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60	R. R. LOUX	WMPD/CARSON CITY	124	S. H. Klein	SAIC			
61	RON HELMS	SAIC	125	GEORGE MORRISON	SAIC			
62	RON MAY	SAIC	126	GEORGE DEWEY	SAIC			

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

- REMOVE - The NNWSI Work Breakdown Structure FY 1987, dated 19 January 88 (pages 1 thru 17) located in the Index in the front of the WBS Dictionary.
- INSERT - The NNWSI Work Breakdown Structure FY 1987, dated 25 March 88 (pages 1 thru 17) into the Index in the front of the WBS Dictionary.
- REMOVE - 1.2.1.1.S, Rev. 1, and 1.2.1.1.T.
- INSERT - 1.2.1.1.S, Rev. 1, and 1.2.1.1.T, Rev. 0.
- REMOVE - 1.2.1.2.4 and 1.2.1.2.4.A, Rev. 1.
- INSERT - 1.2.1.2.4, Rev. 0, and 1.2.1.2.4.A, Rev. 1.
- REMOVE - 1.2.1.2.4.S, Rev. 2, and 1.2.1.2.4.T, Rev. 1.
- INSERT - 1.2.1.2.4.S, Rev. 2, and 1.2.1.2.4.T, Rev. 2.
- INSERT - 1.2.1.3.4.T, Rev. 0, and "Page Intentionally Left Blank".
- REMOVE - 1.2.1.4.4.S, Rev. 1.
- INSERT - 1.2.1.4.4.S, Rev. 1, and 1.2.1.4.5.T, Rev. 0.
- REMOVE - 1.2.2.1.R, Rev. 1, and 1.2.2.1.T.
- INSERT - 1.2.2.1.R, Rev. 1, and 1.2.2.1.T, Rev. 0.
- REMOVE - 1.2.2.2.L, Rev. 1 (continuation sheet) and 1.2.2.3.
- INSERT - 1.2.2.2.L, Rev. 1 (continuation sheet) and 1.2.2.2.T, 1.2.2.2.T, Rev. 0 (continuation sheet) and 1.2.2.3.
- REMOVE - 1.2.2.3.1.2.L, Rev. 0, 1.2.2.3.2.L, 1.2.2.3.2.L (continuation sheet) and 1.2.2.3.3.L.
- INSERT - 1.2.2.3.1.2.L, Rev. 0, and 1.2.2.3.1.3.T, Rev. 0.
- INSERT - 1.2.2.3.2.L, and 1.2.2.3.2.L (continuation sheet), Rev. 2.
- INSERT - 1.2.2.3.3.L, Rev. 2, and "Page Intentionally Left Blank".

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- INSERT - 1.2.2.4.T and 1.2.2.4.T,
(continuation sheet), Rev. 0.
- REMOVE - 1.2.2.5.2.L, Rev. 0.
- INSERT - 1.2.2.5.2.L, Rev. 0, and 1.2.2.5.3.T, Rev. 0.
- REMOVE - 1.2.3.1.R and 1.2.3.1.T, Rev. 1.
- INSERT - 1.2.3.1.R and 1.2.3.1.T, Rev. 2.
- REMOVE - 1.2.3.5.1.R, Rev. 2, and 1.2.3.5.1.T, Rev. 0.
- INSERT - 1.2.3.5.1.R, Rev. 2, and 1.2.3.5.1.T, Rev. 1.
- REMOVE - 1.2.3.6.1.T, Rev. 2, and 1.2.3.6.1.U, Rev. 1.
- INSERT - 1.2.3.6.1.T, Rev. 3, and 1.2.3.6.1.U, Rev. 1.
- REMOVE - 1.2.3.7.T, Rev. 1, and 1.2.3.8, Rev. 2.
- INSERT - 1.2.3.7.T, Rev. 2, and 1.2.3.8, Rev. 2.
- REMOVE - 1.2.3.8.L, Rev. 2, and 1.2.3.8.T.
- INSERT - 1.2.3.8.L, Rev. 2, and "Page Intentionally
Left Blank".
- REMOVE - 1.2.4.1.4.S, Rev. 1, 1.2.4.1.5.T, 1.2.4.1.5.T
(continuation sheet) Rev. 1, and 1.2.4.2.
- INSERT - 1.2.4.1.4.S, Rev. 1, 1.2.4.1.5.T, "Page Left
Intentionally Blank" and 1.2.4.2.
- INSERT - 1.2.4.2.4.T, Rev. 0 and "Page Intentionally
Left Blank".
- REMOVE - 1.2.4.3.5.S, Rev. 1, and 1.2.4.4, Rev. 1.
- INSERT - 1.2.4.3.5.S, Rev. 1, and 1.2.4.3.6.T. Rev. 0.
- INSERT - 1.2.4.4, Rev. 1, and "Page Intentionally
Left Blank".
- INSERT - 1.2.4.4.T, Rev. 0, and "Page Intentionally
Left Blank".

- INSERT - 1.2.4.5.T, REV. 0, and "Page Intentionally Left Blank".
- INSERT - 1.2.4.6.5.T, Rev. 0, and "Page Intentionally Left Blank".
- REMOVE - 1.2.5.1.T, Rev. 1, and 1.2.5.2, Rev. 1.
- INSERT - 1.2.5.1.T, Rev. 2, and 1.2.5.2, Rev. 1.
- REMOVE - 1.2.5.2.1.S, Rev. 2, and 1.2.5.2.1.T, Rev. 2.
- INSERT - 1.2.5.2.1.S, Rev. 2, and 1.2.5.2.1.T, Rev. 3.
- REMOVE - 1.2.5.3.1.T, Rev. 1, and 1.2.5.3.2, Rev. 1.
- INSERT - 1.2.5.3.1.T, Rev. 2, and 1.2.5.3.2, Rev. 1.
- REMOVE - 1.2.5.3.2.T, Rev. 0, and 1.2.5.3.3.T, Rev. 1.
- INSERT - 1.2.5.3.2.T, Rev. 1, and 1.2.5.3.3.T, Rev. 2.
- REMOVE - 1.2.5.3.4.T, and 1.2.5.4, Rev. 2.
- INSERT - "Page Intentionally Left Blank" and 1.2.5.4, Rev. 2.
- REMOVE - 1.2.5.4.1.T, Rev. 1.
- INSERT - 1.2.5.4.1.T, Rev. 2, and "Page Intentionally Left Blank".
- REMOVE - 1.2.6.1.1.T, Rev. 0, and 1.2.6.1.2, Rev. 2.
- INSERT - 1.2.6.1.1.T, Rev. 1, and 1.2.6.1.2, Rev. 2.
- REMOVE - 1.2.6.1.2.S, Rev. 2, and 1.2.6.1.2.T, Rev. 3.
- INSERT - 1.2.6.1.2.S, Rev. 2, and 1.2.6.1.2.T, Rev. 4.
- REMOVE - 1.2.6.1.3.T, Rev. 0, and 1.2.6.2, Rev. 2.
- INSERT - "Page Intentionally Left Blank" and 1.2.6.2, Rev. 2.
- INSERT - 1.2.6.8.4.T, Rev. 0, and "Page Intentionally Left Blank".

- INSERT - 1.2.6.9.5.T and 1.2.6.9.5.T, (continuation sheet), Rev. 0.
- REMOVE - 1.2.7.1.R, Rev. 1, and 1.2.7.2, Rev. 2.
- INSERT - 1.2.7.1.R, Rev. 1, 1.2.7.1.T, 1.2.7.1.T, (continuation sheet), Rev. 0 and 1.2.7.2, Rev. 2.
- REMOVE - 1.2.8.2.T and 1.2.8.2.T, Rev. 0 (continuation sheet).
- REMOVE - 1.2.8.3, Rev. 0, and 1.2.8.3.T, Rev. 0.
- INSERT - 1.2.8.3, Rev. 0, and "Page Intentionally Left Blank".
- REMOVE - 1.2.9.1.1.S, Rev. 2, 1.2.9.1.1.T, 1.2.9.1.1.T, (continuation sheet), Rev. 1 and 1.2.9.1.2, Rev. 1.
- INSERT - 1.2.9.1.1.S, Rev. 2, 1.2.9.1.1.T, 1.2.9.1.1.T, (continuation sheet), Rev. 2 and 1.2.9.1.2, Rev. 1.
- REMOVE - 1.2.9.1.2.S, Rev. 1, 1.2.9.1.2.T, Rev. 1.
- INSERT - 1.2.9.1.2.S, Rev. 1, and 1.2.9.1.2.T, Rev. 2.
- REMOVE - 1.2.9.1.3.S, Rev. 1, and 1.2.9.1.3.T, Rev. 1.
- INSERT - 1.2.9.1.3.S, Rev. 1, and 1.2.9.1.3.T, Rev. 2.
- REMOVE - 1.2.9.1.4.H, Rev. 0, and 1.2.9.1.4.L, Rev. 4.
- INSERT - 1.2.9.1.4.H, Rev. 1, and 1.2.9.1.4.L, Rev. 4.
- REMOVE - 1.2.9.1.4.T, Rev. 4, and 1.2.9.2, Rev. 2.
- INSERT - 1.2.9.1.4.T, Rev. 5, and 1.2.9.2, Rev. 2.
- REMOVE - 1.2.9.2.S, Rev. 2, and 1.2.9.2.T, Rev. 1.
- INSERT - 1.2.9.2.S, Rev. 2, and 1.2.9.2.T, Rev. 2.
- REMOVE - 1.2.9.3.T, Rev. 1, and 1.2.9.9.X.
- INSERT - 1.2.9.3.T, Rev. 2, and 1.2.9.9.X.

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 - 1.2.3.2.3.3.G Seismicity & Strain**
 - 1.2.3.2.3.4.S Weapons-Test Seismicity**
- 1.2.3.3 Hydrology**
 - 1.2.3.3.1.G Stream Flow**
 - 1.2.3.3.2 Groundwater Flow Analysis**
 - 1.2.3.3.2.B LBL**
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 - 1.2.3.3.3.G Saturated Zone Hydrology**
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 - 1.2.4.6.2.S Design Analysis
 - 1.2.4.6.3.S Preclosure Safety Analysis
 - 1.2.4.6.4.S Performance Confirmation
 - 1.2.4.6.5.T SAIC

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- 1.2.5 REGULATORY AND INSTITUTIONAL
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 - 1.2.5.1.T SAIC
 - 1.2.5.2 Licensing
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 - 1.2.5.2.3 Construction Authorization Application
 - 1.2.5.2.4 Preliminary Safety Analysis Report
 - 1.2.5.3 Environmental Compliance
 - 1.2.5.3.1 Environmental Assessment
 - 1.2.5.3.1.A LANL
 - 1.2.5.3.1.G USGS
 - 1.2.5.3.1.L LLNL
 - 1.2.5.3.1.S SNL
 - 1.2.5.3.1.T SAIC
 - 1.2.5.3.2 Environmental Impact Statement
 - 1.2.5.3.2.G USGS

NNWSI Project Work Breakdown Structure FY1987
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1.2.5.3.2.S SNL
1.2.5.3.2.T SAIC

1.2.5.3.3.T Environmental Regulatory Interactions

1.2.5.4 Communication and Liason

1.2.5.4.1 Institutional Studies

1.2.5.4.1.S SNL
1.2.5.4.1.T SAIC

1.2.6 EXPLORATORY SHAFT INVESTIGATIONS

1.2.6.1 Management and Integration

1.2.6.1.1 Exploratory Shaft Management, Planning and
Design Review

1.2.6.1.1.A LANL
1.2.6.1.1.F F&S
1.2.6.1.1.G USGS
1.2.6.1.1.H H&N
1.2.6.1.1.L LLNL
1.2.6.1.1.R REECO
1.2.6.1.1.S SNL
1.2.6.1.1.T SAIC

1.2.6.1.2 Quality Assurance

1.2.6.1.2.A LANL
1.2.6.1.2.F F&S
1.2.6.1.2.G USGS
1.2.6.1.2.H H&N
1.2.6.1.2.L LLNL
1.2.6.1.2.R REECO
1.2.6.1.2.S SNL
1.2.6.1.2.T SAIC

1.2.6.1.3 Safety

1.2.6.1.3.A LANL
1.2.6.1.3.F F&S

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1.2.6.1.3.G	USGS
1.2.6.1.3.H	H&N
1.2.6.1.3.L	LLNL
1.2.6.1.3.R	REECo
1.2.6.1.3.S	SNL

1.2.6.2 Site Preparation

1.2.6.2.1 Site & Roads

1.2.6.2.1.H	H&N
1.2.6.2.1.R	REECo

1.2.6.2.2 Utilities & Communications Systems

1.2.6.2.2.H	H&N
1.2.6.2.2.R	REECo

1.2.6.3 Surface Facilities

1.2.6.3.1 Buildings

1.2.6.3.1.F	F&S
1.2.6.3.1.H	H&N
1.2.6.3.1.R	REECo

1.2.6.4 First Shaft

1.2.6.4.1 Shaft and Liner

1.2.6.4.1.F	F&S
1.2.6.4.1.H	H&N
1.2.6.4.1.R	REECo

1.2.6.4.2 Hoist and Headframe

1.2.6.4.2.F	F&S
1.2.6.4.2.H	H&N
1.2.6.4.2.R	REECo

1.2.6.5 Second Shaft

1.2.6.5.1 Shaft and Liner

1.2.6.5.1.F	F&S
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1.2.6.5.1.H	H&N
1.2.6.5.1.R	REECo
1.2.6.5.2	Hoist and Headframe
1.2.6.5.2.F	F&S
1.2.6.5.2.H	H&N
1.2.6.5.2.R	REECo
1.2.6.6	Subsurface Excavations
1.2.6.6.F	F&S
1.2.6.6.H	H&N
1.2.6.6.R	REECo
1.2.6.7	Underground Service Systems
1.2.6.7.1	Utilities & Communications
1.2.6.7.1.F	F&S
1.2.6.7.1.H	H&N
1.2.6.7.1.R	REECo
1.2.6.7.2	Mine Plant
1.2.6.7.2.F	F&S
1.2.6.7.2.H	H&N
1.2.6.7.2.R	REECo
1.2.6.7.3	Shaft Internals & Conveyances-First Shaft
1.2.6.7.3.F	F&S
1.2.6.7.3.H	H&N
1.2.6.7.3.R	REECo
1.2.6.7.4	Shaft Internals & Conveyances-Second Shaft
1.2.6.7.4.F	F&S
1.2.6.7.4.H	H&N
1.2.6.7.4.R	REECo
1.2.6.8	Operations
1.2.6.8.1.R	Site & Equipment Maintenance

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25 March 88

1.2.6.8.2.R Project Operations
1.2.6.8.3.R Training
1.2.6.8.4.T SAIC

1.2.6.9 Testing

1.2.6.9.1 Exploratory Shaft Test Plan

1.2.6.9.1.A LANL
1.2.6.9.1.G USGS
1.2.6.9.1.L LLNL
1.2.6.9.1.S SNL

1.2.6.9.2 Exploratory Shaft Testing

1.2.6.9.2.1 Geologic Testing

1.2.6.9.2.1.B LBL
1.2.6.9.2.1.F F&S
1.2.6.9.2.1.G USGS
1.2.6.9.2.1.H H&N
1.2.6.9.2.1.P Pan Am
1.2.6.9.2.1.R REEC_o

1.2.6.9.2.2 Hydrologic Testing

1.2.6.9.2.2.F F&S
1.2.6.9.2.2.G USGS
1.2.6.9.2.2.H H&N
1.2.6.9.2.2.R REEC_o

1.2.6.9.2.3 Geomechanical Testing

1.2.6.9.2.3.F F&S
1.2.6.9.2.3.G USGS
1.2.6.9.2.3.H H&N
1.2.6.9.2.3.R REEC_o
1.2.6.9.2.3.S SNL

1.2.6.9.2.4 Geochemical Testing

1.2.6.9.2.4.A LANL
1.2.6.9.2.4.F F&S
1.2.6.9.2.4.G USGS

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1.2.6.9.2.4.H H&N
1.2.6.9.2.4.R REECo

1.2.6.9.2.5 Engineered Barrier Design Testing

1.2.6.9.2.5.F F&S
1.2.6.9.2.5.H H&N
1.2.6.9.2.5.L LLNL
1.2.6.9.2.5.R REECo

1.2.6.9.3 Integrated Data System

1.2.6.9.3.A LANL
1.2.6.9.3.H H&N
1.2.6.9.3.R REECo

1.2.6.9.4 Prototype Testing

1.2.6.9.4.1 Prototype Geologic Testing

1.2.6.9.4.1.A LANL
1.2.6.9.4.1.B LBL
1.2.6.9.4.1.F F&S
1.2.6.9.4.1.G USGS
1.2.6.9.4.1.H H&N
1.2.6.9.4.1.P Pan Am
1.2.6.9.4.1.R REECo

1.2.6.9.4.2 Prototype Hydrologic Testing

1.2.6.9.4.2.F F&S
1.2.6.9.4.2.G USGS
1.2.6.9.4.2.H H&N
1.2.6.9.4.2.R REECo

1.2.6.9.4.3 Prototype Geomechanical Testing

1.2.6.9.4.3.F F&S
1.2.6.9.4.3.G USGS
1.2.6.9.4.3.H H&N
1.2.6.9.4.3.R REECo
1.2.6.9.4.3.S SNL

1.2.6.9.4.4 Prototype Geochemical Testing

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25 March 88

1.2.6.9.4.4.A	LANL
1.2.6.9.4.4.F	F&S
1.2.6.9.4.4.G	USGS
1.2.6.9.4.4.H	H&N
1.2.6.9.4.4.R	REECo

1.2.6.9.4.5 Prototype Engineered Barrier Design Testing

1.2.6.9.4.5.F	F&S
1.2.6.9.4.5.H	H&N
1.2.6.9.4.5.L	LLNL
1.2.6.9.4.5.R	REECo

1.2.6.9.4.6 Prototype Air Coring

1.2.6.9.4.6.A	LANL
1.2.6.9.4.6.F	F&S
1.2.6.9.4.6.H	H&N
1.2.6.9.4.6.R	REECo

1.2.6.9.4.7 Prototype IDS Testing

1.2.6.9.4.7.A	LANL
1.2.6.9.4.7.H	H&N
1.2.6.9.4.7.R	REECo

1.2.6.9.5.T Test Support

1.2.6.10 Decommissioning

1.2.7 TEST FACILITIES

1.2.7.1 Management & Integration

1.2.7.1.F	F&S
1.2.7.1.H	H&N
1.2.7.1.R	REECo
1.2.7.1.T	SAIC

1.2.7.2 Testing

1.2.7.2.1 Climax

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1.2.7.2.1.F	F&S
1.2.7.2.1.H	H&N
1.2.7.2.1.L	LLNL
1.2.7.2.1.R	REECo
1.2.7.2.2	E-MAD
1.2.7.2.2.H	H&N
1.2.7.2.2.R	REECo
1.2.7.2.2.W	Westinghouse
1.2.7.2.3	G-Tunnel
1.2.7.2.3.F	F&S
1.2.7.2.3.H	H&N
1.2.7.2.3.R	REECo
1.2.7.3	New Facility Acquisitions
1.2.8	LAND ACQUISITION
1.2.8.1	Management and Integration
1.2.8.1.T	SAIC
1.2.8.2	Exploratory Shaft
1.2.8.3	Repository
1.2.9	PROJECT MANAGEMENT
1.2.9.1	Management and Integration
1.2.9.1.1	Management
1.2.9.1.1.A	LANL
1.2.9.1.1.C	CSC
1.2.9.1.1.F	F&S
1.2.9.1.1.G	USGS
1.2.9.1.1.H	H&N
1.2.9.1.1.I	Security/WSI
1.2.9.1.1.J	OSTI/TC

NNWSI Project Work Breakdown Structure FY1987
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1.2.9.1.1.L	LLNL
1.2.9.1.1.R	REEC _o
1.2.9.1.1.S	SNL
1.2.9.1.1.T	SAIC

1.2.9.1.2 Interface Activities

1.2.9.1.2.A	LANL
1.2.9.1.2.G	USGS
1.2.9.1.2.L	LLNL
1.2.9.1.2.R	REEC _o
1.2.9.1.2.S	SNL
1.2.9.1.2.T	SAIC

1.2.9.1.3 Geologic Repository Program Support

1.2.9.1.3.A	LANL
1.2.9.1.3.G	USGS
1.2.9.1.3.L	LLNL
1.2.9.1.3.S	SNL
1.2.9.1.3.T	SAIC

1.2.9.1.4 Records Management

1.2.9.1.4.A	LANL
1.2.9.1.4.F	F&S
1.2.9.1.4.G	USGS
1.2.9.1.4.H	H&N
1.2.9.1.4.L	LLNL
1.2.9.1.4.R	REEC _o
1.2.9.1.4.S	SNL
1.2.9.1.4.T	SAIC

1.2.9.2 Project Control

1.2.9.2.A	LANL
1.2.9.2.F	F&S
1.2.9.2.G	USGS
1.2.9.2.H	H&N
1.2.9.2.L	LLNL
1.2.9.2.R	REEC _o
1.2.9.2.S	SNL
1.2.9.2.T	SAIC

1.2.9.3 Quality Assurance

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25 March 88

1.2.9.3.A	LANL
1.2.9.3.F	F&S
1.2.9.3.G	USGS
1.2.9.3.H	H&N
1.2.9.3.L	LLNL
1.2.9.3.R	REECo
1.2.9.3.S	SNL
1.2.9.3.T	SAIC

1.2.9.9.X NTS Allocation

1.2.10 FINANCIAL & TECHNICAL ASSISTANCE

1.2.10.1.N State of Nevada

Undistributed Budget

NNWSI Project Work Breakdown Structure FY1987
25 March 88

TOTAL WBS ITEMS IN BUDGET TABLE FOR FY-1987: 462

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.1.S

TITLE: Systems Management and Integration

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To manage and integrate work performed within the systems WBS elements.

DESCRIPTION OF WORK: All efforts required to:

- o provide overall management of the systems activities, including planning, scheduling, budgeting, controlling, and reporting
- o provide for interaction with other OCRWM participants in the systems area (e.g., participation in the Performance Assessment Coordinating Group)
- o prepare and implement QA program procedures for systems activities.

C/SCR:

APPROVED:

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.1.T

TITLE: Systems Management and Integration

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To assist the Project Office in the organization and integration of the systems element of the Project.

DESCRIPTION OF WORK: All efforts required to:

- o provide support to the WMPO to develop programmatic guidance to the Project
- o provide support to WMPO for planning, scheduling, budgeting, coordinating, controlling, and reporting of the systems activities
- o provide support to Project Quality Assurance activities as required (including QA audits and development of QA procedures)
- o perform management and milestone criteria reviews of Project technical documents and coordinate the technical and policy reviews of these documents
- o provide support to monitor and coordinate work performed by Project participants, including the review of their work for completeness, technical sufficiency, and compliance with Project requirements
- o support the WMPO in the development of technical responses to inquiries from NRC, EPA, State, and action items from OCRWM
- o provide integration of systems interfaces with other third level WBS elements and ensure that interfaces are defined and controlled within the systems elements
- o participate in coordinating group meetings as required
- o provide for interaction with other OCRWM participants in the systems area (e.g., participation in the Performance Assessment Coordinating Group).

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.2.4

TITLE: Systems Engineering Integration

PARTICIPANT:

OBJECTIVE: To provide for the integration of technical activities of the NNWSI Project toward an efficient Mined Geologic Disposal System for the Yucca Mountain Site that meets DOE and regulatory requirements.

DESCRIPTION OF WORK: All efforts required to:

- o coordinate the participant activities to establish the NNWSI Project Systems Engineering Management Plan (SEMP)
- o provide for detailed site-specific systems engineering procedures that will meet the unique needs of the NNWSI Project and requirements of the OGR SEMP
- o develop the technical element of the NNWSI Project Technical Baseline in accordance with the NNWSI Project SEMP and related change control procedures
- o plan, coordinate, and conduct internal and OCRWM technical reviews for the NNWSI Project
- o provide guidance for System Studies and Coordinating Groups on specific technical topics.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.2.4.A

TITLE: Systems Engineering Integration

PARTICIPANT: Los Alamos National Laboratory

OBJECTIVE: To provide for the integration of technical activities of the NNWSI Project toward an efficient Mined Geologic Disposal System for the Yucca Mountain Site that meets DOE and regulatory requirements.

DESCRIPTION OF WORK: All efforts required to:

- o coordinate the participant activities to establish the NNWSI Project Systems Engineering Management Plan (SEMP)
- o provide for detailed site-specific systems engineering procedures that will meet the unique needs of the NNWSI Project and requirements the OGR SEMP
- o develop an NNWSI Project Technical Baseline in accordance with the NNWSI Project SEMP and related change control procedures
- o plan, coordinate, and conduct internal and OGR technical reviews for the NNWSI Project
- o provide guidance for System Studies and Coordinating Groups on specific technical topics.

C/SCR: 86/051

APPROVED: 06-dec-1985

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.2.4.S

TITLE: Systems Engineering Integration

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To provide for the interfacing and integration of technical activities of the NNWSI Project to ensure an efficient Mined Geologic Disposal System for the Yucca Mountain Site that meets DOE and regulatory requirements.

DESCRIPTION OF WORK: All efforts required to:

- o coordinate the participant activities to develop and maintain the NNWSI Project Systems Engineering Management Plan (SEMP)
- o provide for detailed site-specific systems engineering procedures that will meet the unique needs of the NNWSI Project and concurrently satisfy requirements of the NNWSI SEM and the OGR SEM
- o guide the development of an NNWSI Project Technical Baseline and related change control procedures in accordance with the NNWSI Project SEM
- o plan, coordinate as appropriate, and conduct internal and OGR technical reviews for the NNWSI Project
- o provide guidance for System Studies and Coordinating Groups on specific technical topics.

C/SCR: 87/244

APPROVED: 14-dec-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.2.4.T

TITLE: Systems Engineering Integration

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide for the integration of technical activities of the NNWSI Project toward an efficient Mined Geologic Disposal System for the Yucca Mountain Site that meets DOE and regulatory requirements.

DESCRIPTION OF WORK: All efforts required to:

- o coordinate the participant activities to develop, implement, and maintain the NNWSI Project Systems Engineering Management Plan (SEMP)
- o provide for detailed site-specific systems engineering procedures that will meet the unique needs of the NNWSI Project and requirements of the OGR SEMP
- o develop the technical element of the NNWSI Project Technical Baseline in accordance with the NNWSI Project SEMP and related change control procedures
- o plan, coordinate, and conduct internal and OCRWM technical reviews for the NNWSI Project
- o provide guidance for System Studies and Coordinating Groups on specific technical topics.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.3.4.T

TITLE: Data Base Management Computer Systems Support

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide the design, development, installation, operation, and maintenance of computer hardware and software to support technical data management.

DESCRIPTION OF WORK: All efforts required to:

- o develop a Project-wide system to manage the planning and performance of technical data acquisition, the validation and release of data, and the use of the data
- o develop a computerized system for the storage, manipulation, and retrieval of technical data for the Project
- o coordinate the development and implementation of the systems throughout the Project
- o operate and maintain the system on a Project level; integrate participant support and use of the system.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.4.4.S

TITLE: Radionuclide Releases from Total System

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To develop the mathematical models and perform the calculations necessary to evaluate the postclosure performance of a total waste disposal system at Yucca Mountain against long-term containment standards.

DESCRIPTION OF WORK: All efforts required to:

- o develop and document a mathematical model for predicting radionuclide releases from a total waste - disposal system to the accessible environment expected at the repository
- o develop and document special-purpose mathematical models to predict radionuclide releases from the total waste-disposal system to the accessible environment under disturbed surface and subsurface conditions at the repository and the site
- o assess the performance of the total system for inclusion in (1) the NNWSI Project Environmental Assessment, (2) the NNWSI Project Site Characterization Plan, (3) the Environmental Impact Statement (EIS) for a high-level waste repository at Yucca Mountain and (4) the Safety Analysis Report for a high-level waste repository at Yucca Mountain by using models, parametric studies, sensitivity analyses, and probabilistic uncertainty calculations.

C/SCR:
APPROVED:
REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.1.4.5.T

TITLE: Performance Assessment Support

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o provide support to the Project in the area of Total System Performance Assessment with focus on:
 - computer codes used to make such calculations
 - data requirements necessary to operate such codes
 - physical and mathematical modeling required to develop codes
 - documentation, verification, benchmarking, and validating codes
 - interpretation of results against established regulations.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY -- UNCONTROLLED
18-APR-1988 08:46:31

WBS: 1.2.2.1.R

TITLE: Waste Package Management and Integration

PARTICIPANT: Reynolds Electrical & Engineering Co., Inc.

OBJECTIVE: To manage and integrate work performed within the waste package WBS elements.

DESCRIPTION OF WORK: All efforts required to:

- o All efforts required to administer and monitor the contract relating to the peer review of the waste package copper alloy studies by independent contractors.

C/SCR:
APPROVED:
REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY -- UNCONTROLLED
18-APR-1988 08:42:44

WBS: 1.2.2.1.T

TITLE: Waste Package Management and Integration

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To assist the Project Office in the organization and integration of the Waste Package element of the Project.

DESCRIPTION OF WORK: All efforts required to:

- o provide support to the WMPD to develop programmatic guidance to the Project
- o provide support to the WMPD for planning, scheduling, budgeting, coordinating, controlling, and reporting of the Waste Package activities
- o provide support to Project Quality Assurance activities as required (including QA audits and development of QA procedures)
- o perform management and milestone criteria reviews of Project technical documents and coordinate the technical policy review of these documents
- o provide support to monitor and coordinate work performed by Project participants, including the review of their work for completeness, technical sufficiency, and compliance with Project requirements
- o support the WMPD in development of technical responses to inquiries from NRC, EPA, State, and action items from OCRWM
- o provide integration of the waste package interfaces with other third level WBS elements and ensure that interfaces are defined and controlled within the waste package elements
- o participate in coordinating group meetings as required
- o provide for interaction with other OCRWM participants in the waste package area.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.2.L (continued)

C/SCR:
APPROVED:
REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.2.T

TITLE: Waste Package Environment

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o characterize the near-field environment in which the waste package would reside, including the physical, hydrologic, geochemical, and geomechanical conditions in the vicinity of the waste package. This characterization is based on the data obtained through additional tests required to characterize the near-field environment. The waste package function includes the development and confirmation of testing methods for the required additional tests; planning and conduct of the tests; and performance of mathematical modeling and analyses
- o determine how the near-field environment might change in response to repository construction and closure as well as waste emplacement
- o conduct experimental and modeling activities to characterize the waste package environment and to provide input to the waste package and repository design and performance assessment tasks
- o provide a data base on the environment into which the waste packages are to be introduced
- o analyze and evaluate data obtained and use the data as input to validate geochemical modeling code EQ3/6
- o review and support experiments to evaluate the effects of dehydration-rehydration cycles on tuff and to determine hydrologic properties of tuff in a temperature gradient (to simulate effects from heating of tuff by radioactive waste emplacement)
- o evaluate various techniques and methods for stability analysis of waste emplacement boreholes, using geological and geophysical properties of Yucca Mountain tuff, in order to evaluate the

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.2.T (continued)

retrievability of waste packages from the tuff repository.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.3

TITLE: Waste Form and Materials Testing

PARTICIPANT:

OBJECTIVE: To perform the testing and evaluation necessary to identify the waste package components required by specific host rock and to select the materials for those components.

DESCRIPTION OF WORK: All efforts required to:

A. Waste Form - consisting of all efforts required to:

- o characterize the behavior and determine radionuclide release rates and mechanisms for spent fuel, commercial high-level waste (CHLW) and other waste forms under both expected and unexpected repository conditions. Includes the development and confirmation of testing methods and the planning and conduct of tests, includes interaction tests between the waste form and the barrier material
- o develop conceptual models to describe radionuclide release rates from the waste forms for use in evaluating waste package performance
- o develop waste form acceptance requirements and specifications
- o provide input to waste package and repository design and performance assessment tasks

B. Metal Barriers - consisting of all efforts required to:

- o characterize the behavior and determine corrosion rates and corrosion mechanisms, including the interaction between the metal barrier and its surrounding environment. Plan and conduct metal degradation tests to determine corrosion modes of candidate materials for the waste package canister and overpack under both expected and unexpected repository conditions. Includes the development and confirmation of testing methods, and the planning and conduct of tests
- o provide input to canister and overpack design, and to waste package and repository design and performance assessment tasks.

C. Other Materials - Consisting of all efforts required to:

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.3.1.2.L

TITLE: Waste-Forming Testing - Glass

PARTICIPANT: Lawrence Livermore National Laboratory

OBJECTIVE: To characterize the behavior of and determine the radionuclide release rates for Glass Waste Forms in the environment in order to establish data base to support predictions of engineered barrier system performance required for license applications in accord with the requirements of 10 CFR 60 and 40 CFR 191.

DESCRIPTION OF WORK: All efforts required to:

- o determine radionuclide release rates from glass waste forms under saturated conditions, by carrying out parameteric testing of glass waste using both inactive (simulated) and fully active samples over a range of temperatures using J-13 water; some experiments will be conducted using tuff reaction vessels and the effect of placing canister materials in contact with the tuff - J-13 water system will also be studied.
- o develop and apply a method for the determination of radionuclide release rates from various glass waste forms in an unsaturated environment by measuring release rates under a range of conditions bracketing those expected on the Yucca Mountain repository.
- o determine data on rates, thermodynamic values, and chemical interactions required to apply the release model for use in waste package performance assessment.
- o participate in Waste Acceptance Committee to formulate interim product specifications for reprocessed waste forms to provide guidelines for waste-form producers and requirements on products to assure compatibility with waste-package and repository designs.

C/SCR: 87/191

APPROVED: 04-jun-1987

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.3.1.3.T

TITLE: Waste Form Testing

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o characterize the behavior of and determine radionuclide release rates and mechanisms for spent fuel, commercial high-level waste (CHLW) and other waste forms under both expected and unexpected repository conditions, including the development and confirmation of testing methods and the planning and conduct of tests, such as interaction tests, between the waste form and the barrier material
- o review and support development of conceptual models to describe radionuclide release rates from the waste forms for use in evaluating waste package performance
- o provide input to waste package and repository design and performance assessment tasks
- o review and support the fabrication and testing of waste-package components
- o review and support of the metals for the canister to establish rates and mechanisms of potential failure and to establish numerical values for parameters for the design and specifications of the waste package
- o determine the rate of degradation of spent-fuel cladding and the rate of radionuclide release from spent fuel defense high-level waste (DHLW), West Valley HLW and reference CHLW in the unsaturated zone environment.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.3.2.L

TITLE: Metal-Barrier Selection and Testing

PARTICIPANT: Lawrence Livermore National Laboratory

OBJECTIVE: To characterize the behavior of the metal barrier and to determine corrosion rates and corrosion mechanisms, and characteristics of other degradation modes.

DESCRIPTION OF WORK: All efforts required to:

- o plan and conduct metal degradation tests to determine corrosion modes of candidate materials for the waste-package containers under both expected and unexpected repository conditions, including the development and confirmation of testing methods and the planning and conduct of tests
- o select a material for advanced design work and focus advanced testing and analytical efforts on this material
- o develop conceptual models of corrosion and of alloy aging for use in evaluating waste-package performance
- o characterize the properties and microstructure of the as-emplaced metal barrier and project changes of these features with time in the repository
- o provide input to container design, to waste-package and repository design and performance assessment tasks
- o determine general and localized corrosion properties of the selected material over a range of temperatures and environments relevant to the emplaced waste packages
- o perform stress-corrosion cracking (SCC) susceptibility tests on the selected materials in environments and a range of temperatures relevant to the emplaced waste packages
- o evaluate the effect of gamma irradiation and radiolysis products on metal corrosion
- o apply advanced microscopic and electrochemical techniques to the characterization of the metal performance in the waste package environment.

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.3.2.L (continued)

C/SCR: 87/292

APPROVED: 14-dec-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.3.3.L

TITLE: Other Materials

PARTICIPANT: Lawrence Livermore National Laboratory

OBJECTIVE: To characterize the properties and behavior of other engineered barrier waste-package components that may be present in a repository in order to establish the predicted performance of other materials, and their effects on the ability of waste forms and metals barriers to meet 10 CFR 60 performance requirements.

DESCRIPTION OF WORK: All efforts required to:

- o perform experiments and develop a data base to allow the assessment of the chemical effects of grouts and concrete used in repository construction and/or shaft sealing on the performance of waste-package components
- o analyze data on release of radionuclides from spent fuel (with cladding defects) to evaluate the need for packing material placed around spent-fuel waste-package canisters
- o if appropriate, select suitable packing material for possible use as part of the waste-package system
- o if used, develop a data base of the physical and chemical properties of the selected packing material(s) to ensure that the material(s) will function as required in the repository environment
- o if used, determine fabrication methods for packing material(s).
- o evaluate alternative waste package container materials, such as ceramic liners inside metal containers.

C/SCR: 87/292

APPROVED: 14-dec-1987

REV: 2

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.4.T

TITLE: Design, Fabrication, and Prototype Testing

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o review and validate waste-package design requirements
- o review and support engineering design and analysis to develop and evaluate alternative waste-package concepts, including thermal, structural, criticality, economic, and other analyses
- o review and support development of the waste-package design, including drawings and specifications
- o review and support the planning and conduct of tests to qualify the waste-package design, including the fabrication of test components as well as the development and confirmation of testing methods
- o provide input to the waste-package performance assessment task and to repository design and performance assessment tasks
- o analyze and complete documentation of selected conceptual engineering designs and waste-package assemblies; perform technical and economic analyses using appropriate models and computer codes. Technical evaluations include:
 - (a) safety (nuclear criticality potential associated with the disposal of spent fuel)
 - (b) thermal (models, assumptions, and approximations used to provide temperature history predictions)
 - (c) structural (models, assumptions, and approximations used to demonstrate package integrity)

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.4.T (continued)

- o review and support development and analysis of selected prototype engineering designs for waste-package assemblies based on input from package environment and materials testing and evaluation, as well as from conceptual package designs studies.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.5.2.L

TITLE: Near-field Flow and Transport

PARTICIPANT: Lawrence Livermore National Laboratory

OBJECTIVE: To provide a detailed conceptual and quantitative understanding of the flow and transport processes active in the near-field waste package environment. Activities will provide a basis for the near-field flow and transport submodel to be included in the waste package performance

DESCRIPTION OF WORK: All efforts required to:

- o develop computational models for near-field flow and transport
- o verify and validate those models
- o perform sensitivity analysis to determine the processes and parameters required to simulate near-field flow and transport for performance assessment purposes
- o apply detailed model to study changes in EBS releases that occur in the first few meters of host rock.

C/SCR: 87/192

APPROVED: 04-jun-1987

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.2.5.3.T

TITLE: Waste Package Performance Assessment

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o provide a quantitative prediction of long-term waste-package performance in an unsaturated tuff environment
- o provide a source term necessary for total system performance assessment
- o provide a detailed conceptual and quantitative understanding of the flow and transport processes.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NOTE

WBS: 1.2.3.1.R

TITLE: Management and Integration

PARTICIPANT: REECo

Entry to be determined and supplied at a later date.

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.3.1.T

TITLE: Management and Integration

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To assist the Project Office in the organization and integration of the site element of the Project.

DESCRIPTION OF WORK: All efforts required to:

- o provide support to the WMPO to develop programmatic guidance to the Project
- o provide support to the WMPO for planning, scheduling, budgeting, coordinating, controlling, and reporting of the systems activities
- o provide support to Project Quality Assurance activities as required (including QA audits and development of QA procedures)
- o perform management and milestone criteria reviews of Project technical documents and coordinate the technical and policy reviews of these documents
- o provide support to monitor and coordinate work performed by Project participants, including the review of their work for completeness, technical sufficiency, and compliance with Project requirements
- o support the WMPO in the development of technical responses to inquiries from NRC, EPA, State, and action items from OCRWM
- o provide integration of systems interfaces with other third level WBS elements and ensure that interfaces are defined and controlled within the systems elements
- o participate in coordinating group meetings as required
- o provide for interaction with other OCRWM participants in the site area.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.3.5.1.R

TITLE: Sample Management Facility Support

PARTICIPANT: Reynolds Electrical & Engineering Co., Inc.

OBJECTIVE: To provide general support to Project participants with regard to the Sample Management Facility.

DESCRIPTION OF WORK: All efforts required to:

- o provide general support, office space and clerical assistance
- o procure and maintain vehicles
- o provide radio support
- o provide logistical support to the USGS.

C/SCR: 87/296

APPROVED: 14-dec-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.3.5.1.T

TITLE: Sample Management Facility Support

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide support for the development, management, and operation of the NNWSI Project Sample Management Facility (SMF) to assure sample traceability and control during all phases of sample utilization, including sample acquisition, transportation, storage, testing, and archiving.

DESCRIPTION OF WORK: All efforts required to:

- o develop and implement all Quality Assurance (QA), technical, and administrative procedures to prescribe and control and collection, documentation transportation, processing, inspection, sampling, tracking, examination, and preservation of NNWSI Project samples
- o develop and implement software for a sample inventory and tracking system
- o provide the support to specify, procure, equip, and maintain an appropriate controlled access facility, accommodating the physical layout, equipment, materials, and hardware necessary for all SMF operational phases
- o provide necessary technical and quality management personnel to assure the implementation of required indoctrination and training in QA and technical areas for all SMF operational phases
- o provide appropriate personnel, material and equipment to assist in the acquisition, documentation, handling, and processing of core and non-core samples (such as shaft, drift and other underground bulk samples, fluids and gas samples) at the site of field activities
- o provide appropriate personnel, material and equipment to assist in the reprocessing, reinspection, and scientific relogging existing NNWSI Project of core and samples at the SMF.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.3.6.1.T

TITLE: Environmental Monitoring

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To continuously monitor environmental conditions at Yucca Mountain in order to characterize existing conditions and to ensure compliance with state and federal regulatory requirements. Obtain data necessary to assess current site conditions and monitor impacts of site characterization. Support other NNWSI Project, OCRWM, and T&MSS environmental-related activities.

DESCRIPTION OF WORK: All efforts required to:

- o prepare, maintain and execute environmental field activity plans for the acquisition of data and information on the environment surrounding the proposed repository location, including such data and information as necessary to support provisions of the NWPA, environmental regulatory requirements, and direction and guidance of the WMPO
- o implement the programs, beginning with equipment ordering and proceeding through installation, calibration, and initiation of routine monitoring
- o operate and maintain data-gathering equipment
- o analyze acquired data and provide documentation of such analysis, as appropriate, in the form of data reports, data analysis reports, and topical reports compatible with requirements for end-use environmental and other documentation
- o provide proposed strategies for the mitigation of any potentially significant adverse environmental impacts and recommended courses of action to accomplish program objectives without significantly disrupting the environment.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 3

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.3.6.1.U

TITLE: Archaeology

PARTICIPANT: Desert Research Institute - University of Nevada at Reno

OBJECTIVE: To identify and characterize the cultural resources at the Yucca Mountain site and on lands proposed to be used for repository support facilities.

DESCRIPTION OF WORK: All efforts required to:

- o perform preconstruction surveys to identify and characterize cultural resources on lands proposed for surface disturbing activities
- o monitor identified sites and provide the NNWSI Project with updated composite maps
- o develop a data recovery program in consultation with the Nevada State Historical Preservation Office
- o assist DOE/NV, their contractors, and NNWSI Project participants with cultural resource expertise.

C/SCR:

APPROVED:

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.3.7.T

TITLE: Socioeconomic

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To determine the economic implications of a Yucca Mountain repository and the potential effect of a repository on the quality of life of southern Nevada residents.

DESCRIPTION OF WORK: All efforts required to:

- o prepare a socioeconomic investigations plan incorporating economic, social, cultural resources, community resources, and land use studies to be performed during site characterization
- o identify issues, evaluate research methods, assess information needs and data availability, acquire and analyze data, and prepare reports regarding assessment of the potential social and economic effects of siting, constructing, operating, and decommissioning a repository at Yucca Mountain
- o identify specific socioeconomic issues to be the subject of detailed research and analysis during site characterization
- o acquire and analyze the data needed to establish the social and economic conditions and potential impacts in the area likely to be affected by the construction and operation of a repository, including field activities required to obtain data
- o develop plans and strategies to mitigate potential adverse social and economic impacts
- o identify social and economic areas of concern and potential impacts from transportation of high-level radioactive waste
- o prepare social and economic input for the Environmental Impact Statement and the topical reports.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.3.8

TITLE: Performance Assessment

PARTICIPANT:

OBJECTIVE: To assess the isolation performance of the site geologic system.

DESCRIPTION OF WORK: All efforts required to:

- o develop, verify, validate, benchmark, and document codes for assessing the performance of the site
- o identify data requirements for the site performance assessment
- o utilize codes in assessing site performance
- o provide for peer review of the site performance assessment activity.

C/SCR: 88/002

APPROVED: 09-nov-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.3.8.L

TITLE: Geochemical Modeling Code EQ3/6

PARTICIPANT: Lawrence Livermore National Laboratory

OBJECTIVE: To further develop the geochemical modeling code EQ3/6 for use in long-term predictions for site suitability and radionuclide release from a nuclear waste repository.

DESCRIPTION OF WORK: All efforts required to:

- o upgrade the EQ3/6 code package and supporting data base, thereby allowing the NNWSI Project to model chemical processes to determine the relative contribution of these processes to the potential transport of radionuclides in groundwater from a nuclear waste repository in tuff
- o document the codes in the EQ3/6 software package such that the user manuals satisfying NRC's requirements for computer codes (NUREG-0856) are made available to the NNWSI Project
- o perform code and data base maintenance tasks to insure that the code package meets user requirements and QA specifications.

C/SCR: 87/292

APPROVED: 14-dec-1987

REV: 2

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.1.4.S

TITLE: Engineering Design Support: Special Studies

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To provide for Engineering Design Support to include special studies designated by OCRWM and the Repository Coordination Group.

DESCRIPTION OF WORK: All efforts required to:

- o perform Engineering Design Support
- o respond to special studies designated by OCRWM and the RCG
- o selected studies to design and/or integrate the repository
- o studies associated with other waste management facilities.

C/SCR: 86/052

APPROVED: 06-dec-1985

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.1.5.T

TITLE: Management and Integration

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To assist WMPO/NV in providing for the overall management and integration of the repository design, testing, and development activities.

DESCRIPTION OF WORK: All efforts required to:

- o provide support to the WMPO to develop programmatic guidance to the Project
- o provide support to the WMPO for planning, scheduling, budgeting, controlling, and reporting of the repository activities
- o provide support to contractor and Project Quality Assurance activities as required (including QA audits and development of QA procedures)
- o perform management and milestone criteria reviews of Project technical documents and coordinate the technical policy review of these documents
- o support the WMPO in development of technical responses to inquiries from NRC, EPA, State, and action items from DOE/OGR
- o provide integration of the repository interfaces with other third level WBS elements and ensure that interfaces are defined and controlled within the repository elements
- o assist WMPO/NV engineering staff in repository design activities and in assessing the impact of the Exploratory Shaft Facility (ESF) design on the repository design
- o assist WMPO/NV in the architect-engineer selection
- o provide for interaction with other OCRWM program participants on repository activities, such as participants in the Enhanced Coordination Group Tasks.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.2

TITLE: Development and Testing

PARTICIPANT:

OBJECTIVE: To provide for repository development and testing by implementing a rock mechanics test and analysis plan; evaluating and developing an equipment and instrumentation plan; establishing sealing requirements, concepts, materials evaluation, materials testing; providing input to repository design and performance assessment tasks.

DESCRIPTION OF WORK: All efforts required to:

A. Rock Mechanics - consisting of all efforts required to:

- o plan and conduct field and laboratory tests, including subsurface drilling to determine the properties of host rock required for repository design. Includes the development and confirmation of testing methods and the validation and optimization of mathematical models and codes
- o perform thermomechanical analyses of the host rock, using the results of field and laboratory tests
- o provide input to repository design and performance assessment tasks.

B. Equipment and Instrumentation Development - Consisting of all related efforts required to:

- o evaluate equipment needs and develop equipment as required, including the design, fabrication, and testing of prototypes. Includes excavation/transport equipment, waste handling equipment, and backfill equipment
- o evaluate monitoring and instrumentation needs. Adapt existing and develop new instruments as required.

C. Sealing - Consisting of all related efforts required to:

- o establish sealing requirements, including requirements due to both expected and unexpected conditions, and develop concepts for the repository

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.2.4.T

TITLE: Development and Testing

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to work required to:

- o support planning and implementation of field and laboratory tests
- o support evaluation and development of equipment and instrumentation requirements
- o support establishment of sealing requirements and development of sealing concepts for the repository
- o support input to repository design and performance assessment tasks

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.3.5.S

TITLE: Underground Service Systems

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To provide the design requirements and to gather data to determine the size, volume, location, and nature of the underground service system.

DESCRIPTION OF WORK: All efforts required to:

- o perform engineering studies and evaluate design options
- o design repository underground service systems including
 - material handling system
 - support systems, e.g., fire protection, dewatering, ventilation, medical, and maintenance
 - utilities
 - monitoring and control systems, including facilities and equipment required for confirmation testing
- o complete the detail design to support license applications
- o design underground utilities for electrical, communications, water, and compressed air
- o provide the definitions of underground service systems, including underground shops and warehouses, emergency medical service, decontamination facilities, sanitation, and general mine monitoring and control.

C/SCR:
APPROVED:
REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.3.6.T

TITLE: Facilities ACD Support

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o review and support engineering development, review and evaluation of pre-ACD studies that will focus on tradeoff studies leading to preferred design options
- o review and support conceptual designs for preparation of the site requirements including surface general arrangements, off-site improvements, and on-site improvements
- o review and support a conceptual design for the repository surface facilities and integration of this activity with the underground requirements
- o review and support preparation of conceptual designs for the shafts and ramps, determining size, location, access, ventilation, and related requirements
- o review and support the conceptual design for the underground portion of the repository
- o review and support completion of the conceptual design, gathering of data, and establishment of capacity requirements and all operating aspects for an underground service system.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.4

TITLE: Operations and Maintenance

PARTICIPANT:

OBJECTIVE: To develop repository operating and maintenance requirements concepts.

DESCRIPTION OF WORK: All efforts required to:

- o develop repository operating concepts, perform trade-offs, and optimization studies
- o provide input to the design and safety analyses of the repository through definition of (1) modes of operation of all systems and equipment; (2) procedures for assembly, emplacement, monitoring, and retrieval of waste package; (3) and maintenance requirements of the operational facility
- o determine operating modes for all systems and equipment. Included are the following:
 - waste receipt, interim storage, packaging and handling
 - waste package fabrication, preparation, repair, handling, emplacement and retrieval
 - seal and backfill emplacement
 - hauling, storage, and disposal of mined material
 - waste control and safeguards
 - site security.

C/SCR: 88/002

APPROVED: 09-nov-1987

REV: 1

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.4.T

TITLE: Operations and Maintenance

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To develop repository operating and maintenance requirements concepts.

DESCRIPTION OF WORK: All efforts required to:

- o review and support the planning and development of the operation and maintenance of facilities, as well as the development of design criteria necessary for efficient operation and maintenance of the repository
- o review and support development of the repository operating concepts, performance trade-offs and optimization studies
- o review and support definition of operating modes for all systems and equipment
- o review and support development of input to the design and safety analyses of the repository through definition of modes of operation of all systems and equipment; procedures for assembly, emplacement, monitoring, and retrieval of waste package; and maintenance requirements of the operational facility
- o review and support development of concepts for the application of remote and robotic systems to the waste receiving, inspecting, and unloading operations conducted at the repository surface waste handling facilities
- o review and support development of concepts for the application of remote and robotic systems to shipping cask maintenance and decontamination operations conducted at the repository surface waste handling facilities
- o provide assistance to the Project Office with the overall management, evaluation, and surveillance of Project participants involved in the WBS activity stated above.

C/SCR: 88/016

APPROVED: 17-mar-1988

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.5.T

TITLE: Decommissioning

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide planning for the effort to close, decontaminate, and decommission the repository upon receipt of the license amendment that authorizes decommissioning. During the conceptual design and later design periods, the design and operational requirements of decommissioning will be developed and converted into design criteria and operating procedures. This early attention to decommissioning is necessary to ensure compliance with licensing requirements at a reasonable cost.

DESCRIPTION OF WORK: All efforts required to:

- o review and support development of repository decommissioning concepts and requirements
- o review and support preparation of input to repository design and safety analysis standards
- o review and support analyses of closure concepts and requirements
- o review and support preparation of a plan for site restoration, decontamination, dismantlement, operation of monitoring instruments, and site security.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.4.6.5.T

TITLE: Repository Performance Assessment

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o develop, verify, validate, benchmark, and document codes for assessing the performance of the repository, including preclosure (e.g., impacts of facility construction and operation, radiological releases from both expected and unexpected conditions) and postclosure phases
- o utilize codes in assessing the preclosure and postclosure performance of the repository
- o conduct preclosure safety analyses of the repository under both expected and unexpected conditions.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.1.T

TITLE: Management and Integration

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To assist the Project Office in the organization and integration of the Regulatory and Institutional element of the Project.

DESCRIPTION OF WORK: All efforts required to:

- o provide support to the WMPD to develop programmatic guidance to the Project
- o provide support to the WMPD for planning, scheduling, budgeting, coordinating, controlling, and reporting for Regulatory and Institutional activity
- o provide support to Project Quality Assurance activities as required (including QA audits and development of QA procedures)
- o perform management and milestone criteria reviews of Project technical documents and coordinate the technical and policy reviews of these documents
- o provide support to monitor and coordinate work performed by Project participants, including the review of their work for completeness, technical sufficiency, and compliance with Project requirements
- o support the WMPD in the development of technical responses to inquiries from NRC, EPA, State, and action items from OCRWM
- o provide integration of Regulatory and Institutional interfaces with other third level WBS elements and ensure that interfaces are defined and controlled within the Regulatory and Institutional elements
- o participate in coordinating group meetings as required
- o provide for interaction with other OCRWM participants in the Regulatory and Institutional area.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.2

TITLE: Licensing

PARTICIPANT:

OBJECTIVE: To ensure that the NNWSI Project actions are in accordance with applicable administrative, technical, and legal requirements of regulatory agencies.

DESCRIPTION OF WORK: All efforts required to:

- o review, analyze, and interpret regulatory requirements to provide licensing guidance to project activities that integrate licensing concerns and the needs of the project
- o participate in defining licensing strategies
- o prepare licensing documents, including site characterization plans, safety analysis reports, and construction authorization application
- o provide for peer review of licensing activities.

C/SCR:
APPROVED:
REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.2.1.S

TITLE: Regulatory Interactions

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To assist with assessments, documentation, presentations, and technical support to ensure the NNWSI Project meets anticipated NRC licensing requirements.

DESCRIPTION OF WORK: All efforts required to:

- o provide a Technical Records Center for processing and archiving technical data
- o review and interpret licensing documentation
- o support technical evaluations and eventual defense of the Program license application.

C/SCR: 87/244

APPROVED: 14-dec-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.2.1.T

TITLE: Regulatory Interactions

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To ensure that all appropriate NNWSI Project actions, decisions, and documentation are in accordance with applicable administrative, technical and legal requirements of regulatory agencies and are supported with proper basis and facts.

DESCRIPTION OF WORK: All efforts required to:

- o provide support and develop and maintain procedures for interaction between the Project Office, Project participants, and the Nuclear Regulatory Commission
- o review, analyze, and interpret all applicable regulations, Regulatory Guides, and Technical Position Papers and provide licensing guidance to the Project Office and Project participants. This includes defining and maintaining licensing strategies for resolving issues during the licensing process
- o train appropriate Project participants for the regulatory process in terms of the requirements and expectations of the NRC in the areas of technical development, QA, and licensing reviews
- o develop positions in response to specific Project issues and requirements established by the NRC
- o prepare the necessary documents required for the Construction Authorization Application and assist in the presentation of material or testimony.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 3

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.3.1.T

TITLE: Environmental Assessment

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To ensure that all appropriate NNWSI Project actions, decisions, and documentation are reflected in the EA and are in accordance with applicable environmental requirements of responsible agencies, the Nuclear Waste Policy Act (NWPA), geologic repository requirements, support data, analysis, and conclusions; and to coordinate the definition of EA data and referenced documents that are to be provided by each Project participant.

DESCRIPTION OF WORK: All efforts required to:

- o assume lead role and responsibility for production of the EA
- o review and revise Project participant input
- o prepare EA input and supporting documents as requested by the WMPO
- o compile, edit, and distribute the EA document and associated references as necessary.

NOTE: Action completed - Inactive element, no work currently required.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.3.2

TITLE: Environmental Impact Statement

PARTICIPANT:

OBJECTIVE: To assure that the NNWSI Project develops an Environmental Impact statement that conforms with the DOE Siting Guidelines and other appropriate regulatory guidelines.

DESCRIPTION OF WORK: All efforts required to:

- o develop an EIS for the NNWSI Project in accordance with appropriate guidelines
- o ensure that all appropriate NNWSI Project actions, decisions, and documentation are included in the EIS and are in accordance with applicable environmental requirements of responsible agencies, the NWPA, geologic repository program requirements, support data, analysis, and conclusions.

C/SCR:

APPROVED:

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.3.2.T

TITLE: Environmental Impact Statement (EIS)

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: Provide NNWSI Project support to OCRWM to develop an Environmental Impact Statement that conforms with the Nuclear Waste Policy Act, the National Environmental Policy Act, the DOE Siting Guidelines and other appropriate regulatory guidelines.

DESCRIPTION OF WORK: All efforts required to:

- o develop EIS topical data reports and documentation as directed by the WMPO for the NNWSI Project in accordance with appropriate guidelines
- o ensure that all appropriate NNWSI Project actions, decisions, and documentation are included in the EIS and are in accordance with applicable environmental requirements and responsible agencies, the NWPA, NEPA, geologic repository program requirements, support data, analysis, and conclusions
- o provide EIS support to NNWSI Project participants, including compiling, editing, and distributing EIS-related documents
- o provide assistance in conducting EIS-related public hearings
- o provide assistance in EIS comment resolution and preparation of comment responses
- o prepare, maintain, and execute a plan to support EIS development.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.3.3.T

TITLE: Environmental Regulatory Interactions

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To review, analyze, and interpret Federal, State, and local environmental regulations; to provide guidance to Project activities that integrate NEPA concerns and the needs of the Project; and to review existing environmental data in regards to applicable regulatory requirements and Project needs.

DESCRIPTION OF WORK: All efforts required to:

- o review, analyze, and interpret Federal, State, and local environmental regulations
- o provide guidance to Project activities that integrate NEPA concerns and the needs of the Project
- o review existing environmental data in regards to applicable regulatory requirements
- o interact with Federal, State, and local regulatory agencies as directed by the WMPO
- o determine environmental permits and permit requirements
- o prepare required environmental regulatory documentation, including permit applications and supporting material
- o prepare required environmental regulatory plans, including the Environmental Monitoring and Mitigation Plan (EMMP) and Environmental Program Plan (EPP)
- o assemble, review, and interpret technical and engineering information required for permitting.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.4

TITLE: Communication and Liaison

PARTICIPANT:

OBJECTIVE: To inform the public and coordinate appropriate NNWSI Project activities with the affected community and government institutions.

DESCRIPTION OF WORK: All efforts required to:

- o collect and disseminate relevant information and coordinate activities with affected States, local governments, affected Indian tribes, and the general public
- o coordinate information meetings, public presentations, exhibits, films, and other public information activities including support of such activities with preparation, reproduction, and collection of audio-visual materials
- o conduct workshops to enhance communications with the public that may be affected by the program
- o prepare and negotiate consultation and cooperation agreements with affected states and Indian tribes
- o consult, cooperate with, and provide support to affect States and Indian tribes
- o provide media skills training to Project participants
- o conduct public hearings
- o select and operate public information centers.

C/SCR: 88/002

APPROVED: 09-nov-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.5.4.1.T

TITLE: Institutional Studies

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the NNWSI Project in the preparation of factual data for use in publications and presentations to citizens, elected officials, and other groups interested in the potential siting of a high-level nuclear waste repository at Yucca Mountain.

DESCRIPTION OF WORK: All efforts required to:

- o support the NNWSI Project in developing and maintaining relationships between the DOE Project Office and the State of Nevada, the Nevada Legislature, and local government
- o identify and prepare materials to fulfill the information needs of the public.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.6.1.1.T

TITLE: Exploratory Shaft Management, Planning and Design Review

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide support to the WMPO in overall management of Exploratory Shaft activities.

DESCRIPTION OF WORK: All efforts required to:

- o provide support to the WMPO to develop programmatic guidance to the Project
- o provide support to the WMPO for planning, scheduling, budgeting, controlling, and reporting of the Exploratory Shaft Facility (ESF) activities
- o provide support to contractor and Project Quality Assurance activities as required (including QA audits and development of QA procedures)
- o perform management and milestone criteria reviews of Project technical documents and coordinate the technical policy review of these documents
- o support the WMPO in development of technical responses to inquiries from NRC, EPA, State, and action items from DOE/DGR
- o provide integration of the ESF interfaces with other third level WBS elements and ensure that interfaces are defined and controlled within the ESF elements
- o develop input to the Exploratory Shaft Subsystem Design Requirements document and the Exploratory Shaft Project Management Plan
- o develop a centralized computer system for the Exploratory Shaft estimate
- o provide for interaction with other OCRWM program participants on repository activities, such as participants in the Enhanced Coordination Group Tasks.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.6.1.2

TITLE: Quality Assurance

PARTICIPANT:

OBJECTIVE: To implement the Quality Assurance Program Plan on the ESF.

DESCRIPTION OF WORK: All efforts required to:

- o develop and implement supporting procedures in accordance with NNWSI Project QA Plan NVO-196-17.

C/SCR: 87/125

APPROVED: 09-nov-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.6.1.2.S

TITLE: Quality Assurance

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To develop and implement a Quality Assurance Program Plan (QAPP) and supporting procedures for all SNL work associated with the Exploratory Shaft.

DESCRIPTION OF WORK: All efforts required to:

- o develop and implement a QAPP and supporting procedures for SNL work in accordance with the NNWSI Project QA Plan NVO-196-17
- o document the accomplishment of all items and submit documentation to the NNWSI Project Records Center.

C/SCR: 87/125

APPROVED: 09-nov-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.6.1.2.T

TITLE: Quality Assurance

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide the WMPO with QA assistance in the overall management of ESF activities to ensure compliance with the NNWSI QA Plan and the WMPO QAPP. This effort will focus on the design, construction, procurement, and decommissioning phases of the ESF. Sufficient QA staff will be provided to assist the ESF technical staff in providing reasonable assurance that all ESF activities and items meet their intended purpose.

DESCRIPTION OF WORK: All efforts required to:

- o provide programmatic advice and counsel relative to Project QA requirements applicable to the ESF
- o provide a QA review of design drawings, specifications, reports, purchase orders, procedures, and other technical documents
- o assist in the assignment of QA levels to the engineered items of the ESF
- o provide assistance to vendor evaluation teams
- o assist in the development of QA procedures
- o assist the design and construction engineering staff in identifying inspection required by applicable codes
- o provide an interface between the QA departments of the organizations participating in the ESF
- o participate in ESF working groups
- o provide on-site Quality Control inspection personnel to verify items and activities for acceptance.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 4

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.6.2

TITLE: Site Preparation

PARTICIPANT:

OBJECTIVE: To design and develop site and road access, utilities, and communication systems.

DESCRIPTION OF WORK: All efforts required to:

- o provide for surveys and maps, and the demolition and removal of structures that are unuseable
- o provide general civil improvements, including clearing, grading, excavating, filling, parking, installation of drainage systems, and muck storage pads as required
- o construct new and relocate or refurbish existing roads, power systems, water supply, communications, and sewage treatment for the site, including provision for road and rail access to the site, as required.

C/SCR: 88/002

APPROVED: 09-nov-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.6.8.4.T

TITLE: Operations

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o review and support all on-site construction, maintenance, and operation activities
- o review and support the experiment and test programs
- o review and support plans related to periodic maintenance on all government-owned equipment, the facilities, and the site in general, including the access road and primary power and water systems
- o review and support plans to operate, maintain, and inspect the facility and review operating and maintenance manuals for (1) the systems necessary to transport personnel and material onto the site, into the shaft, and into the underground workings such as the hoist, headframe, cage, and other related equipment and (2) the systems necessary to remove excavated material from the underground workings to its storage pad
- o review and support operation, maintenance, inspection of system components plans, operating and maintenance manuals for shaft and subsurface ventilation, communications, instrumentation, plant utilities, and emergency systems.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.6.9.5.T

TITLE: Test Support

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o review and support development of an Exploratory Shaft Test Plan (ESTP)
- o review and support the development of an Exploratory Shaft test implementation and control plan
- o review and support the conduct of observations, measurements, experiments, and tests required to determine the suitability of the Yucca Mountain site for geologic containment of nuclear waste
- o prepare technical and management reports
- o review and support the development, design, procurement, installation, and operation of test equipment (including data collection systems)
- o review and support the conduct of the test program, reduction of data, preparation of reports, and provision of results to the waste package, repository, and site tasks
- o review and support the development of prototype test plans and QA procedures
- o review and support the conduct of prototype tests as required to validate testing methods, procedures, and equipment for tests to be conducted in the Exploratory Shaft
- o review and support the documentation of the results of prototype tests, including procedures and methods used, and recommend modifications to ES test plans, engineering designs, equipment performance, materials, and QA procedures/controls.

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.6.9.5.T (continued)

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.7.1.R

TITLE: Management and Integration

PARTICIPANT: Reynolds Electrical & Engineering Co., Inc.

OBJECTIVE: To provide management and integration of the REECo support activities associated with drilling services, coreholes, and related construction.

DESCRIPTION OF WORK: All efforts required to:

- o provide management controls including planning, scheduling, budgeting, controlling, and reporting of contracted engineering activity
- o manage the production of design drawings, calculations and related estimates
- o develop and implement proper procedures for drilling, materials handling, and safety related requirements
- o manage drilling programs, produce as-built drawings and related activity.

C/SCR:

APPROVED:

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.7.1.T

TITLE: Management and Integration

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing technical and engineering expertise to assist in reviewing and validating activity plans, design criteria, designs, consultant reviews, design verification, criteria and system requirements and all resulting technical reports produced. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o provide support to the WMPO to develop programmatic guidance to the Project
- o provide support to the WMPO for planning, scheduling, budgeting, coordinating, controlling, and reporting of the test facilities activities
- o provide support to Project Quality Assurance activities as required (including QA audits and development of QA procedures)
- o perform management and milestone criteria reviews of Project technical documents and coordinate the technical and policy reviews of these documents
- o provide support to monitor and coordinate work performed by Project participants, including the review of their work for completeness, technical sufficiency, and compliance with Project requirements
- o support the WMPO in the development of technical responses to inquiries from the NRC, EPA, State, and action items from OCRWM
- o provide integration of test facilities interfaces with other third level WBS elements and ensure that interfaces are defined and controlled within the test facilities elements
- o participate in coordinating group meetings as required
- o provide for interaction with other OCRWM participants in the test facilities area.

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.7.1.T (continued)

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 0

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.7.2

TITLE: Testing

PARTICIPANT:

OBJECTIVE: To provide for the operation and maintenance of domestic test facilities including the Asse mine, URL, STRIPA, NSTF, Avery Island.

DESCRIPTION OF WORK: All efforts required to:

- o provide for the operation and maintenance of domestic test facilities that would not be a site for a commercial high-level waste repository, and for the conduct of test program in foreign facilities. These facilities include the Asse mine, URL, STRIPA, CLIMAX, MSTF, Avery Island, and G-Tunnel. Also includes decommissioning costs that are the responsibility of the program.

C/SCR: 88/002

APPROVED: 09-nov-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.8.3

TITLE: Repository

PARTICIPANT:

OBJECTIVE: Acquire the land necessary for the development of the repository.

DESCRIPTION OF WORK: All efforts required to:

- o acquire licenses, leases, titles, withdrawal, agreements, cooperative agreements, and any other agreements necessary to protect or obtain access to land required for constructing a repository. Includes condemnation if negotiations are unsuccessful.

C/SCR: 88/002

APPROVED: 09-nov-1987

REV: 0

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NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.1.S

TITLE: Management

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To direct and assure coordination of all SNL NNWSI Project activities.

DESCRIPTION OF WORK: All efforts required to:

- o manage and coordinate the SNL activities to be consistent with the goals and objectives of the NNWSI Project, including planning, technical direction, management support, budget control, and cost control.

C/SCR: 87/244

APPROVED: 14-dec-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.1.T

TITLE: Management

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide management and administrative support to the Waste Management Project Office for effective planning and execution of the NNWSI Project.

DESCRIPTION OF WORK: All efforts required to:

- o prepare NNWSI Project Management Plan and Annual Project Plans for WMPO/NV. These Plans shall be revised and updated as required from input provided by all Project participants
- o assist DOE in the organization of meetings, development and dissemination of appropriate information, and preparation of meeting records including, but not be limited to, Project Control Meetings, Project Manager's Meetings, and Project Midyear and End-of-Year Review Meetings
- o develop and maintain a NNWSI Project-wide Administrative Procedures Manual defining a uniform set of systematic procedures for all participants to follow in the conduct of Project activities
- o prepare reports such as the UCRS Monthly Report, Weekly Highlights Report, Informal Project Weekly Report, MSA Report, and Quarterly Technical Report
- o perform internal Project management and control necessary to plan, organize, and direct technical and administrative activities of the contract, including short- and long-range planning, secretarial and word processing staff and facilities, financial analysis and periodic contract reporting, contract management, procurement, general office management, administration, and on-the-job training
- o provide graphic support services as requested by WMPO/NV to provide visual aids for Project and public presentations or documents
- o develop and prepare material for speeches, other presentations made by WMPO/NV personnel, and public information material for the general public, news media, and others. Preparation includes supporting background material collection, data research documentation, and post-presentation analysis and documentation.

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.1.T (continued)

- o provide support for Project-wide training associated with the training requirements of QA criteria.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.2

TITLE: Interface Activities

PARTICIPANT:

OBJECTIVE: To conduct OCRWM interface activities.

DESCRIPTION OF WORK: All efforts required to coordinate interfaces between the Geologic Repository Program and the other OCRWM Program elements. This is accomplished by waste-isolation interface coordination groups. Coordination groups are formed to represent the various technical elements of the wasteisolation system (e.g. waste-package, repository, etc.) with members representing technical participants of the OCRWM Program.

C/SCR:

APPROVED:

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.2.S

TITLE: Interface Activities

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To conduct OCRWM interface activities.

DESCRIPTION OF WORK: All efforts required to coordinate interfaces between Geologic Repository Program and the other OCRWM Program elements. This is accomplished by Waste Isolation Interface coordination groups. Coordination groups are formed to represent the various technical elements of the wasteisolation system (e.g. waste-package, repository, etc.) with members representing technical participants of the Program to achieve OCRWM Program.

C/SCR:

APPROVED:

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.2.T

TITLE: Interface Activities

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To conduct OCRWM interface activities.

DESCRIPTION OF WORK: All efforts required to:

- o coordinate interfaces between the Geologic Repository Program and the other OCRWM Program elements. This is accomplished by Waste Isolation Interface coordination groups. Coordination groups are formed to represent the various technical elements of the waste-isolation system (e.g., waste package, repository, etc.) with members representing technical participants of the OCRWM Program.

NOTE: Not covered by Contract SOW - No work effort required.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.3.S

TITLE: Geologic Repository Program Support

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To provide special technical support to the Geologic Repository Program.

DESCRIPTION OF WORK: All efforts required:

- o work with other GR Program participants and/or contractors preparing or reviewing documents
- o review major documents, plans, or criteria prepared by other Projects within the Program
- o attend and participate in Program meetings and discussions, including meetings between the DOE and other Federal agencies
- o participate in workshops, etc., in support of the GR Program effort.

C/SCR:
APPROVED:
REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.3.T

TITLE: Geologic Repository Program Support

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide special technical support to the Geologic Repository Program.

DESCRIPTION OF WORK: All efforts required to:

- o work with other GR program participants and/or contractors preparing or reviewing documents
- o review major documents, plans, or criteria prepared by other projects within the Program
- o attend and participate in Program meetings and discussions, including meetings between the DOE and other Federal agencies
- o participate in workshops, etc., in support of the GR Program effort.

NOTE: Not covered by Contract SOW - No work effort required.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.4.H

TITLE: Information Management

PARTICIPANT: Holmes & Narver, Inc.

OBJECTIVE: To provide the Local Records Center (LRC) and Microfilming and Archival Storage Services Facility (MASSF) portions of the NNWSI Project Information Management System (IMS) that will meet the requirements of NVO-196-17.

DESCRIPTION OF WORK: All efforts required to:

- o establish and operate a LRC and MASSF for the NNWSI Project Information Management System (IMS)
- o the LRC shall receive, retain, and protect documents/records through an authorized system for receiving, controlling, filing, accessing, tracking, retrieving, distributing, and storing
- o the MASSF shall receive, retain, protect and microfilm documents/records through an authorized system for receiving, controlling, microfilming, filing, accessing, tracking, retrieving, duplicating, distributing, and sorting.

C/SCR: 88/018

APPROVED: 17-mar-1988

REV: 1

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.4.L

TITLE: Information Management

PARTICIPANT: Lawrence Livermore National Laboratory

OBJECTIVE: To provide for an Information Management System that will meet all applicable requirements until records are transferred to the NNWSI Central Records Facility (CFR).

DESCRIPTION OF WORK: All efforts required to:

- o establish and operate an Information Management capability
- o receive, retain, and protect documents/records through an authorized system for receiving, controlling, filing, accessing, tracking, retrieving, transmitting, storing and destroying.

C/SCR: 87/292

APPROVED: 14-dec-1987

REV: 4

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.1.4.T

TITLE: Records Management

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide for a Records Management System that will meet the requirements of NVO-196-17 until records are transferred to the NNWSI Project Record Center (PRC) for permanent retention.

DESCRIPTION OF WORK: All efforts required to:

- o establish and operate an authorized Records Management capability
- o receive, retain, and protect documents/records through an authorized system for receiving, controlling, filing, accessing, tracking, retrieving, distributing, storing and destroying
- o prepare procedures which describe how licensing and quality assurance related documents are controlled
- o establish, staff and operate facilities and systems for:
 - (a) the central NNWSI Project Records Management System for capturing, tracking, retrieving and archiving documents necessary to support submittal of a license application
 - (b) the T&MSS contractor Information Management System which supports the T&MSS contractor and WMPO staffs.
- o develop, implement, and maintain Records Management systems, processes and procedures for:
 - (a) an integrated NNWSI Project Records Management System for capturing, tracking, retrieving, and archiving information necessary to support license application
 - (b) the T&MSS contractor Information Management System which supports the T&MSS contractor and WMPO staffs, and is integrated with the NNWSI Project Records Management System.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 5

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.2

TITLE: Project Control

PARTICIPANT:

OBJECTIVE: To provide project management support in the areas of cost and schedule planning and control.

DESCRIPTION OF WORK: All efforts required to:

- o provide project management support in the areas of cost and schedule planning and control, development of management practices and procedures, and management information systems
- o provide valid, timely, and auditable performance measurement information
- o collect project management planning and control data; develop, implement and maintain computerized cost, schedule, and technical milestone data bases; and develop strategies to meet management information requirements.

C/SCR: 88/002

APPROVED: 09-nov-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.2.S

TITLE: Project Control

PARTICIPANT: Sandia National Laboratories

OBJECTIVE: To monitor the fiscal and technical accomplishments of the SNL participation in the NNWSI Project.

DESCRIPTION OF WORK: All efforts required to:

- o to ensure that the schedule, milestones, and deliverables are maintained within the approved fiscal year budget
- o develop networks to support the identification and monitoring of milestones and schedules
- o submit baseline change requests for milestones, documents, and data bases consistent with guidance in WMPO approved plans
- o monitor progress and provide performance measurement information.

C/SCR: 87/244

APPROVED: 14-dec-1987

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.2.T

TITLE: Project Control

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To provide systems and methods to execute Project planning, scheduling, and cost reporting procedures in accordance with DOE orders.

DESCRIPTION OF WORK: All efforts required to:

- o provide PMS-related information required by the NNWSI Project to make periodic reports specified by the Office of Management and Budgets (OMB) for Major Systems Acquisitions (MSA)
- o maintain the NNWSI Project work breakdown structure in accordance with OGR direction
- o provide procedures for the implementation by all participants of a uniform method of organizing and planning work elements
- o analyze variances in schedule and cost
- o prepare performance measurement data to support NNWSI Project reporting.

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NNWSI PROJECT WORK BREAKDOWN STRUCTURE DICTIONARY

WBS: 1.2.9.3.T

TITLE: Quality Assurance - NNWSI Project

PARTICIPANT: Science Applications International Corporation

OBJECTIVE: To support the Project Office with the execution of this subelement of the Project by providing Quality Assurance expertise to assist in reviewing QA program plans, procedures, and manuals; preparing QA specifications; conducting QA audits and surveillances; and making recommendations. To provide additional technical management services requested in support of this subelement.

DESCRIPTION OF WORK: The reviews and support will be provided for, but not limited to, work required to:

- o maintain the NNWSI QAP and Administrative Procedures (formerly Standard Operating Procedures); the WMPO QA Program Plan, NVO-196-18; and Quality Management Procedures
- o review participant QA program plans, procedures, manuals, and QA records for compliance with requirements, including recommending revisions and corrective actions
- o conduct a comprehensive QA audit and surveillance program on all NNWSI Project participants to assist WMPO in ensuring compliance with established Project and participant QA requirements. This effort will include monitoring and tracking audit findings, nonconformances, and corrective actions and performing follow-up reviews and surveillance to ensure deficiencies are corrected
- o provide QA engineering and administrative support in preparing QA specifications; interpreting NRC QA requirements; and reviewing design drawings, specifications, technical reports, criteria or requirement documents, and test plans to ensure incorporation of QA requirements
- o perform periodic quality management reviews and evaluations of the NNWSI Project overall QA program and make recommendations where appropriate to improve performance

C/SCR: 88/016

APPROVED: 17-mar-1988

REV: 2

NOTE

WBS: 1.2.9.9.X

TITLE: NTS allocation

Entry to be determined and supplied at a later date.