, site preparation and construction associated with the proposed action would not be likely to adversely affect the American burying beetle and potential impacts would be SMALL.

All of SFC's construction activities associated with Alternative 3 would be located within the Process Area, which is located approximately 5 kilometers (3 miles) north of the Sequoyah NWR boundary. This distance would provide a suitable buffer such that potential impacts on wildlife or visitors to the refuge would be SMALL.

Under the partial off-site disposal alternative, SFC would excavate and remove from the Process Area all contaminated soil, equipment, and structures to be placed in the on-site disposal cell. After removal, SFC would backfill and revegetate all the affected areas. Restoration of the Process Area in areas not covered by the disposal cell would result in up to approximately 34 hectares (85 acres) of new herbaceous habitat in an area mostly void of vegetative cover. This in turn would provide additional habitat for some wildlife species in the area.

Potential exposures of wildlife to radiological and nonradiological contaminants would be reduced because sediments, sludges, and soils containing contaminants would be isolated in the disposal cell.

B.5.2.4 No-Action Alternative

Under the no-action alternative, there would be no change in the current level of disturbance associated with surveillance and monitoring activities. Vegetation and wildlife would not be affected because there would be no construction activities or removal of equipment or buildings. However, no additional habitat areas would be created. Therefore, the impacts on ecological resources would be SMALL.

B.6 Socioeconomic Conditions and Impacts

B.6.1 Affected Environment

The SFC site is located in a largely rural area with generally low population density. This section provides population and employment statistics for the surrounding municipalities that could potentially be impacted by the implementation of the proposed action or alternative actions for site reclamation.

B.6.1.1 Population

The SFC site is located in Sequoyah County, Oklahoma, which has a population of 38,972 according to the 2000 U.S. census (U.S. Bureau of the Census, 2000). The study area defined for the SFC site comprises Sequoyah County and the adjacent counties of Cherokee, Haskell, McIntosh, and Muskogee. The boundaries of the study area were determined based upon the estimated commuting area for the site (see Figure B.6-1). In 2000 the total population for the entire study area was 182,192 (see Table B.6-1). These counties experienced an 11% total increase in population from 1990 to 2000, compared with a 25% increase for the entire state of Oklahoma during the same period (U.S. Bureau of the Census, 2000).

Table B.6-1 Historic Population in the Study Area

Area	1990	2000	% Change
Cherokee County	34,049	42,521	25%
Haskell County	10,940	11,792	8%
McIntosh County	16,779	19,456	16%
Muskogee County	68,078	69,451	2%
Sequoyah County	33,828	38,972	15%
Study Area Total	163,674	182,192	11%

Source: U.S. Bureau of the Census, 2000

Specific population centers located within the study area include the towns of Gore, Vian, Warner, and Webber Falls, and the city of Muskogee. These are all located within 40.2 kilometers (25 miles) of the SFC site.

The town closest to the SFC facility is Gore, which is approximately 4 kilometers (2.5 miles) away. The population of Gore in 2000 was 850, which represents a 20% increase from 1990. The largest population center in the study area is the city of Muskogee, located approximately 40.2 kilometers (25 miles) northwest of the site in Muskogee County. The city of Muskogee had 38,317 people in 2000, which comprised more than half of the total population of the County of Muskogee (U.S. Bureau of the Census, 2000). Table B.6-2 shows the populations of towns near the SFC site in 1990 and 2000.

The majority of the population in Sequoyah County is white (68%), which is consistent with the entire State of Oklahoma. Among the 77 counties in Oklahoma, Sequoyah County has the fifth highest percentage of American Indian residents (20% of the total population) (U.S. Bureau of the Census 2000). Table B.6-3 shows the racial composition of the population of Sequoyah County in 2000. The large American Indian population is primarily due to the presence of the

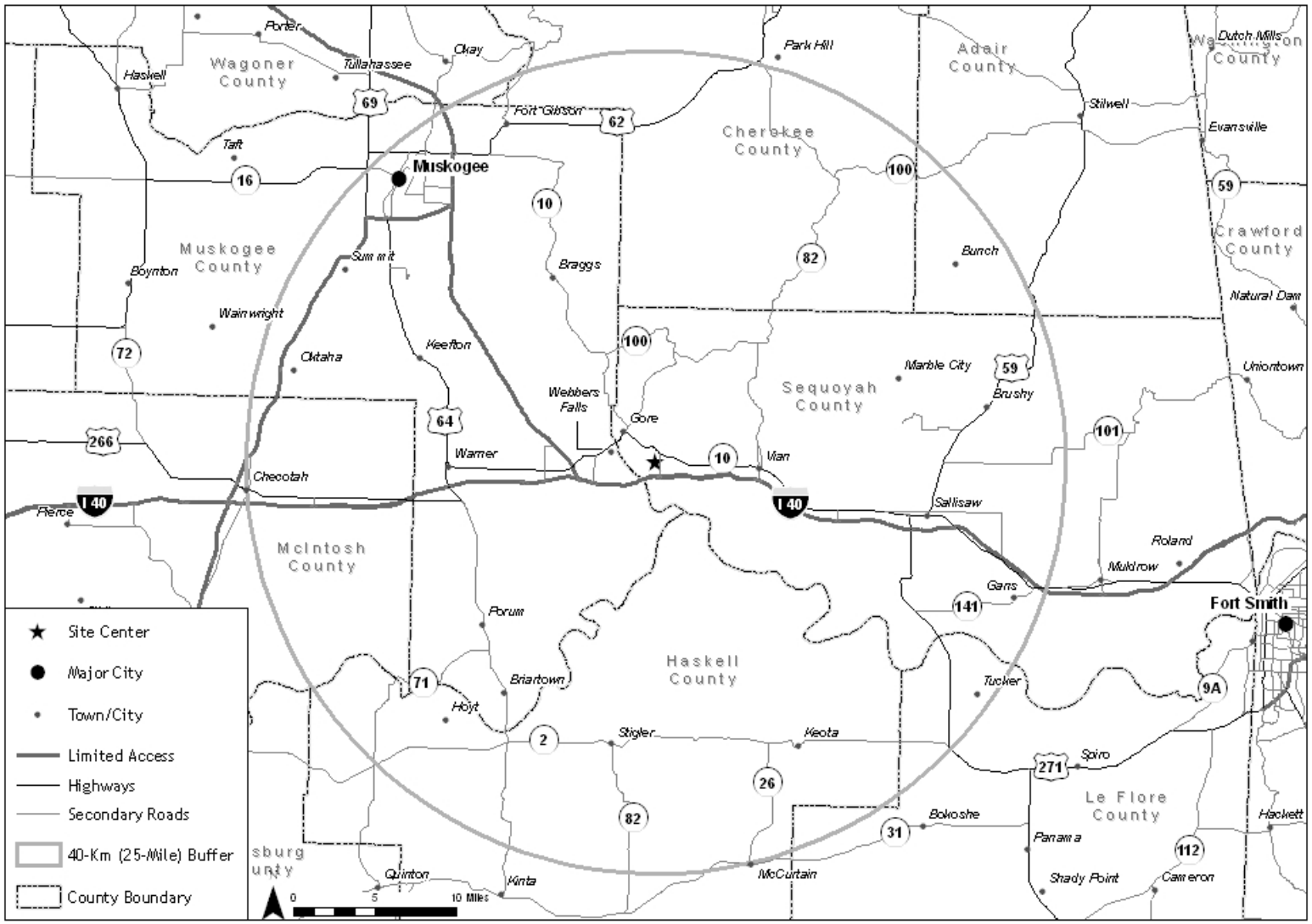


Figure B.6-1 Socioeconomic Study Area

Cherokee Nation in Tahlequah, Oklahoma, which is located approximately 80.4 kilometers (50 miles) northeast of Gore, Oklahoma. The Cherokee people populate the entire region, with concentrations in Cherokee and Sequoyah counties.

Table B.6-2 Population Centers Near the SFC Facility

Population Center	1990	2000	% Change
Gore	710	850	20%
Muskogee	37,708	38,317	2%
Vian	1,367	1,362	<1%
Warner	1,462	1,430	-2%
Webber Falls	767	726	-5%

Source: U.S. Bureau of the Census, 2000

Table B.6-3 Population of Sequoyah County by Race in 2000

Race	Persons	% of Total
White	26,548	68%
American Indian	7,654	20%
Black or African American	725	2%
Other (includes Asian, Native Hawaiian, other, and two or more races)	4,045	10%
Total Population of Sequoyah County	38,972	100%

Source: U.S. Bureau of the Census, 2000

Appendix B.7, Environmental Justice, describes the distribution of minority and low-income populations in the vicinity of the SFC site.

B.6.1.2 Employment

The industries employing the highest percentage of people in the study area are retail trade, manufacturing, education, health care, and social assistance. Unemployment rates within the study area range from 4.7% (Haskell County) to 8.2% (Cherokee County), with an average of 7.0% (U.S. Bureau of the Census, 2000). The total labor force is 78,252, with 5,516 people unemployed throughout the study area.

Six individuals are currently employed at the SFC site to perform routine maintenance and surveillance. It is assumed that these individuals live in the general vicinity of the SFC site (primarily the study area described above) and commute to work on a daily basis. Additional personnel are brought in as needed to support special activities or work projects (SFC, 2001).

B.6.2 Population and Employment Impacts

This section presents the potential direct and indirect impacts on socioeconomics that would result from the implementation of each alternative.

B.6.2.1 Alternative 1: On-Site Disposal of Contaminated Materials (the Licensee's Proposed Action)

Under this alternative, SFC projects that the local population will be increased by approximately 72 workers during the peak level of activity, which would be the first two years of reclamation activities (SFC, 2001). The type of manpower projected under Alternative 1 would include the management team, cell closure workers, health and safety technicians, equipment operators, truck drivers, welders and riggers, and general laborers.

The overall number of short-term workers that would be needed is small compared with the total labor force of the study area (i.e., 72 short-term workers divided by 78,252 workers in the local labor force (from Section B.6.2) equals a less than 1%). The majority of the workers would be drawn from the local labor force, while the balance would consist of specialty contractors that would reside in hotels during construction. Thus, there would be a SMALL short-term, direct impact on the population, but there would be no permanent population impacts under this alternative.

Appendix B.7 describes any foreseeable impacts of Alternative 1 on minority and/or low-income populations in the vicinity of the SFC site.

Once site reclamation is completed, the NRC would terminate the SFC's source material license and the State of Oklahoma or the United States would take control of the area within a proposed 131-hectare (324 acre) ICB. The remaining 112 hectares (276 acres) would be released for unrestricted use. The short-term socioeconomic impacts after reclamation of the SFC site and prior to reuse would be SMALL. Following reclamation and until reuse of the property released for unrestricted use (131 hectares [324 acres]), there would be no commercial activity and the impacts would be SMALL. However, in the long-term, there is a potential for development of the unrestricted portion of the site given the proximity of the site to the Illinois and Arkansas rivers and Interstate-40. Depending upon the how the site is developed, there could be economic benefits and increased employment opportunities.

B.6.2.2 Alternative 2: Off-Site Disposal of All Contaminated Materials

For the off-site disposal alternative, SFC projects a peak requirement of 73 workers during the first two years of reclamation activities (SFC, 2001). The overall number of short-term workers that would be needed is less than 1% of the local labor force. The majority of the workers would be drawn from the local labor force, while the balance would consist of specialty contractors who would reside in hotels during construction. Thus, it is estimated there would be a SMALL impact on the local permanent population during implementation of this alternative. The off-site disposal alternative is similar to the on-site disposal alternative in that there would be a short-term, direct impact on the population, but there would be no permanent population impacts.

Appendix B.7 describes any foreseeable impacts of Alternative 2 on minority and/or low-income populations in the vicinity of the SFC site.

Once the contaminated materials have been transported from the SFC site, the NRC would terminate the SFC's source material license and the entire site (approximately 243 hectares [600 acres]) would be released for unrestricted use. The short-term socioeconomic impacts of post-

reclamation conditions until reuse of the property would be SMALL. Following reclamation and until reuse of the property released for unrestricted use (243 hectares [600 acres]), there would be no commercial activity and the socioeconomic impacts would be SMALL. However, in the long-term, there is a potential for development of the entire site given its proximity to the Illinois and Arkansas rivers and Interstate-40. Depending upon how the site is developed, there could be economic benefits and increased employment opportunities.

B.6.2.3 Alternative 3: Partial Off-Site Disposal of Contaminated Materials

For the partial off-site disposal alternative, SFC projects an increase of approximately 96 workers during peak activity associated with construction of the on-site disposal cell. Of these 96 workers, 18 will be off-site truck drivers responsible for transportation of contaminated waste for disposal who may or may not live in the immediate vicinity of the SFC site. Thus, the true number of on-site workers would be closer to 78 during peak reclamation activities, which would occur during the first two years.

The number of short-term workers (approximately 96) required for both on-site cell construction and off-site transportation would represent less than 1% of the total local labor force. Therefore, there would be short-term, direct impacts from construction of the on-site disposal cell and the transportation of contaminated materials.

Appendix B.7 describes any foreseeable impacts of Alternative 3 on minority and/or low-income populations in the vicinity of the SFC site.

Once site reclamation has been completed, the NRC would terminate the SFC's source material license, and the Department of Energy would take control of the area within the 131-hectare (324 acre) ICB. The remaining 112 hectares (276 acres) would be released for unrestricted use. The short-term socioeconomic impacts of post-reclamation conditions until reuse of the property would be SMALL. Following reclamation and until reuse of the property released for unrestricted use (131 hectares [324 acres]), there would be no commercial activity and the socioeconomic impacts would be SMALL. However, in the long-term, there is a potential for development of the unrestricted portion of the site given the proximity of the site to the Illinois and Arkansas rivers and Interstate-40. Depending upon the how the site is developed, there could be economic benefits and increased employment opportunities.

B.6.2.4 No-Action Alternative

Under the no-action alternative, there will be no change to the existing management system and no change in the operations or employment at the SFC site. The lack of any change in employment would result in no change in the overall population of the study area and the impact would be SMALL.

B.6.3 Property Value and Tourism Impacts

This section presents the potential impacts on property values and tourism that would result from the implementation of each individual alternative.

B.6.3.1 Alternative 1: On-Site Disposal of Contaminated Materials (the Licensee's Proposed Action)

With the reclamation of the SFC site, including completion of the groundwater *Corrective Action Plan*, there would be SMALL impacts on current and future property values and tourism opportunities in Sequoyah County. Demolition of the buildings and equipment currently present on-site would improve the visual aesthetics. The proposed disposal cell would be constructed in accordance with the stringent design criteria in Appendix A to 10 CFR Part 40, which are protective of public health and safety. In the short-term, following reclamation, there would likely be no change in the existing economic conditions that could affect property values and tourism. However, release of a portion of the site for unrestricted use (including potential commercial or industrial reuse) could potentially have long-term economic benefits given the proximity of the site to the Illinois and Arkansas rivers and Interstate 40, and it is possible that property values would be affected favorably. It is expected that, in the long-term, tourism opportunities would remain the same or be enhanced, depending upon how the unrestricted portion of the property is developed.

B.6.3.2 Alternative 2: Off-Site Disposal of All Contaminated Materials

With the reclamation of the SFC site, including completion of the groundwater *Corrective Action Plan*, and release of the entire site for unrestricted use, there would be SMALL impacts on current and future property values and tourism opportunities in Sequoyah County. In the short-term, following reclamation, there would likely be no change in the existing economic conditions that could affect property values and tourism. However, in the long-term there would be a potential for long-term economic benefits given the proximity of the site to the Illinois and Arkansas rivers and Interstate 40, and it is possible that property values would be affected favorably. It is expected that, in the long-term, tourism opportunities would remain the same or be enhanced, depending upon how the unrestricted portion of the property is developed.

B.6.3.3 Alternative 3: Partial Off-Site On-Site Disposal of Contaminated Materials

With the reclamation of the SFC site, including completion of the groundwater *Corrective Action Plan*, there would be SMALL impacts on current and future property values and tourism opportunities in Sequoyah County. There would be improvement in visual aesthetics, and public health and safety would be protected as stated in Alternative 1. In the short-term, following reclamation, there would likely be no change in the existing economic conditions that could affect property values and tourism. However, release of a portion of the site for unrestricted use (including potential commercial or industrial reuse) could potentially have long-term economic benefits, and it is possible that property values would be affected favorably. It is expected that, in the long-term, tourism opportunities would remain the same or be enhanced, depending upon how the unrestricted portion of the property is developed.

B.7 Environmental Justice

Consistent with NUREG–1748, the demographics of the SFC site were reviewed with respect to environmental justice concerns. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, was issued by President Clinton in 1994. This Executive Order directs all federal agencies to develop strategies for considering environmental justice in their programs, policies, and activities.

Executive Order 12898:
Environmental justice is described, in essence, as "disproportionately high and adverse human health or environmental effects of . . . programs, policies, and activities on minority populations and low-income populations."

On December 10, 1997, the CEQ issued *Environmental Justice Guidance Under the National Environmental Policy Act* (CEQ, 1997). The NRC considered the CEQ's guidance in developing guidance for the Federal and State Materials and Environmental Management Program on conducting environmental justice reviews (Appendix B of NUREG-1748).

For the purpose of this analysis, a minority is defined as members of the following population groups: Black or African American (non-Hispanic), American Indian or Alaska Native (non-Hispanic), Asian (non-Hispanic), Native Hawaiian or other Pacific Islander (non-Hispanic), some other race (non-Hispanic), two or more races (non-Hispanic), and Hispanic or Latino (of any race). Low income is defined as being below the poverty level as defined by the U.S. Census Bureau.

If a facility is located outside the city limits or in a rural area, NUREG-1748 recommends that all geographic units (in this case, census tracts) within or partially within a 50-mile radius should be evaluated. However, the guidance is flexible with regard to the zone of potential impacts as long as the geographic area encompasses all of the alternative sites. This analysis only includes one geographic site (the SFC site). In addition, there are no LARGE impacts associated with any of the proposed alternatives (with the exception of the no-action alternative) that would help to define an appropriate EJ analysis study area. In fact, with the exception of transportation impacts for Alternatives 2 and 3, all potential environmental impacts are geographically restricted to the region surrounding the SFC site. Potential transportation impacts are characterized as SMALL and are limited to the transportation route. It is for these reasons that this analysis utilizes a 25-mile radius study area. Furthermore, this study area will include those communities that would have the greatest potential to be affected by the impacts of the proposed action. This 25-mile study area encompasses portions of seven counties and includes the closest city with a significant population (Muskogee).

In conducting this environmental justice analysis, the percentage of minority population and low-income populations was compared with state and county percentages. According to NUREG-1748, if the study area percentages significantly exceed county/state percentages (i.e., by more than 20 percentage points) or exceed 50%, environmental justice "should be considered in greater detail." If neither criterion is met, no further evaluation is necessary unless additional relevant information is discovered during scoping.

B.7.1 Minority Populations

Table B.7-1 describes the racial distribution in the census tracts within 25 miles of the SFC site, which is located in Sequoyah County, Oklahoma. Figure B.7-1 identifies census tracts within a 25-mile radius of the SFC site. As shown on the figure, the 25-mile radius also encompasses portions of Cherokee and Adair counties to the north; Haskell County and the northwestern tip of Le Flore County to the south; and Muskogee and McIntosh counties to the northwest and west. A small portion (approximately 5.2 square kilometers [2 square miles]) of one census tract in Wagoneer County is encompassed by the 25-mile boundary but was excluded from the analysis due to the small size (see Figure B.7-1).

As shown in the table, the majority of the 34 census tracts within 25 miles of the site do not present an environmental justice concern with regard to race or ethnicity. Minority populations in most census tracts do not exceed 50% and are not 20 percentage points higher than in their respective counties. There are no census tracts where the population of American Indian and Alaska Natives exceed 50% of the county/state populations. The county with the highest percentage of American Indian and Alaska Native population is Adair County. This county is located to the northeast of the SFC site, approximately 32 kilometers (20 miles) from the Lower Ilinois River, which is significantly upgradient of all potential impacts of the proposed action.

As shown in Table B.7-1, four census tracts require further evaluation due to the fact that minority populations exceed 50% of state/county populations. These census tracts are in Muskogee County (tracts 3, 4, and 6) and Adair County (tract 9768). A more detailed analysis of these census tracts is presented in Section B.7.3.

B.7.2 Low-income Populations

Table B.7-2 describes the poverty status of persons living within 25 miles of the SFC site. As shown in the table, median household incomes were similar among the counties within 25 miles of the site. Poverty rates were generally similar among the counties and were not significantly higher in the census tracts compared with their respective counties, with the exception of one tract. None of the census tracts or counties had poverty rates that exceeded 50%. A more detailed analysis of census tract 2 in Muskogee County is presented in Section B.7.3.

B.7.3 Examination of Potential Minority and Low-Income Census Tracts

Minority Status

Muskogee County census tracts 3, 4, and 6 have minority populations (Black/African American) that exceed 50% of the total population at 66.8%, 68.5%, and 54.2%, respectively (see Table B.7-1). Census tracts 3 and 4 are a significant 30 percentage points above the county minority population. However, these tracts are nearly 25 miles to the northwest of the site, and the proposed reclamation of the site by SFC would not be expected to affect populations in these areas.

Table B.7-1 Preliminary Screening for Minority Status

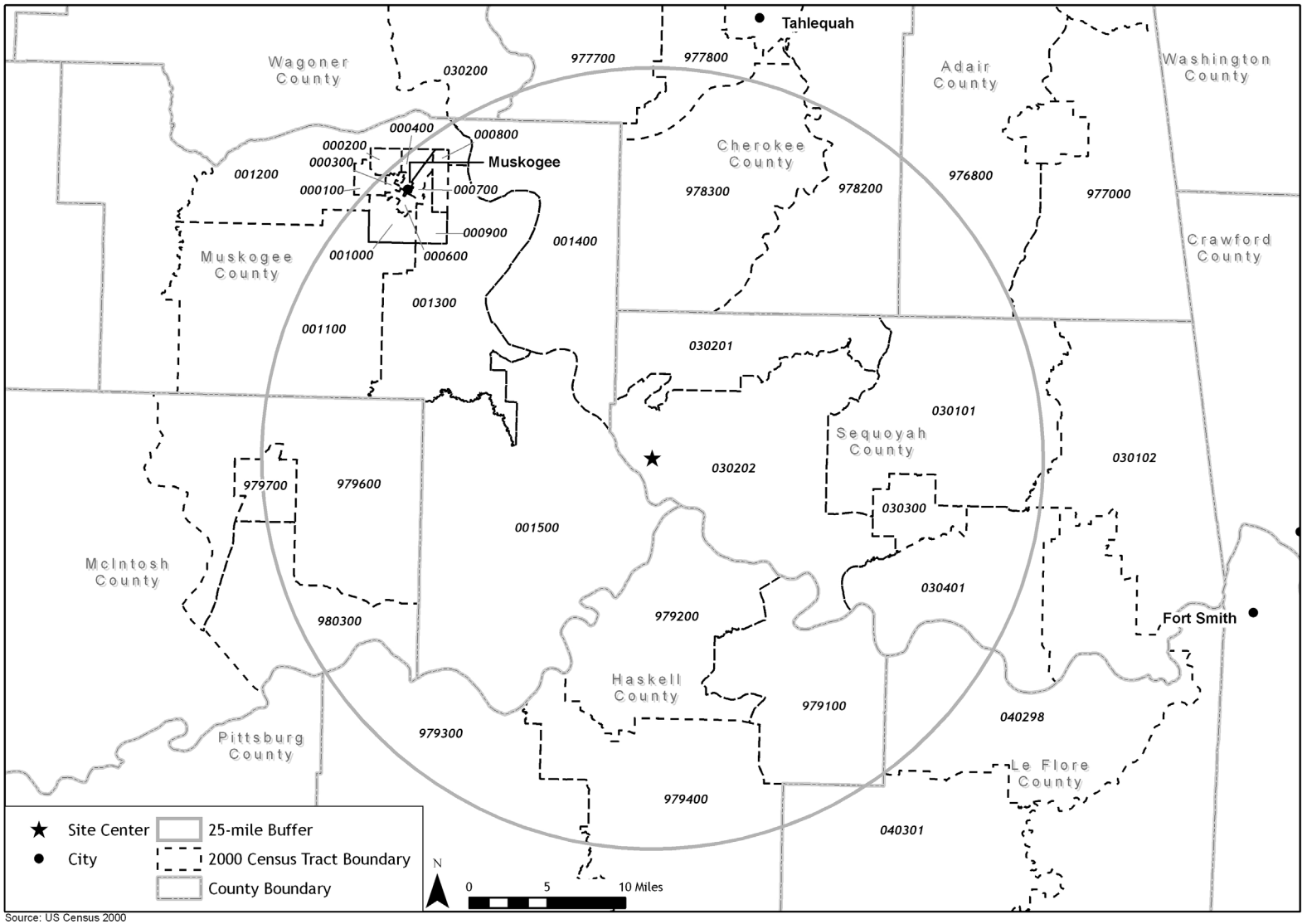
State/County/ Census Tract	Total Population	Percent Non-white	Percent Hispanic	White Alone	Non-White	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races
State of Oklahoma	**3,450,654**	**23.9**	**5.2**	**2,624,679**	**825,975**	**258,532**	**266,801**	**45,546**	**1,840**	**84,830**	**168,426**
Sequoyah County	**38,972**	**32.0**	**2.0**	**26,510**	**12,462**	**613**	**7,913**	**68**	**15**	**250**	**3,603**
Tract 303.01	4,291	42.4	1.4	2,473	1,818	32	1,200	0	5	15	566
Tract 301.02	8,421	30.3	2.3	5,873	2,548	269	1,480	17	7	84	691
Tract 302.01	2,794	30.8	1.2	1,934	860	16	553	0	0	11	280
Tract 302.02	5,335	37.3	1.5	3,346	1,989	116	1,416	10	0	12	435
Tract 303	8,426	31.2	2.4	5,800	2,626	65	1,766	34	3	47	711
Tract 304.01	3,553	23.0	1.2	2,736	817	24	561	2	0	23	207
Muskogee County	**69,451**	**36.3**	**2.7**	**44,210**	**25,241**	**8,958**	**10,284**	**351**	**8**	**939**	**4,701**
Tract 1	4,812	44.6	3.0	2,667	2,145	1,254	546	0	0	93	252
Tract 2	1,892	65.4	1.7	654	1,238	1,044	162	0	0	0	32
Tract 3	3,483	66.8	2.8	1,155	2,328	1,837	251	19	0	12	209
Tract 4	1,806	68.5	6.3	569	1,237	834	156	0	0	113	134
Tract 6	1,878	54.2	5.1	861	1,017	546	245	0	0	126	100
Tract 7	5,252	32.2	6.4	3,563	1,689	225	985	13	0	157	309
Tract 8	7,358	23.8	2.1	5,608	1,750	262	851	119	0	61	457
Tract 9	5,232	28.2	3.3	3,759	1,473	167	954	9	0	32	311
Tract 10	4,414	33.6	1.4	2,932	1,482	541	319	46	0	33	543
Tract 11	3,667	32.2	1.4	2,486	1,181	347	597	3	0	7	227
Tract 12	5,424	41.2	1.7	3,188	2,236	1,152	638	92	7	30	317
Tract 13	6,321	27.1	1.9	4,605	1,716	60	1,070	12	0	88	486
Tract 14	7,207	29.9	3.4	5,055	2,152	74	1,391	17	0	112	558
Tract 15	6,423	34.4	1.4	4,215	2,208	86	1,596	21	1	57	447

Table B.7-1 Preliminary Screening for Minority Status

State/County/ Census Tract	Total Population	Percent Non-white	Percent Hispanic	White Alone	Non-White	Black or African American Alone	American Indian and Alaska Native Alone	Asian Alone	Native Hawaiian and Other Pacific Islander Alone	Some Other Race Alone	Two or More Races
Haskell County	**11,792**	**20.7**	**1.5**	**9,348**	**2,444**	**92**	**1,615**	**21**	**8**	**27**	**681**
Tract 9791	1,893	17.3	2.4	1,566	327	0	251	9	0	3	64
Tract 9792	4,243	18.9	2.3	3,440	803	5	586	10	8	6	188
Tract 9793	3,329	23.9	0.5	2,534	795	81	464	2	0	2	246
Tract 9794	2,327	22.3	0.7	1,808	519	6	314	0	0	16	183
Adair County	**21,038**	**51.7**	**3.1**	**10,167**	**10,871**	**22**	**9,023**	**4**	**16**	**249**	**1,557**
Tract 9768	4,531	59.7	1.7	1,827	2,704	0	2,305	0	11	28	360
McIntosh County	**19,456**	**27.7**	**1.3**	**14,071**	**5,385**	**734**	**2,984**	**26**	**17**	**67**	**1,557**
Tract 9796	4,335	23.7	1.5	3,306	1,029	92	494	0	0	35	408
Tract 9797	3,748	30.9	1.2	2,589	1,159	246	533	0	0	4	376
Tract 9803	3,191	17.4	1.2	2,636	555	16	359	6	0	6	168
Cherokee County	**42,521**	**43.8**	**4.1**	**23,908**	**18,613**	**403**	**13,534**	**87**	**0**	**1,010**	**3,579**
Tract 9777	5,603	38.2	2.4	3,464	2,139	44	1,696	5	0	56	338
Tract 9778	4,690	48.6	3.7	2,409	2,281	33	1,624	0	0	122	502
Tract 9782	5,631	47.4	1.7	2,963	2,668	13	2,130	0	0	44	481
Tract 9783	5,704	45.5	3.0	3,110	2,594	15	1,950	8	0	54	567
LeFlore County	**48,109**	**20.0**	**3.8**	**38,479**	**9,630**	**909**	**5,166**	**118**	**10**	**921**	**2,506**
Tract 402.98	8,008	21.4	1.7	6,297	1,711	469	551	0	0	71	620
Tract 403.01	5,234	16.7	1.5	4,359	875	2	545	33	0	26	269

Source: U.S. Bureau of the Census, 2000.

Note: Shaded rows identify census tracts with a 50+% minority population.



Source: US Census 2000

Figure B.7-1 Census Tracts within 25 miles of the SFC Site

Table B.7-2 Preliminary Screen for Poverty Status

Geography State/County/Census Tract)	Median Household Income in 1999 (Dollars)	Total Population for whom Poverty Status is Determined[1]	Persons With Income in 1999 Below Poverty Level	Poverty Rate (Percent)
Oklahoma	**$33,400**	**3,336,224**	**491,235**	**14.7**
Sequoyah County	**$27,615**	**38,445**	**7,613**	**19.8**
Tract 303.01	$27,352	4,270	905	21.2
Tract 301.02	$29,843	8,345	1,621	19.4
Tract 302.01	$28,925	2,766	500	18.1
Tract 302.02	$25,438	5,186	1,154	22.3
Tract 303	$25,332	8,267	1,865	22.6
Tract 304.01	$26,378	3,512	595	16.9
Muskogee County	**$28,438**	**66,136**	**11,846**	**17.9**
Tract 1	$21,189	4,596	944	20.5
Tract 2	$19,911	1,892	745	39.4
Tract 3	$22,258	3,444	976	28.3
Tract 4	$20,265	1,448	439	30.3
Tract 6	$20,485	1,878	540	28.8
Tract 7	$20,344	5,086	1,218	23.9
Tract 8	$38,997	7,058	623	8.8
Tract 9	$24,626	5,111	890	17.4
Tract 10	$37,325	4,401	618	14.0
Tract 11	$36,524	3,651	449	12.3
Tract 12	$32,786	3,856	552	14.3
Tract 13	$40,181	6,271	466	7.4
Tract 14	$32,712	7,088	1,131	16.0
Tract 15	$22,837	6,110	1,443	23.6
Haskell County	**$24,553**	**11,594**	**2,377**	**20.5**
Tract 9791	$24,848	1,891	428	22.6
Tract 9792	$22,238	4,082	908	22.2
Tract 9793	$26,644	3,309	578	17.5
Tract 9794	$24,430	2,312	463	20.0
Adair County	**$24,881**	**20,552**	**4,770**	**23.2**
Tract 9768	$24,496	4,479	1,028	23.0
McIntosh County	**$25,964**	**19,026**	**3,459**	**18.2**
Tract 9796	$30,074	4,292	525	12.2
Tract 9797	$22,593	3,552	718	20.2
Tract 9803	$27,534	3,191	457	14.3
Cherokee County	**$26,536**	**40,920**	**9,355**	**22.9**
Tract 9777	$31,630	5,584	969	17.4
Tract 9778	$28,315	4,668	1,046	22.4
Tract 9782	$26,840	5,576	973	17.4
Tract 9783	$26,491	5,678	1,495	26.3

Table B.7-2 Preliminary Screen for Poverty Status

Geography State/County/Census Tract)	Median Household Income in 1999 (Dollars)	Total Population for whom Poverty Status is Determined[1]	Persons With Income in 1999 Below Poverty Level	Poverty Rate (Percent)
LeFlore County	**$27,278**	**46,443**	**8,857**	**19.1**
Tract 402.98	$27,301	7,876	1,395	17.7
Tract 403.01	$28,657	5,192	1,044	20.1

Source: U.S. Bureau of the Census, 2000.

[1] Poverty status was determined for all people except institutionalized people, people in military group quarters, people in college dormitories, and unrelated individuals under 15 years old. These groups also were excluded from the numerator and denominator when calculating poverty rates. They are considered neither "poor" nor "non-poor."

Note: Shaded rows identify census tracts with a poverty rate more than 20 percentage points greater than the poverty rate of the county as a whole.

Census tract 9768 in Adair County, has a minority population of 59.7% (American Indian/ Alaska Native), which slightly exceeds the NUREG-1748 criteria of 50%; however, this percentage is not significantly higher than the county as a whole, which has a minority population of 51.7%. The American Indian/Native Alaska population comprises 42.9% of the county's population. Census tract 9768 is nearly 20 miles from the SFC site and, at this distance, residents in Adair County would not be expected to experience any direct adverse impacts from the SFC reclamation.

Low-Income Status

Census tract 2 in Muskogee County had a poverty rate of 39.4%, which was slightly more than 20 percentage points higher than the poverty rate of the county (17.9%). The median income of this census tract, $19,911, was lower than the county's median income of $28,438. While this figure would typically present a concern with regard to environmental justice, the majority of this census tract is more than 25 miles from the SFC site, and residents within this census tract are not expected to experience impacts from the SFC reclamation.

Conclusion

Minority and low income populations would not be directly affected by the potential impacts resulting from the reclamation of the SFC site, mainly due to the distance that these populations reside from the site. However, because minority and low income populations are more likely to be subsistence fishers or hunters, or gatherers of edible plant material, there is a possibility that these populations could be indirectly affected by implementation of the proposed action and its alternatives. Also, American Indian populations commonly use plants and animals that inhabit the area for religious ceremonies. Plants and animal resources used as food sources and for religious purposes could be found in proximity to the SFC site and the Lower Illinois River. Any disproportionate impacts on these ecological and surface water resources would be SMALL as the proposed reclamation of the SFC site would result in the containment of site contamination either in a disposal cell or by removal from the site.

Therefore, based on the NRC environmental justice guidelines (NUREG 1748) and this impact analysis, the NRC staff has concluded that proposed reclamation of the site would be SMALL and not have disproportionately high or adverse human health or environmental impacts on minority and low-income populations. Therefore, no further analysis or action is required.

B.8 Noise

B.8.1 Affected Environment

The SFC site is located in a rural area, and the land surrounding the site is used primarily for agricultural and recreational activities. Residential, industrial, and commercial development constitutes about one-third of the land use near the SFC site. The study area comprises the SFC site and the nearest noise receptors, which are less than 5,000 feet to the north and northwest of the site. Background noise at the site results mostly from light traffic in the area. This noise level would be comparable to that of a quiet residential area, which is about 45 to 55 decibels (dB) in the normal (A-scale) auditory frequency band dB(A).

The day-night noise level is the average sound level during a 24-hour period with 10 dBA added to nighttime sound levels from 10 p.m. to 7 a.m. to account for people's greater sensitivity to sound during that period.

Although there is no state or local noise ordinance for Gore, Oklahoma, in 1974 the EPA published "Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety." This document provides information to state and local governments for use in developing their own ambient noise standards. The EPA determined that a day-night noise level of 55 dBA protects the public from noise interfering with indoor and outdoor activities.

The noise receptors closest to the SFC site include a residence on State Highway10 near the intersection of Highway 64, and a museum on U.S. Route 64 west of its intersection with State Highway 10 (see Figure B.8-1). The residence on State Highway 10 is more than 732 meters (2,400 feet) to the northeast of the site boundary, and the museum is more than 1,524 meters (5,000 feet) north of the proposed reclamation area and location of the disposal cell construction.

B.8.2 Alternatives Analysis

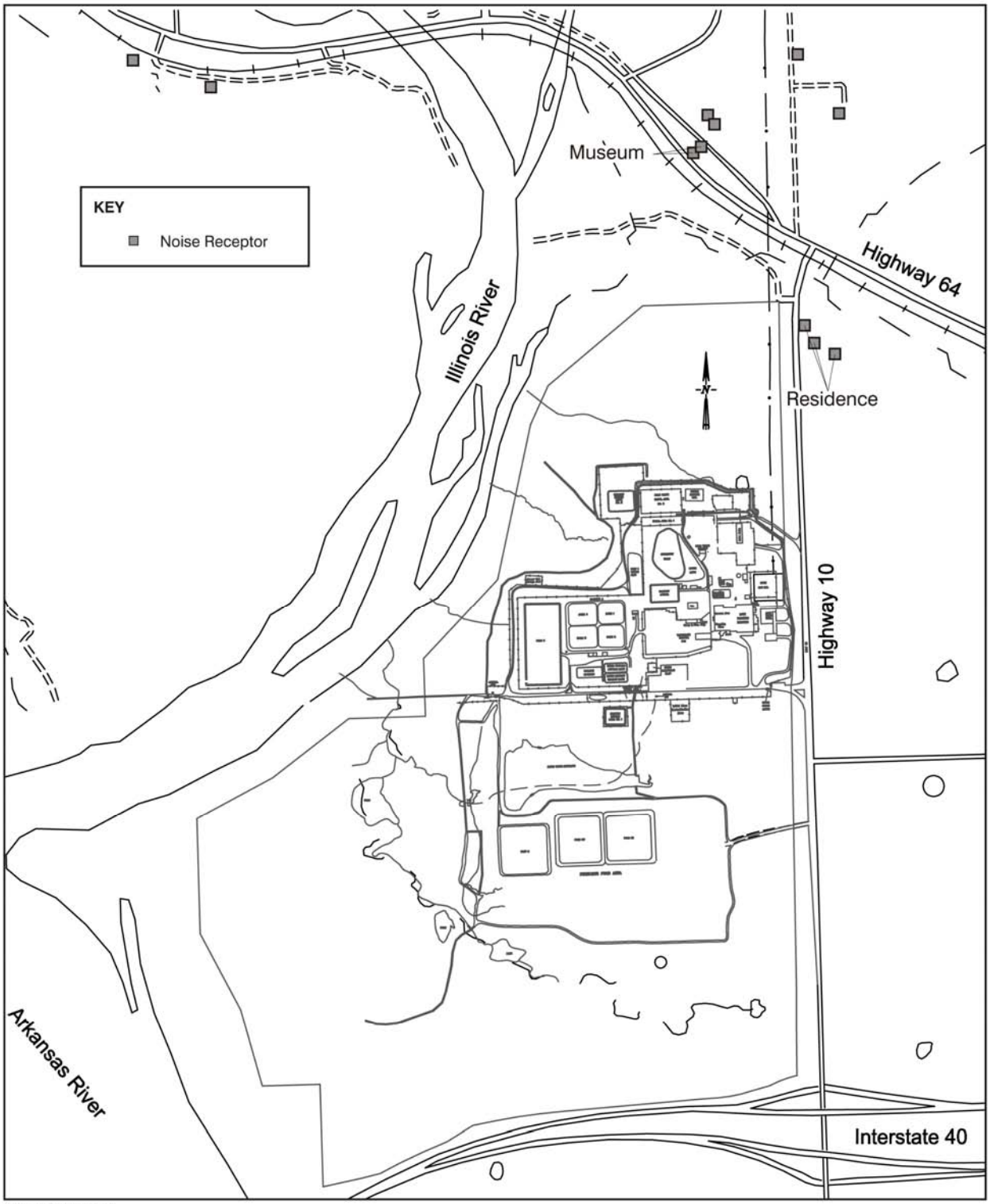
A noise analysis was performed for the nearest of these receptors to identify any potential noise impacts.

B.8.2.1 Alternative 1: On-Site Disposal of Contaminated Materials (the Proposed Action)

During the reclamation process and construction of the on-site disposal cell, the primary sources of noise would be from demolition of the existing buildings, the movement of heavy equipment during soil excavation, the placing the liner materials, and filling and capping the disposal cell.

The following elements of the reclamation process are expected to generate noise levels above background:

- Construction of an above-grade disposal cell;
- Removal of sludge and sediment;



SOURCE: SFC, 2006

Figure B.8-1 Noise Receptors Near the SFC Site

- Excavation of buried low-level wastes;
- Dismantlement of process equipment;
- Dismantlement/demolition of structures;
- Demolition of concrete floors, foundations, and storage pads;
- Excavation of underground utilities;
- Excavation of contaminated soils; and
- Regrading the site.

It is anticipated that the majority of the construction noise would be generated during daylight hours. Blasting is not anticipated to occur during reclamation or construction activities.

Reclamation activities would generate temporary increases in outdoor noise levels, especially if heavy trucks or other construction vehicles are accelerating frequently around the site. The levels of noise attributable to these activities would generally be comparable to the normal industrial activities previously carried out at the SFC site.

Table B.8-1 identifies typical noise emission levels for the construction equipment that would be used during demolition and cell construction activities, as well as a percent usage (FHWA, 2006), which accounts for the percentage of time that the equipment would typically be in use during these types of activities. The expected noise contribution at the location of the nearest receptor was calculated for each type of equipment using the FHWA Roadway Construction Noise Model (RCNM), version 1.0, 2006. The model results, as well as the maximum combined noise level expected from all of the construction equipment, is provided in Table B.8-1.

Table B.8-1 Demolition and Cell Construction Noise

Construction Equipment	Sound Pressure Level (SPL) at 50 feet (dBA)	Usage (%)	Noise Level at nearest Receptor (dBA)
Jack Hammer	89	20	48
Concrete Joint Cutter	90	20	49
Bulldozer	82	40	44
Crane	81	16	39
Front-end Loader	79	40	42
Truck	76	40	39
Pump	81	50	44
Maximum Noise Level			54

Source: FHWA, 2006.

The maximum noise level calculated for the nearest residential receptor, located 2,400 feet to the northeast of the site boundary, was 54 dBA, and it is likely that the typical noise levels from most construction equipment would be below 54 dBA over this distance. This is a conservative estimate, as additional reduction in noise level would be expected due to noise shielding by hills

and vegetation and air absorption. Construction-related noise levels at the museum would be lower due to its greater distance from the site. Since no activity would be conducted in the evening hours, a noise level of 54 dB(A) during the day would not exceed the EPA day-night level of 55 dB(A), which is recommended for protecting the public from interference with indoor and outdoor activities. Therefore, the excavation of soil and demolition of on-site buildings would result in SMALL, direct noise impacts.

Changes in modes and times of transportation would be involved in all of the alternatives except the no-action alternative. Site workers commuting to and from the SFC site and the transport of equipment and materials to the site by truck can generate noise. Waste shipped from the site for off-site disposal also would create additional truck traffic and noise. However, this noise would be transient in nature and is not expected to create a significant increase over existing traffic noise levels. Therefore, the noise impact is expected to be SMALL.

Since very little activity would be necessary to maintain the disposal cell after the reclamation activity has been completed, noise levels in the site area would be expected to be near background noise levels, resulting in a SMALL impact.

B.8.2.2 Alternative 2: Off-site Disposal of All Contaminated Materials

Under Alternative 2, noise would be generated primarily by demolition of the existing buildings and equipment, the movement of heavy equipment during soil excavation, and the transport of materials to an off-site disposal facility. The elements of the reclamation process that would be expected to generate noise levels above background are the same as under Alternative 1, with the addition of the construction of a rail spur and an on-site loading facility.

It is anticipated that the majority of construction-related noise would be generated during daylight hours. Blasting is not anticipated to occur during reclamation or construction activities.

Reclamation activities would generate temporary increases in outdoor noise levels, especially if heavy trucks or other construction vehicles are accelerating frequently around the site. The levels of noise attributable to these activities would generally be comparable to the normal industrial activities previously carried out at the SFC site. The typical noise emission levels for construction equipment identified in Table B.8-1 also apply to Alternative 2. The maximum noise level predicted for the nearest residential receptor, located 2,400 feet to the northeast of the site boundary, is 54 dBA, and it is likely that the typical noise levels from most construction equipment would be reduced to below 55 dBA over this distance.

This alternative includes the construction and operation of a 2.57-km (1.6-mile) rail spur to junction with the Union Pacific Railroad line. The spur would pass within 366 meters (1,200 feet) of the nearest residences on N447 Road near U.S. Highway 64. To maximize the potential noise impact, it is assumed that one train trip per day, involving an estimated 60 to 80 rail cars joined into a train, would be required to ship waste from the site to a disposal facility. Based on FHWA noise evaluation guidance, it is predicted that the noise level at the nearest receptor to the spur would average 47 dBA during the hour when the train is traveling along the spur. This level would add very little to the existing daytime noise level of 45 to 55 dBA for a quiet residential area. In addition, the existing Union Pacific rail line is closer to these receptors than the

proposed rail spur location and, therefore, would be expected to contribute more noise than the spur.

Therefore, the excavation of soil, demolition of on-site buildings and equipment, and transportation of all contaminated materials to an off-site disposal facility would result in SMALL, direct noise impacts.

B.8.2.3 Alternative 3: Partial Off-Site Disposal of Contaminated Materials

Under Alternative 3, noise would be generated primarily by demolition of the existing buildings, the movement of heavy equipment during soil excavation, placing the liner materials, filling and capping the disposal cell, and transport of the sludge and sediment to an off-site facility licensed to accepted such materials. The elements of the reclamation process that would be expected to generate noise levels above background are the same as under Alternative 1, with the addition of the truck noise that would result from the loading and transport of the sludges and sediments.

It is anticipated that the majority of the construction noise would be generated during daylight hours. Blasting is not anticipated to occur during reclamation or construction activities.

Reclamation activities would generate temporary increases in outdoor noise levels, especially if heavy trucks or other construction vehicles are accelerating frequently around the site. The levels of noise attributable to these activities would generally be comparable to the normal industrial activities previously carried out at the SFC site. The typical noise emission levels for construction equipment identified in Table B.8-1 also apply to Alternative 3. Additional truck noise would result from the loading and transport of the sludges and sediments (in super sacks) at the same time as the cell construction or building demolition. However, the additional truck traffic is expected to generate short duration noise events that would add little to the average noise levels at the receptors, and the impact would be SMALL. The maximum noise level predicted for the nearest residential receptor is 54 dBA, and it is likely that the typical noise levels from most construction equipment would be reduced to below 55 dBA over this distance.

Therefore, the excavation of soil, demolition of on-site buildings, and transportation of contaminated materials would result in SMALL, direct noise impacts.

B.8.2.4 No-Action Alternative

Since there would be no dismantling, excavation, construction, or transportation of contaminated materials under the no-action alternative, there would be no impacts from noise levels at the SFC site.

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