

Scope Management

Waste Volumes vs. Estimates

Excerpts From The Rocky Flats Experience

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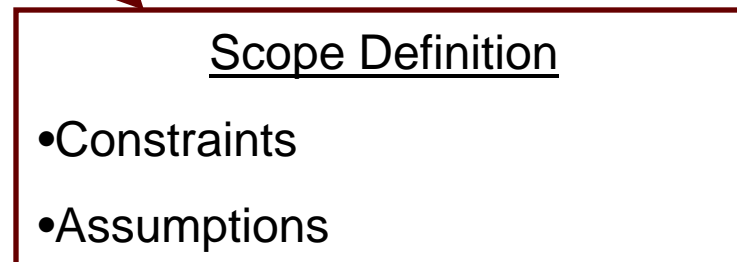
Scope Management¹

- Scope Planning
- Scope Definition
- Create Work Breakdown Structure
- Scope Verification
- Scope Control

¹taken from “A Guide to the Project Management Body of Knowledge (PMBOK® Guide)”

Scope Management

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Scope Management

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Scope Control

- Influencing factors that create scope changes
- Controlling impact of changes

SCOPE DEFINITION

The Contract

- Risk “sharing”
 - The contractor accepted risk of volume differences for all but Remediation waste:
 - Low Level Waste (LLW)
 - Mixed Low Level Waste (MLLW) < 10 nCi/g
 - The government accepted risk of volume differences for Remediation waste:
 - LLW ER beyond 107,000 yd³
 - MLLW ER < 1 nCi/g beyond 41,000 yd³
 - MLLW ER > 1 nCi/g beyond 220 yd³
 - Schedule Incentive
 - Cost Incentive

Based on uncertainty associated with extent of soil contamination at the time of contract award



SCOPE DEFINITION

Original Estimates

□ History

■ Decontamination & Decommissioning Waste

□ Systems Engineering Analysis (SEA) – 1994 – 1996

- Use of structural drawings to estimate material weights
- Use of walkdowns to estimate areas of contamination
- Limited to 20 “major” buildings
- Calculation of “average” values per ft² for given “type” of building, which was subsequently applied to all remaining structures
- MAJOR DRAWBACK: failed to account for expansion (i.e., inefficiencies) from in place to containerized waste for disposal

□ Building 889 Decommissioning – 1996

- Former Uranium contaminated size reduction facility
- Similar approach
- Utilized 20% expansion factor
- MAJOR DRAWBACK: predicted vs. actual volumes still too low; a poor predictor for other “unique” facilities

SCOPE DEFINITION

Original Estimates (cont.)

□ History (cont.)

■ Decontamination & Decommissioning (cont.)

□ Building 779 Decommissioning – 1998 – 2000

- First major Plutonium contaminated structure
- Similar approach
- 25% expansion factor
- TRU waste assumed = in place glovebox volume
- Ventured into use of Surface Contaminated Object characterization¹ for larger containers leading to greater inefficiencies but allowed for *significant* risk reduction
 - Practical application of emphasis on worker safety resulted in compromise with waste efficiencies



¹ Full implementation by mid-FY 2002



SCOPE DEFINITION

Original Estimates (cont.)

- History (cont.)
 - Decontamination & Decommissioning (cont.)
 - Equipment Metric Approach – 2000+
 - Utilize prior estimates and adjust based on Building 779 D&D experience
 - Metrics developed:
 - Glovebox volume
 - Glovebox surface area
 - Pipe length
 - Duct length
 - Tank volume
 - Miscellaneous items surface area
 - Established metrics library
 - Adjustment factor based on Building 779 actuals



SCOPE DEFINITION

Original Estimates (cont.)

- History (cont.)
 - Environmental Remediation
 - Historical Release Report used to identify potential environmental release sites and potential contaminants of concern
 - Use of empirical data (contaminant type expected, release volumes, and contaminant pathways) to project volumes for each site
 - Initially based on Interim Action Levels
 - Limited quantitative knowledge of concentration and extent of contaminations



SCOPE DEFINITION

Original Estimates/Status

WASTE TYPE	ORIGINAL ESTIMATE - Closure Project Baseline - (June 2000)	REVISED LIFECYCLE ESTIMATE (September 2003)	CURRENT LIFECYCLE PROJECTION (October 2004)	ACTUAL LCTD (November 7, 2004)
TRU/TRM	12,500 m ³	14,237 m ³	15,012 m ³	13,399 m ³
LLW	175,000 m ³	227,705 m ³	347,397 m ³	257,169 m ³
MLLW	44,500 m ³	45,773 m ³	48,288 m ³	41,068 m ³



SCOPE CONTROL

The Changes

□ Packaging efficiency

- Volume of waste “measured” in place is far different from waste containerized for final disposal
- Estimate assumed size reduction/decon to certain standards; practical application proved far different
- Continuous conflict between worker/public/environmental health & safety and waste minimization

□ Strategic changes

- Structures originally estimated as free release (sanitary waste); shipped as LLW by rail in spite of heroic decontamination efforts



SCOPE CONTROL

The Changes (cont.)

- Emerging technologies or failure of planned technologies resulted in different waste forms/types and quantities
- Emerging treatment/disposal options
- Waste management activities managed under one part of the WBS; waste generation activities managed under different part of the WBS
 - Leads to mis-estimation because of:
 - Internal priorities
 - Lack of “penalty” for inadequate data
 - Data generating entities are not the end user of the data
- IMPACT:
 - schedule acceleration (reduced cost)
 - reduced worker risk
 - increased transportation/disposal cost and risk



SCOPE CONTROL

The Changes (cont.)

- Surface Contaminated Object (SCO) Characterization
 - Applied to gloveboxes
 - Rocky Flats was a glovebox operation = big impact
 - Needed measurement technique
 - Obvious safety improvement over glovebox size reduction
 - Original estimate was to size reduce and certify as TRU
 - SCO waste dispositioned as LLW thus increase in LLW as whole segments shipped
- IMPACT: avoided 3 – 4 fold increase in TRU volumes and Government Furnished Services/Items shipping impact
 - reduced transportation/disposal cost and risk



SCOPE CONTROL

The Changes (cont.)

- Impure Oxides (Plutonium Recovery Residues)
 - Originally intended to go thru stabilization/packaging system then to Savannah River Site in 9 SST shipments
 - Would have prolonged stabilization/packaging system operations (and life of critical path structure D&D) by 3 months
- SOLUTION: terminate safeguards allowing for disposition at WIPP
- IMPACT: increased TRUPACT shipments by 46, or approximately 3 weeks
 - reduced schedule risk
 - increased transportation/disposal cost and risk

SCOPE CONTROL

The Changes (cont.)

- Building 881
 - WWII subterranean type construction
 - Glovebox operations
 - Original Estimates:
 - LLW 2,631 m³
 - MLLW 2,336 m³
 - Actuals:
 - LLW 19,213 m³
 - MLLW 208 m³
 - What happened?
 - Really, really bad estimating
 - Decontamination and size reduction efforts not effective
 - Imploded the Building
- IMPACT:
 - increased transportation/disposal cost and risk

SCOPE CONTROL

The Changes (cont.)

- 903 Pad
 - Asphalt capped contaminated soil area, formerly utilized for drum storage as well
 - Original Estimates:
 - LLW 34,126 m³
 - MLLW 3,321 m³
 - Actuals:
 - LLW 45,566 m³
 - MLLW 11,187 m³
 - What Happened?
 - Trade-off between:

infinite characterization/certain generation
vs.
limited characterization/uncertain generation
 - IMPACT:
 - increased transportation/disposal cost and risk



SCOPE CONTROL

The Changes (cont.)

- Under Building Contamination
 - Two major structures contributed to the overall estimate
 - Building 776/777 – 11,178 m³ estimate reduced to actual of approximately 2,000 m³
 - Building 771 - 7,680 m³ estimate reduced to actual of < 100 m³
 - Why?
 - Buried equipment did not exist (“Urban Legend”)
 - Expected leak paths through floor slabs did not exist
- IMPACT:
 - reduced retrieval/transportation/disposal cost and risk



Conclusion

- Scope change will occur

- Key to success is how the change is managed
 - Remain flexible
 - Establish working customer/regulator relationship
 - Balance cost/schedule/risk impacts
 - Remain focused on the scope definition as an objective measurable result
 - During project execution, don't focus on how, focus on what
 - Maintain integrated, organizational control