

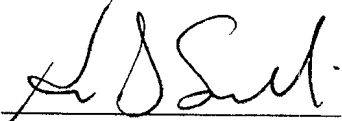
WSMS-WV-08-0001

Revision 0


November 2008

Western New York Nuclear Service Center
Facility Description and Methodology
Technical Report

Prepared for the
U.S. Department of Energy
West Valley, New York

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ACRONYMS AND ABBREVIATIONS

ACOE	Army Corps of Engineers
ALARA	as low as reasonably achievable
ANTI-C	anti-contamination
ASER	Annual Site Environmental Report
BSFC	Brake-Specific Fuel Compensation
BSW	Bulk Storage Warehouse
CAPR	Cost Accounting Planning Report
CDD	Clean Demolition Debris
CDDL	Construction and Demolition Debris Landfill
CDR	Conceptual Design Report
CFR	Code of Federal Regulations
CMF	Container Management Facility
CPC-WSA	Chemical Process Cell – Waste Storage Area
D&M	Dames & Moore
DCGLs	derived concentration guideline levels
DESC	Defense Energy Support Center
DOE	U.S. Department of Energy
EDI	Engineering, Design, and Inspection
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FHWA	Federal Highway Authority
FRS	Fuel Receiving and Storage Area
FTE	Full-Time Equivalent
GTCC	Greater than Class C
HEPA	high-efficiency particulate air
HLW	high-level waste
LLW	low-level waste
LLW2	Low-Level Waste Treatment Building
LSA	Low-Specific Activity
LSA 1	Lag Storage Addition 1
LSA 2	Lag Storage Addition 2
LSA 3	Lag Storage Addition 3
LSA 4	Lag Storage Addition 4
LSB	Lag Storage Building
M&O	Management and Operations
NAC	noise abatement criteria
NDA	Nuclear Regulatory Commission-Licensed Disposal Area
NFS	Nuclear Fuel Services, Inc.

ACRONYMS AND ABBREVIATIONS *(continued)*

NRC	Nuclear Regulatory Commission
NTS	Nevada Test Site
NYCRR	Title 6 of the New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSERDA	New York State Energy Research and Development Authority
O2 Building	Former Low-Level Waste Treatment Building
PCB	polychlorinated biphenyl
PM ₁₀	Particulate Material of 10 micron or less
PPE	personal protective equipment
PPM	parts per million
PUREX	plutonium uranium refining by extraction
PVC	polyvinyl chloride
PVS	Permanent Ventilation System
RCRA	Resource Conservation and Recovery Act
REMS	Radiation Exposure Monitoring System
RFI	RCRA Facility Investigation
RHWF	Remote-Handled Waste Facility
SDA	State-Licensed Disposal Area
SPDES	State Pollutant Discharge Elimination System
STS	Supernatant Treatment System
SWMU	Solid Waste Management Unit
TAGM	Technical and Administrative Guidance Memorandum
TBP	tributyl phosphate
THOREX	thorium refining by extraction
TRU	transuranic
TSP	total suspended particulates
UPL	upper prediction limit
WIPP	Waste Isolation Pilot Plant
WIR	waste incidental to reprocessing
WMA	Waste Management Area
WNYNSC	Western New York Nuclear Service Center
WPDA	Waste Package Decontamination Area
WPF	Waste Processing Facility
WVDP	West Valley Demonstration Project
WVES	West Valley Environmental Services LLC
WVNSCO	West Valley Nuclear Services Company
XC1	Extraction Cell 1
XC2	Extraction Cell 2
XC3	Extraction Cell 3
XCR	Extraction Chemical Room

ACRONYMS AND ABBREVIATIONS *(concluded)***UNITS**

Ci	curie
dB	decibel
ft ²	square feet
ft ³	cubic feet
g	gram
gpd	gallons per day
hr	hour
kg	kilogram
kW-hr	kilowatt per hour
MCF	million cubic feet
mL	milliliter
mrem	0.001 Roentgen equivalent man
mR/hr	milliroentgen per hour
μCi	1.0E-06 curie
μCi/ml	microcuries per milliliter
pCi	1.0E-12 curie
R	Roentgen
R/hr	Roentgen per hour
yd ³	cubic yards

1.0 INTRODUCTION

1.1 Purpose

The purpose of this technical report is to provide information on the Western New York Nuclear Service Center (WNYNSC) site facilities at the starting point of the EIS and to provide methodology for engineering design and engineering analysis of the Environmental Impact Statement (EIS) decommissioning alternatives. The different approaches described in these engineering studies are being evaluated in the Draft Environmental Impact Statement on Decommissioning and/or Long-Term Stewardship of the WNYNSC and the West Valley Demonstration Project (WVDP or Project premises), hereafter referred to as the EIS. The WNYNSC is generally referred to in this report as the Center.

1.2 Scope

This report addresses the following matters:

- The facilities on the Center, including those constructed by the WVDP;
- The planned conditions in these facilities at the starting point of the EIS, following deactivation phase work being accomplished by the U.S. Department of Energy (DOE); and
- The baseline estimating processes used in the conceptual engineering studies, which are described in separate technical reports.

1.3 Background

The following matters are briefly discussed in this section to help place the information that follows into context:

- General site characteristics;
- Conditions at the starting point of the EIS;
- The decommissioning alternatives being evaluated;
- The role of technical reports in EIS evaluations; and
- The bases for estimates provided in related technical reports.

1.3.1 General Site Characteristics

Located approximately 30 miles south of Buffalo, New York on 3,338 acres of property owned by the New York State Energy Research and Development Authority (NYSERDA), the Center is the location of the only commercial spent nuclear fuel reprocessing plant to have operated in the United States.

This plant was operated by Nuclear Fuel Services, Inc. (NFS) from 1966 through 1972 to recover uranium, plutonium, and thorium from irradiated nuclear fuel using an acid separations process known as PUREX, for plutonium uranium refining by extraction¹. NFS retained control of the facility until 1981, after which the DOE assumed control of the portion of the Center known as the Project premises to carry out the WVDP Act. The primary objective of the

¹ One fuel batch was reprocessed using the similar THOREX (thorium uranium extraction process) method.

WVDP Act was to solidify the high-level waste (HLW) generated by NFS during reprocessing.

The Center ranges in elevation from 1,000 to 1,800 feet above mean sea level. The area of the 167-acre WVDP ranges from 1,300 to 1,445 feet above mean sea level. The undeveloped part of the Center remains a mixture of forest, wetlands, and abandoned farmland. Figure 1-1 shows key features of the Center. On Figure 1-2, the Main Plant Process Building (Waste Management Area [WMA] 1), the heart of the former reprocessing plant, is located near the area of the underground HLW tanks (WMA 3).

On the lower portion of Figure 1-2, the two shallow-land disposal sites for radioactive waste – known as the Nuclear Regulatory Commission (NRC)-Licensed Disposal Area (NDA) and the State-Licensed Disposal Area (SDA) – are identified. The SDA does not lie within the WVDP premises.

The three named streams in the vicinity of the WVDP are Erdman Brook, Franks Creek, and Quarry Creek, which are shown on Figure 1-2. Erdman Brook divides the Project premises into two areas known as the north plateau and the south plateau, with the Main Plant Process Building standing on the north plateau.

The Project Premises

At the approximate middle of the Center property lies the former nuclear fuel reprocessing plant. Figure 1-2 shows part of the Center and the Project premises.

Groundwater Hydrology

The groundwater depth in the sand and gravel unit on the north plateau ranges from the surface to 16 feet below the surface. In Waste Management Area (WMA) 1, in the area of the Main Plant Process Building, the water table typically lies about 10 feet below the ground surface (West Valley Nuclear Services Company LLC [WVNSCO], 1997b). The ground floor elevation of the Main Plant Process Building is approximately 1,410 feet above mean sea level. This elevation is designated the 100 foot level on Main Plant Process Building drawings for reference purposes.

In WMA 3, in the area of the HLW tanks, the water table naturally lies about eight to 15 feet below the ground surface, at times slightly above the tops of the concrete vaults for Tanks 8D-1 and 8D-2 (WVNSCO, 1997c). A dewatering well is used to artificially lower the water table in this area to help minimize groundwater leakage into the tank vaults. Discharge from this well is sent to the Low-Level Waste Treatment Facility for processing.

The groundwater flows generally northeastward toward Franks Creek. Near the northwestern margin of the sand and gravel unit, flow is southeastward toward Quarry Creek and, at the southeastern margin, toward Erdman Brook. Groundwater seeps to the surface in places along stream banks and in swampy areas in WMA 4 and WMA 5.

The Center and the 12 WMAs into which it has been divided for remediation purposes are described in detail in Section 2.

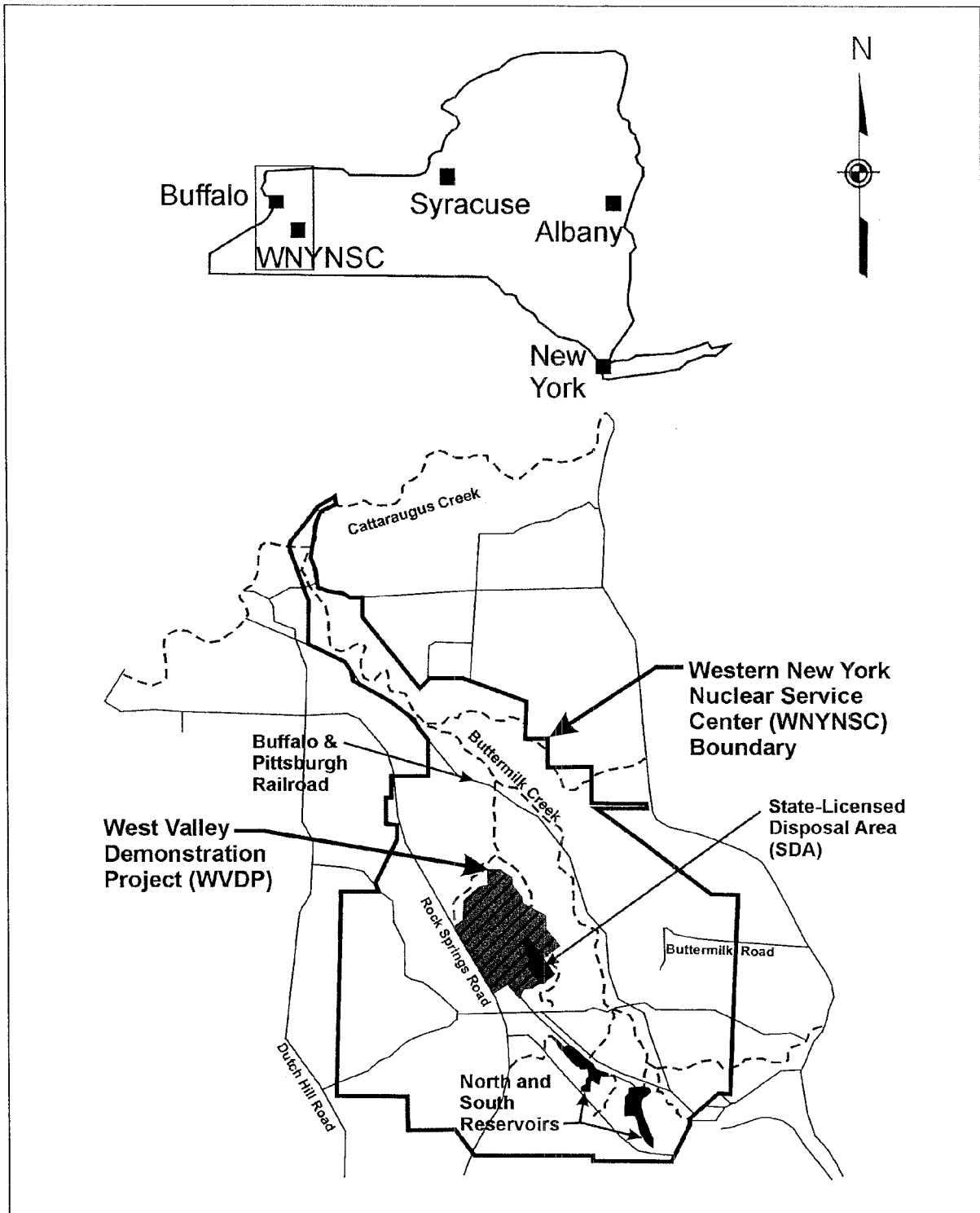


Figure 1-1. The Western New York Nuclear Service Center

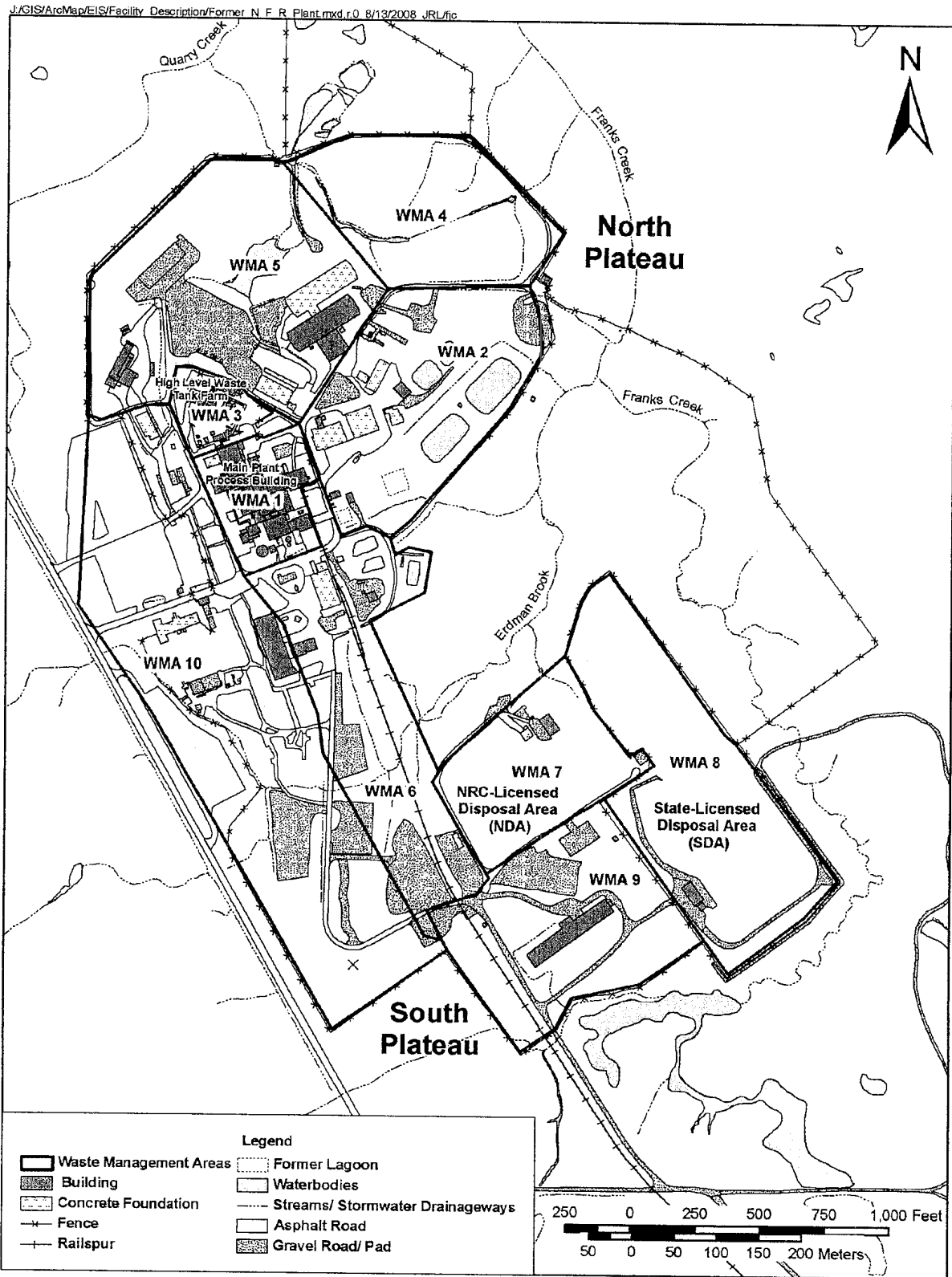


Figure 1-2. The Former Nuclear Fuel Reprocessing Plant and the WVDP in 2006

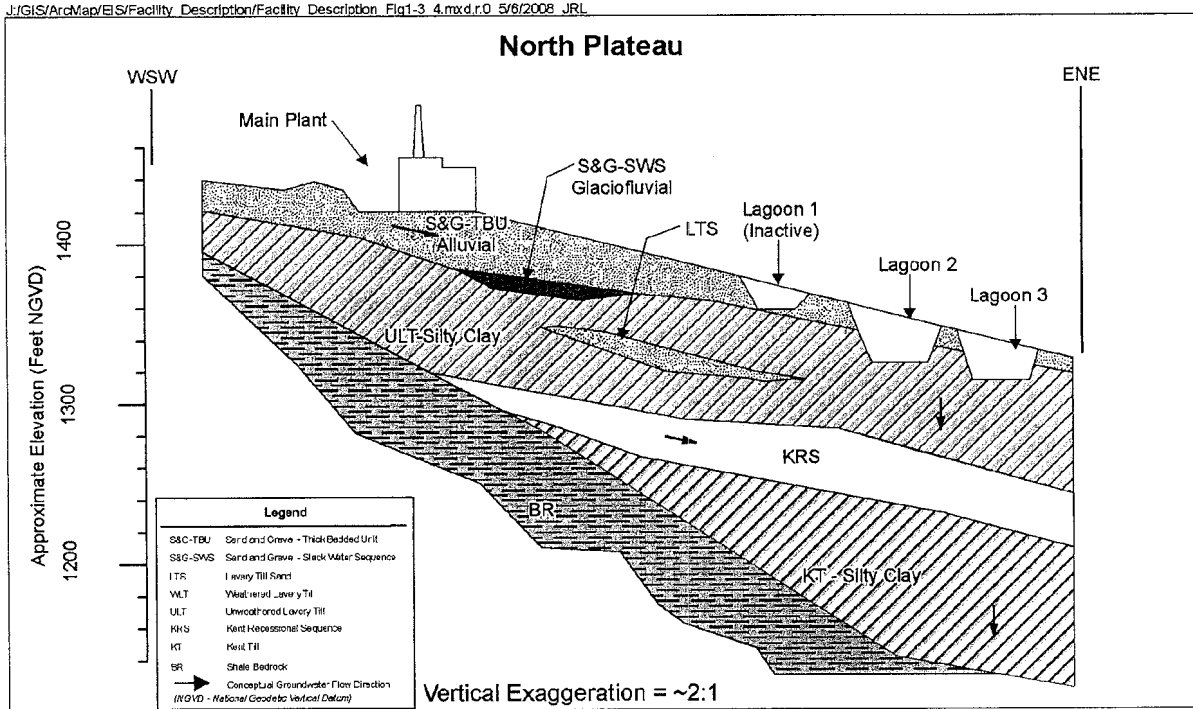


Figure 1-3. North Plateau Geologic Cross Section (from WVNSCO and URS, 2007)

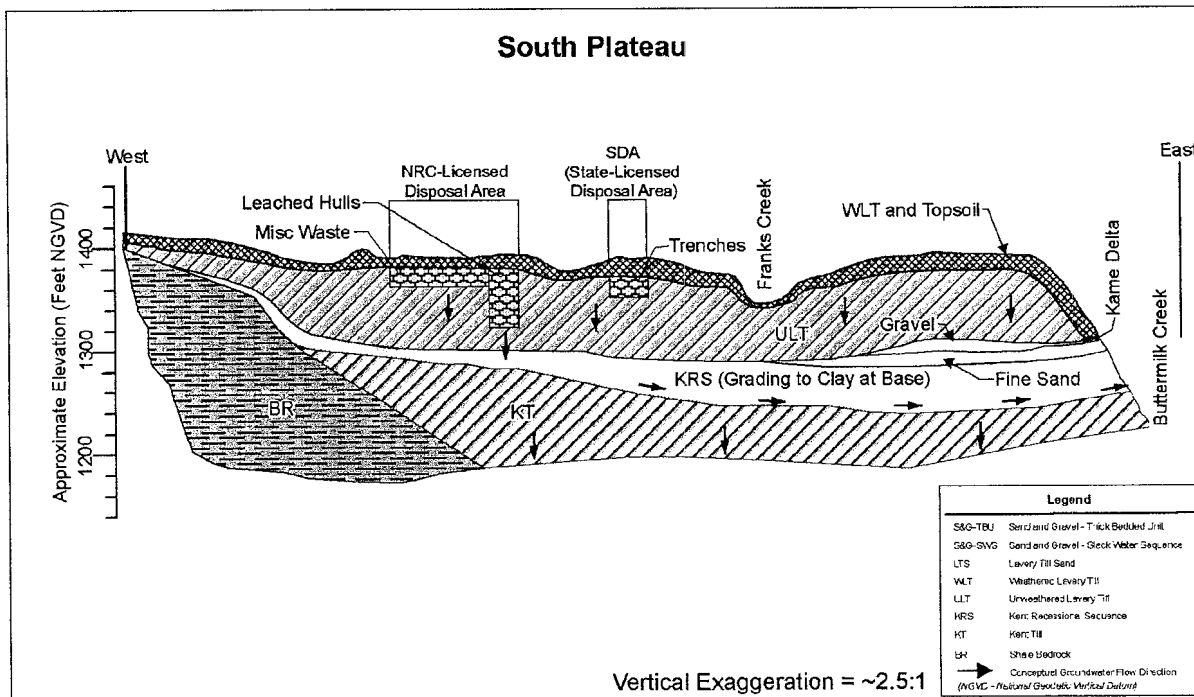


Figure 1-4. South Plateau Geologic Cross Section (from WVNSCO and URS, 2007)

1.3.2 Conditions at the Starting Point of the EIS

Closure of the WNYSNC will occur in two separate phases: the deactivation phase and the decommissioning phase. The deactivation phase will produce conditions referred to as the Interim End State. The deactivation work is being accomplished by West Valley Environmental Services LLC (WVES) for the DOE.

1.3.3 Alternatives Being Evaluated

Four decommissioning alternatives are being evaluated in the EIS:

- The Sitewide Removal Alternative;
- The Sitewide Close-In-Place Alternative;
- The Phased Decisionmaking Alternative; and
- The No Action Alternative, which is included for comparison purposes.

Under this alternative, no actions towards decommissioning would be taken and no release of property would occur. The no-action alternative would involve the continued management and oversight of all facilities located on the Center property at a steady funding level.

1.3.4 The Role of Technical Reports in EIS Evaluations

This technical report, as noted previously, provides information in support of conceptual engineering studies prepared in support of the EIS that are described in other technical reports. Four other related technical reports provide specific data inputs to the EIS for each of the previously mentioned alternatives.

These reports describe engineered approaches that could be used for the decommissioning. These approaches are conceptual, typical designs representative of the different alternatives being evaluated. The information contained in these technical reports facilitates quantitative comparison of decommissioning alternatives and the identification of key closure engineering parameters.

Each of the other technical reports describes a technical and engineering approach suitable for achieving the given end state for a particular alternative. However, it is not intended to represent the only approach that could be taken, nor to limit consideration of other feasible approaches that might be used to accomplish the alternative.

After an alternative is selected for implementation, more detailed evaluations, such as value engineering studies and as low as reasonably achievable (ALARA) analyses, will be conducted in order to optimize the approach and generate follow-up implementation documents.

1.3.5 Estimates and Their Bases

The other technical reports provide estimates for implementing the alternatives, such as quantities and types of construction materials, utility requirements, and labor requirements. In addition, volumes of wastes that could be generated are estimated. Costs for implementing the alternative are estimated for the representative implementation approaches.

Among the bases for these estimates are industry standards, DOE experience, site-specific information, and standard cost-estimating factors. The resulting rough order of magnitude estimates provide a consistent basis for comparison of the decommissioning alternatives for the Center.

Section 3 of this report provides details of the bases used for the estimates provided in the other technical reports.

2.0 DESCRIPTION OF FACILITIES BY WASTE MANAGEMENT AREA

The Center has been divided into 12 WMAs for remediation purposes, as follows:

- WMA 1: Main Plant Process Building and Vitrification Facility Area;
- WMA 2: Low-Level Waste Treatment Facility Area;
- WMA 3: Waste Tank Farm Area;
- WMA 4: Construction and Demolition Debris Landfill;
- WMA 5: Waste Storage Area;
- WMA 6: Central Project Premises;
- WMA 7: NRC-Licensed Disposal Area and Associated Facilities;
- WMA 8: State-Licensed Disposal Area and Associated Facilities;
- WMA 9: Radwaste Treatment System Drum Cell;
- WMA 10: Support and Services Area;
- WMA 11: Bulk Storage Warehouse and Hydrofracture Test Well Area; and
- WMA 12: Balance of Site

WMAs 11 and 12 are identified on Figure 2-2.

Figure 2-1 shows WMAs 1 through 10 which are located on the Project premises, which is controlled by the DOE, except for WMA 8, which is managed by NYSERDA and is not part of the Project premises.

Table 2-1 presents the facilities/areas within each WMA that would remain at the starting point of the EIS.