

**U.S. DEPARTMENT OF ENERGY
OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT**

**NUCLEAR WASTE TECHNICAL REVIEW BOARD
FULL BOARD MEETING**

SUBJECT: MISSION 2001

PRESENTER: CARL GERTZ

**PRESENTER'S TITLE
AND ORGANIZATION: PROJECT MANAGER
YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT
LAS VEGAS, NEVADA**

**PRESENTER'S
TELEPHONE NUMBER: (702) 794-7920**

**ARLINGTON, VIRGINIA
JANUARY 5-6, 1993**

Presentation Topics

- **Objectives**
- **Assumptions**
- **Baseline**
- **Strategy**
- **Approach**
- **Organization**
- **Results**
- **Follow-on Activities**
 - **Cost Evaluation Study**

Objectives

- **Validate scope, cost and schedule required to submit license application by 2001**
 - Establish high level milestones to meet 2001 LA
 - Define activities and resources required to support milestones
 - Expand schedule, scope and budget to lower levels
 - Prepare detailed PACS input for revised baseline
- **Develop a MGDS which meets the requirements**
 - Site characterization and suitability
 - Design and development
 - Licensing

Assumptions For Mission 2001 Study

- **Use funding total of \$318M for FY93 budget**
- **Permits will not be delayed**
- **Project is not resource limited after FY93**
- **Challenged the scope of all tasks**

Technical Baseline

- **Site Characterization Program Baseline**
- **Site Characterization Plan (SCP) Conceptual Design Report (CDR) as modified by Exploratory Studies Facility (ESF) Alternative Study (Option 30, modified)**

Strategy

- **Develop high level milestones supporting License Application by 2001**
- **Include all major participants in planning process to increase credibility of results**
- **Challenge work scopes, but maintain technical baseline**
- **Develop a fully integrated plan which could serve as a basis for updating the program and project baseline**

Approach

- **A bottom-up perspective was taken to define the tasks required**
- **Schedule and budget data were input into the Planning and Control System (PACS)**
- **The work scopes and budgets were reviewed by the Yucca Mountain Project Office (YMPO)**
- **The participant schedules were integrated into a master project schedule consisting of over 6,000 activities**
- **Meetings held over a two week period to verify the logic in the network schedule**
- **Work arounds were identified to mitigate the effect of specific critical path activities**

Results

- **Fully integrated schedule with completion of license application by October 30, 2001**
- **Increased confidence in scope of work, budget and schedule**
- **Total estimated cost of \$6.1B, escalated**

Yucca Mountain Site Characterization Project

Budget Details

(year of expenditure \$M)

WBS		Prior	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01	Total
1.2.1	Systems	103.9	25.9	43.6	51.2	53.9	55.1	56.4	55.6	47.6	41.9	535.3
1.2.2	Waste Package	88.4	10.2	31.9	37.5	39.3	36.9	31.5	23.1	17.7	14.0	330.5
1.2.3	Site	337.2	68.3	153.1	161.8	155.3	156.6	111.3	47.1	28.2	16.1	1235.0
1.2.4	Repository	95.5	11.4	24.9	40.8	47.8	72.9	138.0	129.6	65.5	60.9	707.3
1.2.5	Regulatory & Inst.	107.6	23.6	37.1	42.3	43.0	44.9	46.7	46.5	38.3	51.9	481.9
1.2.6	ESF	111.7	71.8	171.0	154.3	129.5	46.2	40.3	21.8	19.9	19.4	765.9
1.2.7	Test Facilities	30.0	18.6	59.8	45.5	42.3	39.6	36.4	30.1	25.9	25.7	354.0
1.2.8	Land Acquisition	1.3	0.2	0.2	0.2	0.2	0.6	0.5	0.5	0.6	0.6	5.0
1.2.9	Project Mgmt	293.3	56.8	80.2	79.7	85.2	87.2	87.5	78.9	75.2	71.7	995.8
1.2.10	F&TA	66.5	35.0	83.0	82.6	79.6	72.3	71.7	60.8	52.4	48.9	672.7
	Total	1255.5	321.9	685.0	695.8	676.2	612.4	620.1	494.0	391.3	351.0	6103.3

- This funding profile is based upon completion of the current work scope. The 2001 completion date can be maintained by replanning work in FY93 for funding above \$240M.
- Funding scenario presented includes budget reductions of approximately \$220M which has not yet been planned by the appropriate participants.
- Estimate to complete FY93 to 2001 (less F&TA) is \$4261.6M

Comparison of YMP Total Project Cost Estimates Unescalated \$K

WBS		ESAAB 01/92	PACS 04/92	ICE Phase II 08/92	2001 08/92	2001 09/92
1.2.1	Systems	439,524	540,595	453,284	505,583	470,073
1.2.2	Waste Package	273,119	335,865	344,550	318,430	296,718
1.2.3	Site	1,113,392	1,047,632	1,140,622	1,205,230	1,126,566
1.2.4	Repository	450,956	850,484	732,001	725,601	599,622
1.2.5	Regulatory & Inst.	382,058	403,259	413,308	446,038	424,032
1.2.6	ESF	802,813	797,236	780,898	723,250	697,890
1.2.7	Test Facilities	313,470	301,755	349,470	329,422	297,419
1.2.8	Land Acquisition	3,514	3,226	3,226	4,328	4,328
1.2.9	Project Mgmt	1,003,280	955,300	821,393	1,039,321	892,406
1.2.10	F&TA	903,165	727,072	489,831	731,600	657,785
Total Project Cost Unescalated		5,685,291	5,962,424	5,528,583	6,028,803	5,466,839
Total Project Cost Escalated		6,319,337	6,856,573	6,284,000	6,874,797	6,103,250

All cost estimates include capital, operating and prior spending.

ESAAB baseline, December 1991.

ESAAB has contingency for ESF Construction only, ICE has contingency for all 3rd level cost elements, PACS and 2001 do not include explicit contingency.

F&TA -

ESSAB - Includes: 10% for grants, cooperative agreements, and impact assistance; PETT; and \$50M (93-2001) for benefits agreement.

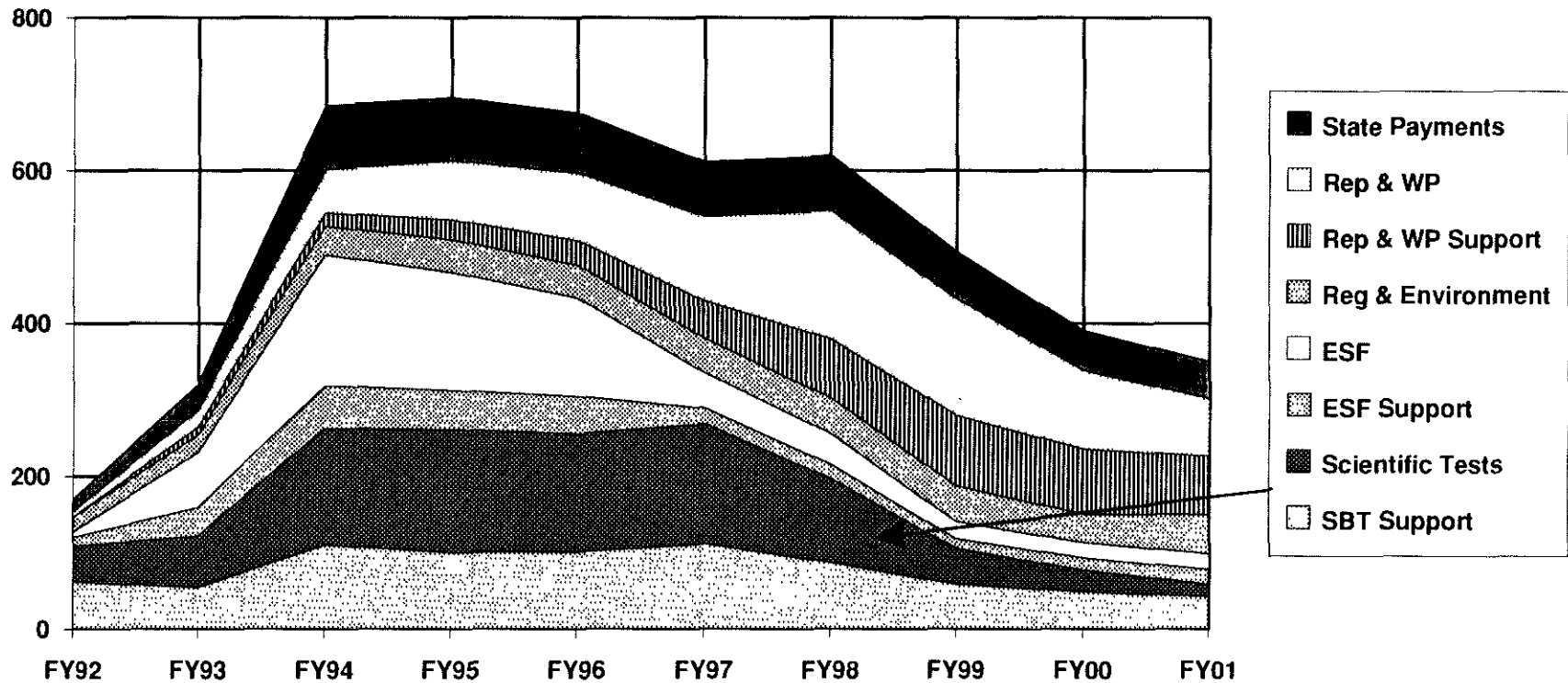
April PACS - Includes: 10% for grants, cooperative agreement, and impact assistance; PETT; and \$25M (94-2001) for benefits agreement.

ICE Phase II - 94-2001 includes 10% for grants, cooperative agreements, and impact assistance; PETT; excludes \$200M benefits agreement

FY93 includes \$8.5M for county grants; 2.5% for state grant; PETT; excludes 2% impact assistance.

2001 - same as April 1992 PACS

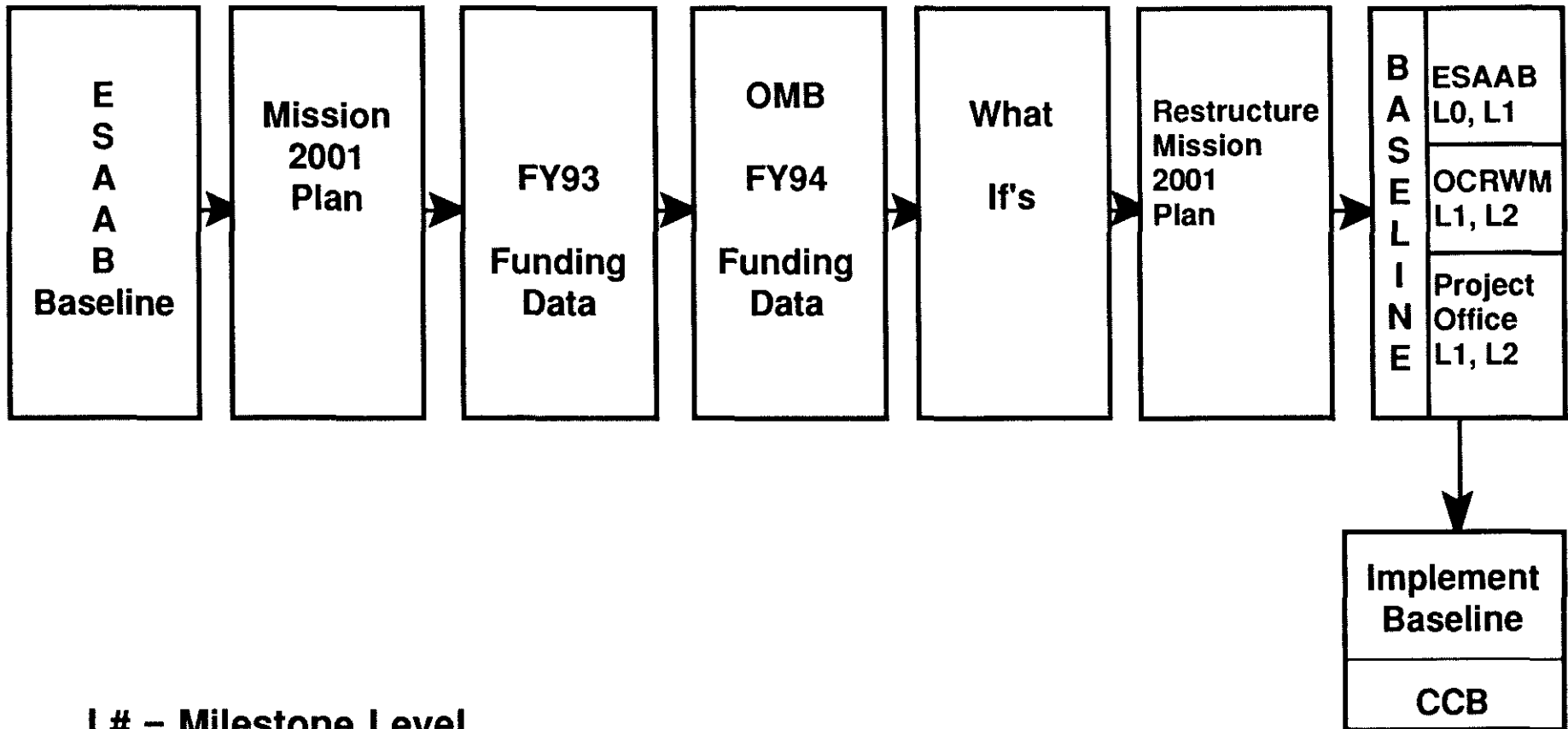
Yucca Mountain Site Characterization Project 2001 Costs Profile



Follow-On Activities

- **The Mission 2001 Plan converted to the new, expanded Work Breakdown Structure**
- **A concentrated cost reduction evaluation is in process**
- **The Mission 2001 Plan will be updated to reflect actual FY93 funding, projected FY94 funding and will incorporate some of the the results of the cost reduction evaluation**
- **The revised plan will be baselined**

Baseline Plan



L# = Milestone Level

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT

PROPOSED COST BASELINE, NOVEMBER 1992

(YEAR OF EXPENDITURE \$M)

WBS		PRIOR	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02	TOTAL
121	SYSTEMS ENGINEERING	24.4	5.9	7.0	10.5	11.4	12.4	12.5	14.5	15.0	14.6	15.1	143.3
122	WASTE PACKAGE	88.4	8.3	20.0	25.2	37.0	39.4	34.9	36.8	14.7	12.3	9.2	326.1
123	SITE INVESTIGATIONS	337.3	50.0	80.8	129.9	142.8	141.5	138.3	88.5	48.5	31.8	17.8	1207.2
124	REPOSITORY	95.5	4.5	14.0	21.1	37.5	46.7	62.5	98.8	106.0	82.4	57.3	626.1
125	REGULATORY	113.7	24.5	25.6	40.8	42.6	53.8	54.3	56.0	51.0	51.3	59.3	572.9
126	ESF	111.7	49.0	95.5	160.9	139.5	103.5	51.5	34.6	24.0	24.0	25.1	819.3
127	TEST FACILITIES	30.0	13.6	15.0	57.0	58.7	35.5	32.2	28.0	25.1	24.0	20.2	339.3
128	RESERVED	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
129	PROJECT MANAGEMENT	122.3	17.4	17.6	22.5	27.4	22.4	22.3	20.8	17.8	14.6	15.0	320.0
1210	FINANCIAL ASSISTANCE *	86.5	17.6	30.0	85.0	95.4	94.1	88.8	85.5	76.5	70.5	67.2	797.0
1211	QUALITY ASSURANCE	69.5	10.0	12.0	24.8	29.5	29.6	31.1	27.8	24.8	21.5	19.7	300.3
1212	INFORMATION MANGMNT	54.0	11.0	12.4	18.5	23.2	21.5	22.7	20.8	17.5	16.6	15.8	234.1
1213	ENVIR/SAFETY & HEALTH	48.7	12.4	15.0	25.1	23.7	18.6	20.4	19.1	17.3	16.7	15.5	232.5
1214	INSTITUTIONAL	13.7	3.5	3.5	9.2	10.2	11.3	11.9	12.1	12.7	11.5	11.9	111.5
1215	SUPPORT SERVICES	59.8	17.0	17.6	21.8	23.9	21.4	20.9	19.2	18.9	15.9	15.0	251.5
	CONTINGENCY	0.0	0.0	0.0	87.7	93.3	85.7	79.5	71.2	54.3	42.8	36.6	551.1
TOTAL		1255.5	245.7	366.0	740.2	796.0	737.2	683.8	633.7	523.8	450.5	400.8	6832.2

* Includes \$200M for benefits (95-2002)

Estimated costs include capital and operating dollars

Estimate to complete FY93 through 2002 (Less FA) is \$4866M

**Not Approved by
Program or Project
Change Control Boards**

YUCCA MOUNTAIN SITE CHARACTERIZATION PROJECT COMPARISON OF MISSION 2001, ICE, AND PROPOSED BASELINE

(YEAR OF EXPENDITURE \$M)

WBS		PRIOR	FY93	FY94	FY95	FY96	FY97	FY98	FY99	FY00	FY01	FY02	TOTAL
1.2.1	SYSTEMS	103.9	25.9	43.6	51.2	53.9	55.1	56.4	55.6	47.6	41.9		535.3
1.2.2	WASTE PACKAGE	88.4	10.2	31.9	37.5	39.3	36.9	31.5	23.1	17.7	14.0		330.5
1.2.3	SITE	337.2	68.3	153.1	161.8	155.3	156.6	111.3	47.1	28.2	16.1		1235.0
1.2.4	REPOSITORY	95.5	11.4	24.9	40.8	47.8	72.9	138.0	129.6	85.5	60.9		707.3
1.2.5	REGULATORY & INST	107.6	23.6	37.1	42.3	43.0	44.9	46.7	46.5	38.3	51.9		481.9
1.2.6	ESF	111.7	82.5	199.5	182.1	152.4	54.9	48.4	26.1	23.9	23.2		904.7
1.2.7	TEST FACILITIES	30.0	18.6	59.8	45.5	42.3	39.6	36.4	30.1	25.9	25.7		354.0
1.2.8	LAND ACQUISITION	1.3	0.2	0.2	0.2	0.2	0.6	0.5	0.5	0.6	0.6		5.0
1.2.9	PROJECT MANAGEMENT	293.3	56.8	80.2	79.7	85.2	87.2	87.5	78.9	75.2	71.7		995.8
1.2.10	F&TA	86.5	35.0	83.0	82.6	79.6	72.3	71.7	60.8	52.4	48.9		672.7
MISSION 2001		1255.5	332.6	713.5	723.6	699.1	621.0	628.3	498.3	395.3	354.8		6222.1
ICE FUNDING PROFILE		1241.9	331.2	644.4	602.3	684.8	655.5	635.7	525.7	509.9	447.9		6279.3
PROPOSED BASELINE		1255.5	244.7	366.0	740.2	796.0	737.2	683.8	633.7	523.8	450.5	400.8	6832.2

- The Mission 2001 funding profile is based upon completion of the current work scope. The 2001 completion date can be maintained by replanning work in FY93 for funding above \$240M.
- All estimates include contingency. Mission 2001 Final Report values adjusted for results of final contingency analysis.
- Mission 2001 Funding profile includes budget reductions of approximately \$220M which have not yet been planned by the appropriate participant.
- Mission 2001 Staffing ramp--up from FY93 to FY94 is high risk but funding at full value is critical to support large capital commitments as well as maintenance of project momentum.
- Proposed baseline funding profile is based on FY93 enacted and FY94 OMB request. This near term funding profile causes a 1 year delay in LA.
- Estimate to Complete FY93 to 2001 (Less F&TA) is \$4380.4M for Mission 2001 and \$4866M for Interim Baseline for FY93 to 2002.

Cost Evaluation Study

- **Cost reduction off site October 22, 1992**
 - **Cost reduction objectives, 20% reduction of E.T.C. - Gertz**
 - **Specific cost reduction targets - Blanchard**
 - **Cost reductions to bottoms up estimates - Foust**
- **Established 7 cost reduction teams - headed by M&O**
 - **Test Program - Quittmeyer**
 - **Environmental & Permitting - Stern**
 - **Design - Pimentel**
 - **Construction - Allan**
 - **Operations - McKie**
 - **Infrastructure - Hurst**
 - **Early program decisions - Schutt**
 - **Performance Assessment & Regulatory Compliance - Lugo**
 - **Financial & Technical Assistance - Hurst**

Cost Evaluation Study Progress Outline

- **Guidance for Cost Evaluation Study Groups**
- **Schedule status**
- **Evaluation status**
- **Report development**

Cost Evaluation Study

Guidance for Cost Evaluation Study Groups

- **This is a further refinement of the product of Mission 2001**
- **Cost reductions as a percent of total remaining budget are not expected to be the same in all areas**
- **Recognize limited available time**
- **Coordinate as appropriate with other Study Groups**
- **Utilize the Coordination Committee for clarification, consistency, integration, and resolving concerns**

Cost Evaluation Study

Guidance for Cost Evaluation Study Groups

(Continued)

- **Items to be considered and included as appropriate:**
 - **Less conservative interpretation of regulations**
 - **Review where DOE Orders and NRC regulations overlap -- NRC should take precedence**
 - **Eliminate non-applicable requirements**
 - **Streamlining work approaches within participant functions**
 - **Review Corrective Action Reports (CARs) for areas where increased efficiency is possible**
 - **Review Technical Direction Letter (TDL) process for possible streamlining**
 - **Consider alternative approaches for accomplishing work**

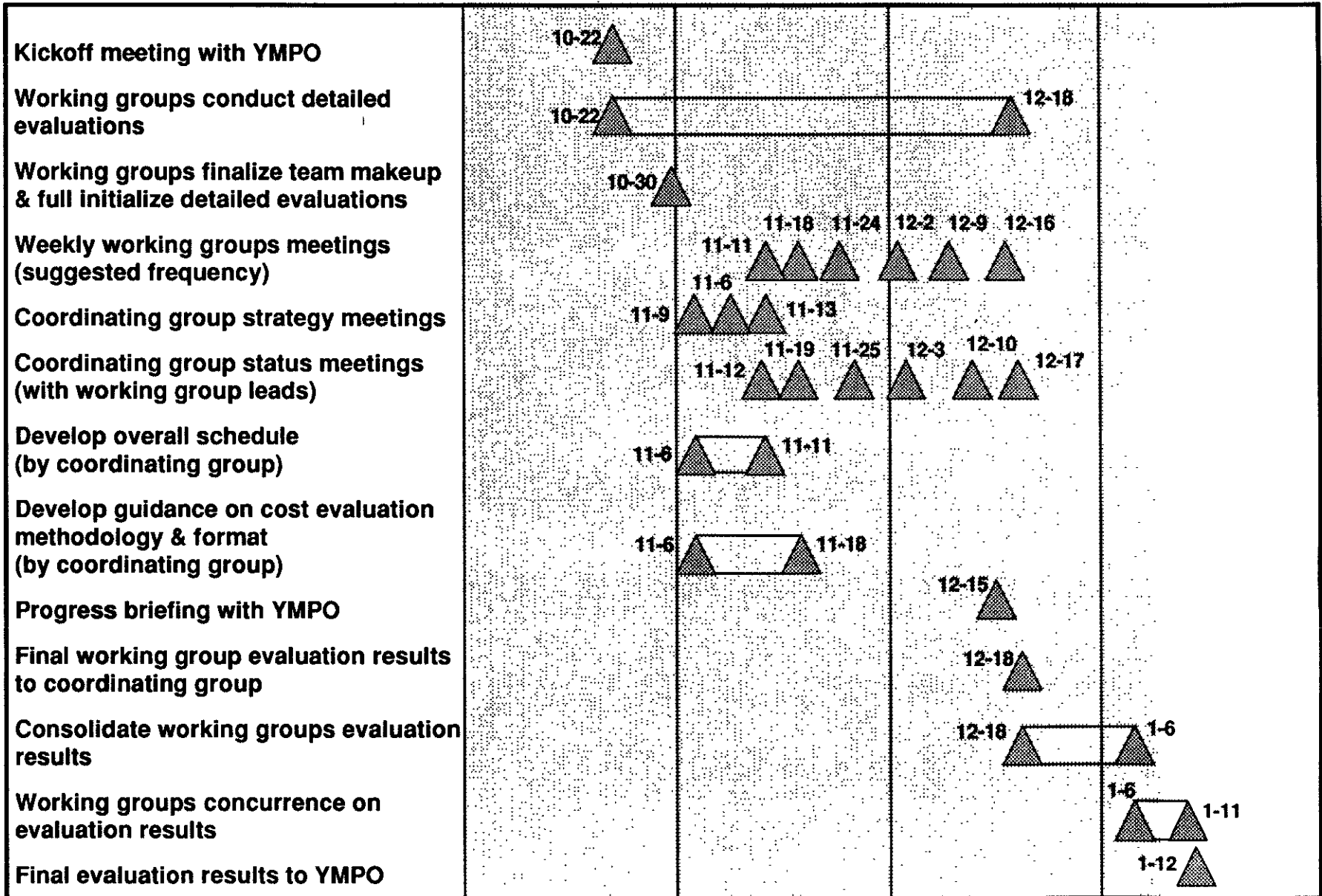
Cost Evaluation Study

Guidance for Cost Evaluation Study Groups

(Continued)

- **Utilize the following format for the recommendations for cost reductions:**
 - **Description of methodology and assumptions used to evaluate all elements**
 - **Description of each subelement, activity, or item that is considered and conclusion regarding cost reduction**
 - **Rationale for work/cost reduction including an assessment of the risk**
 - **Approvals needed for implementation of work/cost reduction**
 - **Estimate of cost/schedule savings**

Cost Evaluation - Overall Schedule Status



Cost Evaluation Study Status Summary

(Continued)

Preliminary

- **Preliminary Cost Savings Identified**

	<u>Savings</u>	<u>Estimate to Complete</u>
- Design, Construction & Operations Work Group		
-- 9 candidate areas (all category 1)	\$164M	3.4
- Testing Programs Work Group		
-- Test consolidation (category 1)	\$ 17M	0.3
-- Scope reductions (category 1)	\$75M	1.5
-- Elimination of tests with high construction costs (category 2)	\$235M	4.9
-- Subtotal	\$327M	6.7

Cost Evaluation Study Status Summary

(Continued)

Preliminary

- **Preliminary Cost Savings Identified** (continued)

	<u>Savings</u>	<u>ETC</u>
- Infrastructure Work Group		
-- Results of Technical Cost Reduction (category 1)	\$10M	.21
-- Infrastructure Cost Baseline Evaluation (category 1)	\$10M	.21
-- 80 discrete suggestions (category 2)	\$10M	.21
- Financial and Technical Assistance Work Group		
-- Estimates under development		

Cost Evaluation Study Status Summary

(Continued)

Preliminary

- **Preliminary Cost Savings Identified**

	<u>Savings</u>	<u>ETC</u>
- Performance Assessment & Regulatory		
-- 6 candidate areas (category 1)	\$7.6M	.16
-- 8 candidate areas (category 2)	\$34.8M	.73
-- Total	\$42.4M	.89
- Environmental Work Group		
-- Under development		
- Early Decision Work Group		
-- 3 candidate areas (category 1)	\$511.0M	10.7
-- 4 candidate areas (category 2)	\$112.0M	2.3
-- Subtotal	\$623.0M	13.0

Cost Evaluation Study Status Summary

(Continued)

Preliminary

- **Summary of Preliminary Estimate of Cost Savings**

	<u>Savings</u>	<u>ETC</u>
- Within current program Strategy/Conservatism (category 1)	\$794.6M	16.6
- Outside Current Program Strategy/Conservatism (category 2)	\$391.8M	8.2
- Total Estimated Savings	\$1,186.4M	24.8
- Estimates for other candidate areas under development		

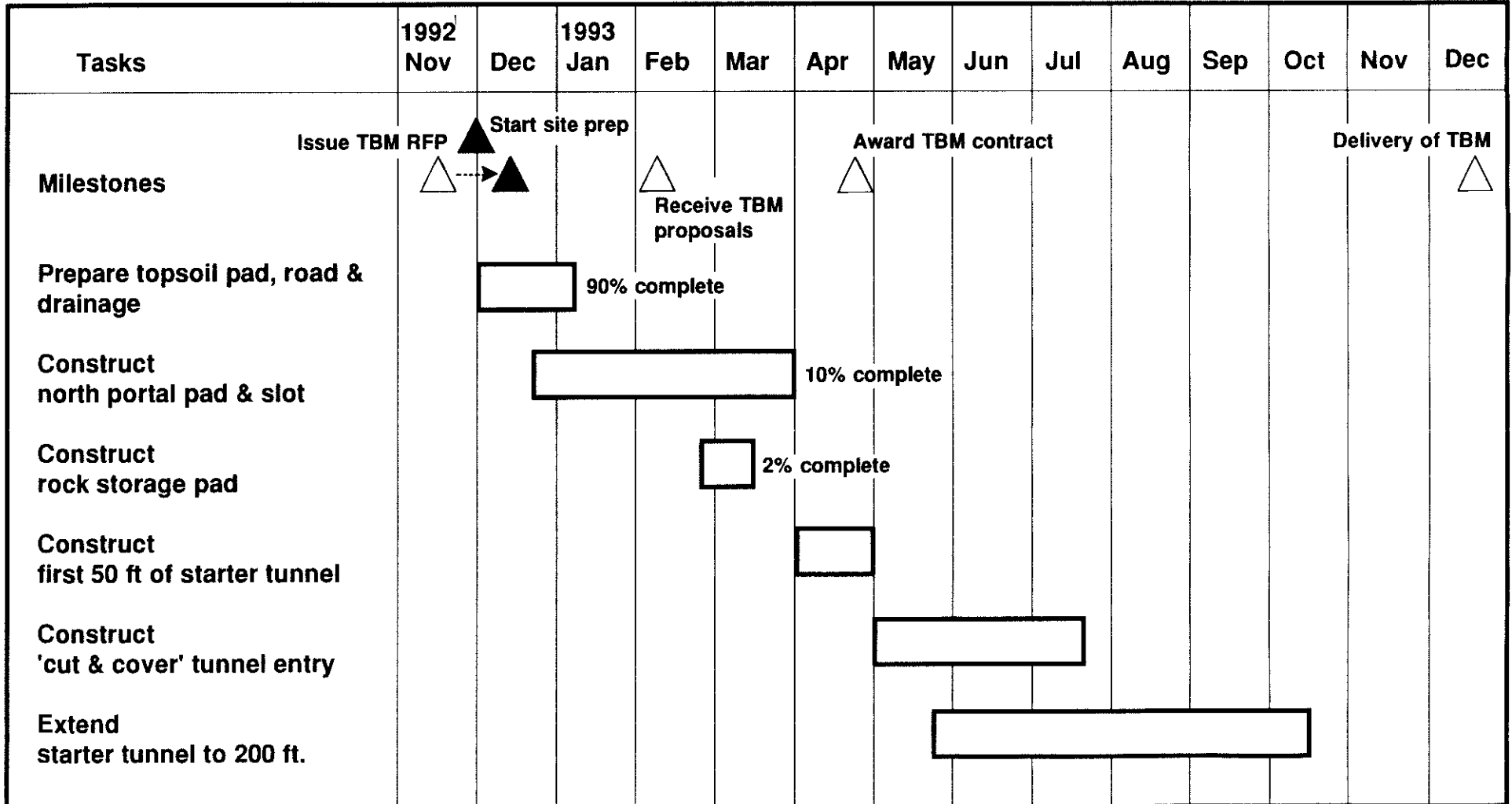
- **Risk Assessment is Preliminary**

Cost Evaluation Study Report Due This Month

- **Full reports for each Cost Evaluation Study Group submitted to the Coordinating Group on December 18, 1992**
- **Coordinating Group will assure full compliance with the evaluation guidance provided**
- **Any discrepancies, duplications, missing information, or inconsistency concerns will be referred back to the appropriate Study Group for resolution**
- **Final report due January 12, 1993**

PRELIMINARY ESF CONSTRUCTION SUMMARY SCHEDULE

As of 1-4-92





**ESF NORTH PORTAL
VIEW FROM FRAN RIDGE
DECEMBER 17, 1992**



**ESF NORTH PORTAL
VIEW FROM MIDWAY VALLEY
DECEMBER 17, 1992**

Conclusion

Cost consciousness concerns raised by NWTRB, Congress, and affected parties are being addressed



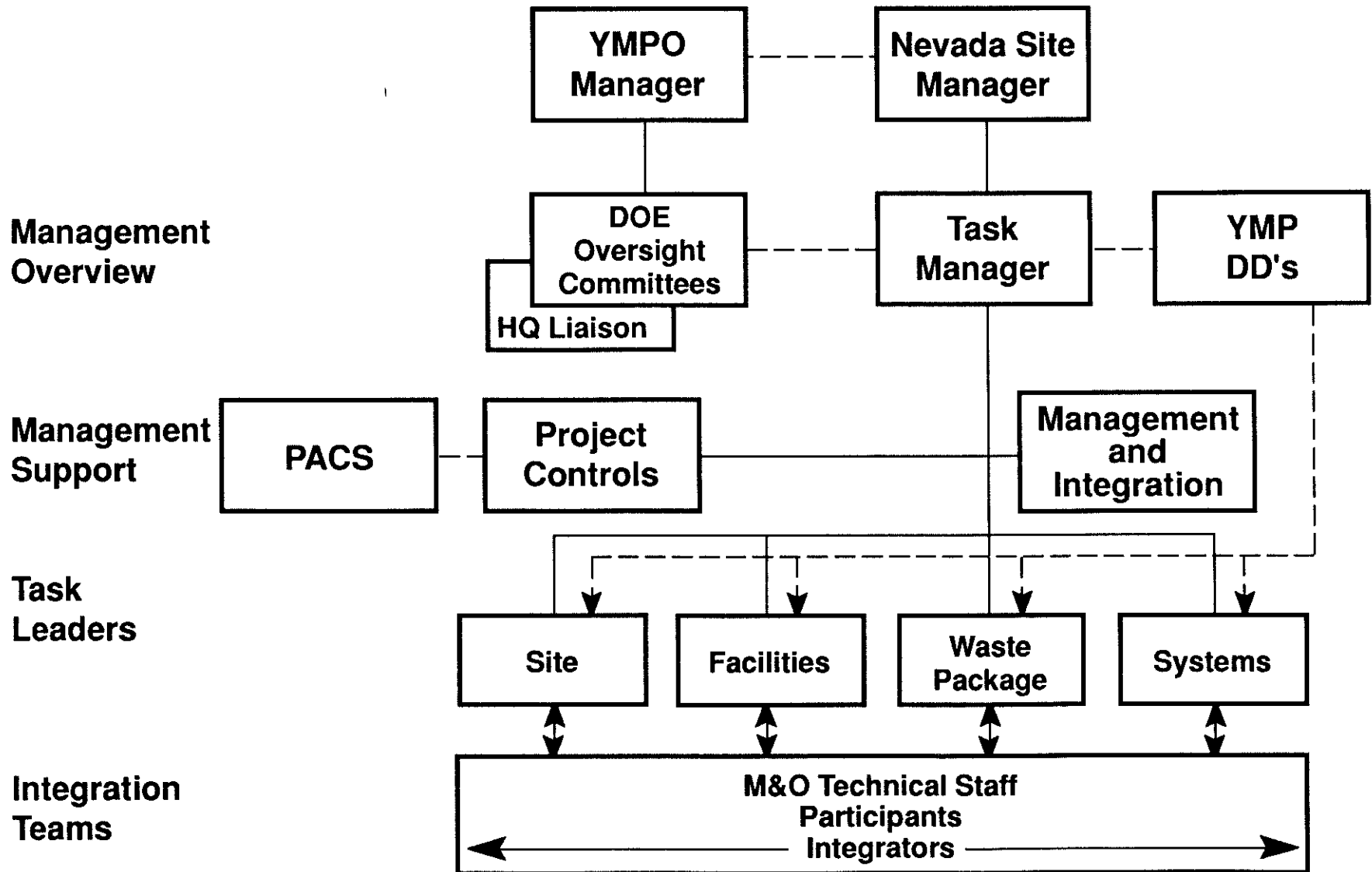
**"GREAT THINGS ARE DONE WHEN
MEN AND MOUNTAINS MEET"**

William Blake
1789-1827



BACKUP

Task Team Organization



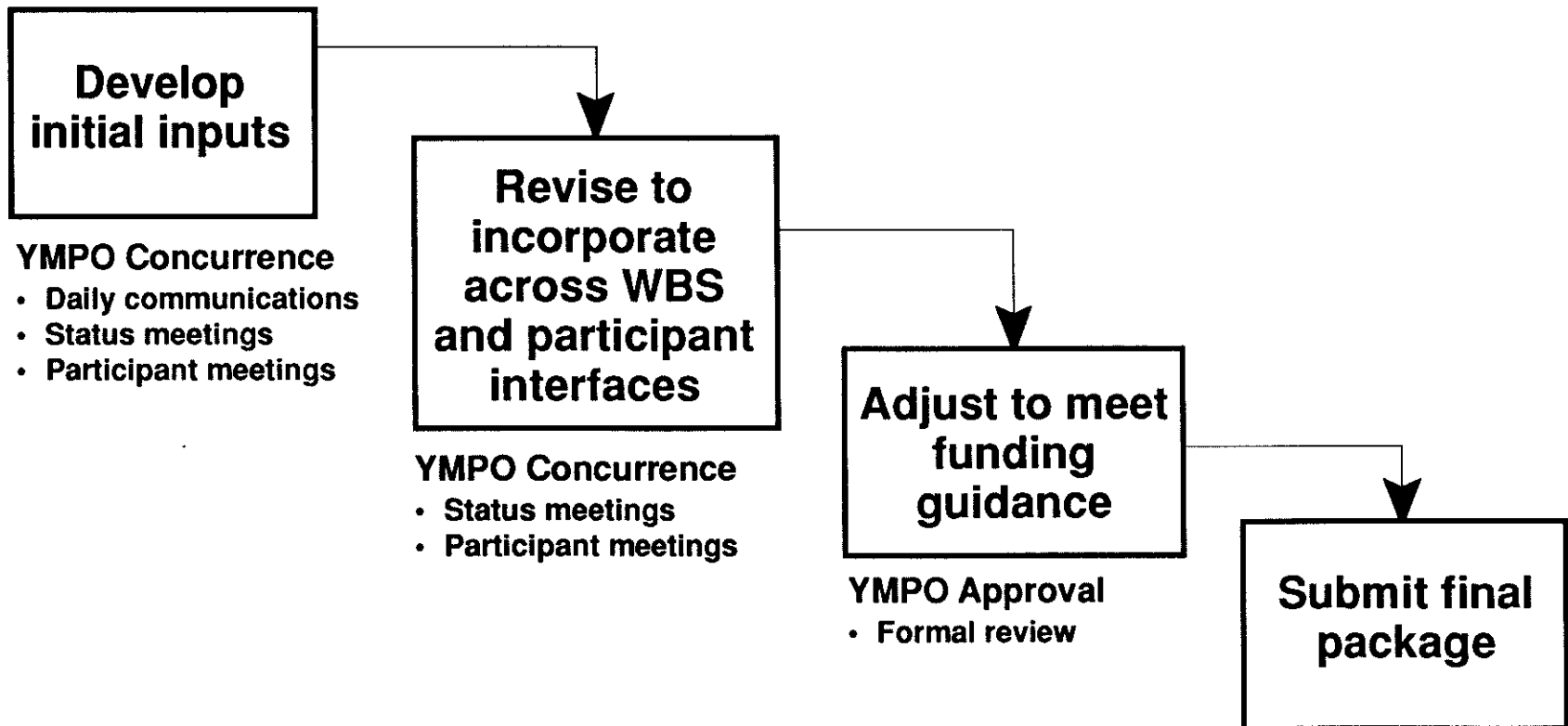
Mission 2001

Roles and Responsibilities

- **Task leaders**
 - **Direct developments of tasks/cost/schedules for WBS assignments**
 - **Constant communication and point of contact with DDs and BCs**
- **Project Engineers**
 - **Single point of contact for appropriate participants**
 - **Assures that each task leader has inputs from respective participants**
- **M&O SE/I Integrator**
 - **Assures coordination of intra-WBS and intra-participant tasks**
 - **Assures intra-WBS/intra-participant technical/schedule problems are resolved**

Mission 2001

Review and Acceptance by YMPO



COMPARISON OF YMP TOTAL PROJECT COST ESTIMATES

UNESCALATED \$M (Except as noted)

WBS		ESAAB 01/92	ICE PHASE II 08/92	Mission 2001 Report With Final Contingency Analysis 09/92
1.2.1	SYSTEMS	440	421	424
1.2.2	WASTE PACKAGE	273	285	268
1.2.3	SITE	1,113	1,006	1,004
1.2.4	REPOSITORY	451	649	502
1.2.5	REGULATORY AND INSTITUTIONAL	382	385	408
1.2.6	ESF	728	693	698
1.2.7	TEST FACILITIES	313	308	250
1.2.8	LAND ACQUISITION	4	3	4
1.2.9	PROJECT MANAGEMENT	1,003	796	862
1.2.10	F&TA (WITHOUT BENEFITS)	453	453	458
SUBTOTAL		5,160	5,000	4,878
	BENEFITS	450	0	200
SUBTOTAL		5,610	5,000	5,078
	* CONTINGENCY	75	526	491
TOTAL PROJECT COST	UNESCALATED	5,685	5,526	5,569
TOTAL PROJECT COST	ESCALATED	6,319	6,279	6,222
	ESTIMATE TO COMPLETE FY93 – LA LESS F&TA	** 3,590	** 3,924	3,743

Estimated costs include capital, operating and prior spending.

* ESAAB contingency is for ESF Construction only; ICE and Mission 2001 contingency is for all 3rd level cost elements.

F&TA and Benefits –

ESAAB – Includes: 10% for grants, cooperative agreements, and impact assistance; PETT; and \$50M (93–2001) for benefits agreement.

ICE PHASE II – 94–2001 includes 10% for grants, cooperative agreements, and impact assistance; PETT; excludes \$200M benefits agreement.

FY93 includes \$8.5M for county grants; 2.5% for state grant; PETT; excludes 2% impact assistance.

MISSION 2001 – Includes: 10% for grants, cooperative agreements, and impact assistance; PETT; and \$25M (94–2001) for benefits agreement.

Estimate To Compete is FY93 through LA less F&TA (unescalated)

** Adjusted to reflect difference between FY92 estimate and FY92 funding. Non-funded FY92 work was shifted to outyears.

