



**US Army Corps
of Engineers®**

Buffalo District

BUILDING STRONG®

Formerly Utilized Sites Remedial Action Program

**APPLICABLE OR RELEVANT AND APPROPRIATE
REQUIREMENTS FOR THE IWCS OPERABLE UNIT
TECHNICAL MEMORANDUM**

**FOR THE
NIAGARA FALLS STORAGE SITE
LEWISTON, NEW YORK**

April 2015

**APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
FOR THE IWCS OPERABLE UNIT
TECHNICAL MEMORANDUM**

**For the Niagara Falls Storage Site
Lewiston, New York**

Prepared for:
**U.S. Army Corps of Engineers
Buffalo District
Contract: W912P4-10-D-0007**

April 2015

TABLE OF CONTENTS

LIST OF FIGURES	iv
LIST OF TABLES	iv
LIST OF APPENDICES	iv
LIST OF ABBREVIATIONS AND ACRONYMS	v
METRIC CONVERSION CHART	vi
 EXECUTIVE SUMMARY	 1
ES.1 Introduction	1
ES.2 The IWCS and Its Contents	2
ES.3 Regulatory Background and Identified Risks Associated with the IWCS	2
ES.4 Remedial Action Objectives and Remedial Alternatives for the IWCS OU	3
ES.5 ARARs for the IWCS OU	4
 1.0 INTRODUCTION	 1-1
1.1 Detailed Description of OUs	1-2
1.2 Report Organization and Content	1-3
 2.0 IWCS OU	 2-1
2.1 IWCS Contents	2-1
2.2 IWCS Construction Details	2-1
2.3 Regulatory Background of IWCS Contents	2-2
2.4 Constituents of Concern	2-3
2.5 Remedial Action Objectives	2-4
2.6 Remedial Alternatives for the IWCS OU	2-4
 3.0 PROCESS FOR IDENTIFYING ARARS	 3-1
4.0 EVALUATION OF ARARS	4-1
4.1 10 CFR 40, Appendix A: CRITERIA RELATING TO THE OPERATION OF URANIUM MILLS AND THE DISPOSITION OF TAILINGS OR WASTES PRODUCED BY THE EXTRACTION OR CONCENTRATION OF SOURCE MATERIAL FROM ORES PROCESSED PRIMARILY FOR THEIR SOURCE MATERIAL CONTENT	4-1
4.1.1 10 CFR 40, Appendix A: Criterion 1, Site Features	4-2
4.1.1.1 Published Regulation	4-2
4.1.1.2 Evaluation and Conclusion	4-3
4.1.2 10 CFR 40, Appendix A: Criterion 2, Off-Site Disposal of Byproduct Material	4-3
4.1.2.1 Published Regulation	4-3
4.1.2.2 Evaluation and Conclusion	4-3
4.1.3 10 CFR 40, Appendix A: Criterion 3, Disposal Mode	4-3
4.1.3.1 Published Regulation	4-3

4.1.3.2	Evaluation and Conclusion.....	4-4
4.1.4	10 CFR 40, Appendix A: Criterion 4, Site and Design Criteria	4-4
4.1.4.1	Published Regulation.....	4-4
4.1.4.2	Evaluation and Conclusion.....	4-5
4.1.5	10 CFR 40, Appendix A: Criterion 5, Groundwater Protection Standards.....	4-5
4.1.5.1	Published Regulation.....	4-5
4.1.5.2	Evaluation and Conclusion.....	4-11
4.1.6	10 CFR 40, Appendix A: Criterion 6, Closure of Waste Disposal Areas	4-11
4.1.6.1	Published Regulations	4-11
4.1.6.2	Evaluation and Conclusion.....	4-13
4.1.7	10 CFR 40, Appendix A: Criterion 6A, Completion of Final Impoundment Radon Barrier	4-13
4.1.7.1	Published Regulation.....	4-13
4.1.7.2	Evaluation and Conclusion.....	4-14
4.1.8	10 CFR 40, Appendix A: Criterion 7, Preoperational Monitoring Period	4-14
4.1.8.1	Published Regulation.....	4-14
4.1.8.2	Evaluation and Conclusion.....	4-15
4.1.9	10 CFR 40, Appendix A: Criterion 8 – Reduction of Airborne Effluent Releases.....	4-15
4.1.9.1	Published Regulation.....	4-15
4.1.9.2	Evaluation and Conclusion.....	4-16
4.1.10	10 CFR 40, Appendix A: Criterion 8A – Daily Inspections	4-16
4.1.10.1	Published Regulation.....	4-16
4.1.10.2	Evaluation and Conclusion.....	4-17
4.1.11	10 CFR 40, Appendix A, Criterion 9	4-17
4.1.11.1	Published Regulation.....	4-17
4.1.11.2	Evaluation and Conclusion.....	4-18
4.1.12	10 CFR 40 Appendix A, Criterion 10, Long-term Surveillance Charge.....	4-18
4.1.12.1	Published Regulation.....	4-18
4.1.12.2	Evaluation and Conclusion.....	4-18
4.1.13	10 CFR 40, Appendix A: Criterion 11, Site and Byproduct Material Ownership	4-18
4.1.13.1	Published Regulation.....	4-18
4.1.13.2	Evaluation and Conclusion.....	4-19

4.1.14	10 CFR 40, Appendix A: Criterion 12, Long-Term Site Surveillance	4-19
4.1.14.1	Published Regulation.....	4-19
4.1.14.2	Evaluation and Conclusion.....	4-20
4.1.15	10 CFR 40, Appendix A: Criterion 13, Hazardous Constituents	4-20
4.1.15.1	Published Regulation.....	4-20
4.1.15.2	Evaluation and Conclusion.....	4-20
4.2	40 CFR 61: National Emission Standards for Hazardous Air Pollutants,.....	4-21
4.2.1	Subpart H: National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities.....	4-22
4.2.1.1	Published Regulations	4-22
4.2.1.2	Evaluation and Conclusion.....	4-22
4.2.2	Subpart Q: National Emission Standards for Radon Emissions From Department of Energy Facilities	4-22
4.2.2.1	Published Regulations	4-22
4.2.2.2	Evaluation and Conclusion.....	4-23
5.0	REGULATIONS EVALUATED BUT DETERMINED NOT TO BE ARARS	5-1
5.1	40 CFR 192, Subparts A, B, C: Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings.....	5-1
5.2	10 CFR 20, Subpart E: Radiological Criteria for License Termination.....	5-1
5.3	10 CFR 61: Licensing Requirements for Land Disposal of Radioactive Waste.....	5-2
5.4	40 CFR 191: Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level, and Transuranic Radioactive Wastes, Subparts A, B, and C	5-2
5.5	6 NYCRR 380: Prevention and Control of Environmental Pollution by Radioactive Materials	5-4
6.0	REFERENCES.....	6-1

LIST OF FIGURES (end of text)

Figure 1-1.	NFSS Vicinity
Figure 1-2.	NFSS Layout
Figure 1-3.	IWCS Operable Unit
Figure 1-4.	Balance of Plant Operable Unit
Figure 2-1.	IWCS and Waste Placement North-South Cross-Section
Figure 2-2.	Subunit Designations for the IWCS OU
Figure 3-1.	ARAR Development Process for the IWCS OU

LIST OF TABLES (following figures)

Table 4-1	10 CFR 40 Appendix A, Relevant and Appropriate Analysis
Table 4-2	40 CFR 61.90 and 61.92 Subpart H: National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities
Table 4-3	40 CFR 192 Subpart A, B, and C, Relevant and Appropriate Analysis
Table 4-4	10 CFR 20 Subpart E, Relevant and Appropriate Analysis
Table 4-5	10 CFR 61 Relevant and Appropriate Analysis
Table 4-6	40 CFR 191 Subparts A, B, and C, Relevant and Appropriate Analysis

LIST OF APPENDICES

Appendix A	Responses to Public Comments on the RAOs and ARARs for the IWCS and Balance of Plant Operable Units Technical Memorandum Fact Sheet
------------	-------------------------------------------------------------------------------------------------------------------------------------

LIST OF ABBREVIATIONS AND ACRONYMS

ALARA	As Low As Reasonably Achievable
ARAR	Applicable or Relevant and Appropriate Requirement
BOP	Balance of Plant
CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
Ci	Curie
cm	Centimeter
FS	Feasibility Study
ft	Feet
FUSRAP	Formerly Utilized Sites Remedial Action Program
HAP	Hazardous Air Pollutant
IWCS	Interim Waste Containment Structure
kg	Kilogram
LLRW	Low-Level Radioactive Waste
LOOW	Lake Ontario Ordnance Works
m	Meter
m ²	Square Meter
m ³	Cubic Meter
mg/kg	Milligrams Per Kilogram
mrem/yr	Millirem per Year
NCP	National Contingency Plan
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NFSS	Niagara Falls Storage Site
NRC	Nuclear Regulatory Commission
NYCRR	New York Codes, Rules and Regulations
NYSDEC	New York State Department of Environmental Conservation
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
pCi/ft ² /sec	Picocuries Per Square Feet Per Second
pCi/g	Picocuries Per Gram
pCi/L	Picocuries Per Liter
pCi/m ² /sec	Picocuries Per Square Meter Per Second
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
TBC	To Be Considered
TEDE	Total Effective Dose Equivalent
TNT	trinitrotoluene
TRU	Transuranic
U ₃ O ₈	Triuranium Octoxide
UMTRCA	Uranium Mill Tailings Radiation Control Act
USACE	United States Army Corps of Engineers
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
yd ³	Cubic Yards

METRIC CONVERSION CHART

To Convert to Metric			To Convert from Metric		
If You Know	Multiply By	To Get	If You Know	Multiply By	To Get
Length					
inches	2.54	centimeters	centimeters	0.3937	inches
feet	30.48	centimeters	centimeters	0.0328	feet
feet	0.3048	meters	meters	3.281	feet
yards	0.9144	meters	meters	1.0936	yards
miles	1.60934	kilometers	kilometers	0.6214	miles
Area					
square inches	6.4516	square centimeters	square centimeters	0.155	square inches
square feet	0.092903	square meters	square meters	10.7639	square feet
square yards	0.8361	square meters	square meters	1.196	square yards
acres	0.40469	hectares	hectares	2.471	acres
square miles	2.58999	square kilometers	square kilometers	0.3861	square miles
Volume					
fluid ounces	29.574	milliliters	milliliters	0.0338	fluid ounces
gallons	3.7854	liters	liters	0.26417	gallons
gallons	0.00378	cubic meters	cubic meters	264.55	gallons
cubic feet	0.028317	cubic meters	cubic meters	35.315	cubic feet
cubic yards	0.76455	cubic meters	cubic meters	1.308	cubic yards
Weight					
ounces	28.3495	grams	grams	0.03527	ounces
pounds	0.4536	kilograms	kilograms	2.2046	pounds
Temperature					
Fahrenheit	Subtract 32 then multiply by 5/9ths	Celsius	Celsius	Multiply by 9/5ths then add 32	Fahrenheit
Radiation					
picocurie	0.037	Becquerel	Becquerel	27.027027	picocuries
curie	3.70E+10	Becquerel	Becquerel	2.703E-11	Curies
rem	0.01	sievert	sievert	100	rem
RAD	0.01	Gray	Gray	100	RADs

EXECUTIVE SUMMARY

ES.1 INTRODUCTION

In 1997, Congress designated the United States Army Corps of Engineers (USACE) as the lead federal agency for implementing the Formerly Utilized Sites Remedial Action Program (FUSRAP) according to protocols set forth in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), applying the standard criteria set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The U.S. Department of Energy (USDOE) designated the Niagara Falls Storage Site (NFSS) for inclusion in the FUSRAP, and the USACE-Buffalo District is the lead District for USACE responsible for conducting a remedial investigation/feasibility study (RI/FS) at the NFSS pursuant to CERCLA and the NCP.

The NFSS is a 191-acre (77-hectare) property located at 1397 Pletcher Road in the township of Lewiston, Niagara County, New York. Located in the southwest corner of the NFSS is the approximately 10-acre (4-hectare) Interim Waste Containment Structure (IWCS).

CERCLA activities at the NFSS have transitioned from the site RI activities to the FS evaluation of potential remediation alternatives for the first of three separate operable units (OUs), the IWCS OU. The remaining two OUs are the Balance of Plant (BOP) OU and the Groundwater OU. The NCP (Title 40 *Code of Federal Regulations [CFR]* Section 300.430[a][ii][A]) states that sites should generally be remediated in OUs when phased analysis is necessary given the size or complexity of a site.

To facilitate the IWCS OU FS process, USACE is developing a series of technical memoranda that will allow USACE to:

- Engage and inform the public on key technical issues in the early stages of the CERCLA FS process so that public concerns can be fully considered during the development of FS documents; and
- Allow the final IWCS OU FS publication to contain information and conclusions that have previously received input from the public, thus promoting a more efficient public review process for the IWCS OU FS document.

The purpose of this technical memorandum is to identify potential Applicable or Relevant and Appropriate Requirements (ARARs) for the IWCS OU.

CERCLA Section 121 (d) “Degree of cleanup” directs that any remedial action selected shall attain a degree of cleanup of hazardous substances, pollutants and contaminants released into the environment, or control of further release, that at a minimum assures the protection of human health and the environment. Such remedial actions shall also be relevant and appropriate under the circumstances *presented by the release* or threatened release of such substance, pollutant or contaminant. With respect to any hazardous substance, pollutant or contaminant *that will remain onsite* the remedy selected shall attain a standard, requirement, criteria or limitation under any Federal environmental law *or* any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than the Federal standard, and has been identified by the State in a timely manner, which is legally applicable to the hazardous substance or pollutant or contaminant concerned *or* is relevant and appropriate under the *circumstances of the release* or threatened release of such hazardous substance or pollutant or contaminant. The statute puts the emphasis on the degree of cleanup, or in other words, how clean is clean enough if a hazardous substance, pollutant or contaminant remains at the site.

The United States Environmental Protection Agency (USEPA) articulated its interpretation of this section of CERCLA in the NCP and defined these standards as ARARs at 40 CFR 300.5. Applicable requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable. Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

ES.2 THE IWCS AND ITS CONTENTS

The IWCS is approximately 990 feet (300 m) long by 450 feet (140 m) wide (10 acres). It was designed as a waste containment system with an engineered cap, dike, sidewall, and natural clay bottom to inhibit radon emissions, infiltration from precipitation, and migration of contamination to groundwater. The specified design life of the IWCS cap is 25 to 50 years; whereas the specified design life of the bottom, dike, and cut-off walls is 200 to 1,000 years (USDOE 1986).

The main hazards in the IWCS are the residues, which were generated from the processing of uranium ore and are otherwise known as uranium mill tailings. These residues, identified as K-65, R-10, L-30, L-50, and F-32, contain varying concentrations of radium-226 due to the original concentration of uranium contained in the ores from which they were processed. Among the residues, the K-65 residues contain the highest concentration of radium-226, approximately 520,000 picocuries per gram (pCi/g). As radium-226 undergoes radioactive decay, it releases gamma radiation and radon-222 gas.

The majority of contaminated materials in the IWCS include soils removed from onsite and offsite areas impacted by historical releases from the residues during the operational period of the NFSS, including in drainage areas (ditches) at the site. Therefore, contaminants found in these materials are expected to be similar to (but with much lower contaminant concentrations than) those in the residues.

ES.3 REGULATORY BACKGROUND AND IDENTIFIED RISKS ASSOCIATED WITH THE IWCS

The uranium mill tailings at the NFSS were all generated before the Atomic Energy Act of 1954 was modified in 1978, known as the Uranium Mill Tailing Radiation Control Act (UMTRCA), to authorize regulation of active uranium processing sites by the NRC and remediation of inactive processing sites containing tailings or residual radioactive material by the USDOE. The tailings and residual radioactive materials at NFSS were excluded from regulation because the definition of “processing site” did not include sites owned by the federal government as of January 1, 1978.

Pursuant to UMTRCA the USEPA was directed to develop “standards of general application...for the protection of the public health, safety, and the environment from radiological and non-radiological hazards associated with (uranium mill tailings)” for both the active and inactive processing sites. Concurrently, USDOE was authorized to remediate uranium mill tailings associated with past operations, commonly referred to as UMTRCA Title I sites, and the NRC was given the responsibility to regulate all existing and future uranium milling operations (Title II sites). The NFSS uranium mill tailings were not

explicitly addressed by the Act. Congressional action with respect to NRC regulation of uranium mill tailings did not authorize regulation of mill tailings generated prior to the enactment of legislation in 1978; therefore, NRC licensing requirements do not apply and NRC regulations are not legally applicable.

In Section 312 of the Energy and Water Development Appropriations Act for the fiscal year ending September 30, 2004, Congress subsequently designated the residues within the IWCS as 11e.(2) byproduct material based on regulatory waste classification definitions.

The 2012 USACE technical memorandum entitled *Preliminary Evaluation of Health Effects of Hypothetical Exposures to Contaminants from the Interim Waste Containment Structure* (USACE 2012) and the 1995 National Research Council report entitled *Safety of the High-Level Uranium Ore Residues at the Niagara Falls Storage Site, Lewiston, New York* (NRC 1995) concluded that the materials in the IWCS are safely contained and will remain safe for as long as active controls are in place at NFSS to prevent inadvertent exposures. If the materials were uncovered and someone was to stay at the IWCS for several days to weeks, substantial doses and serious health effects could result. The main contributors would be external gamma irradiation and inhalation of radon-222 gas and its progeny.

ES.4 REMEDIAL ACTION OBJECTIVES AND REMEDIAL ALTERNATIVES FOR THE IWCS OU

A remedial action objective is a specific goal that remedial alternatives must fulfill to be protective of human health and the environment. Remedial action objectives provide the basis for selecting remedial technologies and developing and evaluating remedial alternatives.

The remedial action objectives for the IWCS OU are designed to provide short- and long-term protection of human health and the environment based on plausible future land uses for the NFSS. CERCLA requires that any action taken be protective of human health and the environment as well as be compliant with identified ARARs. The remedial action objectives for the IWCS OU were established in the *IWCS Remedial Alternatives Technologies Development and Screening Technical Memorandum* (USACE 2013) and are as follows:

- Prevent unacceptable exposure of the public and workers to the hazardous substances associated with uranium ore mill tailings (e.g., radium-226 and its short-lived decay products) inside the IWCS.
- Minimize/prevent the transport of hazardous substances within the IWCS to other environmental media (e.g., soil, groundwater, surface water, sediment, and air) outside of the IWCS.
- During implementation of the remedial alternatives(s), minimize/prevent releases and other impacts that could adversely affect human health and the environment, including ecological receptors.

The IWCS OU was divided into “subunits” for the purpose of identifying remedial alternatives that would comprehensively address the entire IWCS. A key driver was the acknowledgment that the K-65, L-30, L-50, and F-32 residues could require a different remedy or implementation of the same remedy than the rest of the IWCS.

The material within the IWCS was divided into three subunits called Subunit A, Subunit B, and Subunit C that were based primarily on waste characteristic and storage location within the IWCS (Figure 4-1). A brief description of each of the three subunits is presented below:

- Subunit A: Residues (K-65, L-30, L-50, and F-32) and commingled waste within Buildings 411, 413, and 414
- Subunit B: Debris and wastes in the south end of the IWCS, including the building structures and contaminated rubble/debris/soil

- Subunit C: Residues (R-10) and wastes in the north end of the IWCS

Using these three subunit designations, the following five remedial alternatives were developed:

- Alternative 1 – No Action
- Alternative 2 – Enhanced containment of Subunits A, B, and C with land-use controls and monitoring
- Alternative 3A - Excavation, treatment, and off-site disposal of Subunit A; enhanced containment of Subunits B and C with land-use controls and monitoring
- Alternative 3B - Excavation, treatment, and off-site disposal of Subunit A; excavation and off-site disposal of Subunit B; enhanced containment of Subunit C with land-use controls and monitoring
- Alternative 4 - Excavation, treatment, and off-site disposal of Subunit A; excavation and off-site disposal of Subunits B and C

ES.5 ARARS FOR THE IWCS OU

The regulations presented in detail in Section 4.0 of this document are limited to the regulations that are identified as ARARs for the remedial alternatives under consideration for the IWCS OU.

The regulations identified as ARARs include:

- 10 CFR 40, Appendix A: Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content
 - Criterion 4, Site and Design Criteria
 - Criterion 6(1), 6(2), 6(3), 6(5), 6(6), and 6(7), Closure of Waste Disposal Areas
 - Criterion 12, Long-term Site Surveillance
- 40 CFR 61.192: Subpart Q National Emission Standards for Radon from Department of Energy Facilities

A general discussion of several other regulations that were determined not to be potential ARARs for evaluation of alternatives under consideration for the IWCS OU is presented in Section 5.0 of this document and includes:

- 40 CFR 192: Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, Subparts A, B, and C
- 10 CFR 20, Subpart E: Radiological Criteria for License Termination
- 10 CFR 61: Licensing Requirements for Land Disposal of Radioactive Waste
- 40 CFR 191: Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level, and Transuranic Radioactive Wastes, Subparts A, B, and C
- 6 NYCRR Part 380: Prevention and Control of Environmental Pollution by Radioactive Materials

1.0 INTRODUCTION

In 1997, Congress designated the United States Army Corps of Engineers (USACE) as the lead federal agency for implementing the Formerly Utilized Sites Remedial Action Program (FUSRAP) according to protocols set forth in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), applying the standard criteria set forth in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The U.S. Department of Energy (USDOE) designated the Niagara Falls Storage Site (NFSS) for inclusion in the FUSRAP, and the USACE-Buffalo District is the lead District for USACE responsible for conducting a remedial investigation/feasibility study (RI/FS) at the NFSS pursuant to CERCLA and the NCP. The NFSS site location and layout are shown on Figures 1-1 and 1-2, respectively.

CERCLA activities at the NFSS have transitioned from the site RI activities to the FS evaluation of potential remediation alternatives for the first of three separate operable units (OUs), the Interim Waste Containment Structure (IWCS) OU. The remaining two OUs include the Balance of Plant (BOP) OU and the Groundwater OU. The NCP (Title 40 *Code of Federal Regulations [CFR]* Section 300.430[a][ii][A]) states that sites should generally be remediated in OUs when phased analysis is necessary given the size or complexity of a site.

To facilitate the IWCS OU FS process, USACE is developing a series of technical memoranda that will allow USACE to:

- Engage and inform the public on key technical issues in the early stages of the CERCLA FS process so that public concerns can be fully considered during the development of FS documents; and
- Allow the final IWCS OU FS publication to contain information and conclusions that have previously received input from the public, thus promoting a more efficient public review process for the IWCS OU FS document.

The purpose of this technical memorandum is to identify Applicable or Relevant and Appropriate Requirements (ARARs) for the IWCS OU.

CERCLA Section 121 (d) “Degree of cleanup” directs that any remedial action selected shall attain a degree of cleanup of hazardous substances, pollutants and contaminants released into the environment, or control of further release, that at a minimum assures the protection of human health and the environment. Such remedial actions shall also be relevant and appropriate under the circumstances *presented by the release* or threatened release of such substance, pollutant or contaminant. With respect to any hazardous substance, pollutant or contaminant *that will remain onsite* the remedy selected shall attain a standard, requirement, criteria or limitation under any Federal environmental law *or* any promulgated standard, requirement, criteria, or limitation under a State environmental or facility siting law that is more stringent than the Federal standard, and has been identified by the State in a timely manner, which is legally applicable to the hazardous substance or pollutant or contaminant concerned *or* is relevant and appropriate under the *circumstances of the release* or threatened release of such hazardous substance or pollutant or contaminant. The statute puts the emphasis on the degree of cleanup, or in other words, how clean is clean enough if a hazardous substance, pollutant or contaminant remains at the site.

The United States Environmental Protection Agency (USEPA) articulated its interpretation of this section of CERCLA in the NCP and defined these standards as ARARs at 40 CFR 300.5. Applicable requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a

timely manner and that are more stringent than federal requirements may be applicable. Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

1.1 DETAILED DESCRIPTION OF OUS

As detailed in *Feasibility Study Work Plan for the Niagara Falls Storage Site, Lewiston, New York* (USACE 2009), three OUs have been defined for the purpose of implementing the CERCLA process at NFSS. These include the IWCS, BOP, and Groundwater OUs.

The OUs represent areas or features at the NFSS that have been grouped together for assessment to facilitate efficient FS evaluations and to develop remedial action alternatives. The factors common to the areas and/or features within each OU include the following:

- Nature of the contaminated media (i.e., soil, groundwater, residues, waste);
- Types of contamination;
- Remedial Action Objectives, ARARs, and initial risk-based cleanup goals (i.e., preliminary remediation goals) applied for identifying potential general response actions/technologies and developing remedial alternatives; and
- Methods expected for remediation of contaminated media.

The definitions of the IWCS OU, BOP OU, and Groundwater OU are provided below.

IWCS OU

The IWCS OU (Figure 1-3) is defined as hazardous substances (i.e., residues and other remedial action waste) that the USDOE placed in the disposal cell within the diked area. The scope for the IWCS OU involves development of remedial alternatives for addressing the residues and other waste material. For any alternatives, including those that involve leaving any hazardous substances in the IWCS, the FS would have to demonstrate that the alternative is protective of human health and the environment.

BOP OU

The BOP OU (Figure 1-4) is defined as all material not included in the IWCS OU, excluding groundwater. BOP material will include surface and subsurface soil across the rest of the site, surface water, sediment, railroad ballast, roads, remaining Building 401 concrete slab and underlying soils, and pipelines, etc. Only structures that need to be removed to obtain access to underlying contamination will be included in the BOP OU. For example, tank cradles may not be removed if they show no risk to human health and the environment from site contaminants, and their removal is otherwise deemed unnecessary. The impacts, if any, of the BOP OU alternatives on groundwater and surface water will be addressed in the alternative evaluations for the BOP OU.

Groundwater OU

The Groundwater OU is defined as groundwater remaining in both the upper water-bearing zone and the lower water-bearing zone after implementation of the selected remedial actions for the IWCS OU and BOP OU. As only the upper water-bearing zone has been impacted by site contaminants, groundwater

contamination may be ultimately addressed by remediation of soil (e.g., by controlling/removing the sources of contaminant migration).

Designating three separate OUs at the NFSS allows USACE to address the IWCS first because disposition of the IWCS will impact the future land use for the Balance of Plant and Groundwater OUs. After completion of the IWCS OU FS, feasibility studies will be completed for the BOP OU, followed by the Groundwater OU. Using the approach presented in the 2009 FS Work Plan for the NFSS, separate CERCLA decision documents, including a Proposed Plan and ROD, will be completed for each of the three OUs.

1.2 REPORT ORGANIZATION AND CONTENT

This technical memorandum is composed of the following sections:

- Section 2.0 describes the contents of the IWCS, IWCS construction, regulatory designation of the residues, and risks posed by the IWCS, as well as remedial action objectives and remedial alternatives for the IWCS OU;
- Section 3.0 presents an overview of the process for identifying ARARs, per CERCLA;
- Section 4.0 discusses the potential ARARs identified for the IWCS OU;
- Section 5.0 discusses the regulations that were determined not to be ARARs; and,
- Section 6.0 lists all of the references cited within this document, including the appendices.

Also, USACE requested and received public comments on the scope and objectives of this technical memorandum through the release of the *Development of Remedial Action Objectives and Applicable or Relevant and Appropriate Requirements for both the Interim Waste Containment Structure and Balance of Plant Operable Units Technical Memorandum Fact Sheet* (USACE 2010). The fact sheet and responses to public comments are provided in Appendix A. Public comments were considered during development of this technical memorandum. In addition, since this Fact Sheet was issued, the scope of this ARARs Technical Memorandum was revised to focus the document on ARARs for the IWCS OU only. ARARs for the BOP OU will be considered during preparation of the BOP OU feasibility study. Furthermore, the remedial action objectives were introduced in the *Remedial Alternatives Technologies Development and Screening* Technical Memorandum.

THIS PAGE INTENTIONALLY LEFT BLANK.

2.0 IWCS OU

The 191 acres (77 hectares) of the NFSS consist of open grassy and forested areas (Figure 1-1). The approximately 10-acre (4-hectare) IWCS is situated in the southwest corner of the NFSS (Figure 1-2).

2.1 IWCS CONTENTS

In 1944, the first FUSRAP-related materials sent to NFSS for storage were radioactive residues from the processing of uranium ore at the Linde Air Products facility in Tonawanda, New York. The residues are categorized according to the amount of uranium (U_3O_8) in the ore, as follows (USACE 2007a, 2011a):

- R-10 residues: from processing ore with 3.5% U_3O_8 ,
- L-30 residues: from processing ore with 10% U_3O_8 ,
- L-50 residues: from processing ore with 7% U_3O_8 , and
- F-32 residues: specific U_3O_8 content of the ore was not found in historical documents; however, the amounts of radium-226 and thorium-230 in these residues were reported as 0.2 curies (Ci) for each radionuclide.

In 1949, the K-65 residues from the Mallinckrodt Chemical Works in St. Louis, Missouri were shipped to NFSS in 55-gallon drums for storage. The uranium ore from which these residues were generated contained 35 to 65% U_3O_8 . Between 1950 and 1952, the K-65 residues were transferred from the 55-gallon drums to a large concrete tower onsite, referred to as Building 434, formerly located in the northeast corner of the NFSS. The residues remained in Building 434 until the 1980s when USDOE transferred them to the IWCS.

Between 1982 and 1991, USDOE performed a number of cleanup activities at the site and nearby areas, which are termed vicinity properties. The radioactive materials generated by these activities were also placed in the IWCS. Within the IWCS, radioactive residues (K-65, L-30, L-50, and F-32) were placed in existing concrete structures that had been part of the freshwater treatment plant for the LOOW site in operation in the 1940s. The L-50 residues were placed in Buildings 413 and 414, which are cylindrical structures made of reinforced concrete that had been used as clarifier tanks at the treatment plant. The remaining residues were placed in the reinforced concrete bays of Building 411 because this building was specifically designed to securely hold liquids. The K-65 residues are in Bays A and C, and the combined L-30 and F-32 residues are in Bays B, C, and D of this building. Soils that were contaminated by the K-65 residues during interim storage (in Building 434), referred to as tower soils, were placed in the north end of Bay D.

Contaminated soil and debris from the USDOE cleanup of the site and vicinity properties were placed on the ground together with the R-10 residues, as well as in the remaining areas of the IWCS, and compacted to ensure the stability of the IWCS. A cover placed over the entire IWCS, which is described in more detail in the following section, was completed in 1986.

An additional disposal action took place in 1991 when excavated soil and drums from the NFSS and vicinity properties were incorporated into the IWCS (USDOE 1994).

2.2 IWCS CONSTRUCTION DETAILS

The IWCS is approximately 990 feet (300 meters) long by 450 feet (140 meters) wide. It was designed as a waste containment system with an engineered cap, dike, sidewall, and natural clay bottom to inhibit radon

emissions, infiltration from precipitation, and migration of contamination to groundwater. The specified design life of the IWCS cap is 25 to 50 years; whereas the specified design life of the bottom, dike, and cut-off walls is 200 to 1,000 years (USDOE 1986).

The sidewalls of the containment system consist of a compacted clay dike and cut-off wall constructed around the waste containment area (Figure 2-1). The dike has a minimum width of eight feet (2.4 meters) and extends approximately five feet (1.5 meters) above the original grade. It rests on the cut-off wall, which has a minimum width of 12 feet (3.6 meters) and extends at least 1.6 feet (0.5 meters) into the gray glaciolacustrine clay or Gray Clay Unit. A dike/cut-off wall also was installed in the center of the IWCS, immediately west and east of Building 411. The height of the cut-off wall beneath the dike ranges between 10 and 22 feet (3 and 7 meters) varying with changes in the elevation of the top of the Gray Clay Unit (USDOE 1986). In general, the cut-off wall is not centered beneath the dike; its location varies according to subsurface conditions.

Below ground surface, the IWCS containment system consists of 6 to 23 feet (1.8 to 7 meters) of naturally occurring brown clay underlain by 11 to 29 feet (3.3 to 8.8 meters) of Gray Clay (USDOE 1986, 1994). The Gray Clay Unit and the dike/cut-off wall function as adsorption barriers to vertical and horizontal constituent migration from groundwater entering the waste containment area (USDOE 1986, 1994).

Once the various residues and wastes were placed in the former buildings and on the ground surface, the IWCS cap was constructed by first spreading stockpiled, contaminated soil and sediment over the residues and waste. A 3-foot (0.9-meter) layer of compacted, low-permeability clay was then overlaid on the contaminated soil layer, forming the principal barrier to moisture and radon emanation, followed by 12 inches (30.5 centimeters) of loosely compacted soil to act as a protective cover to the clay layer. Six inches (15 centimeters) of topsoil was then placed on the cap prior to adding a final cover of seeded, shallow-rooted turf to control erosion and minimize frost heave damage. The cap slopes at approximately 8% from the center to the vicinity of the clay dikes to promote run-off while limiting moisture retention and erosion. At this point, the side slopes increase to 3:1 (33%). In all, the IWCS reaches a maximum height of 34 feet (10 meters) above ground surface (USDOE 1991, 1986).

A full description of the IWCS containment system is detailed in the *Design Report for the Interim Waste Containment Facility at the Niagara Falls Storage Site, Lewiston, New York* (USDOE 1986) and the *Failure Analysis Report for Niagara Falls Storage Site, Lewiston, New York* (USDOE 1994).

The suitability of the IWCS for longer-term use was evaluated in the 1994 NFSS Failure Analysis Report (USDOE 1994). The period of interest for this suitability evaluation was 10,000 years. Based on an analysis of several failure scenarios, the report recommended modifying the interim cap to include a rock-fill penetration barrier (rip-rap layer) between the clay cover and vegetation layers, and reducing the maximum side slopes from 3:1 (33%) to 5:1 vertical (20%). The 1994 study also noted that the concrete foundations and walls of Building 411 and other structures within the IWCS would not be expected to last 10,000 years, but that the remaining concrete rubble may provide an alkaline buffer against the solubility of the stored residues, which are more soluble under acidic conditions, if any moisture intrusion under the cap or through/around the dike and clay cut-off wall occurs (USDOE 1994).

2.3 REGULATORY BACKGROUND OF IWCS CONTENTS

The majority of the radiological material stored in the IWCS consists of the residues and material that the residues contacted (e.g., contaminated soil). The residues are the waste generated by the processing of uranium ore and are commonly known as uranium mill tailings. While there are isolated areas outside the IWCS OU but within the BOP OU that are known to have other radionuclides not typically present in

uranium mill tailings (e.g., cesium) they are not widespread across the site and are believed to be associated with the handling of non-mill tailings waste that were once temporarily stored but subsequently removed from the site.

The residues or uranium mill tailings in the IWCS were all generated before the Atomic Energy Act was modified in 1978 and were located at a site owned by the federal government as of January 1, 1978 and therefore excluded from coverage under UMTRCA. The US Environmental Protection Agency (USEPA) was directed to develop “standards of general application...for the protection of the public health, safety, and the environment from radiological and non-radiological hazards associated with (uranium mill tailings)” for both the active and inactive processing sites (42 U.S.C. § 2022). Concurrently, USDOE was directed to address uranium mill tailings and residual radioactive material at former processing sites identified by Congress and designated by USDOE, commonly referred to as Uranium Mill Tailings Radiation Control Act (UMTRCA) Title I sites. Congress authorized the Nuclear Regulatory Commission (NRC) to regulate all existing and future uranium milling operations (Title II sites). The NFSS uranium mill tailings were not explicitly addressed by the Act.

The waste material inside the IWCS is classified as 11e.(2) byproduct material based on regulatory waste classification definitions.

2.4 CONSTITUENTS OF CONCERN

Although the wastes within the IWCS are currently safely contained, potential exposure to contaminants in the IWCS was evaluated to support the development and screening of remedial alternatives in the FS. Pathways evaluated include (1) airborne releases due to a hypothetical cap breach and (2) migration to groundwater due to infiltration of precipitation through the cap and the leaching of contaminants beyond the IWCS containment structure.

The potential impacts to groundwater due to leaching of constituents beyond the IWCS containment structure were presented in the *Groundwater Flow and Contaminant Transport Modeling* (USACE 2007b, 2011b). One objective of this evaluation was to support the FS evaluation of the long-term effectiveness of any remedial alternative that considers leaving the wastes in the IWCS in place. Some of the selected constituents of potential concern were those contaminants that were determined to be most prevalent in the residues and expected to be mobile in the environment if water percolated through the IWCS cover.

Potential airborne releases were evaluated in the *Preliminary Health Effects for Hypothetical Exposures to Contaminants from the Interim Waste Containment Structure Technical Memorandum* (Health Effects TM) (USACE 2012). The Health Effects TM conducted an evaluation of risk conditions relevant to the near term (i.e., on the order of 10 years). The evaluation was not intended to address all constituents in the IWCS; rather, it focused on a set of constituents considered to reflect those of primary concern if the IWCS cap were breached (whether by excavation or other events that could uncover the wastes) and contaminants were released to the air and subsequently deposited where on-site workers or the general public could be exposed (USACE 2012).

A total of 22 constituents (11 radionuclides and 11 chemicals) were evaluated as constituents of potential concern for the wastes within the IWCS. These evaluations confirmed that the principal constituents of concern for the IWCS is the radionuclide radium-226 and its short-lived decay products due to its high concentrations in the residues and its potential to emit substantial gamma radiation and to release radon-222 gas. Among the wastes stored in the IWCS, the K-65 residues contain the highest concentration of radium-226.

2.5 REMEDIAL ACTION OBJECTIVES

A remedial action objective is a specific goal that remedial alternatives must fulfill to be protective of human health and the environment. Remedial action objectives provide the basis for selecting remedial technologies and developing and evaluating remedial alternatives.

The remedial action objectives for the IWCS OU are designed to provide short- and long-term protection of human health and the environment based on the most likely future land uses for the NFSS. CERCLA requires that any action taken be protective of human health and the environment as well as be compliant with identified ARARs.

The remedial action objectives for the IWCS OU were established in the *IWCS Remedial Alternatives Technologies Development and Screening Technical Memorandum* (USACE 2013) and are as follows:

- Prevent unacceptable exposure of the public and workers to the hazardous substances associated with uranium ore mill tailings (e.g., radium-226 and its short-lived decay products) inside the IWCS.
- Minimize/prevent the transport of hazardous substances within the IWCS to other environmental media (e.g., soil, groundwater, surface water, sediment, and air) outside of the IWCS.
- During implementation of the remedial alternatives(s), minimize/prevent releases and other impacts that could adversely affect human health and the environment, including ecological receptors.

2.6 REMEDIAL ALTERNATIVES FOR THE IWCS OU

The IWCS OU was divided into “subunits” for the purpose of identifying remedial alternatives that would comprehensively address the entire IWCS. A key driver was the acknowledgment that the K-65, L-30, L-50, and F-32 residues could require a different remedy or implementation of the same remedy than the rest of the IWCS. These differences are highlighted by a comparison of radium-226 concentrations in the residues and other materials in the IWCS, as indicated below:

Category	Radium-226 (pCi/g)	Total Waste Volume ¹	
		(m ³)	(yd ³)
K-65 Residues	520,000	3,080	4,030
Other IWCS Residues/Waste			
L-30 Residues	12,000	6,090	7,960
L-50 Residues	3,300	1,640	2,150
F-32 Residues	300	340	440
Tower Soils	10,400	3,150	4,115
Contaminated Rubble/Waste	6,181	35,650	46,610
R-10 Residues and Soil	95	45,500	59,500
Contaminated Soil	16	189,680	248,100
Total Waste Volume		285,130	372,905

¹ Volumes are preliminary and will be finalized in the FS

pCi/g = Picocuries per gram

m³ = Cubic meters.

yd³ = Cubic yards

The material within the IWCS was divided into three subunits called subunit A, subunit B, and subunit C that were based primarily on waste characteristic and storage location within the IWCS (Figure 2-2). A detailed description of each of the three subunits is presented below.

Subunit A: Residues (K-65, L-30, L-50, and F-32) and Commingled Wastes within Buildings 411, 413, and 414

This subunit includes all of the radioactive residues (K-65, L-30, L-50, and F-32) placed in Buildings 411, 413, and 414. Additionally, this subunit includes other wastes placed within Buildings 411, 413, and 414 including contaminated soil (tower soils and other contaminated soil and clay) and contaminated rubble/debris that is commingled with the residues in Building 411.

Subunit B: Debris and Wastes in the South End of the IWCS

The wastes comprising subunit B are defined as the wastes placed south of the IWCS dike/cut-off wall that abuts Building 411 on both its east and west sides, except for those wastes defined as part of Subunit A. This subunit includes the Buildings 411, 413, and 414 structures and could include any underground lines associated with the former water treatment plant. It also includes other contaminated rubble/debris that was placed outside of Buildings 411, 413, and 414 that was associated with storage, handling, and transfer of K-65 residues. Subunit B also includes contaminated rubble/debris from the former K-65 storage silo (Building 434), the Thaw House Foundation, Building 415, Building 410, and the Middlesex Sands that were placed into former Building 410. Additionally, Subunit B includes contaminated soil that was placed surrounding the debris within the south end of the IWCS.

Subunit C: Residues (R-10) and Wastes in the North End of the IWCS

This subunit includes the majority of the volume of waste categorized as contaminated soil, miscellaneous waste, and about 9,500 yd³ of R-10 residues. The concentration of radium-226 in the wastes in the north end of the IWCS ranges from approximately 16 to 95 pCi/g.

Using these three subunit designations, the following five remedial alternatives were developed:

- Alternative 1 – No Action
- Alternative 2 – Enhanced containment of Subunits A, B, and C with land-use controls and monitoring
- Alternative 3A - Excavation, treatment, and off-site disposal of Subunit A; enhanced containment of Subunits B and C with land-use controls and monitoring
- Alternative 3B - Excavation, treatment, and off-site disposal of Subunit A; excavation and off-site disposal of Subunit B; enhanced containment of Subunit C with land-use controls and monitoring
- Alternative 4 - Excavation, treatment, and off-site disposal of Subunit A; excavation and off-site disposal of Subunits B and C

THIS PAGE INTENTIONALLY LEFT BLANK.

3.0 PROCESS FOR IDENTIFYING ARARs

This section describes the general process used to identify and evaluate ARARs. It presents a brief overview of how ARARs support the CERCLA remedy selection process and describes the factors that must be considered during development of ARARs. The process is also summarized on Figure 3-1.

ARARs are developed in accordance with the process set forth in the NCP [Subpart E, Section 300.400(g)]. ARARs are identified in the RI, refined and developed during the FS, limited during the stage of the CERCLA remedy selection process, and finalized in the ROD. When identifying ARARs, CERCLA Section 121 (d) “Degree of cleanup” directs that any remedial action selected shall attain a degree of cleanup of hazardous substances, pollutants and contaminants released into the environment, or control of further release, that at a minimum assures the protection of human health and the environment.

Regulatory language interpreting and implementing the statutory directive within the NCP [40 CFR 300.400(g)], provides that the lead agency (USACE) and support agencies (e.g., New York State Department of Environmental Conservation [NYSDEC]) shall identify applicable requirements. These requirements shall be based upon an objective determination of whether the requirement specifically addresses a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. If it is determined that a requirement is not applicable to a specific release, the requirement may still be relevant and appropriate to the circumstances of the release. As will be discussed below, that determination is made in accordance with 40 CFR 300.400(g)(2). Under 40 CFR 300.430(e), USACE has the ultimate responsibility to identify what requirements are ARARs for remedial alternatives.

The general process to develop ARARs for the IWCS begins with a review of the specific language used to describe the concept of ARARs in Section 121(d) of CERCLA and the NCP provisions in 40 CFR § 300.5. To be considered an ARAR, a requirement must consist of a “standard, requirement, criteria, or limitation” that has been formally promulgated as a statute or regulation under a federal environmental law, or a state environmental or facility siting law [CERCLA § 121(d)(2)(A)]. Thus, non-promulgated requirements are not ARARs. In addition, Section 121(d)(2)(A) of CERCLA states that ARARs apply “with respect to any hazardous substance, pollutant or contaminant that will remain onsite.” Regulations that relate to activities associated with the implementation of a remedial action, such as United States Department of Transportation requirements governing the shipment of radioactive waste and Occupational Safety and Health Act requirements that address worker health and safety are considered technical requirements that would be complied with during execution of the remedial action but are not related to the degree of cleanup and therefore not ARARs.

Only the substantive requirements within a regulation can be considered an ARAR; administrative and procedural requirements do not qualify. In accordance with the NCP, disposal actions need to comply only with *substantive* requirements (55 FR 8758, March 8, 1990).

Examples of administrative/procedural requirements include administrative approvals, inspections, permits, consultations, definitions, and reporting requirements. Administrative/procedural requirements also include methodologies or procedures applicable only to the regulatory agency.

The next step in identifying ARARs is to determine whether a requirement is legally applicable. Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial

action, location, or other circumstance found at a CERCLA site. Only those state standards identified in a timely manner and that are more stringent than Federal requirements may be applicable [CERCLA (§ 121(d)) and NCP (40 CFR 300.5)]. A requirement is applicable if all of the jurisdictional prerequisites of the law or rule are satisfied. These jurisdictional prerequisites are:

- Specified by the statute or regulation and subject to the authority of such statute or regulation;
- The types of substances or activities listed as falling under the authority of the statute or regulation;
- The time period for which the statute or regulation is in effect; and
- The type of activities the statute or regulation requires, limits, or prohibits.

If it is determined that a requirement is not legally applicable to a specific release, the requirement may instead be relevant and appropriate to the circumstances of the release. Determining whether a rule is relevant and appropriate is a two-step process that involves determining whether the rule is relevant, and, if so, whether it is also appropriate. A requirement is relevant if it addresses problems or situations sufficiently similar to the circumstances of the remedial action contemplated. It is appropriate if its use is well suited to the site.

In evaluating relevance and appropriateness, the factors listed below [from 40 CFR 300.400(g)(2)] are examined, where pertinent, to determine whether a requirement addresses problems or situations sufficiently similar to the circumstances of the release or remedial action contemplated, and whether its use is well suited to the site, and therefore is both relevant and appropriate.

- (i) The purpose of the requirement and the purpose of the CERCLA action.
- (ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.
- (iii) The substances regulated by the requirement and the substances found at the CERCLA site.
- (iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.
- (v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.
- (vi) The type of place regulated and the type of place affected by the release or CERCLA action.
- (vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.
- (viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.

A determination of relevance and appropriateness may be applied to only portions of a requirement, so that only parts of a requirement need be met for compliance, whereas a determination of applicability is made for the requirement as a whole, so that the entire requirement must be met for compliance.

In addition to ARARs, USACE and support agencies may identify other advisories, criteria, or guidance “to be considered” (TBC) for a particular release. The TBC category consists of advisories, criteria, or guidance that were developed by USEPA, other federal agencies, or states that may be useful in developing CERCLA remedies. TBCs will be considered as guidance or justification for a standard used in the remediation if no other standard is available for a situation to help determine the necessary level of cleanup for protection of health or the environment. This may occur if no ARAR is available for a particular constituent of concern, or if there are multiple constituents of concern and/or pathways not considered when establishing the standards in the ARAR.

4.0 EVALUATION OF ARARs

The regulations presented in this section include 10 CFR 40 Appendix A and 40 CFR 61 Subparts H and Q, which have been inserted directly from the published regulation found at <http://www.gpo.gov/fdsys/browse/collectionCfr.action>, i.e., they have not been altered in any way, although tables associated within the published regulations were not included in the text of this appendix due to their length. Each regulation is evaluated in detail to determine if it meets the definition of an ARAR, and if so, whether it is applicable or relevant and appropriate.

The regulations identified as ARARs include:

- 10 CFR 40, Appendix A: Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material From Ores Processed Primarily for Their Source Material Content
 - Criterion 4, Site and Design Criteria
 - Criterion 6(1), 6(2), 6(3), 6(5), 6(6), and 6(7), Closure of Waste Disposal Areas
 - Criterion 12, Long-term Site Surveillance
- 40 CFR 61.192: Subpart Q National Emission Standards for Radon from Department of Energy Facilities.

A general discussion of several other regulations that did not meet the criteria to qualify as ARARs is presented in Section 5.0 of this document and includes:

- 40 CFR 192: Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings, Subparts A, B, and C;
- 10 CFR 20, Subpart E: Radiological Criteria for License Termination;
- 10 CFR 61: Licensing Requirements for Land Disposal of Radioactive Waste
- 40 CFR 191: Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level, and Transuranic Radioactive Wastes, Subparts A, B, and C; and,
- 6 NYCRR Part 380: Prevention and Control of Environmental Pollution by Radioactive Materials

4.1 10 CFR 40, APPENDIX A: CRITERIA RELATING TO THE OPERATION OF URANIUM MILLS AND THE DISPOSITION OF TAILINGS OR WASTES PRODUCED BY THE EXTRACTION OR CONCENTRATION OF SOURCE MATERIAL FROM ORES PROCESSED PRIMARILY FOR THEIR SOURCE MATERIAL CONTENT

Under the UMTRCA, the USEPA was directed to develop “standards of general application...for the protection of the public health, safety, and the environment from radiological and nonradiological hazards associated with (uranium mill tailings)” for both the active and inactive processing sites (42 U.S.C. § 2022 and 772 F.2d 617). By contrast, UMTRCA charged the NRC to ensure that the management of any byproduct material at “active sites” (i.e., sites currently under NRC license and sites licensed in the future) conforms with the applicable general standards promulgated by USEPA under 42 U.S.C § 4200. In response to UMTRCA, NRC initially promulgated Appendix A of 10 CFR 40 on October 3, 1980, almost 3 years prior to USEPA’s promulgation of 40 CFR 192 on September 30, 1983. Given this timeline, on November 26, 1984, the NRC published a notice of proposed rulemaking to conform the Appendix A criteria to the USEPA standards, resulting in promulgated amendments to the Appendix A criteria on October 16, 1985.

The NRC subsequently implemented rulemaking to use the existing UMTRCA radium soil standard “to derive a dose criterion (benchmark approach) for the cleanup of byproduct material other than radium in soil and for the cleanup of surface activity on structures to be released for unrestricted use. This final rule was intended to provide a clear and consistent regulatory basis for determining the extent to which lands and structure can be considered to be decommissioned.” The dose criterion associated with this regulation allows for other radionuclides present at the site (besides radium) to be accounted for (i.e., uranium, thorium, cesium, etc.) since the criterion is based upon the established benchmark dose. This rulemaking resulted in a final rule on April 12, 1999 (64 FR 17506).

As explained in Section 2.3, the uranium ore mill tailings or residues in the IWCS are not licensed by the NRC. Since the requirements of 10 CFR 40, Appendix A apply to licensed facilities only and the IWCS is not licensed, they are not applicable to the IWCS; however, they are further evaluated to determine whether they are relevant and appropriate.

The 13 criteria in 10 CFR 40 Appendix A are presented in their entirety and evaluated in the following sections. Some of these criteria are administrative or procedural or otherwise do not meet the definition of an ARAR. If the criteria are identified as substantive, they are further evaluated to determine if they are relevant and appropriate. Based on this process, Criterion 4, Site and Design Criteria, portions of Criterion 6, Closure of Waste Disposal Areas, and Criterion 12, Long-term Site Surveillance, are identified as relevant and appropriate for the remedial alternatives being considered for the IWCS OU. The detailed relevant and appropriate analysis [i.e., evaluation against the eight factors in 40 CFR 300.400(g)(2)] of all 10 CFR 40 Appendix A criteria are presented on Table 4-1.

4.1.1 10 CFR 40, Appendix A: Criterion 1, Site Features

4.1.1.1 *Published Regulation*

The general goal or broad objective in siting and design decisions is permanent isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural forces, and to do so without ongoing maintenance. For practical reasons, specific siting decisions and design standards must involve finite times (e.g., the longevity design standard in Criterion 6). The following site features which will contribute to such a goal or objective must be considered in selecting among alternative tailings disposal sites or judging the adequacy of existing tailings sites:

Remoteness from populated areas;

Hydrologic and other natural conditions as they contribute to continued immobilization and isolation of contaminants from ground-water sources; and

Potential for minimizing erosion, disturbance, and dispersion by natural forces over the long term.

The site selection process must be an optimization to the maximum extent reasonably achievable in terms of these features.

In the selection of disposal sites, primary emphasis must be given to isolation of tailings or wastes, a matter having long-term impacts, as opposed to consideration only of short-term convenience or benefits, such as minimization of transportation or land acquisition costs. While isolation of tailings will be a function of both site and engineering design, overriding consideration must be given to siting features given the long-term nature of the tailings hazards.

Tailings should be disposed of in a manner that no active maintenance is required to preserve conditions of the site.

4.1.1.2 *Evaluation and Conclusion*

Criterion 1 states the general goal or broad objective in siting and design decisions is permanent isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural forces, and to do so without dependence on ongoing maintenance. It specifies site features that will help achieve this objective.

Criterion 1 is relevant for the IWCS since it deals with the disposal of uranium mill tailings; however, criterion 1 addresses the siting and design of a new waste disposal facility that is not appropriate for the IWCS since it already exists. Therefore, Criterion 1 is not an ARAR.

4.1.2 10 CFR 40, Appendix A: Criterion 2, Off-Site Disposal of Byproduct Material

4.1.2.1 *Published Regulation*

To avoid proliferation of small waste disposal sites and thereby reduce perpetual surveillance obligations, byproduct material from in situ extraction operations, such as residues from solution evaporation or contaminated control processes, and wastes from small remote above ground extraction operations must be disposed of at existing large mill tailings disposal sites; unless, considering the nature of the wastes, such as their volume and specific activity, and the costs and environmental impacts of transporting the wastes to a large disposal site, such offsite disposal is demonstrated to be impracticable or the advantages of onsite burial clearly outweigh the benefits of reducing the perpetual surveillance obligations.

4.1.2.2 *Evaluation and Conclusion*

Upon closure, legal title to lands on which 11e.(2) disposal cells are located are transferred to the Government of the United States or to a state for perpetual maintenance. To minimize the cost and potential risks associated with perpetual maintenance, this criterion requires preferential use of existing large mill tailings disposal sites unless such use is impracticable, or the advantages of on-site burial clearly outweigh the benefits associated with avoiding perpetual surveillance obligations.

Criterion 2 is relevant for the IWCS since it deals with the disposal of uranium mill tailings; however, this criterion is not appropriate because it does not address circumstances sufficiently similar to the IWCS where disposal has already taken place. Therefore, Criterion 2 is not an ARAR.

4.1.3 10 CFR 40, Appendix A: Criterion 3, Disposal Mode

4.1.3.1 *Published Regulation*

The “prime option” for disposal of tailings is placement below grade, either in mines or specially excavated pits (that is, where the need for any specially constructed retention structure is eliminated). The evaluation of alternative sites and disposal methods performed by mill operators in support of their proposed tailings disposal program (provided in applicants’ environmental reports) must reflect serious consideration of this disposal mode. In some instances, below grade disposal may not be the most environmentally sound approach, such as might be the case if a ground-water formation is relatively close to the surface or not very well isolated by overlying soils and rock. Also, geologic and topographic conditions might make full below grade burial impracticable: For example, bedrock may be sufficiently near the surface that blasting would be required to excavate a disposal pit at excessive cost, and more suitable alternative sites are not available. Where full below grade burial is not practicable, the size of retention structures, and size and steepness of slopes associated exposed embankments must be minimized by excavation to the maximum extent reasonably achievable or appropriate given the geologic

and hydrologic conditions at a site. In these cases, it must be demonstrated that an above grade disposal program will provide reasonably equivalent isolation of the tailings from natural erosional forces.

4.1.3.2 Evaluation and Conclusion

Criterion 3 states that the prime option for disposal is placement below grade. Where below-grade disposal is not practicable, it must be demonstrated that above-grade disposal will provide reasonably equivalent isolation of the tailings from natural erosion forces.

Criterion 3 addresses the design of a new waste disposal facility that is relevant but not appropriate for the IWCS since the IWCS already exists. Therefore, Criterion 3 is not an ARAR.

4.1.4 10 CFR 40, Appendix A: Criterion 4, Site and Design Criteria

4.1.4.1 Published Regulation

The following site and design criteria must be adhered to whether tailings or wastes are disposed of above or below grade.

- (a) Upstream rainfall catchment areas must be minimized to decrease erosion potential and the size of the floods which could erode or wash out sections of the tailings disposal area.
- (b) Topographic features should provide good wind protection.
- (c) Embankment and cover slopes must be relatively flat after final stabilization to minimize erosion potential and to provide conservative factors of safety assuring long-term stability. The broad objective should be to contour final slopes to grades which are as close as possible to those which would be provided if tailings were disposed of below grade; this could, for example, lead to slopes of about 10 horizontal to 1 vertical (10h:1v) or less steep. In general, slopes should not be steeper than about 5h:1v. Where steeper slopes are proposed, reasons why a slope less steep than 5h:1v would be impracticable should be provided, and compensating factors and conditions which make such slopes acceptable should be identified.
- (d) A full self-sustaining vegetative cover must be established or rock cover employed to reduce wind and water erosion to negligible levels.

Where a full vegetative cover is not likely to be self-sustaining due to climatic or other conditions, such as in semi-arid and arid regions, rock cover must be employed on slopes of the impoundment system. The NRC will consider relaxing this requirement for extremely gentle slopes such as those which may exist on the top of the pile. The following factors must be considered in establishing the final rock cover design to avoid displacement of rock particles by human and animal traffic or by natural process, and to preclude undercutting and piping:

Shape, size, composition, and gradation of rock particles (excepting bedding material average particles size must be at least cobble size or greater);

Rock cover thickness and zoning of particles by size; and

Steepness of underlying slopes.

Individual rock fragments must be dense, sound, and resistant to abrasion, and must be free from cracks, seams, and other defects that would tend to unduly increase their destruction by water and frost actions. Weak, friable, or laminated aggregate may not be used.

Rock covering of slopes may be unnecessary where top covers are very thick (or less); bulk cover materials have inherently favorable erosion resistance characteristics; and, there is negligible drainage catchment area upstream of the pile and good wind protection as described in points (a) and (b) of this Criterion.

Furthermore, all impoundment surfaces must be contoured to avoid areas of concentrated surface runoff or abrupt or sharp changes in slope gradient. In addition to rock cover on slopes, areas toward which surface runoff might be directed must be well protected with substantial rock cover (rip rap). In addition to providing for stability of the impoundment system itself, overall stability, erosion potential, and geomorphology of surrounding terrain must be evaluated to assure that there are not ongoing or potential processes, such as gully erosion, which would lead to impoundment instability.

- (e) The impoundment may not be located near a capable fault that could cause a maximum credible earthquake larger than that which the impoundment could reasonably be expected to withstand. As used in this criterion, the term “capable fault” has the same meaning as defined in section III(g) of appendix A of 10 CFR part 100. The term “maximum credible earthquake” means that earthquake which would cause the maximum vibratory ground motion based upon an evaluation of earthquake potential considering the regional and local geology and seismology and specific characteristics of local subsurface material.
- (f) The impoundment, where feasible, should be designed to incorporate features which will promote deposition. For example, design features which promote deposition of sediment suspended in any runoff which flows into the impoundment area might be utilized; the object of such a design feature would be to enhance the thickness of cover over time.

4.1.4.2 *Evaluation and Conclusion*

Sections (a), (b), (e) and (f) of Criterion 4 provide disposal site design and construction criteria including wind and water erosion controls and siting of disposal facilities to promote deposition and avoid earthquake faults that are relevant but not appropriate for the IWCS, which already exists. However, sections (c) and (d) of this criterion also specifies requirements for the disposal facility cover that are appropriate for leave in-place remedial alternatives.

4.1.5 10 CFR 40, Appendix A: Criterion 5, Groundwater Protection Standards

4.1.5.1 *Published Regulation*

5A(1)—The primary ground-water protection standard is a design standard for surface impoundments used to manage uranium and thorium byproduct material. Unless exempted under paragraph 5A(3) of this criterion, surface impoundments (except for an existing portion) must have a liner that is designed, constructed, and installed to prevent any migration of wastes out of the impoundment to the adjacent subsurface soil, ground water, or surface water at any time during the active life (including the closure period) of the impoundment. The liner may be constructed of materials that may allow wastes to migrate into the liner (but not into the adjacent subsurface soil, ground water, or surface water) during the active life of the facility, provided that impoundment closure includes removal or decontamination of all waste residues, contaminated containment system components (liners, etc.), contaminated subsoils, and structures and equipment contaminated with waste and leachate. For impoundments that will be closed with the liner material left in place, the liner must be constructed of materials that can prevent wastes from migrating into the liner during the active life of the facility.

5A(2)—The liner required by paragraph 5A(1) above must be—

- (a) Constructed of materials that have appropriate chemical properties and sufficient strength and thickness to prevent failure due to pressure gradients (including static head and external hydrogeologic forces), physical contact with the waste or leachate to which they are exposed, climatic conditions, the stress of installation, and the stress of daily operation;
- (b) Placed upon a foundation or base capable of providing support to the liner and resistance to pressure gradients above and below the liner to prevent failure of the liner due to settlement, compression, or uplift; and
- (c) Installed to cover all surrounding earth likely to be in contact with the wastes or leachate.

5A(3)—The applicant or licensee will be exempted from the requirements of paragraph 5A(1) of this criterion if the Commission finds, based on a demonstration by the applicant or licensee, that alternate design and operating practices, including the closure plan, together with site characteristics will prevent the migration of any hazardous constituents into ground water or surface water at any future time. In deciding whether to grant an exemption, the Commission will consider—

- (a) The nature and quantity of the wastes;
- (b) The proposed alternate design and operation;
- (c) The hydrogeologic setting of the facility, including the attenuative capacity and thickness of the liners and soils present between the impoundment and ground water or surface water; and
- (d) All other factors which would influence the quality and mobility of the leachate produced and the potential for it to migrate to ground water or surface water.

5A(4)—A surface impoundment must be designed, constructed, maintained, and operated to prevent overtopping resulting from normal or abnormal operations, overfilling, wind and wave actions, rainfall, or run-on; from malfunctions of level controllers, alarms, and other equipment; and from human error.

5A(5)—When dikes are used to form the surface impoundment, the dikes must be designed, constructed, and maintained with sufficient structural integrity to prevent massive failure of the dikes. In ensuring structural integrity, it must not be presumed that the liner system will function without leakage during the active life of the impoundment.

5B(1)—Uranium and thorium byproduct materials must be managed to conform to the following secondary ground-water protection standard: Hazardous constituents entering the ground water from a licensed site must not exceed the specified concentration limits in the uppermost aquifer beyond the point of compliance during the compliance period. Hazardous constituents are those constituents identified by the Commission pursuant to paragraph 5B(2) of this criterion. Specified concentration limits are those limits established by the Commission as indicated in paragraph 5B(5) of this criterion. The Commission will also establish the point of compliance and compliance period on a site specific basis through license conditions and orders. The objective in selecting the point of compliance is to provide the earliest practicable warning that the impoundment is releasing hazardous constituents to the ground water. The point of compliance must be selected to provide prompt indication of ground-water contamination on the hydraulically downgradient edge of the disposal area. The Commission shall identify hazardous constituents, establish concentration limits, set the compliance period, and may adjust the point of compliance if needed to accord with developed data and site information as to the flow of ground water or

contaminants, when the detection monitoring established under Criterion 7A indicates leakage of hazardous constituents from the disposal area.

5B(2)—A constituent becomes a hazardous constituent subject to paragraph 5B(5) only when the constituent meets all three of the following tests:

- (a) The constituent is reasonably expected to be in or derived from the byproduct material in the disposal area;
- (b) The constituent has been detected in the ground water in the uppermost aquifer; and
- (c) The constituent is listed in Criterion 13 of this appendix.

5B(3)—Even when constituents meet all three tests in paragraph 5B(2) of this criterion, the Commission may exclude a detected constituent from the set of hazardous constituents on a site specific basis if it finds that the constituent is not capable of posing a substantial present or potential hazard to human health or the environment. In deciding whether to exclude constituents, the Commission will consider the following:

- (a) Potential adverse effects on ground-water quality, considering—
 - (i) The physical and chemical characteristics of the waste in the licensed site, including its potential for migration;
 - (ii) The hydrogeological characteristics of the facility and surrounding land;
 - (iii) The quantity of ground water and the direction of ground-water flow;
 - (iv) The proximity and withdrawal rates of ground-water users;
 - (v) The current and future uses of ground water in the area;
 - (vi) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;
 - (vii) The potential for health risks caused by human exposure to waste constituents;
 - (viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;
 - (ix) The persistence and permanence of the potential adverse effects.
- (b) Potential adverse effects on hydraulically-connected surface water quality, considering—
 - (i) The volume and physical and chemical characteristics of the waste in the licensed site;
 - (ii) The hydrogeological characteristics of the facility and surrounding land;
 - (iii) The quantity and quality of ground water, and the direction of ground-water flow;
 - (iv) The patterns of rainfall in the region;
 - (v) The proximity of the licensed site to surface waters;

- (vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;
- (vii) The existing quality of surface water, including other sources of contamination and the cumulative impact on surface-water quality;
- (viii) The potential for health risks caused by human exposure to waste constituents;
- (ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
- (x) The persistence and permanence of the potential adverse effects.

5B(4)—In making any determinations under paragraphs 5B(3) and 5B(6) of this criterion about the use of ground water in the area around the facility, the Commission will consider any identification of underground sources of drinking water and exempted aquifers made by the Environmental Protection Agency.

5B(5)—At the point of compliance, the concentration of a hazardous constituent must not exceed—

- (a) The Commission approved background concentration of that constituent in the ground water;
- (b) The respective value given in the table in paragraph 5C if the constituent is listed in the table and if the background level of the constituent is below the value listed; or
- (c) An alternate concentration limit established by the Commission.

5B(6)—Conceptually, background concentrations pose no incremental hazards and the drinking water limits in paragraph 5C state acceptable hazards but these two options may not be practically achievable at a specific site. Alternate concentration limits that present no significant hazard may be proposed by licensees for Commission consideration. Licensees must provide the basis for any proposed limits including consideration of practicable corrective actions that limits are as low as reasonably achievable, and information on the factors the Commission must consider. The Commission will establish a site specific alternate concentration limit for a hazardous constituent as provided in paragraph 5B(5) of this criterion if it finds that the proposed limit is as low as reasonably achievable, after considering practicable corrective actions, and that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the alternate concentration limit is not exceeded. In making the present and potential hazard finding, the Commission will consider the following factors:

- (a) Potential adverse effects on ground-water quality, considering—
 - (i) The physical and chemical characteristics of the waste in the licensed site including its potential for migration;
 - (ii) The hydrogeological characteristics of the facility and surrounding land;
 - (iii) The quantity of ground water and the direction of ground-water flow;
 - (iv) The proximity and withdrawal rates of ground-water users;
 - (v) The current and future uses of ground water in the area;

- (vi) The existing quality of ground water, including other sources of contamination and their cumulative impact on the ground-water quality;
 - (vii) The potential for health risks caused by human exposure to waste constituents;
 - (viii) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents;
 - (ix) The persistence and permanence of the potential adverse effects.
- (b) Potential adverse effects on hydraulically-connected surface water quality, considering—
- (i) The volume and physical and chemical characteristics of the waste in the licensed site;
 - (ii) The hydrogeological characteristics of the facility and surrounding land;
 - (iii) The quantity and quality of ground water, and the direction of ground-water flow;
 - (iv) The patterns of rainfall in the region;
 - (v) The proximity of the licensed site to surface waters;
 - (vi) The current and future uses of surface waters in the area and any water quality standards established for those surface waters;
 - (vii) The existing quality of surface water including other sources of contamination and the cumulative impact on surface water quality;
 - (viii) The potential for health risks caused by human exposure to waste constituents;
 - (ix) The potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to waste constituents; and
 - (x) The persistence and permanence of the potential adverse effects.

5C—Maximum Values for Ground-Water Protection

[The table which comprises 5C has not been included in this document.]

5D—If the ground-water protection standards established under paragraph 5B(1) of this criterion are exceeded at a licensed site, a corrective action program must be put into operation as soon as is practicable, and in no event later than eighteen (18) months after the Commission finds that the standards have been exceeded. The licensee shall submit the proposed corrective action program and supporting rationale for Commission approval prior to putting the program into operation, unless otherwise directed by the Commission. The objective of the program is to return hazardous constituent concentration levels in ground water to the concentration limits set as standards. The licensee's proposed program must address removing the hazardous constituents that have entered the ground water at the point of compliance or treating them in place. The program must also address removing or treating in place any hazardous constituents that exceed concentration limits in ground water between the point of compliance and the downgradient facility property boundary. The licensee shall continue corrective action measures to the extent necessary to achieve and maintain compliance with the ground-water protection standard. The Commission will determine when the licensee may terminate corrective action measures based on

data from the ground-water monitoring program and other information that provide reasonable assurance that the ground-water protection standard will not be exceeded.

5E—In developing and conducting ground-water protection programs, applicants and licensees shall also consider the following:

- (1) Installation of bottom liners (Where synthetic liners are used, a leakage detection system must be installed immediately below the liner to ensure major failures are detected if they occur. This is in addition to the ground-water monitoring program conducted as provided in Criterion 7. Where clay liners are proposed or relatively thin, in-situ clay soils are to be relied upon for seepage control, tests must be conducted with representative tailings solutions and clay materials to confirm that no significant deterioration of permeability or stability properties will occur with continuous exposure of clay to tailings solutions. Tests must be run for a sufficient period of time to reveal any effects if they are going to occur (in some cases deterioration has been observed to occur rather rapidly after about nine months of exposure)).
- (2) Mill process designs which provide the maximum practicable recycle of solutions and conservation of water to reduce the net input of liquid to the tailings impoundment.
- (3) Dewatering of tailings by process devices and/or in-situ drainage systems. (At new sites, tailings must be dewatered by a drainage system installed at the bottom of the impoundment to lower the phreatic surface and reduce the driving head of seepage, unless tests show tailings are not amenable to such a system. Where in-situ dewatering is to be conducted, the impoundment bottom must be graded to assure that the drains are at a low point. The drains must be protected by suitable filter materials to assure that drains remain free running. The drainage system must also be adequately sized to assure good drainage.)
- (4) Neutralization to promote immobilization of hazardous constituents.

5F—Where ground-water impacts are occurring at an existing site due to seepage, action must be taken to alleviate conditions that lead to excessive seepage impacts and restore ground-water quality. The specific seepage control and ground-water protection method, or combination of methods, to be used must be worked out on a site-specific basis. Technical specifications must be prepared to control installation of seepage control systems. A quality assurance, testing, and inspection program, which include supervision by a qualified engineer or scientist, must be established to assure the specifications are met.

5G—In support of a tailings disposal system proposal, the applicant/operator shall supply information concerning the following:

- (1) The chemical and radioactive characteristics of the waste solutions.
- (2) The characteristics of the underlying soil and geologic formations particularly as they will control transport of contaminants and solutions. This includes detailed information concerning extent, thickness, uniformity, shape, and orientation of underlying strata. Hydraulic gradients and conductivities of the various formations must be determined. This information must be gathered from borings and field survey methods taken within the proposed impoundment area and in surrounding areas where contaminants might migrate to ground water. The information gathered on boreholes must include both geologic and geophysical logs in sufficient number and degree of sophistication to allow determining significant discontinuities, fractures, and channeled deposits of high hydraulic conductivity. If field survey methods are used, they should be in addition to and calibrated with borehole logging. Hydrologic parameters such as permeability may not be determined on the basis of

laboratory analysis of samples alone; a sufficient amount of field testing (e.g., pump tests) must be conducted to assure actual field properties are adequately understood. Testing must be conducted to allow estimating chemi-sorption attenuation properties of underlying soil and rock.

(3) Location, extent, quality, capacity and current uses of any ground water at and near the site.

5H—Steps must be taken during stockpiling of ore to minimize penetration of radionuclides into underlying soils; suitable methods include lining and/or compaction of ore storage areas.

4.1.5.2 *Evaluation and Conclusion*

Criteria 5A(1)(2)(5) provide design requirements for liners and dikes that are not appropriate for the IWCS which already exists; 5A(3)(4) and 5B(4) are administrative or procedural in nature and are not considered ARARs.

Criteria 5D and 5F provide requirements for corrective action and are administrative or procedural in nature and are not considered ARARs. Criteria 5E and 5G provide requirements for new disposal facilities. The IWCS already exists so these requirements are not appropriate. Criteria 5H provides requirements for stockpiling ore, which is not appropriate for the IWCS.

Criteria 5B(1)(2)(3)(5) and 5C provide groundwater protection standards for the management of uranium byproduct material. However, these regulations are not appropriate for the NFSS because groundwater resources underlying the NFSS reflect the USEPA Class IIIb criteria for non-potable and limited beneficial use water (USEPA 1986). In order to be a potable water source, groundwater at the NFSS would require expensive and energy intensive treatment by reverse osmosis (desalination). Since there is a replaceable surface-water source via the Niagara River/Lake Ontario and groundwater south of the site (Lockport Formation), it is reasonable to assume that no municipality or service would find NFSS groundwater economically viable.

4.1.6 10 CFR 40, Appendix A: Criterion 6, Closure of Waste Disposal Areas

4.1.6.1 *Published Regulations*

Criterion 6—(1) In disposing of waste byproduct material, licensees shall place an earthen cover (or approved alternative) over tailings or wastes at the end of milling operations and shall close the waste disposal area in accordance with a design¹ which provides reasonable assurance of control of radiological hazards to (i) be effective for 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years, and (ii) limit releases of radon-222 from uranium byproduct materials, and radon-220 from thorium byproduct materials, to the atmosphere so as not to exceed an average ² release rate of 20 picocuries per square meter per second (pCi/m² s) to the extent practicable throughout the effective design life determined pursuant to (1)(i) of this Criterion. In computing required tailings cover thicknesses, moisture in soils in excess of amounts found normally in similar soils in similar circumstances may not be considered. Direct gamma exposure from the tailings or wastes should be reduced to background levels. The effects of any thin synthetic layer may not be taken into account in determining the calculated radon exhalation level. If non-soil materials are proposed as cover materials, it must be demonstrated that these materials will not crack or degrade by differential settlement, weathering, or other mechanism, over long-term intervals.

1. In the case of thorium byproduct materials, the standard applies only to design. Monitoring for radon emissions from thorium byproduct materials after installation of an appropriately designed cover is not required.

2. This average applies to the entire surface of each disposal area over a period of at least one year, but a period short compared to 100 years. Radon will come from both byproduct materials and from covering materials. Radon emissions from covering materials should be estimated as part of developing a closure plan for each site. The standard, however, applies only to emissions from byproduct materials to the atmosphere.

(2) As soon as reasonably achievable after emplacement of the final cover to limit releases of radon-222 from uranium byproduct material and prior to placement of erosion protection barriers or other features necessary for long-term control of the tailings, the licensee shall verify through appropriate testing and analysis that the design and construction of the final radon barrier is effective in limiting releases of radon-222 to a level not exceeding 20 pCi/m 2s averaged over the entire pile or impoundment using the procedures described in 40 CFR part 61, appendix B, Method 115, or another method of verification approved by the Commission as being at least as effective in demonstrating the effectiveness of the final radon barrier.

(3) When phased emplacement of the final radon barrier is included in the applicable reclamation plan, the verification of radon-222 release rates required in paragraph (2) of this criterion must be conducted for each portion of the pile or impoundment as the final radon barrier for that portion is emplaced.

(4) Within ninety days of the completion of all testing and analysis relevant to the required verification in paragraphs (2) and (3) of this criterion, the uranium mill licensee shall report to the Commission the results detailing the actions taken to verify that levels of release of radon-222 do not exceed 20 pCi/m 2s when averaged over the entire pile or impoundment. The licensee shall maintain records until termination of the license documenting the source of input parameters including the results of all measurements on which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine compliance. These records shall be kept in a form suitable for transfer to the custodial agency at the time of transfer of the site to DOE or a State for long-term care if requested.

(5) Near surface cover materials (i.e., within the top three meters) may not include waste or rock that contains elevated levels of radium; soils used for near surface cover must be essentially the same, as far as radioactivity is concerned, as that of surrounding surface soils. This is to ensure that surface radon exhalation is not significantly above background because of the cover material itself.

(6) The design requirements in this criterion for longevity and control of radon releases apply to any portion of a licensed and/or disposal site unless such portion contains a concentration of radium in land, averaged over areas of 100 square meters, which, as a result of byproduct material, does not exceed the background level by more than: (i) 5 picocuries per gram (pCi/g) of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over the first 15 centimeters (cm) below the surface, and (ii) 15 pCi/g of radium-226, or, in the case of thorium byproduct material, radium-228, averaged over 15-cm thick layers more than 15 cm below the surface.

Byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium contaminated soil to the above standard (benchmark dose), and must be at levels which are as low as is reasonably achievable. If more than one residual radionuclide is present in the same 100-square-meter area, the sum of the ratios for each radionuclide of concentration present to the concentration limit will not exceed "1" (unity). A calculation of the potential peak annual TEDE within 1000 years to the average member of the critical group that would result from applying the radium standard (not including radon) on the site must be submitted for approval. The use of decommissioning plans with benchmark doses which exceed 100 mrem/yr, before application of ALARA, requires the approval of the Commission after consideration of the recommendation of the NRC staff. This requirement for dose criteria does not apply to sites that have decommissioning plans for soil and structures approved before June 11, 1999.

(7) The licensee shall also address the nonradiological hazards associated with the wastes in planning and implementing closure. The licensee shall ensure that disposal areas are closed in a manner that minimizes the need for further maintenance. To the extent necessary to prevent threats to human health and the environment, the licensee shall control, minimize, or eliminate post-closure escape of nonradiological hazardous constituents, leachate, contaminated rainwater, or waste decomposition products to the ground or surface waters or to the atmosphere.

4.1.6.2 *Evaluation and Conclusion*

Criterion 6(1) incorporates performance standards for the disposal area by defining the time frame for long-term effectiveness and establishing radon emission criteria. Although the IWCS already exists and thus has already been sited, designed, and operated, and is currently being maintained, this requirement is relevant and appropriate for leave in-place or enhanced containment remedial alternatives.

Criteria 6(2) and 6(3), 6(5), and 6(7) address the design and performance of the cover of a disposal facility. These requirements would be relevant and appropriate for any leave in-place or enhanced containment remedial alternatives.

Criterion 6(4) is administrative in nature and is therefore not an ARAR.

Criterion 6(6) establishes benchmark dose requirements for addressing radionuclides other than radium. These benchmark doses are used to develop cleanup criteria such that “byproduct material containing concentrations of radionuclides other than radium in soil, and surface activity on remaining structures, must not result in a total effective dose equivalent (TEDE) exceeding the dose from cleanup of radium to the above standard (benchmark dose) and must be at levels that are ALARA [as low as reasonably achievable].” Under this approach, dose assessments (excluding radon) are conducted to convert the radium soil standards into a benchmark dose for all the radionuclides at the site. Criterion 6(6) requirements also address the NRC approval of benchmark dose calculations and approval of benchmark doses exceeding 100 mrem/yr; this portion of 6(6) is administrative and not an ARAR. The remaining requirements of Criterion 6(6) are relevant and appropriate for any remedial alternative that involves excavation.

4.1.7 10 CFR 40, Appendix A: Criterion 6A, Completion of Final Impoundment Radon Barrier

4.1.7.1 *Published Regulation*

(1) For impoundments containing uranium byproduct materials, the final radon barrier must be completed as expeditiously as practicable considering technological feasibility after the pile or impoundment ceases operation in accordance with a written, Commission-approved reclamation plan. (The term as expeditiously as practicable considering technological feasibility as specifically defined in the Introduction of this appendix includes factors beyond the control of the licensee.) Deadlines for completion of the final radon barrier and, if applicable, the following interim milestones must be established as a condition of the individual license: windblown tailings retrieval and placement on the pile and interim stabilization (including dewatering or the removal of freestanding liquids and recontouring). The placement of erosion protection barriers or other features necessary for long-term control of the tailings must also be completed in a timely manner in accordance with a written, Commission-approved reclamation plan.

(2) The Commission may approve a licensee's request to extend the time for performance of milestones related to emplacement of the final radon barrier if, after providing an opportunity for public participation, the Commission finds that the licensee has adequately demonstrated in the manner required

in paragraph (2) of Criterion 6 that releases of radon-222 do not exceed an average of 20 pCi/m²s. If the delay is approved on the basis that the radon releases do not exceed 20 pCi/m²s, a verification of radon levels, as required by paragraph (2) of Criterion 6, must be made annually during the period of delay. In addition, once the Commission has established the date in the reclamation plan for the milestone for completion of the final radon barrier, the Commission may extend that date based on cost if, after providing an opportunity for public participation, the Commission finds that the licensee is making good faith efforts to emplace the final radon barrier, the delay is consistent with the definition of available technology, and the radon releases caused by the delay will not result in a significant incremental risk to the public health.

(3) The Commission may authorize by license amendment, upon licensee request, a portion of the impoundment to accept uranium byproduct material or such materials that are similar in physical, chemical, and radiological characteristics to the uranium mill tailings and associated wastes already in the pile or impoundment, from other sources, during the closure process. No such authorization will be made if it results in a delay or impediment to emplacement of the final radon barrier over the remainder of the impoundment in a manner that will achieve levels of radon-222 releases not exceeding 20 pCi/m²s averaged over the entire impoundment. The verification required in paragraph (2) of Criterion 6 may be completed with a portion of the impoundment being used for further disposal if the Commission makes a final finding that the impoundment will continue to achieve a level of radon-222 releases not exceeding 20 pCi/m²s averaged over the entire impoundment. In this case, after the final radon barrier is complete except for the continuing disposal area, (a) only byproduct material will be authorized for disposal, (b) the disposal will be limited to the specified existing disposal area, and (c) this authorization will only be made after providing opportunity for public participation. Reclamation of the disposal area, as appropriate, must be completed in a timely manner after disposal operations cease in accordance with paragraph (1) of Criterion 6; however, these actions are not required to be complete as part of meeting the deadline for final radon barrier construction.

4.1.7.2 *Evaluation and Conclusion*

The provisions mandated herein require prompt closure of cells and adherence to the regulatory milestones, in addition to a provision giving the Commission discretion as part of a license amendment to authorize disposal of other material that are “similar in physical, chemical, and radiological characteristics to the uranium mill tailings” that may be considered in future options for disposal of non-11e.(2) material in 11e.(2) disposal cells.

Although the enhanced containment remedial alternatives include the installation of a new cover, the existing radon barrier will remain in-place and will not be removed. Criterion 6A is relevant but not appropriate for the remedial alternatives considered for the IWCS.

4.1.8 10 CFR 40, Appendix A: Criterion 7, Preoperational Monitoring Period

4.1.8.1 *Published Regulation*

7—At least one full year prior to any major site construction, a preoperational monitoring program must be conducted to provide complete baseline data on a milling site and its environs. Throughout the construction and operating phases of the mill, an operational monitoring program must be conducted to measure or evaluate compliance with applicable standards and regulations; to evaluate performance of control systems and procedures; to evaluate environmental impacts of operation; and to detect potential long-term effects.

7A—The licensee shall establish a detection monitoring program needed for the Commission to set the site-specific ground-water protection standards in paragraph 5B(1) of this appendix. For all monitoring

under this paragraph the licensee or applicant will propose for Commission approval as license conditions which constituents are to be monitored on a site specific basis. A detection monitoring program has two purposes. The initial purpose of the program is to detect leakage of hazardous constituents from the disposal area so that the need to set ground-water protection standards is monitored. If leakage is detected, the second purpose of the program is to generate data and information needed for the Commission to establish the standards under Criterion 5B. The data and information must provide a sufficient basis to identify those hazardous constituents which require concentration limit standards and to enable the Commission to set the limits for those constituents and the compliance period. They may also need to provide the basis for adjustments to the point of compliance. For licenses in effect September 30, 1983, the detection monitoring programs must have been in place by October 1, 1984. For licenses issued after September 30, 1983, the detection monitoring programs must be in place when specified by the Commission in orders or license conditions. Once ground-water protection standards have been established pursuant to paragraph 5B(1), the licensee shall establish and implement a compliance monitoring program. The purpose of the compliance monitoring program is to determine that the hazardous constituent concentrations in ground water continue to comply with the standards set by the Commission. In conjunction with a corrective action program, the licensee shall establish and implement a corrective action monitoring program. The purpose of the corrective action monitoring program is to demonstrate the effectiveness of the corrective actions. Any monitoring program required by this paragraph may be based on existing monitoring programs to the extent the existing programs can meet the stated objective for the program.

4.1.8.2 *Evaluation and Conclusion*

Criterion 7 mandates implementation of a compliance monitoring program once groundwater protection standards have been established. A preoperational monitoring program is required at least one year prior to any major site construction and an operational monitoring program is required thereafter. Criterion 7A requires development of a groundwater monitoring program to set site-specific ground-water protection standards.

The pre-operational monitoring and compliance monitoring program established by Criteria 7 and 7A are relevant but not appropriate since groundwater at the NFSS is not a potential potable water source (see discussion in Section 4.1.5.2).

4.1.9 10 CFR 40, Appendix A: Criterion 8 – Reduction of Airborne Effluent Releases

4.1.9.1 *Published Regulation*

Milling operations must be conducted so that all airborne effluent releases are reduced to levels as low as is reasonably achievable. The primary means of accomplishing this must be by means of emission controls. Institutional controls, such as extending the site boundary and exclusion area, may be employed to ensure that offsite exposure limits are met, but only after all practicable measures have been taken to control emissions at the source. Notwithstanding the existence of individual dose standards, strict control of emissions is necessary to assure that population exposures are reduced to the maximum extent reasonably achievable and to avoid site contamination. The greatest potential sources of offsite radiation exposure (aside from radon exposure) are dusting from dry surfaces of the tailings disposal area not covered by tailings solution and emissions from yellowcake drying and packaging operations. During operations and prior to closure, radiation doses from radon emissions from surface impoundments of uranium or thorium byproduct materials must be kept as low as is reasonably achievable.

Checks must be made and logged hourly of all parameters (e.g., differential pressures and scrubber water flow rates) that determine the efficiency of yellowcake stack emission control equipment operation. The licensee shall retain each log as a record for three years after the last entry in the log is made. It must be

determined whether conditions are within a range prescribed to ensure that the equipment is operating consistently near peak efficiency; corrective action must be taken when performance is outside of prescribed ranges. Effluent control devices must be operative at all times during drying and packaging operations and whenever air is exhausting from the yellowcake stack. Drying and packaging operations must terminate when controls are inoperative. When checks indicate the equipment is not operating within the range prescribed for peak efficiency, actions must be taken to restore parameters to the prescribed range. When this cannot be done without shutdown and repairs, drying and packaging operations must cease as soon as practicable. Operations may not be restarted after cessation due to off-normal performance until needed corrective actions have been identified and implemented. All these cessations, corrective actions, and restarts must be reported to the appropriate NRC regional office as indicated in Criterion 8A, in writing, within ten days of the subsequent restart.

To control dusting from tailings, that portion not covered by standing liquids must be wetted or chemically stabilized to prevent or minimize blowing and dusting to the maximum extent reasonably achievable. This requirement may be relaxed if tailings are effectively sheltered from wind, such as may be the case where they are disposed of below grade and the tailings surface is not exposed to wind. Consideration must be given in planning tailings disposal programs to methods which would allow phased covering and reclamation of tailings impoundments because this will help in controlling particulate and radon emissions during operation. To control dusting from diffuse sources, such as tailings and ore pads where automatic controls do not apply, operators shall develop written operating procedures specifying the methods of control which will be utilized.

Milling operations producing or involving thorium byproduct material must be conducted in such a manner as to provide reasonable assurance that the annual dose equivalent does not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public as a result of exposures to the planned discharge of radioactive materials, radon-220 and its daughters excepted, to the general environment.

Uranium and thorium byproduct materials must be managed so as to conform to the applicable provisions of title 40 of the Code of Federal Regulations, part 440, "Ore Mining and Dressing Point Source Category: Effluent Limitations Guidelines and New Source Performance Standards, subpart C, Uranium, Radium, and Vanadium Ores Subcategory," as codified on January 1, 1983.

4.1.9.2 *Evaluation and Conclusion*

The provisions in Criterion 8 mandate controls for airborne effluent releases for uranium and thorium milling operations. Since no milling operations have or will be conducted at the NFSS, these requirements are not relevant and appropriate for any remedial alternatives being considered.

4.1.10 10 CFR 40, Appendix A: Criterion 8A – Daily Inspections

4.1.10.1 *Published Regulation*

Daily inspections of tailings or waste retention systems must be conducted by a qualified engineer or scientist and documented. The licensee shall retain the documentation for each daily inspection as a record for three years after the documentation is made. The appropriate NRC regional office as indicated in appendix D to 10 CFR part 20 of this chapter, or the Director, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, DC, 20555, must be immediately notified of any failure in a tailings or waste retention system that results in a release of tailings or waste into unrestricted areas, or of any unusual conditions (conditions not contemplated in the design of the retention system) that is not corrected could indicate the potential or lead to failure of the system and result in a release of tailings or waste into unrestricted areas.

4.1.10.2 *Evaluation and Conclusion*

Although this criterion contains some procedural provisions, substantive requirements provide daily quality control/quality assurance inspections to identify and facilitate correction of tailings or waste retention systems in order to control releases of tailings or wastes into unrestricted areas during operation of the uranium recovery facility. Since no milling operations have or will be conducted at the NFSS, these requirements are not relevant and appropriate for any remedial alternatives being considered.

4.1.11 10 CFR 40, Appendix A, Criterion 9

4.1.11.1 *Published Regulation*

Financial surety arrangements must be established by each mill operator prior to the commencement of operations to assure that sufficient funds will be available to carry out the decontamination and decommissioning of the mill and site and for the reclamation of any tailings or waste disposal areas. The amount of funds to be ensured by such surety arrangements must be based on Commission-approved cost estimates in a Commission-approved plan for (1) decontamination and decommissioning of mill buildings and the milling site to levels which allow unrestricted use of these areas upon decommissioning, and (2) the reclamation of tailings and/or waste areas in accordance with technical criteria delineated in Section I of this appendix. The licensee shall submit this plan in conjunction with an environmental report that addresses the expected environmental impacts of the milling operation, decommissioning and tailings reclamation, and evaluates alternatives for mitigating these impacts. The surety must also cover the payment of the charge for long-term surveillance and control required by Criterion 10. In establishing specific surety arrangements, the licensee's cost estimates must take into account total costs that would be incurred if an independent contractor were hired to perform the decommissioning and reclamation work. In order to avoid unnecessary duplication and expense, the Commission may accept financial sureties that have been consolidated with financial or surety arrangements established to meet requirements of other Federal or state agencies and/or local governing bodies for such decommissioning, decontamination, reclamation, and long-term site surveillance and control, provided such arrangements are considered adequate to satisfy these requirements and that the portion of the surety which covers the decommissioning and reclamation of the mill, mill tailings site and associated areas, and the long-term funding charge is clearly identified and committed for use in accomplishing these activities. The licensees's surety mechanism will be reviewed annually by the Commission to assure, that sufficient funds would be available for completion of the reclamation plan if the work had to be performed by an independent contractor. The amount of surety liability should be adjusted to recognize any increases or decreases resulting from inflation, changes in engineering plans, activities performed, and any other conditions affecting costs. Regardless of whether reclamation is phased through the life of the operation or takes place at the end of operations, an appropriate portion of surety liability must be retained until final compliance with the reclamation plan is determined.

This will yield a surety that is at least sufficient at all times to cover the costs of decommissioning and reclamation of the areas that are expected to be disturbed before the next license renewal. The term of the surety mechanism must be open ended, unless it can be demonstrated that another arrangement would provide an equivalent level of assurance. This assurance would be provided with a surety instrument which is written for a specified period of time (e.g., 5 years) yet which must be automatically renewed unless the surety notifies the beneficiary (the Commission or the State regulatory agency) and the principal (the licensee) some reasonable time (e.g., 90 days) prior to the renewal date of their intention not to renew. In such a situation the surety requirement still exists and the licensee would be required to submit an acceptable replacement surety within a brief period of time to allow at least 60 days for the regulatory agency to collect.

Proof of forfeiture must not be necessary to collect the surety so that in the event that the licensee could not provide an acceptable replacement surety within the required time, the surety shall be automatically collected prior to its expiration. The conditions described above would have to be clearly stated on any surety instrument which is not open-ended, and must be agreed to by all parties. Financial surety arrangements generally acceptable to the Commission are:

- (a) Surety bonds;
- (b) Cash deposits;
- (c) Certificates of deposits;
- (d) Deposits of government securities;
- (e) Irrevocable letters or lines of credit; and
- (f) Combinations of the above or such other types of arrangements as may be approved by the

Commission. However, self insurance, or any arrangement which essentially constitutes self insurance (e.g., a contract with a State or Federal agency), will not satisfy the surety requirement since this provides no additional assurance other than that which already exists through license requirements.

4.1.11.2 Evaluation and Conclusion

This criterion requires the establishment of financial surety arrangements prior to the commencement of operations to assure that sufficient funds will be available to carry out the decontamination and decommissioning of the mill and site and for the reclamation of any tailings or waste disposal areas. Since this criterion is administrative or procedural in nature, it is not an ARAR.

4.1.12 10 CFR 40 Appendix A, Criterion 10, Long-term Surveillance Charge

4.1.12.1 Published Regulation

A minimum charge of \$250,000 (1978 dollars) to cover the costs of long-term surveillance must be paid by each mill operator to the general treasury of the United States or to an appropriate State agency prior to the termination of a uranium or thorium mill license.

If site surveillance or control requirements at a particular site are determined, on the basis of a site-specific evaluation, to be significantly greater than those specified in Criterion 12 (e.g., if fencing is determined to be necessary), variance in funding requirements may be specified by the Commission. In any case, the total charge to cover the costs of long-term surveillance must be such that, with an assumed 1 percent annual real interest rate, the collected funds will yield interest in an amount sufficient to cover the annual costs of site surveillance. The total charge will be adjusted annually prior to actual payment to recognize inflation. The inflation rate to be used is that indicated by the change in the Consumer Price Index published by the U.S. Department of Labor, Bureau of Labor Statistics.

4.1.12.2 Evaluation and Conclusion

This criterion requires funding for long-term surveillance costs. Since this criterion is administrative or procedural in nature, it is not an ARAR.

4.1.13 10 CFR 40, Appendix A: Criterion 11, Site and Byproduct Material Ownership

4.1.13.1 Published Regulation

A. These criteria relating to ownership of tailings and their disposal sites become effective on November 8, 1981, and apply to all licenses terminated, issued, or renewed after that date.

B. Any uranium or thorium milling license or tailings license must contain such terms and conditions as the Commission determines necessary to assure that prior to termination of the license, the licensee will comply with ownership requirements of this criterion for sites used for tailings disposal.

C. Title to the byproduct material licensed under this part and land, including any interests therein (other than land owned by the United States or by a State) which is used for the disposal of any such byproduct material, or is essential to ensure the long term stability of such disposal site, must be transferred to the United States or the State in which such land is located, at the option of such State. In view of the fact that physical isolation must be the primary means of long-term control, and Government land ownership is a desirable supplementary measure, ownership of certain severable subsurface interests (for example, mineral rights) may be determined to be unnecessary to protect the public health and safety and the environment. In any case, however, the applicant/operator must demonstrate a serious effort to obtain such subsurface rights, and must, in the event that certain rights cannot be obtained, provide notification in local public land records of the fact that the land is being used for the disposal of radioactive material and is subject to either an NRC general or specific license prohibiting the disruption and disturbance of the tailings. In some rare cases, such as may occur with deep burial where no ongoing site surveillance will be required, surface land ownership transfer requirements may be waived. For licenses issued before November 8, 1981, the Commission may take into account the status of the ownership of such land, and interests therein, and the ability of a licensee to transfer title and custody thereof to the United States or a State.

D. If the Commission subsequent to title transfer determines that use of the surface or subsurface estates, or both, of the land transferred to the United States or to a State will not endanger the public health, safety, welfare, or environment, the Commission may permit the use of the surface or subsurface estates, or both, of such land in a manner consistent with the provisions provided in these criteria. If the Commission permits such use of such land, it will provide the person who transferred such land with the right of first refusal with respect to such use of such land.

E. Material and land transferred to the United States or a State in accordance with this Criterion must be transferred without cost to the United States or a State other than administrative and legal costs incurred in carrying out such transfer.

F. The provisions of this part respecting transfer of title and custody to land and tailings and wastes do not apply in the case of lands held in trust by the United States for any Indian tribe or lands owned by such Indian tribe subject to a restriction against alienation imposed by the United States. In the case of such lands which are used for the disposal of byproduct material, as defined in this part, the licensee shall enter into arrangements with the Commission as may be appropriate to assure the long-term surveillance of such lands by the United States.

4.1.13.2 *Evaluation and Conclusion*

These requirements grant the legal transfer of disposal sites to the United States or to a state for perpetual maintenance. This action, although critical to the perpetual management of the uranium recovery facility disposal site, is a relevant but not appropriate requirement for the site, which is already owned by the federal government.

4.1.14 10 CFR 40, Appendix A: Criterion 12, Long-Term Site Surveillance

4.1.14.1 *Published Regulation*

Criterion 12—The final disposition of tailings, residual radioactive material, or wastes at milling sites should be such that ongoing active maintenance is not necessary to preserve isolation. As a minimum,

annual site inspections must be conducted by the Government agency responsible for long-term care of the disposal site to confirm its integrity and to determine the need, if any, for maintenance and/or monitoring. Results of the inspections for all the sites under the licensee's jurisdiction will be reported to the Commission annually within 90 days of the last site inspection in that calendar year. Any site where unusual damage or disruption is discovered during the inspection, however, will require a preliminary site inspection report to be submitted within 60 days. On the basis of a site specific evaluation, the Commission may require more frequent site inspections if necessary due to the features of a particular disposal site. In this case, a preliminary inspection report is required to be submitted within 60 days following each inspection.

4.1.14.2 *Evaluation and Conclusion*

Criterion 12 mandates that the disposition of wastes at milling sites be implemented so that active maintenance is not required to preserve the isolation of wastes. The substantive provisions require annual inspections of closed disposal sites to verify that controls continue to be protective. Periodic inspections are an important component of institutional controls and are considered to be appropriate.

Although there are some administrative requirements (e.g., time frame for reporting requirements) in Criterion 12, the substantive requirements, such as the mandatory site inspections, are considered to be relevant and appropriate for any leave in-place or enhanced containment remedial alternative.

4.1.15 10 CFR 40, Appendix A: Criterion 13, Hazardous Constituents

4.1.15.1 *Published Regulation*

Criterion 13—Secondary ground-water protection standards required by Criterion 5 of this appendix are concentration limits for individual hazardous constituents. The following list of constituents identifies the constituents for which standards must be set and complied with if the specific constituent is reasonably expected to be in or derived from the byproduct material and has been detected in ground water. For purposes of this appendix, the property of gross alpha activity will be treated as if it is a hazardous constituent. Thus, when setting standards under paragraph 5B(5) of Criterion 5, the Commission will also set a limit for gross alpha activity. The Commission does not consider the following list imposed by 40 CFR part 192 to be exhaustive and may determine other constituents to be hazardous on a case-by-case basis, independent of those specified by the U.S. Environmental Protection Agency in part 192. (NOTE: The list of constituents was not included in the text of this document because it is several pages long.)

4.1.15.2 *Evaluation and Conclusion*

10 CFR 40, Appendix A: Criterion 13 is considered relevant since it presents groundwater criteria for uranium mill tailing disposal facilities, such as the IWCS. However, Criterion 13 is not appropriate since groundwater at the NFSS is not a potential potable water source (see discussion in Section 4.1.5.2).

4.2 40 CFR 61: NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS,

The Clean Air Act (CAA) requires USEPA to develop and enforce regulations to protect the general public from exposure to airborne contaminants that are known to be hazardous to human health. National Emissions Standards for Hazardous Air Pollutants (NESHAPs) are point-source standards promulgated under Title III of CAA for substances identified by USEPA as hazardous air pollutants (HAPs). HAPs are designated as hazardous substances under CERCLA 101(14). The USEPA promulgated NESHAPs under 40 CFR 61. The NESHAPs are intended to address air pollutants for which National Ambient Air Quality Standards do not exist, but that may cause or contribute to an increase in mortality, irreversible illness, or incapacitating but reversible illness. 40 CFR 61 applies to emissions of particular pollutants from specific stationary sources and requires the application of technology-based emissions standards referred to as Maximum Achievable Control Technology.

40 CFR 61 consists of several subparts, including:

- Subpart A: General Provisions;
- Subpart B: National Emission Standards for Radon Emissions from Underground Uranium Mines;
- Subpart C: National Emission Standard for Beryllium;
- Subpart D: National Emission Standard for Beryllium Rocket Motor Firing;
- Subpart E: National Emission Standard for Mercury;
- Subpart F: National Emission Standards for Vinyl Chloride;
- Subpart G: Reserved;
- Subpart H: National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities;
- Subpart I: National Emission Standards for Radionuclide Emissions from Federal Facilities other than NRC Licensees and Not Covered by Subpart H;
- Subpart J: National Emission Standard for Equipment Leaks (Fugitive Emission Sources) of Benzene;
- Subpart K: National Emission Standards for Radionuclide Emissions from Elemental Phosphorus Plants;
- Subpart L: National Emission Standard for Benzene Emissions from Coke By-Product Recovery Plants;
- Subpart M: National Emission Standard for Asbestos;
- Subpart N: National Emission Standard for Inorganic Arsenic Emissions from Glass Manufacturing Plants;
- Subpart O: National Emission Standard for Inorganic Arsenic Emissions from Primary Copper Smelters;
- Subpart P: National Emission Standard for Inorganic Arsenic Emissions from Arsenic Trioxide and Metallic Arsenic Production Facilities;
- Subpart Q: National Emission Standards for Radon Emissions From Department of Energy Facilities
- Subpart R: National Emission Standards for Radon Emissions from Phosphogypsum Stacks;
- Subpart S: Reserved;
- Subpart T: National Emission Standards for Radon Emissions from the Disposal of Uranium Mill Tailings;
- Subpart U: Reserved;
- Subpart V: National Emission Standard for Equipment Leaks (Fugitive Emission Sources);
- Subpart W: National Emission Standards for Radon Emissions from Operating Mill Tailings;
- Subpart X: Reserved;
- Subpart Y: National Emission Standard for Benzene Emissions from Benzene Storage Vessels;
- Subparts Z: AA-Reserved;

- Subpart BB: National Emission Standard for Benzene Emissions from Benzene Transfer Operations;
- Subparts CC: EE-Reserved; and
- Subpart FF: National Emission Standard for Benzene Waste Operations.

Among these subparts, only Subpart H, National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities and Subpart Q, National Emission Standards for Radon Emissions from Department of Energy Facilities are presented and discussed in the following sections.

4.2.1 Subpart H: National Emission Standards for Emissions of Radionuclides other than Radon from Department of Energy Facilities

4.2.1.1 Published Regulations

40 CFR 61.90, Designation of Facilities

The provisions of this subpart apply to operations at any facility owned or operated by the Department of Energy that emits any radionuclide other than radon-222 and radon-220 into the air, except that this subpart does not apply to disposal at facilities subject to 40 CFR part 191, subpart B or 40 CFR part 192.

40 CFR 61.92, Standard

Emissions of radionuclides to the ambient air from Department of Energy facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent of 10 mrem/yr.

4.2.1.2 Evaluation and Conclusion

Emissions covered by the NESHAPs program apply to specific source categories defined in the standards. The HAPs addressed under 40 CFR 61 include a number of the contaminants, including radionuclides/radon. The regulations, although varying in applicability, establish consistent standards allowable for exposure to the public and emissions of radon to ensure protection of the public. Specifically, Subpart H of 40 CFR 61 regulates emissions of radionuclides excluding radon-222 and radon-220 from USDOE facilities and protects members of the public from receiving an annual effective dose equivalent greater than 10 mrem/yr.

The dose limitation in 40 CFR 61.92 would be considered relevant because the NFSS is a USDOE-owned facility; however, it is not appropriate because the constituents of concern for the IWCS are radium-226 and its short-lived decay products (mainly radon-222), and radon-222 is excluded from this rule in accordance with 40 CFR 61.90. Evaluation of 40 CFR 61.90 and 61.92 against the eight factors in 40 CFR 300.400(g)(2)] are presented on Table 4-2.

4.2.2 Subpart Q: National Emission Standards for Radon Emissions From Department of Energy Facilities

4.2.2.1 Published Regulations

40 CFR 61.192, Standard

No source at a Department of Energy facility shall emit more than 20 picocuries per square meter per second (pCi/(m²-sec)) (1.9 pCi/(ft²-sec)) of radon-222 as an average for the entire source, into the air.

This requirement will be part of any Federal Facilities Agreement reached between Environmental Protection Agency and Department of Energy.

4.2.2.2 *Evaluation and Conclusion*

This subpart limits the emission of radon-222 to 20 pCi/(m²-sec) from a “source” defined as “...any building, structure, pile, impoundment or area used for interim storage or disposal that is or contains waste material containing radium in sufficient concentration to emit radon-222 in excess of this standard prior to remedial action.” In addition to this generic definition, this regulation identifies specific facilities that are subject to this subpart and the NFSS is a listed facility.

Since the NFSS is a listed facility, this subpart is applicable and is carried forward as an ARAR for all remedial alternatives.

THIS PAGE INTENTIONALLY LEFT BLANK.

5.0 REGULATIONS EVALUATED BUT DETERMINED NOT TO BE ARARS

5.1 40 CFR 192, SUBPARTS A, B, C: HEALTH AND ENVIRONMENTAL PROTECTION STANDARDS FOR URANIUM AND THORIUM MILL TAILINGS

Under the UMTRCA, the USEPA was directed to develop “standards of general application...for the protection of the public health, safety, and the environment from radiological and nonradiological hazards associated with (uranium mill tailings)” for both the inactive and active processing sites, 42 U.S.C. § 2022 and 772 F.2d 617. These standards of general application were promulgated in 40 CFR 192.

USDOE was directed to provide for the decontamination of all inactive sites processing sites designated in Title I of the Act and those that may be added in accordance with the Act in accordance with USEPA standards 42 U.S.C. 7918(a)(1). However, these standards are not legally applicable to the NFSS because the NFSS is not among the 24 Title I Remedial Action Program sites, as defined in Section 102 (Designation of Processing Sites) of the UMTRCA, as amended (42 USC 88). These standards also are not applicable under UMTRCA Title II since necessary criteria are not met for them to be applicable: 1) the 11e.(2) uranium ore processing residues in the IWCS pre-date the effective date authorizing NRC to regulate 11e.(2) byproduct material, 2) the NFSS is not an NRC-licensed facility and USDOE and USACE are not licensees, and 3) NFSS is not a “processing site” because it was owned by the federal government as of January 1, 1978.

The requirements specified in 40 CFR 192 are considered relevant to the IWCS OU since they focus on uranium ore mill tailings and apply the same performance standards that are found in 10 CFR 40 Appendix A; however, unlike 10 CFR 40 Appendix A, the requirements in 40 CFR 192 provide soil clean-up standards for radium-226 only and do not allow for consideration of other radionuclides, as does the benchmark dose in 10 CFR 40 Appendix A. Since other radionuclides are known to be present, 40 CFR 192 is relevant but not appropriate for the remedial alternatives being considered for the IWCS OU. A relevant and appropriate analysis is presented on Table 4-3.

5.2 10 CFR 20, SUBPART E: RADIOLOGICAL CRITERIA FOR LICENSE TERMINATION

The NRC regulates byproduct, special nuclear, and source material pursuant to the authorization of the Atomic Energy Act of 1954. As an integral part of its statutory role, NRC promulgated 10 CFR 20 specifically to provide “Standards for Protection against Radiation.” Subpart E “Radiological Criteria for License Termination” provides cleanup requirements for NRC licensees and serves as the primary remediation standard for non-USDOE organizations in the United States.

The provisions of the NRC decommissioning rule provided in 10 CFR 20 Subpart E specifically exclude uranium and thorium recovery facilities already subject to 10 CFR 40 Appendix A. As stated in §20.1401, General Provisions and Scope, “The criteria do not apply to uranium and thorium recovery facilities already subject to Appendix A to 10 CFR part 40...” Since 10 CFR 40 Appendix A has been determined to be relevant and appropriate for the remedial alternatives being considered for the IWCS, 10 CFR 20 Subpart E may be relevant but by its own terms, is not appropriate for the site. A relevant and appropriate analysis is presented on Table 4-4.

5.3 10 CFR 61: LICENSING REQUIREMENTS FOR LAND DISPOSAL OF RADIOACTIVE WASTE

The NRC regulates byproduct, special nuclear, and source material pursuant to the authorization of the Atomic Energy Act of 1954. As an integral part of its statutory role, NRC has promulgated 10 CFR 61 specifically to provide “Licensing Requirements for Land Disposal of Radioactive Waste.”

As stated in 10 CFR 61.1, this regulation establishes (for land disposal of radioactive waste) the procedures, criteria, and terms and conditions upon which the NRC issues licenses for the disposal of radioactive waste containing byproduct, source, and special nuclear material received from “other persons” (i.e. licensed or un-licensed facilities). Low-level radioactive waste is radioactive waste not classified as high-level radioactive waste, transuranic (TRU) waste, spent nuclear fuel, or byproduct material, as defined in section 11e.(2) of the Atomic Energy Act (uranium or thorium tailings and waste).

10 CFR 61.1(b)(2) specifically states that disposal of uranium or thorium tailings or waste [byproduct material as defined in 10 CFR 40.4(a-1) as provided for in part 40] is excluded from this regulation. This exclusion is based on the fact that a separate regulatory program exists for uranium mill tailings, rather than on actual waste characteristics. Substances in the IWCS are uranium mill tailings and contaminated soil resulting from previous handling and storage of the residues at the site, and therefore, are excluded from the coverage of this regulation. Since 10 CFR 40 Appendix A has been determined to be relevant and appropriate for the remedial alternatives being considered for the IWCS, 10 CFR 61 may be relevant but by its own terms, is not appropriate for the site. A relevant and appropriate analysis is presented on Table 4-5.

5.4 40 CFR 191: ENVIRONMENTAL RADIATION PROTECTION STANDARDS FOR MANAGEMENT AND DISPOSAL OF SPENT NUCLEAR FUEL, HIGH-LEVEL, AND TRANSURANIC RADIOACTIVE WASTES, SUBPARTS A, B, AND C

The USEPA promulgated 40 CFR 191 as a general environmental regulation for the management and disposal of spent nuclear fuel, and high-level and TRU waste. This regulation consists of three subparts: Subpart A, Environmental Standards for Management and Storage; Subpart B, Environmental Standards for Disposal; and Subpart C, Environmental Standards for Groundwater Protection.

The requirements in 40 CFR 191.01 (Subpart A), 40 CFR 191.11 (Subpart B), and 40 CFR 191.21 (Subpart C) define ‘applicability’ for their respective subparts and therefore, are generally administrative/procedural in nature; however, they are useful in determining the applicability of the regulation to the IWCS OU. These requirements specify that 40 CFR 191 applies to radiation doses or releases of radioactive materials resulting from the management (except for transportation) and storage of spent nuclear fuel or high-level or TRU radioactive waste at NRC, the agreement state, and USDOE facilities. Because they apply to “spent nuclear fuel or high-level or TRU radioactive waste,” the requirements of 40 CFR 191 are not applicable to the uranium ore processing residues in the IWCS or the circumstances at the NFSS. The residues and waste in the IWCS are not spent nuclear fuel and are not comprised of the radionuclides which make up high-level waste or TRU waste. In addition, the IWCS is not regulated by the NRC or an agreement state (New York) and is not currently operated by USDOE (however, NFSS is a USDOE facility). Therefore, the substantive criteria developed for high-level waste, TRU waste, and spent fuel under 40 CFR 191, are not applicable to the waste in the IWCS. Since this regulation deals with disposition of radioactive waste, the substantive requirements of 40 CFR 191 are further evaluated to determine whether they are relevant and appropriate for the remedial alternatives being considered for the IWCS. The results of this evaluation are presented below and summarized in Table 4-6.

As previously stated, the uranium ore processing residues and waste at the IWCS are not spent nuclear fuel and are not comprised of the radionuclides which make up high-level waste or TRU waste. With an emphasis on a completely different waste stream, neither the purpose nor the media or substances regulated by 40 CFR 191 are similar to the residues in the IWCS.

Despite the fact that the residues in the IWCS clearly are not TRU waste, the nature of the K-65 residues is similar to those defined by TRU. TRU waste is defined as radioactive wastes containing more than 100 nanocuries per gram (nCi/g) of alpha-emitting transuranic radionuclides with half-lives greater than 20 years. The activity of K-65 residues is 520 nCi/g, which exceeds 100 nCi/g, and it contains radionuclides (e.g., radium-226) with half-lives greater than 20 years; however, the differences between the IWCS OU residues and TRU waste addressed by 40 CFR 191 are substantial. With regard to characteristics of TRU waste, the USEPA noted in *Background Information Document for Amendments to 40 CFR Part 191, Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Waste* (USEPA 1993) that:

- Relative to other radioactive waste, TRU waste represents a group of liquid and solid materials with widely varying chemical and physical properties
- Most TRU waste comes from the production of nuclear weapons
- TRU wastes consist mainly of plutonium and americium but contain other TRU isotopes.
- Alpha-emitting TRU nuclides present a hazard because of their long radiological half-lives and high chemical toxicity
- TRU waste contain many radionuclides with long half-lives, and some with much longer half-lives; of particular concern over the longer term are those TRU nuclides such as Neptunium-237 (half-life two million years) and Plutonium-239 (half-life 24,000 years) which have particularly long half-lives
- Although a few decay products have energetic gamma emissions, their most significant hazard is due to alpha radiation emissions.

By contrast, uranium ore processing residues such as those in the IWCS OU:

- Exhibit radionuclide constituents that are well established, consisting of naturally occurring uranium, thorium and actinium decay series radionuclides with thorium-230 and radium-226 being the long-lived radionuclides of primary concern
- Represent the constituents remaining after the extraction of uranium from ores that are processed primarily for their source material content and thus, the origin of the waste is substantially different than for TRU radioactive waste
- Consist primarily of thorium-230 and radium-226 and progeny with concentrations of actinium-series radionuclides being on the order of 4.4 percent of the activity or uranium-series constituents
- Have a small number of radionuclide constituents that exhibit long half-lives. They are primarily limited to thorium-230 (75,380 years), radium-226 (1,601 years), protactinium-241 (32,400 years) and thorium-232 (1.41E+10 years) with the latter being present at less than 5 percent of the activity of the other stated radionuclides
- The radium-226, which is the highest activity radionuclide within the IWCS, has a half-life of 1,601 years whereas plutonium-239 has a half-life of 24,000 years
- Are hazardous primarily due to radon decay products and external gamma emissions.

In summary, the characteristics of TRU material and uranium ore processing residuals are substantially different such that standards developed specifically for uranium ore processing residuals address more

similar circumstances for the IWCS OU than those for TRU material, spent fuel, and high-level waste addressed by 40 CFR 191.

Finally, Section 312 of the Energy and Water Development Appropriations Act of 2004 notes that NFSS ore processing residuals “shall be considered “byproduct material” as defined by section 11e.(2) of the Atomic Energy Act of 1954, as amended [42 U.S.C. 2014(e)(2)].” Therefore, it is reasonable to consider the uranium ore processing residues in the IWCS OU are “byproduct material” as addressed in 10 CFR 40, Appendix A and makes applying 40 CFR 191 to the IWCS contrary to nature and characteristics of the material and Section 312 of P.L. 108-137. Further, to utilize 40 CFR 191 is not consistent with the federal government’s final disposal of the K-65 residues (from the Fernald Facility in Ohio) into a licensed 11e.(2) disposal cell at Waste Control Specialists in Andrews, Texas.

5.5 6 NYCRR 380: PREVENTION AND CONTROL OF ENVIRONMENTAL POLLUTION BY RADIOACTIVE MATERIALS

The regulations in 6 NYCRR 380 establish standards to protect against ionizing radiation resulting from the disposal and discharge of radioactive material to the environment. The purpose of the requirements in this regulation is to control the disposal and discharge of radioactive material to the environment so that the total dose to an individual member of the public (including doses resulting from licensed and unlicensed radioactive material and from radiation sources other than background radiation) does not exceed the standards for protection against radiation prescribed in Subpart 380-5.

Per 42 §USC 9620, (a)(2) **Application of requirements to Federal facilities:**

“All guidelines, rules, regulations, and criteria which are applicable to preliminary assessments carried out under this chapter for facilities at which hazardous substances are located, applicable to evaluations of such facilities under the National Contingency Plan, applicable to inclusion on the National Priorities List, or applicable to remedial actions at such facilities shall also be applicable to facilities which are owned or operated by a department, agency, or instrumentality of the United States in the same manner and to the extent as such guidelines, rules, regulations, and criteria are applicable to other facilities. No department, agency, or instrumentality of the United States may adopt or utilize any such guidelines, rules, regulations, or criteria which are inconsistent with the guidelines, rules, regulations, and criteria established by the Administrator under this chapter.”

6 NYCRR Part 380 applies only to the Federal Government and, as such, this requirement is not considered an ARAR. Furthermore, the contents of the regulation do not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP. ARARs are cleanup standards, standards of control or other substantive requirements that specifically address a hazardous substance, pollutant or contaminant that will remain on site. Regulations that relate to activities associated with the implementation of a remedial action, such as requirements governing the shipment of waste or health and safety requirements that address worker health and safety, or in the case of 6 NYCRR Part 380, off-site emissions of hazardous substances, would be complied with during execution of the remedial action; however, since this regulation is not related to the degree of cleanup of hazardous substances released into the environment or the control of further release, it is not an ARAR.

6.0 REFERENCES

- 10 CFR (Code of Federal Regulations) 20. *Standards for Protection Against Radiation.*
- 10 CFR 40 Appendix A. *Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Waste Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content.*
- 10 CFR 61. *Licensing Requirements for Land Disposal of Radioactive Waste.*
- 40 CFR 61. *National Emission Standards for Hazardous Air Pollutants.*
- 40 CFR 191. *Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level, and Transuranic Radioactive Wastes.*
- 40 CFR 192. *Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings.*
- 40 CFR 300. *National Oil and Hazardous Substances Pollution Contingency Plan.*
- Fdsys (Federal Digital System) 2010. Code of Federal Regulations (Annual Edition), <http://www.gpo.gov/fdsys> (accessed October 11, 2011)
- 55 Federal Register 8758. *Final National Contingency Plan.*
- 6 NYCRR 380. *Rules and Regulations for Prevention and Control of Environmental Pollution by Radioactive Materials.*
- 42 United States Code Chapter 88. *Uranium Mill Tailings Radiation Control.*
- 42 United States Code Chapter 2014. *Definitions.*
- 42 United States Code Chapter 2022. *Health and Environmental Standards for Uranium Mill Tailings.*
- 42 United States Code Chapter 7918. *Remedial Action and Mineral Recovery Activities.*
- National Research Council 1995. *Safety of the High-Level Uranium Ore Residues at the NFSS, Lewiston, NY.* Washington, DC.
- USACE 2007a. *Remedial Investigation Report for the Niagara Falls Storage Site, Lewiston, New York.* December 2007.
- USACE 2007b. *Groundwater Flow and Contaminant Transport Modeling, Niagara Falls Storage Site.* Prepared by HydroGeoLogic, Inc. December.
- USACE 2009. *Feasibility Study Work Plan for the Niagara Falls Storage Site, Lewiston, New York.* Final. December 2009.
- USACE 2010. *Development of Remedial Action Objectives and Applicable or Relevant and Appropriate Requirements for both the Interim Waste Containment Structure and Balance of Plant Operable Units Technical Memorandum Fact Sheet.* December 2010.
- USACE 2011a. *Remedial Investigation Report Addendum for the Niagara Falls Storage Site.* April 2011.

- USACE 2011b. *Final Updated Model Results, Groundwater Flow and Contaminant Transport Modeling, Formerly Utilized Sites Remedial Action Program, Niagara Falls Storage Site, Lewiston, New York*. Prepared by HydroGeoLogic, Inc. March.
- USACE 2012. *Preliminary Evaluation of Health Effects of Hypothetical Exposures to Contaminants from the Interim Waste Containment Structure*, February 2012.
- USDOE 1986. *Design Report for the Interim Waste Containment Facility at the Niagara Falls Storage Site*. Prepared by Bechtel National, Inc. May 1986.
- USDOE 1991. *Geotechnical Post-Construction Report for NFSS Contaminated Waste Pile Consolidation, July-October, 1991*.
- USDOE 1994. *Failure Analysis Report for the Niagara Falls Storage Site, Lewiston, New York*. December 1994.
- USEPA (United States Environmental Protection Agency) 1986. *Guidelines for Ground-Water Classification under the EPA Ground-Water Protection Strategy*, USEPA/440/6-86-007. December 1986.
- USEPA 1988a. *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final*. USEPA/540/G-89/004. OSWER Directive 9355.3-01. October 1988.
- USEPA 1988b. *CERCLA Compliance with Other Laws Manual: Interim Final*. Office of Emergency and Remedial Response, Washington D.C. USEPA/540/G-89/006. August 1988.
- USEPA 1993. *Background Information Document for Amendments to 40 CFR Part 191, Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Waste*, USEPA 402-R-93-073, USEPA Office of Radiation and indoor Air, Washington, DC 30260, November 1993.

FIGURES

THIS PAGE INTENTIONALLY LEFT BLANK.

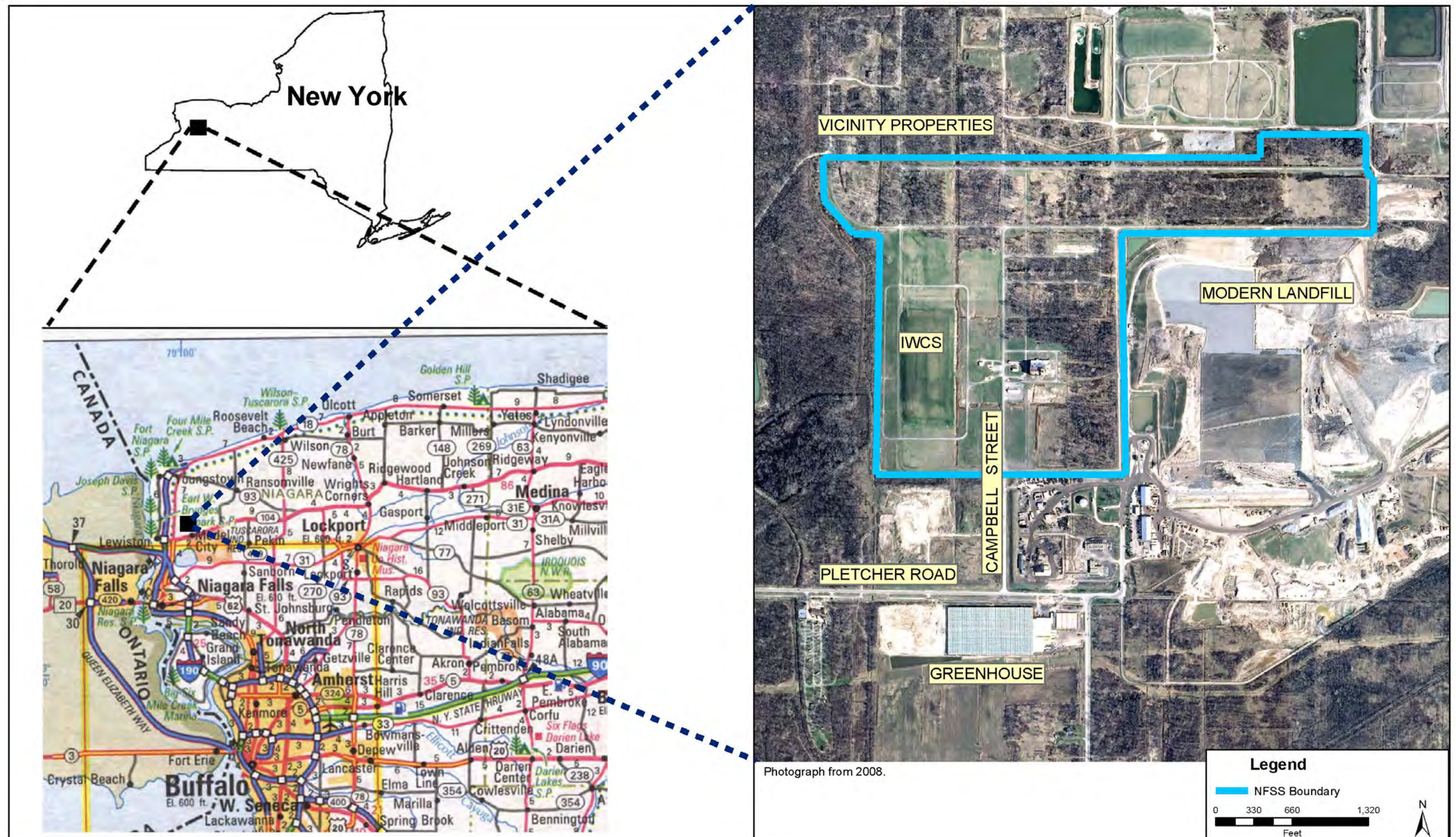


Figure 1-1. NFSS Vicinity

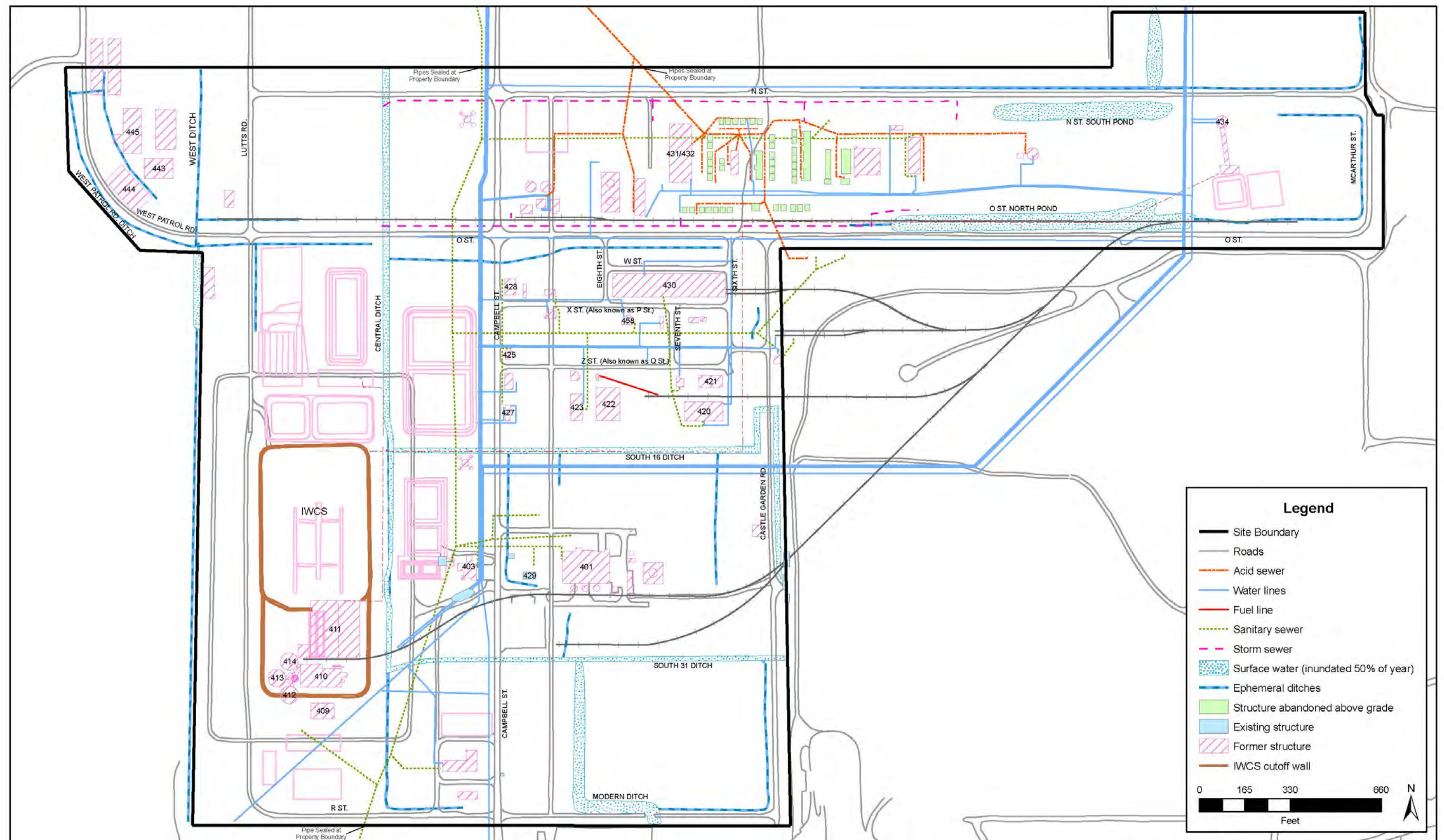


Figure 1-2. NFSS Layout

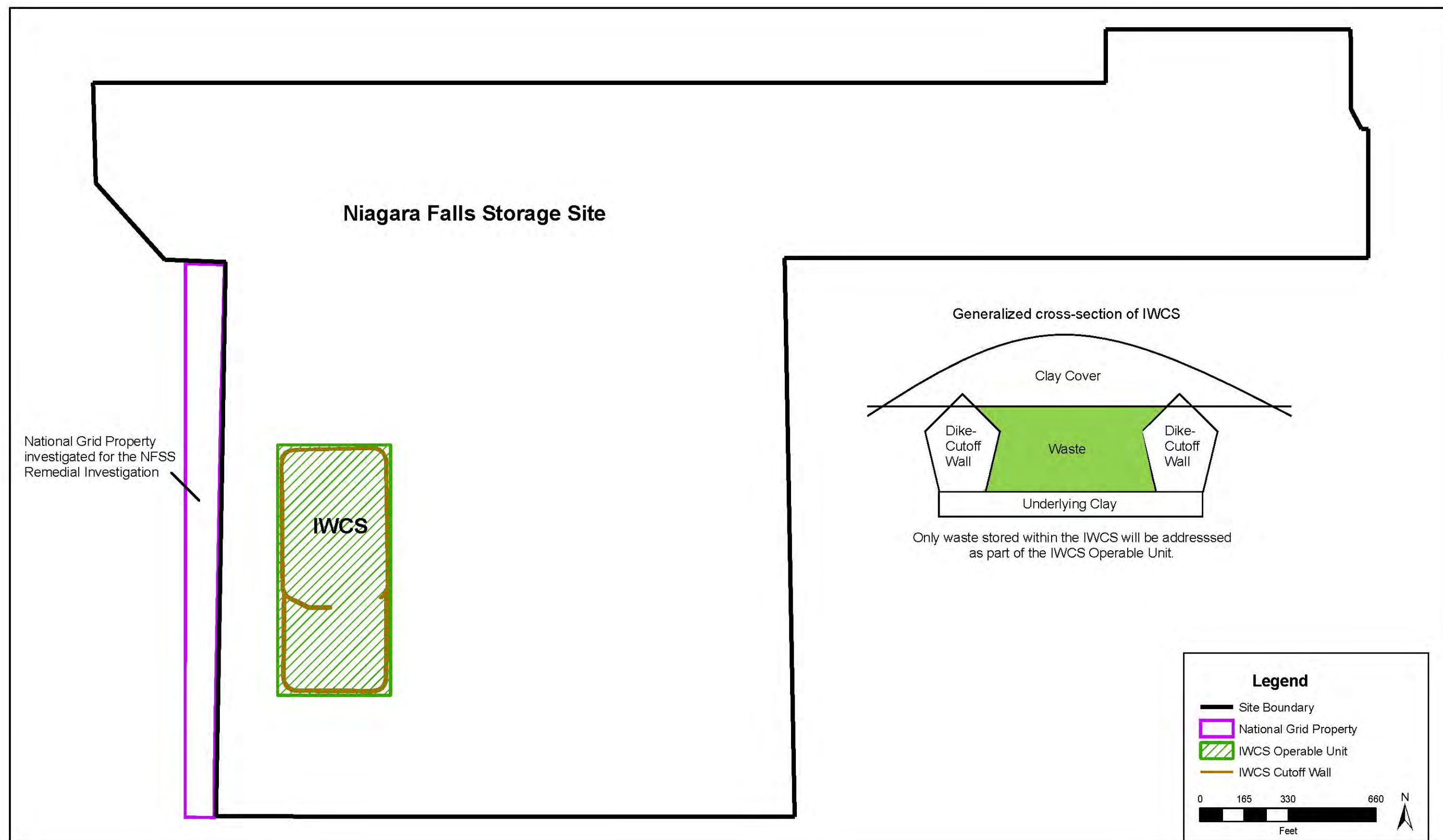


Figure 1-3. IWCS Operable Unit

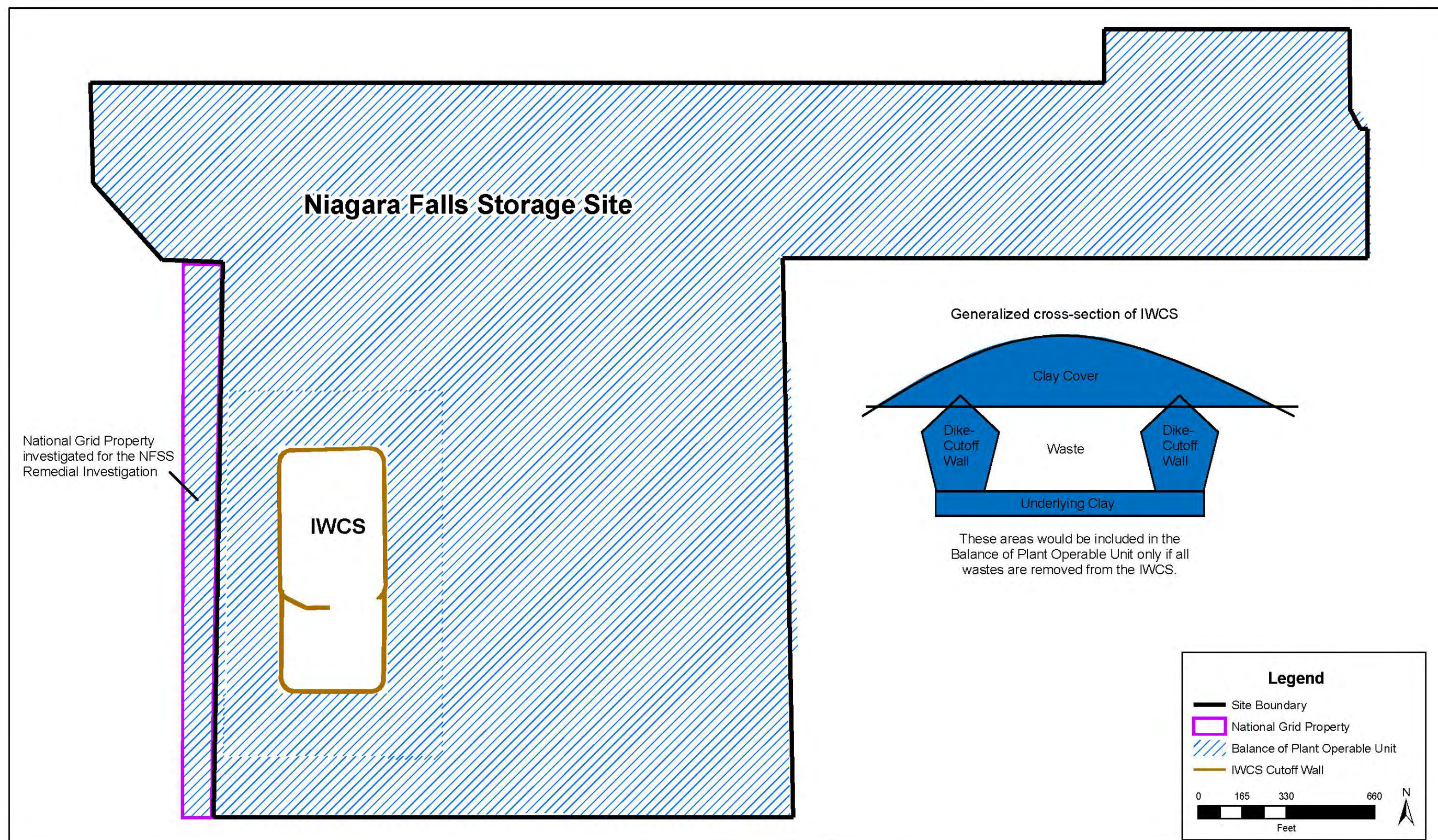
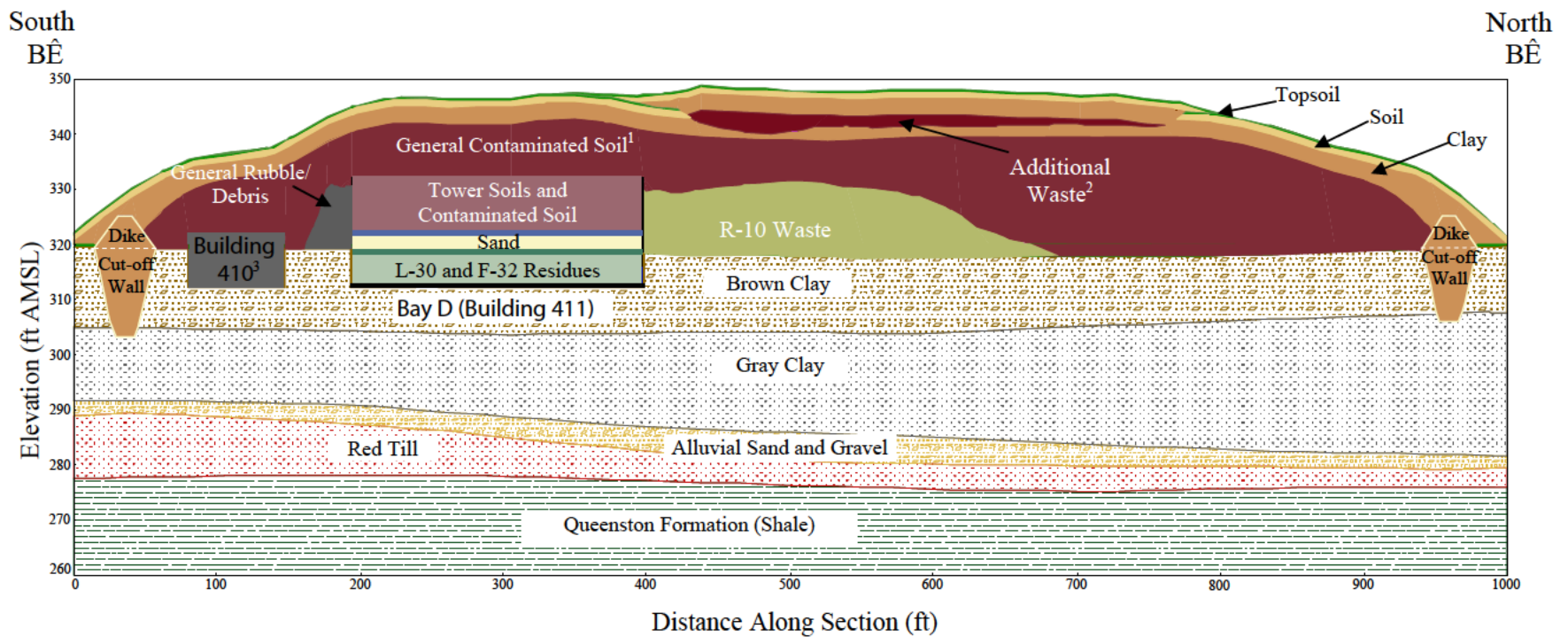


Figure 1-4. Balance of Plant Operable Unit



Note: Not to Scale (Approximate Vertical Exaggeration is 4:1)

- 1 - Contaminated soil consists predominantly of waste clay.
- 2 - Thickness is estimated. No documentation is available on depth of layer. 3,500 cubic yards of contaminated soil and materials were placed in a 325-ft by 192-ft waste containment cell that was excavated in 1991.
- 3 - Building 410 contains assorted rubble and debris and 230 cubic yards of the Middlesex Sands.

Figure 2-1: IWCS and Waste Placement North-South Cross-Section

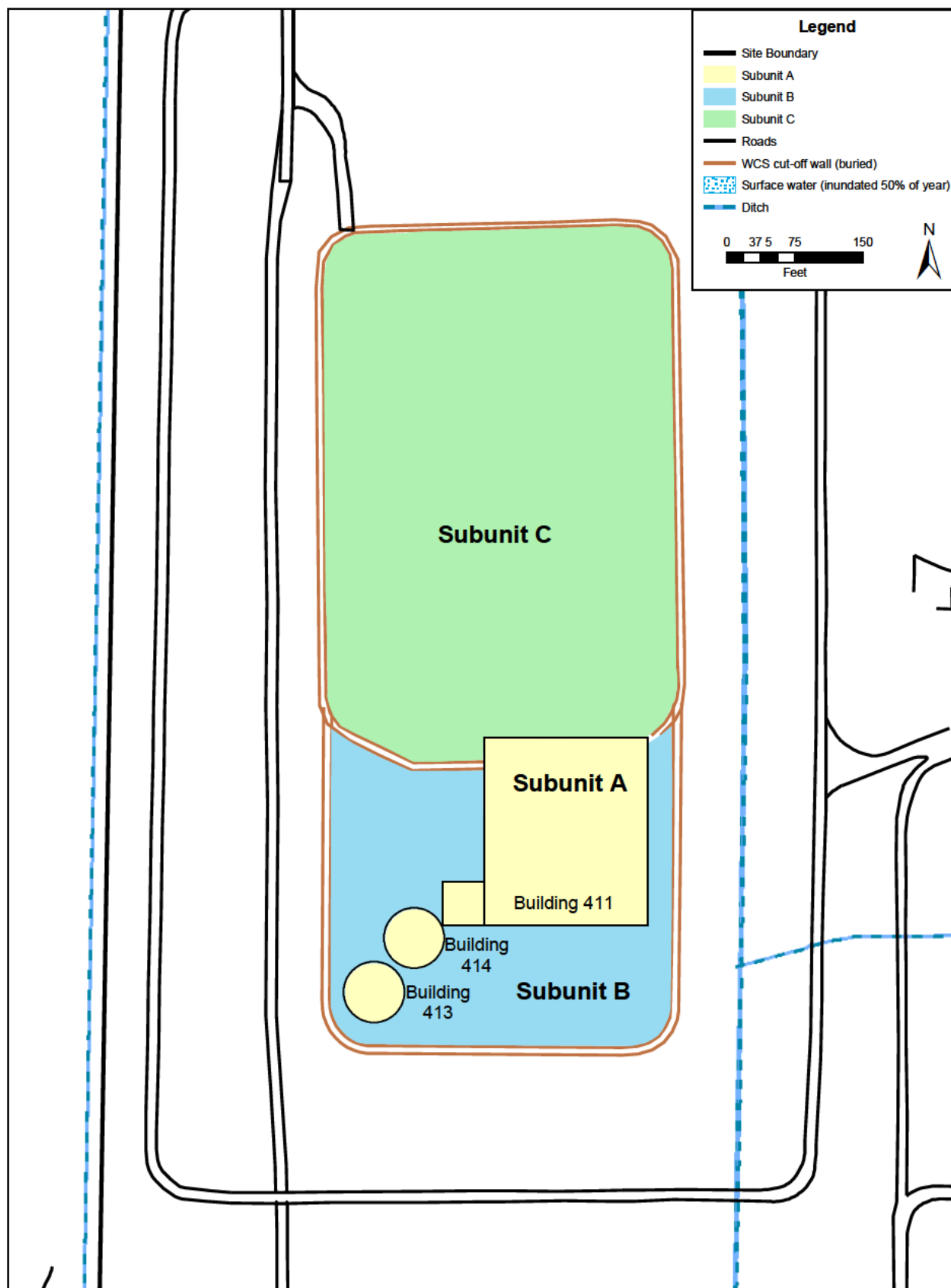


Figure 2-2. Subunit Designations for the IWCS OU

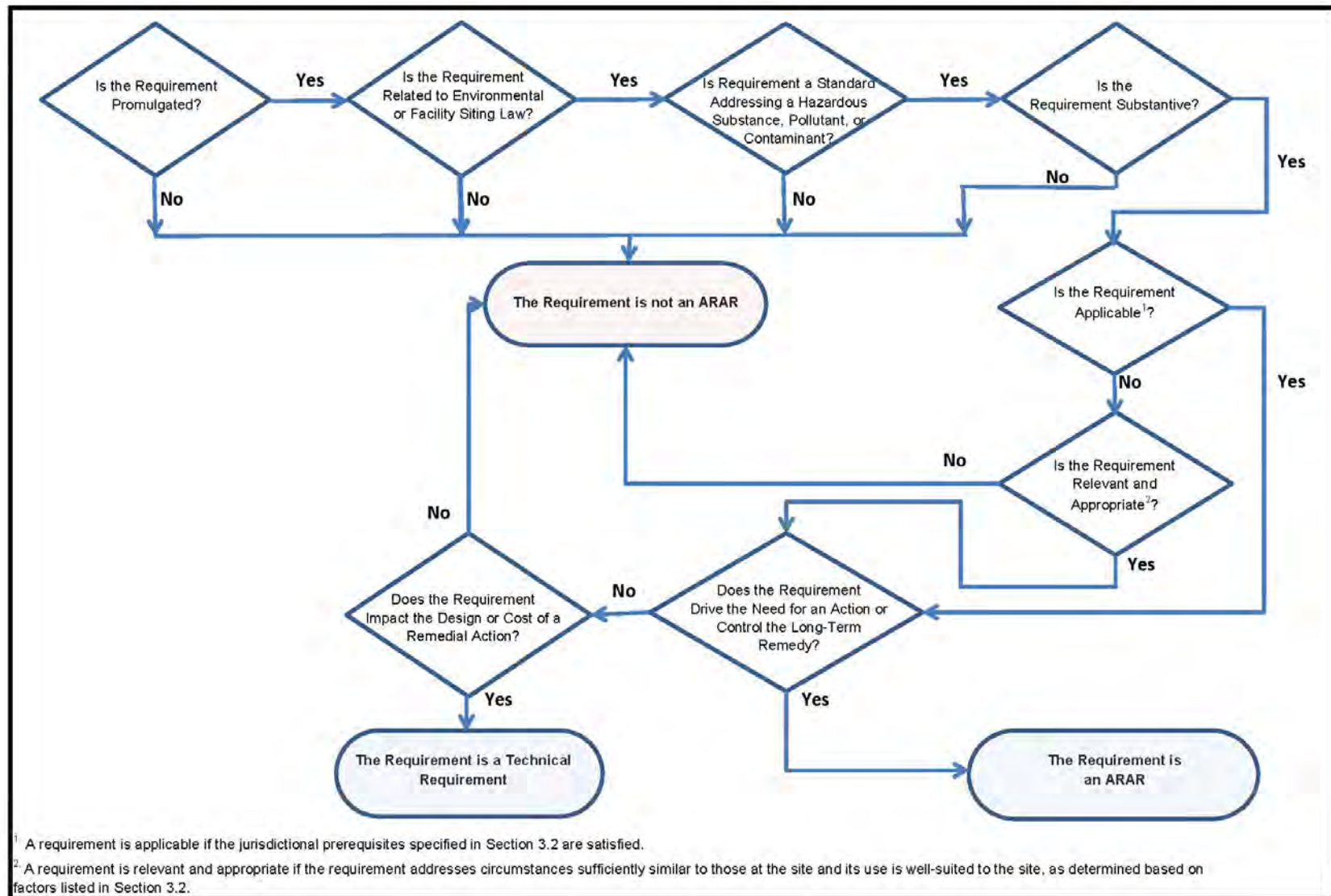


Figure 3-1. ARAR Development Process for the IWCS OU

TABLES

THIS PAGE INTENTIONALLY LEFT BLANK.

TABLE 4-1
10 CFR 40 APPENDIX A: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from the Ores Processed Primarily for their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Criterion 1 – Site Features	<p>Criterion 1 states the general goal or broad objective in siting and design decisions is permanent isolation of tailings and associated contaminants by minimizing disturbance and dispersion by natural forces, and to do so without dependence on ongoing maintenance. It specifies site features that will help achieve this objective.</p> <p>Although Criterion 1 mainly addresses disposal facility siting requirements, it also states that “tailings should be disposed of in a manner that no active maintenance is required...” This objective is a key consideration in the design of the new cover included in the enhanced containment remedial alternatives.</p>	Criterion 1 does not address media.	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	Criterion 1 addresses the siting and design requirements of a new waste disposal facility. The IWCS already exists so the activities regulated by Criterion 1 are not appropriate for the IWCS.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings addressed by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.

NOTE: Gray shading indicates that the criterion is not relevant and appropriate.

TABLE 4-1
10 CFR 40 APPENDIX A: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from the Ores Processed Primarily for their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Criterion 2 – Off-site Disposal of Byproduct Material	<p>Upon closure, legal title to lands on which 11e.(2) disposal cells are located are transferred to the Government of the United States or to a state for perpetual maintenance. To minimize the cost and potential risks associated with perpetual maintenance, this criterion requires preferential use of existing large mill tailings disposal sites unless such use is impracticable, or the advantages of on-site burial clearly outweigh the benefits associated with avoiding perpetual surveillance obligations.</p> <p>Criterion 2 deals with the disposal of uranium mill tailings; however, it pertains to wastes that have not yet been disposed of and not wastes in an existing waste containment structure such as the IWCS. Therefore, the purpose of Criterion 2 is not consistent with the purpose of the CERCLA action.</p>	Criterion 2 does not address media.	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	The IWCS already exists and Criterion 2 encourages off-site disposal for wastes not already contained. Therefore, the actions regulated by Criterion 2 are not consistent with the remedial actions contemplated for the IWCS.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.
Criterion 3 – Disposal Mode	<p>Criterion 3 states that the prime option for disposal is placement below grade. Where below-grade disposal is not practicable, it must be demonstrated that above-grade disposal will provide reasonably equivalent isolation of the tailings from natural erosion forces.</p> <p>Criterion 3 addresses the design of a new waste disposal facility, which is not consistent with the remedial alternatives considered for the IWCS (i.e., new cover over existing facility and/or excavation and off-site disposal of material in the IWCS).</p>	Criterion 3 does not address media.	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	The IWCS already exists and Criterion 3 encourages below-grade disposal for wastes not already contained. Therefore, the actions regulated by Criterion 3 are not consistent with the remedial actions contemplated for the IWCS.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.

NOTE: Gray shading indicates that the criterion is not relevant and appropriate.

TABLE 4-1

10 CFR 40 APPENDIX A: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from the Ores Processed Primarily for their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Criterion 4 – Site and Design Criteria	Criterion 4 provides disposal site design and construction criteria including wind and water erosion controls, and siting of disposal facilities to promote deposition and avoid earthquake faults, that are not relevant for the IWCS which already exists. The criterion also specifies requirements for the disposal facility cover that are appropriate for leave in-place remedial alternatives.	Criterion 4 does not address media.	10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements. The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.	The activities regulated by this criterion include the construction of the disposal facility cover, which is appropriate for leave in-place remedial alternatives.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings. The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.
Criterion 5 – Groundwater Protection Standards	Criteria 5A(1)(2)(5) provide design requirements for liners and dikes that are not appropriate for the IWCS which already exists; 5A(3)(4) and 5B(4) are administrative in nature and are not considered ARARs. Criteria 5D and 5F provide requirements for corrective action and are administrative in nature, so they are not ARARs. Criteria 5E and 5G provide requirements for new disposal facilities and the IWCS already exists so these requirements are not appropriate. Criteria 5H provides requirements for stockpiling ore, which is not appropriate for the IWCS. Criteria 5B(1)(2)(3)(5) and 5C provide groundwater protection standards for the management of uranium byproduct material and are not appropriate because groundwater underlying the NFSS reflect USEPA Class IIIb criteria for non-potable, limited beneficial use water. In order to be a potable water source, NFSS groundwater would require expensive, energy intensive treatment by reverse osmosis (desalination). Since there is a replaceable surface-water source via the Niagara River/Lake Ontario and groundwater south of the site (Lockport Formation), it is reasonable to assume that no municipality or service would find NFSS groundwater economically viable.	Criterion 5 regulates groundwater. However, these regulations are not appropriate for the NFSS because groundwater at the NFSS reflect USEPA Class IIIb criteria for non-potable, limited beneficial use water.	10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements. The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.	These criteria provide groundwater protection standards for disposal facilities. However, these regulations are not appropriate for the NFSS because groundwater at the NFSS does not meet the definition of groundwater provided by this standard.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings. The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.

TABLE 4-1

10 CFR 40 APPENDIX A: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from the Ores Processed Primarily for their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Criterion 6 – Closure of Waste Disposal Area	<p>Criteria 6(1), 6(2), 6(3), 6(5), and 6(7) provide disposal site technical requirements, including design requirements for a final earthen cover. The purpose of these requirements is considered appropriate for leave in-place remedial alternatives.</p> <p>Criterion 6(4) is administrative in nature and is not considered an ARAR.</p> <p>Criterion 6(6) provides clean-up criteria for soil and is appropriate for any remedial alternative that involves removal.</p>	<p>Criterion 6(6) provides for a benchmark dose for contaminants in soil and would be used to determine the extent of contaminated soil below the IWCS for all excavation and removal alternatives.</p>	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	<p>The actions regulated by these criteria are appropriate for the remedial alternatives considered for the IWCS, which include leave in-place and excavation/removal alternatives.</p>	<p>No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).</p>	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	<p>The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.</p>	<p>This criterion does not consider future use of the site. See the discussion under Criterion 11.</p>
Criterion 6A – Completion of Final Radon Barrier	<p>Criterion 6A requires the expeditious completion of the final radon barrier.</p> <p>Although the enhanced containment remedial alternatives include the installation of a new cover, the existing radon barrier will remain in-place and will not be removed. Therefore, the purpose of Criterion 6A is not appropriate for the remedial alternatives being considered.</p>	<p>Criterion 6A addresses radon emissions to air and is appropriate for the IWCS.</p>	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	<p>Although the enhanced containment remedial alternatives include the installation of a new cover, the existing radon barrier will remain in-place and will not be removed. Therefore, the action regulated by Criterion 6A is not appropriate for the remedial alternatives being considered.</p>	<p>No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).</p>	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	<p>The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.</p>	<p>This criterion does not consider future use of the site. See the discussion under Criterion 11.</p>

NOTE: Gray shading indicates that the criterion is not relevant and appropriate.

TABLE 4-1
10 CFR 40 APPENDIX A: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from the Ores Processed Primarily for their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Criterion 7 – Preoperational Monitoring Period and 7A - Detection Monitoring Program	<p>Criterion 7 mandates implementation of a compliance monitoring program once groundwater protection standards have been established. A preoperational monitoring program is required at least one year prior to any major site construction and an operational monitoring program is required thereafter. Since the IWCS already exists, the purpose of this regulation is not appropriate for the leave in-place remedial alternatives.</p> <p>Criterion 7A requires development of a groundwater monitoring program to detect leakage from the disposal area which is relevant but not appropriate because groundwater underlying the NFSS reflect USEPA Class IIIb criteria for non-potable, limited beneficial use water. In order to be a potable water source, NFSS groundwater would require expensive, energy intensive treatment by reverse osmosis (desalination). Since there is a replaceable surface-water source via the Niagara River/Lake Ontario and groundwater south of the site (Lockport Formation), it is reasonable to assume that no municipality or service would find NFSS groundwater economically viable.</p>	Criteria 7 and 7A regulate groundwater, which is relevant but not appropriate because groundwater at the NFSS reflect USEPA Class IIIb criteria for non-potable, limited beneficial use water.	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	Pre-operational and post-operational monitoring regulated by Criteria 7 and 7A are relevant but not appropriate because the IWCS already exists and groundwater at the NFSS reflect USEPA Class IIIb criteria for non-potable, limited beneficial use water, respectively.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.

NOTE: Gray shading indicates that the criterion is not relevant and appropriate.

TABLE 4-1

10 CFR 40 APPENDIX A: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from the Ores Processed Primarily for their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Criterion 8 – Reduction of Airborne Effluent Releases	Criterion 8 provisions mandate controls for airborne effluent releases for uranium and thorium milling operations. There are no milling operations being conducted or anticipated in the future at the NFSS. These requirements are not appropriate for the IWCS OU or for any remedial alternatives being considered.	These provisions mandate controls for airborne effluent releases, which are appropriate for the site.	10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements. The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.	These provisions mandate controls for airborne effluent releases for uranium and thorium milling operations. There are no milling operations being conducted or anticipated in the future at the NFSS.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings. The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.
Criterion 8A – Daily Inspection	Although Criterion 8A contains some procedural provisions, substantive requirements provide daily quality control/quality assurance inspections to identify and facilitate correction of tailings or waste retention systems in order to control releases of tailings or wastes into unrestricted areas during operation of the uranium recovery facility. There are no milling operations being conducted at the NFSS. These requirements are not appropriate for the IWCS or for any remedial alternatives being considered.	Criterion 8A does not specifically address any media.	10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements. The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.	This criterion regulates milling operations. No milling operations take place at the NFSS.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings. The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.

NOTE: Gray shading indicates that the criterion is not relevant and appropriate.

TABLE 4-1
10 CFR 40 APPENDIX A: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from the Ores Processed Primarily for their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Criterion 11 – Site and Byproduct Material Ownership	<p>These requirements grant the legal transfer of disposal sites to the United States or to a state for perpetual maintenance. This action is critical to the perpetual management of uranium recovery facility disposal sites.</p> <p>The IWCS is currently owned by the federal government so these requirements are not appropriate for the site.</p>	There are no media addressed by Criterion 11.	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	The action regulated by Criterion 11 is the transfer of land ownership of a byproduct material disposal facility to the federal government or agreement state. The federal government owns the IWCS and will continue to do so for any leave in-place remedial alternatives.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	<p>In accordance with Criterion 11, when a site undergoes long-term stabilization (containment of uranium mill tailings on-site) ownership and control of the land will transfer to either the federal government or agreement state government. After transfer, the government may allow another use of the land that is compatible with remedy integrity.</p> <p>Ownership and control of the IWCS is currently with the federal government and will remain so for any alternative requiring control of future land use.</p>
Criterion 12 – Long-term Surveillance	<p>Criterion 12 states that the disposition of wastes at milling sites should be implemented so that active maintenance is not required to preserve the isolation of wastes. It also recognizes that such engineering controls have limitations and require at least annual inspections to ensure maintenance of such controls.</p> <p>The purpose of Criterion 12 is appropriate for leave in-place remedial alternatives.</p>	There are no media addressed by Criterion 12.	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	Site inspections mandated by the criterion are appropriate for any leave in-place remedial alternatives are being considered for the IWCS.	No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	This criterion does not consider future use of the site. See the discussion under Criterion 11.

NOTE: Gray shading indicates that the criterion is not relevant and appropriate.

TABLE 4-1
10 CFR 40 APPENDIX A: Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from the Ores Processed Primarily for their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Criterion 13 – Hazardous Constituents	<p>Criterion 13 presents groundwater criteria for uranium mill tailing disposal facilities, such as the IWCS.</p> <p>While this regulation is relevant, it is not appropriate because groundwater underlying the NFSS reflect USEPA Class IIIb criteria for non-potable, limited beneficial use water. In order to be a potable water source, NFSS groundwater would require expensive, energy intensive treatment by reverse osmosis (desalination). Since there is a replaceable surface-water source via the Niagara River/Lake Ontario and groundwater south of the site (Lockport Formation), it is reasonable to assume that no municipality or service would find NFSS groundwater economically viable.</p>	<p>Criterion 13 regulates groundwater, which is not appropriate because groundwater at the NFSS reflect USEPA Class IIIb criteria for non-potable, limited beneficial use water .</p>	<p>10 CFR 40 regulates uranium mill tailings at active milling sites as of 1978, which are defined as 11e.(2) byproduct materials that are subject to NRC licensing requirements.</p> <p>The residues disposed of in the IWCS are also uranium mill tailings but they were not licensed material and were located at a federally-owned facility as of 1978.</p>	<p>Leave in-place remedial alternatives are being considered for the IWCS, which is consistent with the actions regulated by this criterion</p>	<p>No variances are discussed within these regulations (i.e., provisions to develop standards other than those included within the regulations).</p>	<p>The type of site or facility regulated by 10 CFR 40 Appendix A is a uranium or thorium mill processing facility licensed by the NRC. Appendix A specifically addresses the operation of uranium mills and the disposition of uranium mill tailings.</p> <p>The IWCS is not a NRC-licensed facility; however, the IWCS is a waste storage facility that contains uranium mill tailings covered by the regulation. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	<p>The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.</p>	<p>This criterion does not consider future use of the site. See the discussion under Criterion 11.</p>

NOTE: Gray shading indicates that the regulation is not relevant and appropriate.

TABLE 4-2
40 CFR 61.90 and 61.92: Subpart H—National Emission Standards for Emissions of Radionuclides Other Than Radon From Department of Energy Facilities

RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
40 CFR 61.90 and 61.92	<p>This rule regulates emissions of radionuclides other than radon-222 and radon-220 at USDOE facilities. This regulation does not apply to facilities subject to 40 CFR part 192.</p> <p>For any leave in-place remedial alternative for the IWCS, the constituents of concern are radium-226 and it's short-lived decay products (mainly radon-222). Since radon-222 is excluded from regulation under this part, use of this regulation is not appropriate for the IWCS.</p>	<p>The medium regulated under the rule is air, which would be regulated for any leave in-place remedial options being considered for the IWCS.</p>	<p>This regulation specifically excludes radon-222, which is the main air emission of concern for the IWCS.</p>	<p>This rule regulates operations at USDOE-owned facilities and the IWCS is owned by the USDOE.</p>	<p>There are no variances available under this rule.</p>	<p>This rule regulates USDOE-owned facilities and the IWCS is owned by the USDOE; however, it exempts facilities covered by 40 CFR 192 (closed or inactive uranium or thorium mill processing facilities or uranium mill tailing disposal sites). Although the IWCS is not a designated Title 1 site covered by 40 CFR 192, the IWCS is a uranium mill tailing disposal facility. Therefore, the type of place envisioned under the rule is not similar to the IWCS.</p>	<p>The type and size of the IWCS may be similar to that found at a uranium disposal facility; however, uranium disposal facilities are specifically exempt from regulation under this rule, so the type and size of structures or facilities regulated under this rule are not consistent with the site.</p>	<p>This criterion does not consider future use of the site.</p>

NOTE: Gray shading indicates that the regulation is not relevant and appropriate.

TABLE 4-3

40 CFR 192 Subpart A, B, and C: Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Subparts A, B, and C	<p>The specific goals and objectives of 40 CFR Part 192 Subparts A, B, and C are to provide for the long-term stabilization (containment or disposal) or cleanup for unrestricted use of land of uranium/thorium mill tailings at closed or inactive uranium/thorium processing or milling operations.</p> <p>Remedial options considered for the IWCS include leave in-place and excavation/removal alternatives. Use of this requirement at the IWCS would be to provide standards for long-term stabilization of wastes, or, alternatively, for removal/excavation of waste material to a level that would allow for unrestricted release of the property. However, for remedial alternatives that involve excavation and removal, the soil clean-up criteria are provided for radium only and do not include other radionuclides that expected to be present, such as thorium and uranium.</p>	The media regulated under the rule, air, soil, and water, are the same as the media regulated in the CERCLA action.	The regulated waste includes residual radioactive waste material from inactive uranium processing sites. The regulated waste, uranium mill tailings from the processing of uranium ore, are the principal substances disposed of in the IWCS. Thus, the substances at the IWCS are similar to the substances being regulated; however, for remedial alternatives that involve excavation and removal, the soil clean-up criteria are provided for radium only and do not include other radionuclides that expected to be present, such as thorium and uranium.	Actions or activities regulated by the rule – either long-term containment or cleanup of soil for unrestricted use of the property - are similar to the remedial actions contemplated at the IWCS; however, for remedial alternatives that involve excavation and removal, the soil clean-up criteria are provided for radium only and do not include other radionuclides that expected to be present, such as thorium and uranium.	Variances are allowed if it is possible that a long-term containment situation may be an interim remedial action, particularly if the human health and environmental consequences of moving the waste materials are more harmful than the consequences of leaving the material in place.	<p>The type of site or facility regulated by 40 CFR 192 is a closed or inactive uranium or thorium mill processing facility or uranium mill tailing disposal site.</p> <p>The IWCS is not a designated Title 1 site covered by the regulation; however, IWCS is a uranium mill tailing disposal facility. Therefore, the type of place envisioned under the rule is similar to the IWCS.</p>	The type and size of structure or facility to be regulated under the rule is a milling facility with wastes typically contained on-site in some manner. At closed or inactive sites, the wastes are typically contained in large waste piles. Active facilities may contain the waste in some type of closed structure. The type and size of the IWCS structure at NFSS may be similar to that found at a milling facility.	<p>Inactive mill tailing sites will either remain in government control or be released to the public (if a site meets the 5/15 pCi/g criteria for radium).</p> <p>Assumptions for future land use for the NFSS site range from unrestricted use to remaining in government control in perpetuity; however, unrestricted release of the property will require consideration of radionuclides other than radium, so use of this requirement at the IWCS is not appropriate.</p>

NOTE: Gray shading indicates that the regulation is not relevant and appropriate.

TABLE 4-4
10 CFR 20 Subpart E: Radiological Criteria for License Termination
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Subpart E	The purpose of 10 CFR Part 20 Subpart E is to provide for decommissioning and unrestricted release of facilities except those subject to 10 CFR 40 Appendix A. Therefore, use of the requirement at the IWCS is not consistent with the purpose of the requirement.	10 CFR 20 Subpart E regulates soil, water, and air, which are the same as those addressed at the site.	10 CFR Part 20 Subpart E applies to source, special nuclear, and byproduct material but excludes uranium mill tailings and facilities associated with them that are regulated under 10 CFR Part 40 Appendix A and 40 CFR Part 192. Since 10 CFR 40 Appendix A is relevant and appropriate for the uranium mill tailings in the IWCS, use of this requirement is not appropriate.	Actions or activities regulated by the rule are decontamination and decommissioning of NRC-licensed sites and release of land to the public. Release can be either unrestricted or restricted. Excavation and removal actions under consideration for the IWCS can be considered similar to decontamination and decommissioning.	No variances or waivers are considered for the requirements of this rule.	The type of place regulated under the rule is any NRC-licensed facility except for uranium or thorium processing and disposal facilities subject to 10 CFR 40 Appendix A, such as the IWCS. Therefore, the type of place regulated is not similar to the IWCS.	The type and size of structure or facility regulated under 10 CFR Part 20 Subpart E is not similar to the IWCS because the IWCS contains uranium mill tailings, which are expressly excluded from this regulation if they are subject to 10 CFR 40 Appendix A.	Under NRC license termination proceedings in 10 CFR Part 20 Subpart E, land can be released for unrestricted use or for restricted use, with land use controls in place. At the IWCS, both options are under consideration for future land use.

NOTE: Gray shading indicates that the regulation is not relevant and appropriate.

TABLE 4-5
10 CFR 61: Licensing Requirements for Land Disposal of Radioactive Waste
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
10 CFR 61	The specific purpose of 10 CFR 61 is to establish requirements for near-surface disposal of Class A, B, and C low-level radioactive waste. The definition of waste under 10 CFR 61 excludes 11(e)(2) byproduct materials (uranium or thorium tailings and waste), so use of the requirement at the IWCS is not consistent with the purpose of the requirement.	The media regulated under the rule (soil, water, and air), are the same as the media that would be regulated at the IWCS.	<p>The regulated waste includes low-level radioactive waste containing source, special nuclear, or byproduct material. Low-level radioactive waste has the same meaning as in the Low-Level Radioactive Waste Policy Act; that is, radioactive waste not classified as high-level radioactive waste, transuranic waste, spent nuclear fuel, or byproduct material as defined in section 11(e)(2) of the Atomic Energy Act (uranium or thorium tailings and waste).</p> <p>Material in the IWCS are uranium mill tailings and waste associated with the handling and storage of these tailings. The uranium mill tailings in the IWCS meet the definition of 11e.(2) byproduct material and are therefore excluded from the requirements of this regulation since a separate regulatory program exists for uranium mill tailings.</p>	This rule covers long-term disposal of low-level radioactive waste. Actions being contemplated for the IWCS include long-term containment of uranium mill tailings, which is not consistent with this rule.	There are no variances for this requirement.	This rule covers near-surface disposal sites for the disposal of Class C or similar to Class C radioactive material, except for uranium or thorium processing and disposal facilities subject to 10 CFR 40 Appendix A, such as the IWCS. Therefore, the type of place regulated is not similar to the IWCS.	The type and size of structure or facility regulated under 10 CFR Part 61 is not similar to the IWCS because the IWCS contains uranium mill tailings, which are expressly excluded from this regulation if they are subject to 10 CFR 40 Appendix A.	<p>This rule requires that the federal government will assume the long-term care of the site, and that the site can be used for other purposes as long as the integrity of the disposal site is not breached.</p> <p>The remedial alternatives under consideration for the IWCS site include leave in-place alternatives that assume the federal government will maintain the site in perpetuity.</p>

NOTE: Gray shading indicates that the regulation is not relevant and appropriate.

TABLE 4-6
40 CFR 191: Subparts A, B, and C: Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-level, and Transuranic Radioactive Wastes
RELEVANT AND APPROPRIATE ANALYSIS

	(i) The purpose of the requirement and the purpose of the CERCLA action.	(ii) The medium regulated or affected by the requirement and the medium contaminated or affected at the CERCLA site.	(iii) The substances regulated by the requirement and the substances found at the CERCLA site.	(iv) The actions or activities regulated by the requirement and the remedial action contemplated at the CERCLA site.	(v) Any variances, waivers, or exemptions of the requirement and their availability for the circumstances at the CERCLA site.	(vi) The type of place regulated and the type of place affected by the release or CERCLA action.	(vii) The type and size of structure or facility regulated and the type and size of structure or facility affected by the release or contemplated by the CERCLA action.	(viii) Any consideration of use or potential use of affected resources in the requirement and the use or potential use of the affected resource at the CERCLA site.
Subparts A, B, and C	<p>These rules establish standards for management, storage, and disposal of spent nuclear fuel, high-level radioactive waste, and transuranic radioactive waste.</p> <p>The purpose for which this rule is under consideration as a potential ARAR for the IWCS remedial action is to provide standards for long-term containment of the more high-activity waste (i.e., the K-65 residues) stored in the IWCS. However, the uranium ore processing residues and waste at the IWCS are not spent nuclear fuel and are not comprised of the radionuclides which make up high-level waste or TRU waste. With an emphasis on a completely different waste stream, the IWCS does not fall under the purpose of the requirement.</p>	The medium regulated by this requirement is groundwater, which is addressed at the site.	<p>This regulation covers spent nuclear fuel, high-level waste and transuranic waste.</p> <p>The materials in the IWCS are uranium mill tailings.</p>	The management, storage, and disposal activities associated with the requirement are related to deep geologic disposal and are not similar to remedial alternatives being considered for the IWCS.	Waiver: reasons for obtaining a waiver of these requirements under CERCLA could include: compliance with the requirement at the facility will result in greater risk to human health and the environment than alternative options if the waste is removed; and the remedial action selected will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, criteria, or limitation, through use of another method or approach.	The provisions of 40 CFR 191 establish performance-based requirements for the disposal of high level and transuranic waste. These performance- based requirements were developed as a consequence of studies examining the singular application of one disposal technology - deep geologic repositories. Therefore, the type of place regulated is not similar to the IWCS, which is a near surface disposal facility.	The type of facility regulated is a disposal facility for spent nuclear fuel, high-level and transuranic radioactive waste, which is assumed to be a deep geologic repository. The type of facility at the IWCS is a near-surface disposal facility, not a deep geologic repository.	<p>In this requirement the federal government is to assume long-term care of the site, and the site can be used for other purposes as long as the integrity of the disposal site is not breached.</p> <p>The remedial alternatives under consideration for the IWCS site include leave in-place alternatives that assume the federal government will maintain the site in perpetuity.</p>

NOTE: Gray shading indicates that the regulation is not relevant and appropriate.

APPENDIX A

Responses to Public Comments on the RAOs and ARARs for the IWCS and Balance of Plant Operable Units Technical Memorandum Fact Sheet

**Fact Sheet for the Development of Remedial Action Objectives and Applicable
or Relevant and Appropriate Requirements for both the
Interim Waste Containment Structure and
Balance of Plant Operable Units Technical Memorandum,
December 2010**



Niagara Falls Storage Site Feasibility Study Technical Memorandum Development

**U.S. Army Corps of Engineers
Buffalo District**

Building Strong[®]

Formerly Utilized Sites Remedial Action Program (FUSRAP)

December 2010

Development of Remedial Action Objectives and Applicable or Relevant and Appropriate Requirements for both the Interim Waste Containment Structure and Balance of Plant Operable Units Technical Memorandum

Purpose

This fact sheet announces that the U.S. Army Corps of Engineers will be developing a technical memorandum to identify Remedial Action Objectives (RAOs) and Applicable or Relevant and Appropriate Requirements (ARARs) to be used in conducting the Feasibility Studies (FSs) for the Interim Waste Containment Structure (IWCS) and Balance of Plant (BOP) Operable Units (OUs) at the Niagara Falls Storage Site (NFSS). Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, the FS is the phase used to evaluate technologies and alternatives that can be used to remediate the site. This technical memorandum will identify the RAOs and ARARs for the contaminants of concern associated with the IWCS and BOP OUs as outlined in the "RAOs and ARARs Technical Memorandum Objective" section presented below. Although the IWCS and BOP OUs will be dealt with in two separate feasibility studies, this technical memorandum is addressing both so as to allow for a comprehensive assessment of the RAOs and ARARs for the entire site since the BOP OU addresses the entire site except the contents within the IWCS. By release of this Fact Sheet, the Corps is soliciting input from the public on the objective of the technical memorandum addressing the RAOs and ARARs for both the IWCS and BOP OUs, recognizing that there are various waste streams to consider with different concentrations and volumes (i.e., K-65 residues, other residues, R-10 materials, contaminated soils in the IWCS, and the BOP). The K-65 residues account for approximately 90% of the total curie content in the IWCS, but only about 2% of the total volume. The results of this technical memorandum will be used to support both the IWCS FS and the BOP FS. The Corps seeks input from the public so that the Corps can address public concerns during the initial stages of the development of this technical memorandum. The Corps intends to complete this technical memorandum and provide it to the public by the Fall of 2011.

Project Background

The NFSS is a 191-acre Federal property containing the 10-acre IWCS. Radioactive residues and wastes brought to the site by the Manhattan Engineer District and the Atomic Energy Commission during the 1940s and 1950s were consolidated into the IWCS by the U.S. Department of Energy in the 1980s. In 1997, the Corps became the Federal agency responsible for implementing the Formerly Utilized Sites Remedial Action Program (FUSRAP) subject to CERCLA. As previously announced, the Corps has begun transitioning into the feasibility study phase. The Corps will prepare a number of technical memoranda that will be made available to the public prior to the development and release of the FS. In this manner, the public will be given the opportunity for review and comment as we progress through the development of the FS.

RAOs and ARARs Technical Memorandum Objective

This technical memorandum will be developed to present RAOs and ARARs for both the IWCS and BOP OUs. RAOs are established to protect human health and the environment and provide the basis for selecting appropriate technologies and developing remedial alternatives for the site. The RAOs developed for the IWCS

and BOP OUs will account for media-specific (e.g., soils, water, building foundations, etc.) contaminants of concern, exposure routes and receptors, and an acceptable contaminant level, or range of levels, for each exposure route based on the expected future land use. ARARs will be evaluated in the technical memorandum to identify potential Federal or state standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate for the IWCS and/or BOP OUs. RAOs developed for the IWCS and BOP OUs will be based on ARARs, whenever possible, and will be selected to ensure long-term protection of human health and the environment.

Preliminary RAOs being considered for the IWCS and BOP OUs include:

- Reduce exposure/direct contact to the waste materials placed inside the IWCS;
- Remove or prevent exposure/direct contact to soil, building foundations, etc. containing concentrations of contaminants of concern that exceed cleanup criteria based on ARARs or acceptable risk limits;
- Reduce the transport of media-specific contaminants of concern at the NFSS and waste materials within the IWCS to other environmental media (soil, groundwater, surface water, sediment and air), both on-site and off-site;
- During implementation of the remedial alternative(s), restrict releases and other impacts that could adversely affect human health and the environment, including ecological receptors;
- Specific to the BOP OU only, remediate the site to a condition consistent with its current and anticipated future use(s), and
- Comply with ARARs.

Additionally, general response actions will be developed for the IWCS OU and presented in the technical memorandum. General response actions describe medium-specific actions that satisfy the RAOs and may include containment, treatment, excavation, pumping, or other remedial actions. Volumes or areas of media to which general response actions may apply will also be identified.

Public Input Regarding the Technical Memorandum

The Corps encourages input from the public regarding the objective of this specific technical memorandum. Input should be provided to the Corps by January 3, 2011, to allow the Corps to consider the input while developing the technical memorandum. Responses to public comments on the objectives of this technical memorandum or on RAOs and ARARs that should be considered will be made available on the project website. Input can be sent via e-mail to fusrap@usace.army.mil (please be sure to note "RAOs and ARARs Technical Memorandum" in the subject of the e-mail) or mail your comments to the FUSRAP Team at the address noted below.

Administrative Record File

The Administrative Record File for the NFSS FUSRAP Site contains the Remedial Investigation Report, Baseline Risk Assessment, Groundwater Flow and Contaminant Transport Modeling and other CERCLA-related documentation for the NFSS. Reports and documents in the Administrative Record may be viewed at the following locations:

US Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207
(by appointment only)

Town of Lewiston Public Library
305 South 8th Street
Lewiston, NY 14092

Youngstown Free Library
240 Lockport Street
Youngstown, NY 14174

U.S. ARMY CORPS OF ENGINEERS – BUFFALO DISTRICT FUSRAP TEAM

1776 NIAGARA STREET, BUFFALO, N.Y. 14207

Phone: 800-833-6390 (Option 4)

Email: fusrap@usace.army.mil

Website: www.lrb.usace.army.mil/fusrap/nfss/index.htm

**Letter to [REDACTED], USACE-Buffalo from [REDACTED] PE,
Director, the New York State Department of Environmental Conservation
(NYSDEC), Division of Environmental Remediation. Dated January 25, 2011.**

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A, 11th Floor
625 Broadway, Albany, New York 12233-7015
Phone: (518) 402-9625 • **Fax:** (518) 402-9627
Website: www.dec.ny.gov



January 25, 2011

[REDACTED]
Department of the Army
Buffalo District, Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207-3199

Dear [REDACTED]

Re: Niagara Falls Storage Site
RAOs and ARARs Technical Memorandum Objective

This responds to the Corps December 2010 fact sheet which solicited input from the public on the objective of the technical memorandum addressing the Remedial Action Objectives (RAOs) and Applicable or Relevant and Appropriate Requirements (ARARs) to be used in conducting the Feasibility Studies (FSs) for the Interim Waste Containment Structure (IWCS) and Balance of Plant (BOP) Operable Units (OUs) at the Niagara Falls Storage Site (NFSS).

Enclosed you will find a listing of State ARARs along with a justification for each one. They are available on the NYSDEC website at <http://www.dec.ny.gov/regs/2491.html> and http://www.dec.ny.gov/docs/remediation_hudson_pdf/cpsoil.pdf.

As you know, the Department does not consider shallow land burial of these waste materials as an appropriate long-term solution. In fact in a September 28, 1993 letter from former Commissioner Thomas Jorling to Mrs. Hazel O'Leary, then Secretary of the United States Department of Energy, we stated that "we believe the 40 CFR Part 192 uranium mill tailings standard established by the United States Environmental Protection Agency was never intended to regulate such high activity wastes as the K-65 residues contain, and that the most applicable standard would be those of 40 CFR Part 191 requiring deep mine repository disposal and assurance of over 10,000 years of isolation from humankind." This position has continued to be reiterated in various correspondences with the Corp including a September 10, 2008 letter from Edwin Dassatti to Lieutenant Colonel Snead.

With regard to RAO's, particularly in relation to the second bullet beneath preliminary RAOs, in keeping with the Corp's conformance with the CERCLA process, the clean-up should achieve an EPA risk level in the 10^{-4} to 10^{-6} range (and the goal of 15 mrem annual Total Effective Dose Equivalent).

If you have any questions or need further information, please contact [REDACTED], of the Radiological Sites Section within this Bureau, at ([REDACTED]) or by email at [REDACTED]

Sincerely, /

[REDACTED]
Director
Remedial Bureau A

Enclosure

cc w/enc:

[REDACTED]
[REDACTED]
[REDACTED]

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau A
Radiation Section
Listing of Applicable or Relevant and Appropriate Requirements
for the Niagara Falls Storage Site

January 3, 2011

Citation	Contents	Justification
6 NYCRR Part 364	Waste Transporter Permits	Applicable to transportation of solid waste
6 NYCRR Part 370	Hazardous Waste Management System: General	General requirements applicable to hazardous wastes
6 NYCRR Part 371	Identification and Listing of Hazardous Wastes	
6 NYCRR Part 372	Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities	Applicable to transport of hazardous waste from the site
6 NYCRR Subpart 373-1	Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements	May be applicable if remedy includes storage, treatment, or disposal of hazardous waste on site
6 NYCRR Subpart 373-2	Final Status Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities	
6 NYCRR Subpart 373-3	Interim Status Standards for Owners and Operators of Hazardous Waste Facilities	
6 NYCRR Part 376	Land Disposal Restrictions	Applicable to disposal of hazardous wastes
6 NYCRR Part 380	Rules and Regulations for Prevention and Control of Environmental Pollution by Radioactive Materials	Relevant and Appropriate for any airborne emissions or discharges to surface or groundwater of radioactive materials.
6 NYCRR Part 382	Regulation of Low-Level Radioactive Waste (LLRW) Disposal Facilities: Certification of Proposed Sites and Disposal Methods	Relevant and Appropriate for land disposal of radioactive wastes

6 NYCRR Part 383	Regulation of Low-level Radioactive Waste (LLRW) Disposal Facilities: Design, Construction, Operation, Closure, Post-Closure, and Institutional Control	Relevant and Appropriate for land disposal of radioactive wastes
6 NYCRR Part 702	Derivation and Use of Standards and Guidance Values	Generally applicable to ground and surface waters
6 NYCRR Part 703	Surface Water And Groundwater Quality Standards and Groundwater Effluent Limitations	Class GA drinking water standards and Class C surface water standards apply at NFSS.
6 NYCRR Part 750-757	Implementation of SPDES Program in NYS	Applicable to discharges of pollutants to surface and groundwater
6 NYCRR Part 375	Environmental Remediation Programs	
6 NYCRR Part 375-6	Remedial Program Soil Cleanup Objectives	Applicable to surface and subsurface soils
CP-51	NYSDEC Soil Cleanup Guidance	
N/A	NYSDEC Technical Guidance for Screening Contaminated Sediments	Applicable to sediments and streams.
DSHM-RAD-05-01	Cleanup Guideline for Soils Contaminated with Radioactive Materials	Applicable to setting radiological cleanup criteria for soils

Table A-1. Comment Response Matrix
Comments Received from [REDACTED] PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
	<p><i>Please note that the scope of this technical memorandum changed since the Fact Sheet was issued in December 2010. The Fact Sheet solicited input from the public on the objective of the technical memorandum addressing the Remedial Action Objectives (RAOs) and Applicable or Relevant and Appropriate Requirements (ARARs) to be used in conducting the Feasibility Studies (FSs) for the Interim Waste Containment Structure (IWCS) and Balance of Plant (BOP) Operable Units (OUs) at the Niagara Falls Storage Site (NFSS). However, this technical memorandum addresses only the ARARs for the IWCS OU; the RAOs for the IWCS were presented in the “Remedial Alternatives Technologies Development and Screening Technical Memorandum” released in April 2013, and the BOP RAOs and ARARs will be completed as part of a future technical memorandum to be developed in support of the BOP OU FS. Only those comments that pertain to the RAOs and ARARs for the IWCS OU will be addressed here.</i></p>	
1	<p>See letter to [REDACTED] USACE) dated January 25, 2011, which states:</p> <p>This responds to the Corps December 2010 fact sheet which solicited input from the public on the objective of the technical memorandum addressing the Remedial Action Objectives (RAOs) and Applicable or Relevant and Appropriate Requirements (ARARs) to be used in conducting the Feasibility Studies (FSs) for the Interim Waste Containment Structure (IWCS) and Balance of Plant (BOP) Operable Units (OUs) at the Niagara Falls Storage Site (NFSS).</p> <p>Enclosed you will find a listing of State ARARs along with a justification for each one. They are available on the NYSDEC website at http://www.dec.ny.gov/regs/2491.html and http://www.dec.ny.gov/docs/remediation_hudson~df/cpsoil.pdf.</p> <p>As you know, the Department does not consider shallow land burial of these waste materials as an appropriate long-term solution. In fact in a September 28, 1993 letter from former Commissioner Thomas Jorling to Mrs. Hazel O'Leary; then Secretary of the United States Department of Energy, we stated that "we believe the 40 CFR Part 192 uranium mill tailings standard established by the United States Environmental Protection Agency was never intended to regulate such high activity wastes as the K-65 residues contain, and that the</p>	<p>The Corps understands that NYSDEC does not consider shallow land burial of the uranium ore residues to be an appropriate long-term solution; however, the waste material inside the IWCS is classified as 11e.(2) byproduct material based on regulatory waste classification definitions. Therefore, if the material inside the IWCS is excavated, the disposal options available are limited to government-operated or commercially-owned 11e.(2) byproduct disposal cells, which are not deep mine repositories. The Corps has considered the fact that the uranium ore residues, or specifically the K-65 residues, exhibit activity levels typically not found at mill tailings sites across the United States and has evaluated 40 CFR Part 191 as a potential ARAR. For the reasons detailed in the main text of this ARARs Technical Memorandum, 40 CFR Part 191 was not selected as a relevant and appropriate ARAR for the IWCS OU.</p> <p>With respect to the comment regarding RAOs, the Corps recognizes that USEPA uses a target risk range of 10^{-4} to 10^{-6} to manage Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) cleanups. Consequently, remedial alternatives considered by the Corps for the IWCS OU must either meet cleanup levels specified in the ARAR or in the absence of such levels, achieve this risk-based goal to be considered protective of human health and the environment. Cleanup levels specified in</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
	<p>most applicable standard would be those of 40 CFR Part 191 requiring deep mine repository disposal and assurance of over 10,000 years of isolation from humankind." This position has continued to be reiterated in various correspondences with the Corp including a September 10, 2008 letter from Edwin Dassatti to Lieutenant Colonel Snead.</p> <p>With regard to RAO's, particularly in relation to the second bullet beneath preliminary RAOs, in keeping with the Corp's conformance with the CERCLA process, the clean-up should achieve an EPA risk level in the 10^{-4} to 10^{-6} range (and the goal of 15 mrem annual Total Effective Dose Equivalent).</p>	<p>ARARs or risk-based levels will be developed in technical documents prepared for the BOP OU because residual contamination resulting from an IWCS removal action will be considered part of the BOP OU.</p> <p>The Corps' responses to the numerous regulations and other documents identified by NYSDEC as potential ARARs are presented below.</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
<i>Responses to NYSDEC Listing of ARARs</i>		
2	6 NYCRR Part 364: Waste Transporter Permits Justification: Applicable to transportation of solid waste	<p>6 NYCRR Part 364 requires a valid permit for the collection, transport, and/or disposal at a treatment/storage/disposal facility of regulated waste, as defined in this part.</p> <p>This regulation does not meet the definition of an ARAR. ARARs are cleanup standards, standards of control or other substantive requirements that specifically address a hazardous substance, pollutant or contaminant that will remain on site. Regulations that relate to activities associated with the implementation of a remedial action, such as requirements governing the shipment of waste or health and safety requirements that address worker health and safety, would be complied with during execution of the remedial action; however, since these types of regulations are not related to the degree of cleanup of hazardous substances released into the environment or the control of further release, they are not ARARs.</p>
3	6 NYCRR Part 370: Hazardous Waste Management System – General 6 NYCRR Part 371: Identification and Listing of Hazardous Waste Justification: General requirements applicable to hazardous wastes	<p>The regulations in 6 NYCRR 370 provide definitions of terms and general standards applicable to Parts 370 through 374, and 376. 6 NYCRR Part 371 establishes the procedures for identifying those solid wastes which are subject to regulation as hazardous wastes under Parts 370 through 373, and 376.</p> <p>These regulations do not meet the definition of an ARAR. ARARs are cleanup standards, standards of control or other substantive requirements that specifically address a hazardous substance, pollutant or contaminant that will remain on site. Regulations that relate to activities associated with the implementation of a remedial action, such as requirements governing the shipment of waste or health and safety requirements that address worker health and safety, would be complied with during execution of the remedial action;</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
		however, since these types of regulations are not related to the degree of cleanup of hazardous substances released into the environment or the control of further release, they are not ARARs.
4	<p>6 NYCRR Part372: Hazardous Waste Manifest System and Related Standards for Generators, Transporters and Facilities</p> <p>Justification: Applicable to transport of hazardous waste from the site</p>	<p>6 NYCRR Part 372 sets forth the requirements for tracking hazardous waste from cradle to grave.</p> <p>This regulation does not meet the definition of an ARAR. ARARs are cleanup standards, standards of control or other substantive requirements that specifically address a hazardous substance, pollutant or contaminant that will remain on site. Regulations that relate to activities associated with the implementation of a remedial action, such as requirements governing the shipment of waste or health and safety requirements that address worker health and safety, would be complied with during execution of the remedial action; however, since these types of regulations are not related to the degree of cleanup of hazardous substances released into the environment or the control of further release, they are not ARARs.</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
5	<p>6 NYCRR Subpart 373-1: Hazardous Waste Treatment, Storage and Disposal Facility Permitting Requirements 6 NYCRR Subpart 373-2: Final Status Standards for Owners and Operators of Hazardous Waste Treatment Storage and Disposal Facilities 6 NYCRR Subpart 373-3: Interim Status Standards for Owners and Operators of Hazardous Waste Facilities</p> <p>Justification: May be applicable if remedy includes storage, treatment, or disposal of hazardous waste on site</p>	<p>6 NYCRR Subparts 373-1, 373-2, and 373-3 provide the requirements for facilities that treat, store, and dispose of hazardous waste.</p> <p>There are no new on-site disposal cells planned for the site. The cited regulations do not meet the definition of an ARAR. ARARs are cleanup standards, standards of control or other substantive requirements that specifically address a hazardous substance, pollutant or contaminant that will remain on site. Regulations that relate to activities associated with the implementation of a remedial action, such as requirements governing the shipment of waste or health and safety requirements that address worker health and safety, may be considered technical requirements that would be complied with during execution of the remedial action; however, since these types of regulations are not related to the degree of cleanup of hazardous substances released into the environment or the control of further release, they are not ARARs.</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
6	<p>6 NYCRR Part 376: Land Disposal Restrictions</p> <p>Justification: Applicable to disposal of hazardous wastes</p>	<p>6 NYCRR Part 376 identifies waste restricted from land disposal in New York State.</p> <p>There are no new on-site disposal cells planned for the site. The cited regulation does not meet the definition of an ARAR. ARARs are cleanup standards, standards of control or other substantive requirements that specifically address a hazardous substance, pollutant or contaminant that will remain on site. Regulations that relate to activities associated with the implementation of a remedial action, such as requirements governing the shipment of waste or health and safety requirements that address worker health and safety, may be considered technical requirements that would be complied with during execution of the remedial action; however, since these types of regulations are not related to the degree of cleanup of hazardous substances released into the environment or the control of further release, they are not ARARs.</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
7	<p>6 NYCRR Part 380: Rules and Regulations for Prevention and Control of Environmental Pollution by Radioactive Materials</p> <p>Justification: Relevant and Appropriate for any airborne emissions or discharges to surface or groundwater of radioactive materials.</p>	<p>6 NYCRR Part 380 establishes a framework for control of radioactive materials and exposures within the state. Included within these rules are general requirements that limit the overall exposures and discharges from active operations allowed at any site where radioactive materials are stored or managed.</p> <p>The IWCS already exists and there are no new on-site disposal cells planned for the site. Additionally, the cited regulation does not meet the definition of an ARAR. ARARs are cleanup standards, standards of control or other substantive requirements that specifically address a hazardous substance, pollutant or contaminant that will remain on site. Regulations that relate to activities associated with the implementation of a remedial action, such as requirements governing the shipment of waste or health and safety requirements that address worker health and safety, or in the case of 6 NYCRR Part 380, off-site emissions of hazardous substances, would be complied with during execution of the remedial action; however, since this regulation is not related to the degree of cleanup of hazardous substances released into the environment or the control of further release, it is not an ARAR.</p>
8	<p>6 NYCRR Part 382: Regulation of Low-Level Radioactive Waste (LLRW) Disposal Facilities: Certification of Proposed Sites and Disposal Methods</p> <p>Justification: Relevant and Appropriate for land disposal of radioactive wastes</p>	<p>6 NYCRR Part 382 sets forth the minimum requirements for land disposal facilities used for permanent disposal of low-level radioactive waste (LLRW), as well as the requirements for acceptable waste form and waste classification.</p> <p>The IWCS already exists and there are no new on-site disposal cells planned for the site. Furthermore, the waste material inside the IWCS is classified as “byproduct material” as defined by 11e.(2) of the Atomic Energy Act of 1954 as amended. Therefore, this regulation is neither relevant nor appropriate for the site.</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
9	<p>6 NYCRR Part 383: Regulation of Low-level Radioactive Waste (LLRW) Disposal Facilities: Design, Construction, Operation, Closure, Post-Closure, and Institutional Control</p> <p>Justification: Relevant and Appropriate for land disposal of radioactive wastes</p>	<p>The 6 NYCRR Part 383 regulations concern design and operations for LLRW disposal facilities.</p> <p>The IWCS already exists and there are no new on-site disposal cells planned for the site. Furthermore, the waste material inside the IWCS is considered “byproduct material” as defined by 11e.(2) of the Atomic Energy Act of 1954 as amended. Therefore, this regulation is neither relevant nor appropriate for the site.</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
10	<p>6 NYCRR Part 702: Derivation and Use of Standards and Guidance Values</p> <p>Justification: Generally applicable to ground and surface waters</p>	<p>6 NYCRR Part 702 presents the derivation of standards and guidance values and provides guidelines for their use.</p> <p>After reviewing the contents of the regulation the Corps determined it is administrative in nature and therefore, does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP.</p>
11	<p>6 NYCRR Part 703: Surface Water And Groundwater Quality Standards and Groundwater Effluent Limitations</p> <p>Justification: Class GA drinking water standards and Class C surface water standards apply at NFSS.</p>	<p>6 NYCRR Part 703 addresses surface water and groundwater quality standards.</p> <p>This regulation is considered to not be relevant or appropriate for the IWCS Operable Unit for the following reasons: (1) the Groundwater Operable Unit will be evaluated in a separate technical memorandum and (2) Groundwater underlying the NFSS reflects USEPA Class IIIb criteria for non-potable, limited beneficial use water. In order to be a potable water source, NFSS groundwater would require expensive, energy intensive treatment by reverse osmosis (desalination); since there is a replaceable surface-water source via the Niagara River/Lake Ontario and groundwater south of the site (Lockport Formation), it is reasonable to assume that no municipality or service would find NFSS groundwater economically viable.</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
12	<p>6 NYCRR Part 750-757: Implementation of SPDES Program in NYS</p> <p>Justification: Applicable to discharges of pollutants to surface and groundwater</p>	<p>The 6 NYCRR Part 750-757 regulations address discharges of pollutants to surface water and groundwater.</p> <p>After reviewing the contents of the regulation the Corps determined it does not meet the definition of an ARAR, as that term is defined in CERCLA or the NCP: ARARs are cleanup standards, standards of control or other substantive requirements that specifically address a hazardous substance, pollutant or contaminant that will remain on site. Regulations that relate to activities associated with the implementation of a remedial action, such as requirements governing the shipment of waste or health and safety requirements that address worker health and safety, would be complied with during execution of the remedial action; however, since these types of regulations are not related to the degree of cleanup of hazardous substances released into the environment or the control of further release, they are not ARARs.</p>
13	<p>6 NYCRR Part 375: Environmental Remediation Programs</p> <p>Justification: (none given)</p>	<p>6 NYCRR Part 375 provides soil cleanup objectives which may apply to constituents of concern in soil that will be evaluated as part of the Balance of Plant Operable Unit. Any residual material that remains following excavation of material in the IWCS will be considered part of the Balance of Plant Operable Unit and will be addressed during the feasibility study process for the Balance of Plant. Therefore, this regulation is not an ARAR for the IWCS OU.</p>

Table A-1. Comment Response Matrix
Comments Received from [REDACTED], PE (NYSDEC Director)
Document: RAOs and ARARs Technical Memorandum Fact Sheet No. 1

Comment No.	Comment	Response
14	6NYCRR Part 375-6: Remedial Program Soil Cleanup Objectives Justification: Applicable to surface and subsurface soils	Please see the response to comment #13.
15	CP-51: INYSDEC Soil Cleanup Guidance Justification: (none given)	This is a guidance document not a regulation, and therefore, is not an ARAR.
16	NYSDEC Technical Guidance for Screening Contaminated Sediments Justification: Applicable to sediments and streams.	This is a guidance document that has not been adopted into regulation, and therefore, does not qualify as an ARAR.
17	DSHM-RAD-05-01: Cleanup Guideline for Soils Contaminated with Radioactive Materials Justification: Applicable to setting radiological cleanup criteria for soils	This is a guidance document that has not been adopted into regulation, and therefore, does not qualify as an ARAR.

**E-mail correspondence from [REDACTED] to
USACE dated January 3, 2011.**

Comments on the RAO's and ARAR's Technical Memorandum Fact Sheet

Input from [REDACTED] below.

-----Original Message-----

From: [REDACTED]
Sent: Monday, January 03, 2011 11:50 PM
To: Fusrap, LRB
Subject: RAO's and ARAR's Technical Memorandum

In response to the Corps of Engineers request for public input regarding the December 2010 USACE Technical Memorandum on RAO's and ARAR's please accept the following comments.

According to the Corp, "The NFSS Feasibility Study is the mechanism for the development, screening and detailed evaluation of the remedial alternatives to address any contamination identified in the Remedial Investigation."

Unfortunately, at this point in time, the NFSS Remedial Investigation is incomplete: significant contamination has been identified which has not been investigated or characterized. Major data gaps include:

- i) incomplete identification and characterization of IWCS contents. In addition to uranium ore residues, there is evidence that nuclear reprocessing wastes containing a variety of radionuclides including cesium-137, strontium-90 and plutonium were deposited into the IWCS.
- ii) no investigation of evidence of IWCS leakage. Uranium concentrations of 1,000 pCi/L have been detected in groundwater south and east of the IWCS, but there has been no investigation of these highly elevated uranium levels (background is 10 pCi/L)
- iii) no investigation of the preferential pathways identified around the IWCS, which have allowed contamination to rapidly migrate across the NFSS. How far has the leakage spread?
- iv) no investigation of the effects of adjacent landfill operations on IWCS integrity. Modern is known to have completely reversed the direction of flow of the lower water bearing zone around the IWCS for several years, yet there has been no evaluation of the effect of this dramatic event on the IWCS
- v) Failure to establish a valid background for ground waters on the NFSS. Modern, down gradient of the IWCS was used to establish a combined background for the lower and upper ground waters. The two ground waters are very different and a single background is not valid.

Such serious deficiencies in the Remedial Investigation preclude USACE moving forward with a satisfactory Feasibility Study for the NFSS. The Feasibility study should not be allowed to proceed until sufficient data of the required quality has been obtained in the Remedial Investigation.

[REDACTED], former resident of Porter

[REDACTED]
Classification: UNCLASSIFIED
Caveats: NONE

Number	Comments	Response
1	<p>Incomplete identification and characterization of IWCS contents. In addition to uranium ore residues, there is evidence that nuclear reprocessing wastes containing a variety of radionuclides including cesium-137, strontium-90 and plutonium were deposited into the IWCS.</p>	<p>Drilling into the Interim Waste Containment Structure (IWCS) to conduct further identification and characterization of the waste was not conducted because there was sufficient information for completing the remedial investigation (RI)/feasibility study without penetrating the protective cap. If, during the remedial design phase of the CERCLA process, it is determined that additional information regarding the contents or performance of the IWCS is needed, appropriate steps will be taken to gather the needed information. It is noted that the relative risk posed by exposure to radium-226, via ingestion, inhalation, and external gamma radiation, on a per unit basis was greater than or comparable to that posed by cesium, strontium, or plutonium. Therefore, radium would require the same (or greater) level of protection as the same amount of cesium, strontium, or plutonium.</p>
2	<p>No investigation of evidence of IWCS leakage. Uranium concentrations of 1,000 pCi/L have been detected in groundwater south and east of the IWCS, but there has been no investigation of these highly elevated uranium levels (background is 10 pCi/L)</p>	<p>Since this comment was submitted, the Corps completed additional investigative field work that included: the installation of seven groundwater monitoring wells south of the IWCS and four wells east of the IWCS (surrounding well OW11B); exposure and plugging of all known pipelines leaving the site, as well as the 10-inch water line in an area just southeast of the IWCS, and sampling of pipeline liquids and pipeline bedding material; and, the excavation of 14 investigative trenches (a total of approximately 200 feet in length) along the sanitary sewer line between manhole 6 (just north of South 31 Ditch) and the former decontamination pad/grit chamber. The findings are presented in the <i>Balance of Plant Field Investigation Report</i> issued in August 2013 and the <i>Balance of Plant Operable Unit Field Investigation to Refine the Extent of Soil Contamination Report</i> issued in February 2015.</p> <p>In summary, there was no evidence of contamination leaving the site based on the analytical result of the soil surrounding the pipelines and material inside the pipelines; there was no contamination detected in or around the 10-inch water line; and excavations in the vicinity of manhole 6, south and north of South 31 Ditch, revealed that the sanitary line that formerly crossed this ditch was cut and capped by the USDOE, presumably in the 1980s, precluding this line from acting as a conduit for contaminants in groundwater from the area south of the IWCS to the areas east of the</p>

Number	Comments	Response
		<p>Central Drainage Ditch (e.g., around well OW11B).</p> <p>Elevated uranium levels were detected in several of the new groundwater monitoring wells, both south and east of the IWCS, as well as in the investigative trenches. However, it is noteworthy that the pattern of contamination does not support the assertion that the IWCS is not effectively containing the wastes. For example, among the newly installed groundwater monitoring wells that surround existing well OW11B, the westernmost well that is closest to the IWCS exhibited the relatively lowest uranium levels. In addition, several new and existing wells south of the IWCS, exhibited elevated uranium levels; however, well OW6B, which is situated closest to the IWCS and has been monitored for many years, continues to exhibit decreasing uranium levels that are below drinking water criteria.</p> <p>Regarding the sanitary sewer line near manhole 6 and well OW11B, the February 2015 Balance of Plant report concluded:</p> <p><i>Observations and analytical results for the investigative excavations indicate that the interior of the sewer does not appear to be a conduit for contaminant migration. This is evidenced by the fact that the sewer had been previously cut and plugged just upgradient of manhole MH06; the manhole itself appeared to have been effectively plugged; and the sewer was found to be intact with no cracks or penetrations. Minor groundwater flow was found along the exterior of the concrete encasement.</i></p> <p><i>Although some of the groundwater samples contained elevated levels of total uranium and uranium isotopes, a source term was not identified in the excavations.</i></p> <p><i>The groundwater analytical data from the 2013 BOP Operable Unit Field Investigation Report and previous investigations and sampling events show that total uranium-impacted groundwater is present in areas where USDOE remedial activities were known to occur. Historical aerial photographs show land scarring in the OW11B area during the time of USDOE remediation activities. Also, video footage taken during IWCS construction show extensive activities, such as equipment decontamination and</i></p>

Number	Comments	Response
		<p><i>materials unloading, storage, and loading, occurred in this area. The uranium impacts detected in the groundwater collected from the area between the buried water supply pipes in excavation IE7 and from along the top of the concrete-encased sanitary sewer, as observed in excavation IE8 and during the current investigation, might be associated with those former remediation activities. In addition to advancing five investigative excavations along the sanitary sewer line, 35 delineation soil borings were advanced in the OW11B area. The fact that none of these investigation activities identified a source term in this area indicates that the source term, if previously present, had been removed and the current groundwater contamination is the result of the historical movement of residue material in this area.</i></p> <p>These findings along with annual environmental surveillance data support the conclusion that IWCS site controls continue to perform as designed and are presently fully protective of human health and the environment.</p>
3	<p>No investigation of the preferential pathways identified around the IWCS (i.e., 10-inch water line), which have allowed contamination to rapidly migrate across the NFSS. How far has the leakage spread?</p>	<p>Please see response to comment #2.</p>
4	<p>No investigation of the effects of adjacent landfill operations on IWCS integrity. Modern is known to have completely reversed the direction of flow of the lower water bearing zone around the IWCS for several years, yet there has been no evaluation of the effect of this dramatic event on the IWCS.</p>	<p>There are two water-bearing zones present at the NFSS: the upper water-bearing zone (UWBZ) and the lower water-bearing zone (LWBZ). The UWBZ and LWBZ are separated by a low-permeability clay unit, which impedes interaction between the two water-bearing units. Modern historically pumped groundwater from the LWBZ during construction of earlier landfill cells. In July 2005, the Corps met with Modern to discuss the potential impacts of the groundwater extraction on NFSS contaminant transport. Based upon the range of Modern pumping rates, groundwater modeling, and review of hydraulic heads on both NFSS and Modern, the pumping at Modern had a maximum radius of influence in the LWBZ of up to 2,000 feet from the dewatering point on Modern. This influence of Modern</p>

Number	Comments	Response
		<p>pumping on the LWBZ was demonstrated by potentiometric surface maps from past Environmental Surveillance Technical Memoranda (see the 1996 Technical Memorandum for example). The groundwater flow direction in the UWBZ (where the uranium groundwater plumes exist) remained unaffected; however, the reversal of groundwater flow direction followed a similar shape as the radius of influence. The hydraulic gradient (or change in water levels over the change in distance between the two monitoring wells), however, was minimal (i.e. 0.003 to 0.007 ft/ft). Therefore, although past Modern pumping activities reversed groundwater flow direction at NFSS, the impact to contaminant migration was negligible.</p>
5	<p>Failure to establish a valid background for ground waters on the NFSS. Modern, down gradient of the IWCS was used to establish a combined background for the lower and upper ground waters. The two ground waters are very different and a single background is not valid.</p>	<p>The Modern Landfill site was selected to establish background levels because the wells at Modern are hydraulically upgradient of the NFSS, within one mile of the site (assuring similar lithology), and there are a sufficient number of available wells screened in the water-bearing zones of interest. Since Modern Landfill is hydraulically upgradient from the NFSS, wells located here are upstream from the facility and allow sampling and analysis of groundwater before it has reached the site-related contamination. Additionally, well construction and geology were documented for the Modern Landfill site. The feasibility of using other wells located further upgradient from Modern Landfill was investigated; however, construction and geologic information for these wells was incomplete.</p> <p>A qualitative re-examination of the NFSS groundwater background data set was included in the RIR Addendum. In the document, a discussion is presented that compares the combined UWBZ/LWBZ</p>

Number	Comments	Response
		<p>NFSS background groundwater screening levels to the UWBZ and LWBZ separately, as well as a comparison to the concentration in national and New York State drinking water sources. It was found that dividing the combined background groundwater data set into separate data sets for the two water-bearing zones did not result in more descriptive background statistics or more reliable delineation of site-related constituents. For many constituents, there was relatively little difference between the background levels developed for the combined background groundwater data set and the background levels developed for the separate UWBZ and LWBZ data sets.</p> <p>A review of mean and maximum values for radium-226, radium-228 and uranium levels in NFSS background groundwater data provided a qualitative indication that NFSS background groundwater levels for these radionuclides were comparable to typical levels observed in domestic groundwater sources.</p>
General	<p>Such serious deficiencies in the Remedial Investigation preclude USACE moving forward with a satisfactory Feasibility Study for the NFSS. The Feasibility study should not be allowed to proceed until sufficient data of the required quality has been obtained in the Remedial Investigation.</p> <p>Given that ground water seasonally flows into and out of the IWCS, the issue is really what radioactive or chemical species are showing up in the groundwater outside of the IWCS. Increasing levels of contamination in groundwater around the IWCS would indicate leakage.</p> <p>In 1995 the NRC committee was told no radioisotopes above background had been detected in groundwater around the IWCS. Today there is over 1,000 pCi/L of uranium contamination in groundwater south</p>	<p>During the RI activities, historical documents were reviewed and over 1,400 samples of soil, groundwater, sediment and surface water were collected to assess the nature and extent of the Manhattan Engineer District/Atomic Energy Commission-related contamination at NFSS. A comprehensive three-dimensional fate and contaminant transport model was prepared to assess future transport of contaminants and a baseline risk assessment quantified media at NFSS that posed long-term risk to human health and the environment. Site wide gamma walkover and geophysical surveys were conducted to better assess subsurface conditions at the site. Background levels of constituents in soil and water were collected to establish natural conditions for comparison to site data. Nearly 30 years worth of environmental surveillance data were collected, compared to regulations, and issued annually to the public to ensure the protection of</p>

Number	Comments	Response
	<p>and east of the IWCS, a level far in excess of both background (around 10 pCi/L) and that attributed by DOE to pre-existing contamination (around 90 pCi/L). I intend discussing ongoing concerns about IWCS leakage with USACE in January 2011.</p>	<p>human health and the environment. This comprehensive dataset is used in the Feasibility Study to evaluate alternatives to address long-term risk at the site.</p> <p>The 2011 RIR Addendum stated that the Corps would conduct additional field activities to address Balance of Plant data gaps, such as the integrity of the underground utility lines south and east of the IWCS. As explained in our response to comment #2, a significant amount of additional field work to address these Balance of Plant data gaps has been completed.</p> <p>In addition to investigating utility lines, 17 new monitoring wells were installed; 11 of these wells are located south and east of the IWCS and are being monitored regularly as part of the Environmental Surveillance Program. Trends in uranium concentrations in groundwater wells used to monitor IWCS integrity are presented in the annual Environmental Surveillance Technical Memoranda to further demonstrate that the IWCS is functioning effectively. The Corps will continue to maintain and monitor the site to ensure future protectiveness of human health and the environment.</p>