Permitting Alternatives for Treatment Skids

Request for Input and Determination from NMED

Los Alamos National Laboratory
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The Problem

We need NMED input on permitting of skids:

1. To develop realistic schedules for the Site Treatment Plan
2. Can treatment skids be fabricated prior to RCRA operating permit
3. If so, can they be used for treatability studies

Our Objective

When the Hazardous Waste Treatment Facility comes on line

1. Have a fleet of fully tested treatment skids

2. Have a crew fully trained on these skids

3. Test & train

   * with the same safety features

   * Under the same safety regulations

As for routine treatment operation in the HWTF

Typical Approach to Development of a Process

1. **Bench Scale.**
   - * Establish process chemistry
   - * Optimize process parameters
2. **Pilot Scale**
   - * Materials of construction Equipment (e.g. pumps)
   - * Instruments/process control systems Safety features
   - * Data not obtainable at bench scale (e.g. mixing)
3. **Full scale**
   - * Detailed design Fabrication Testing
   - * Operation

Proposed Approach for Some LANL Waste Treatment Skids

1. Bench Scale Tests
2. Construction of Skid
3. *Treatability Study Using Skid*
4. Waste Treatment (With Part B Mod.)

The same treatment unit would be used for steps 2, 3, 4

Justification For One Size Unit

Small Volumes of waste (LANL + AL sites):

Treatability-size unit is large enough for later full-size treatment

E.g. Water-reactive waste:

Total inventory:	6000 Kg
Proposed treatability rate:	Start low (e.g. 1 Kg/batch)
	Increase to max 100 Kg/week
Proposed treatability maximum:	1000 Kg
Routine operation (w. Part B Mod.):	100 Kg/batch (week)

Principal Advantages of Full-Size Treatability. 1.

* Fully operational (debugged) treatment skids when HWTF comes on line

* Crew fully trained on full size skid

i.e. Faster treatment of inventory of wastes in HWTF

Advantages of Full-Size Treatability. 2.

Demonstrates System/Process

* To Regulators
* To the Public
* To DOE

Advantages of Full-Size Treatability. 3.

Shorter schedule to treatment

Proposed schedule

Bench tests	**Skid construct'n**	**Treatability**	**Part B Mod.**	**Treatment**	

Advantage: Definitive data for PART B Mod

Alternate 1

Bench tests	RD&D permit	Construction	Testing	Part B Mod	Treatment

Disadvantages: Two permitting processes
Increased limit on waste volume for RD&D not needed
Not all processes used are innovative

Alternate 2

Bench tests	Part B Mod.	Construction	Testing	Part B update	Treatment

Disadvantages: Lack of definitive data for the first Part B application
System modifications during testing require permit update

Advantages of Full-Size Treatability. 4.

Same unit for treatability & treatment VS

Smaller treatability unit + Full size treatment

* Reduce technical risk

  Testing real size equipment prior to operation in the HWTF

* Almost half cost

  Cost of small scale & large scale unit is almost the same. Cost is mostly fabrication & safety features, not size

  Duplication of documents and permits when two units of different size are operated

Advantages of Full-Size Treatability. 5.

Same unit for treatability & treatment VS

Small treatability unit + Full size treatment

* Crew operational when HWTF starts up:

  Trained continuously (various treatment processes)

  On full size units

* Accelerated waste treatments in HWTF

* Shorter overall schedule (one construction vs two)

Advantages of Full-Size Treatability. 6

Same unit for treatability & treatment VS

Small treatability unit + Full size treatment

* Complete design data for Part B Mod. applications
* Better timing of Part B Mod. applications
* Flexibility in scheduling manpower....Operators being continuously trained

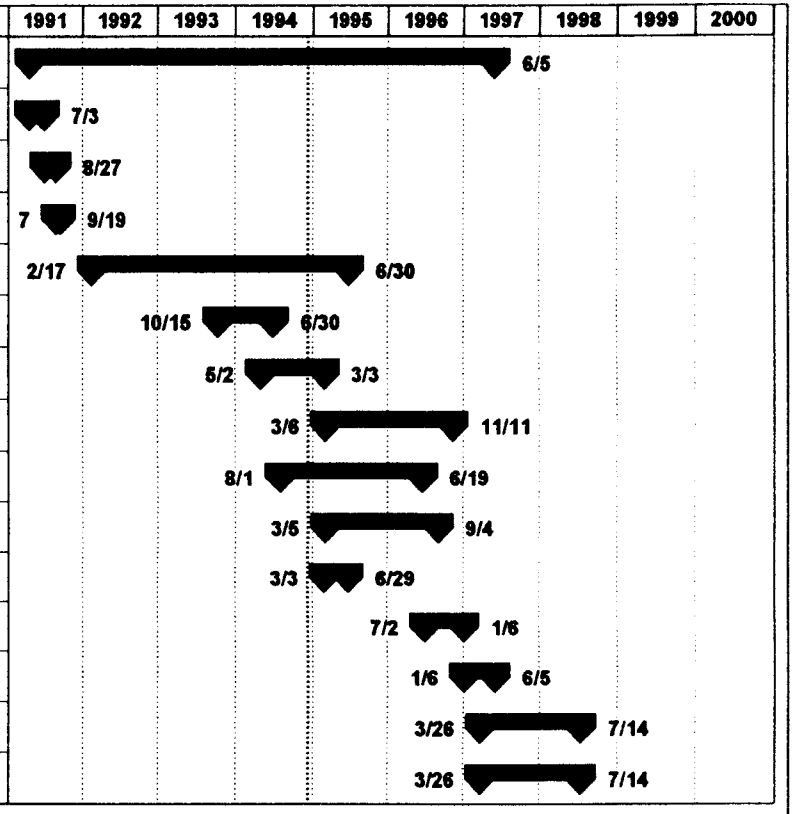
WATER REACTIVE WASTE SKID

	DURATION	START	FINISH	FISCAL	RESOURCE	RESOURCE	STAFF	TECH	CONTR	BASE SALARY	DIRECT	WITH LANL	WITH GROUP	WITH DIVISION		FUNDING
Run Water tests using LIH	130	1-Oct-94	28-Nov-94	1995	1A05---S	CST-18 Staff	80.00			$54.00		95.31	121.14	132.04	$10,563.32	
				1995	1A05---O	CST-18 Other		240.00		$30.00		52.95	67.30	73.36	$17,605.54	
Run Water tests using other wastes	155	29-Nov-94	30-Jun-95	1995	1A05---S	CST-18 Staff	190.00			$54.00		95.31	121.14	132.04	$25,087.89	
				1995	1A05---O	CST-18 Other		380.00		$30.00		52.95	67.30	73.36	$0.00	
Contractor Draft Design 1	130	9-May-94	4-Nov-94	1995	1A05---S	CST-18 Staff	11.00			$54.00		95.31	121.14	132.04	$1,452.46	2
				1995	1A05---O	CST-18 Other		5.00		$30.00		52.95	67.30	73.36	$366.78	
Design Review 1	10	7-Nov-94	18-Nov-94	1995	1A05---S	CST-18 Staff	80.00			$54.00		95.31	121.14	132.04	$10,563.32	2
				1995	1A05---O	CST-18 Other		40.00		$30.00		52.95	67.30	73.36	$2,934.26	
Feed Prep Glovebox Design	65	21-Nov-94	17-Feb-95	1995	1A05---E	ENG CONT					$65,000.00	91000			$91,000.00	
Contractor Final Design	65	21-Nov-94	2/1`7/95	1995	1A05---S	CST-18 Staff	47.00			$54.00		95.31	121.14	132.04	$6,205.95	2
				1995	1A05---O	CST-18 Other		24.00		$30.00		52.95	67.30	73.36	$1,760.55	
Design Review Final	10	20-Feb-95	3-Mar-95	1995	1A05---S	CST-18 Staff	48.00			$54.00		95.31	121.14	132.04	$6,337.99	2
				1995	1A05---O	CST-18 Other		24.00		$30.00		52.95	67.30	73.36	$1,760.55	
1.7 Title III (Fabrication & Construction)				1995												
Operating Site Doc.	15	6-Mar-95	27-Mar-95	1995	1A05---S	CST-18 STAFF	40.00			$54.00		95.31	121.14	132.04	$5,281.66	2
Prepare Site	50	28-Mar-95	6-Jun-95	1995	1A05---S	CST-18 STAFF	20.00			$54.00		95.31	121.14	132.04	$2,640.83	2
				1995	1A05---O	CST-18 OTHER		40.00		$30.00		52.95	67.30	73.36	$2,934.26	2
				1995	1A05-J1K	JCI LABOR					$51,750.00	106605.00	0.00	0.00	$106,605.00	2
Prepare Spec Package	10	6-Mar-95	17-Mar-95	1995	1A05---S	CST-18 STAFF	80.00			$54.00		95.31	121.14	132.04	$10,563.32	2
				1995	1A05---O	CST-18 OTHER		40.00		$30.00		52.95	67.30	73.36	$2,934.26	
Process Through MAT	50	20-Mar-95	26-May-95	1995	1A05---S	CST-18 STAFF	24.00			$54.00		95.31	121.14	132.04	$3,169.00	2
Review Proposals	25	17-Jul-95	18-Aug-95	1995	1A05---S	CST-18 STAFF	40.00			$54.00		95.31	121.14	132.04	$5,281.66	2
EPA Notice	1	11-Nov-96	11-Nov-96	1995								0.00	0.00	0.00	$0.00	2
1.8 Environmental Permitting				1995												
Determine Potential Emissions & 2nd Wastes	100	1-Aug-94	15-Dec-94	1995			0.00					0.00	0.00	0.00	$0.00	2
Prepare ES&H Questionnaire	90	15-Aug-94	15-Dec-94	1995			0.00					0.00	0.00	0.00	$0.00	2
ES&H Questionnaire Review Period	25	16-Dec-94	13-Jan-95	1995			0.00					0.00	0.00	0.00	$0.00	2
Obtain Decision on Permit Requirements	35	16-Jan-95	1-Mar-95	1995			0.00					0.00	0.00	0.00	$0.00	2
Determine Data Needed for Permits	35	2-Mar-95	17-Apr-95	1995	1A05---S	CST-18 STAFF	40.00			$54.00		95.31	121.14	132.04	$5,281.66	2
NEPA Prep.	245	18-Apr-95	30-Sep-95	1995	1A05---S	CST-18 STAFF	20.00			$54.00		95.31	121.14	132.04	$2,640.83	2
				1995	1B05---S	ESH-8 STAFF			40.00			104.68			$4,187.20	
				1995	1A05-T5X	ENG SERV					$10,000.00	11600.00			$11,600.00	
NEPA Review	65	20-Mar-96	19-Jun-96	1995	1A05---S	CST-18 STAFF	8.00			$54.00		95.31	121.14	132.04	$1,056.33	2
				1995	1B05---S	ESH-8 STAFF			40.00			104.68			$4,187.20	
NESHAPS Appl. Prep.	40	18-Apr-95	12-Jun-95	1995	1A05---S	CST-18 STAFF	40.00			$54.00		95.31	121.14	132.04	$5,281.66	2
				1995	1B05---S	ESH-8 STAFF			80.00			104.68			$8,374.40	
				1995	1A05-T5X	ENG SERV					$20,000.00	23200.00			$23,200.00	
NESHAPS Permitting	65	12-Jun-95	7-Sep-95	1995	1A05---S	CST-18 STAFF	8.00			$54.00		95.31	121.14	132.04	$1,056.33	2
				1995	1B05---S	ESH-8 STAFF			24.00			104.68			$2,512.32	
RCRA Appl. Prep.	60	18-Apr-95	7-Jul-95	1995	1A05---S	CST-18 STAFF	40.00			$54.00		95.31	121.14	132.04	$5,281.66	
				1995	1B05---S	ESH-8 STAFF			80.00			104.68			$8,374.40	
				1995	1A05-EDX	NM EID					$24,000.00	27840.00			$27,840.00	
				1995	1A05T6X	ENVIR SERV					$50,000.00	58000.00			$58,000.00	
RCRA Permitting	90	10-Jul-95	30-Sep-95	1995	1A05---S	CST-18 STAFF	9.00			$54.00		95.31	121.14	132.04	$1,188.37	
				1995	1B05---S	ESH-8 STAFF			72.00			85.60			$6,163.20	
STATE Air Appl.	32	18-Apr-95	1-Jun-95	1995	1A05---S	CST-18 STAFF	40.00			$54.00		95.31	121.14	132.04	$5,281.66	2
				1995	1B05---S	ESH-8 STAFF			80.00			104.68			$8,374.40	
				1995	1A05-T5X	ENG SERV					$20,000.00	23200.00			$23,200.00	
STATE Air Permitted	105	4-Jan-95	26-May-95	1995	1A05---S	CST-18 STAFF	8.00			$54.00		95.31	121.14	132.04	$1,056.33	2
				1995	1B05---S	ESH-8 STAFF			40.00			104.68			$4,187.20	
Public Relations Video	124	1-Jun-95	30-Sep-95	1995	1A05---S	CST-18 STAFF	43.00			$54.00		95.31	121.14	132.04	$5,677.79	
				1995	1A05-T5X	ENG SERV					$23,400.00	27144.00			$27,144.00	
1.9 Safety Documentation				1995												
ID Hazards/Perform FMEA	12	5-Mar-95	20-Mar-95	1995	1A05---S	CST-18 STAFF	88.00			$54.00		95.31	121.14	132.04	$11,619.65	2
				1995	1N05---O	ESH-1 TECH			88.00	$30.00		$52.95	67.25	73.30	$6,450.28	
Prepare PHA	40	20-Mar-95	12-May-94	1995	1A05---S	CST-18 STAFF	192.00			$54.00		95.31	121.14	132.04	$25,351.97	2
				1995	1A05---O	CST-18 OTHER		77.00		$30.00		52.95	67.30	73.36	$5,648.44	
DOE Review	45	15-May-95	13-Jul-95	1995	1A05---S	CST-18 STAFF	18.00			$54.00		95.31	121.14	132.04	$2,376.75	2
				1995	1N05---O	ESH-1 TECH		88.00		$30.00		52.95	67.30	73.36	$6,455.36	
Resolve DOE Comments	25	14-Jul-95	15-Aug-95	1995	1A05---S	CST-18 STAFF	16.00			$54.00		95.31	121.14	132.04	$2,112.88	2
				1995	1Q05---S	ESH-3 RISK AS			16.00			80.48			$1,287.68	
Prepare PSAR task scope	3	16-Aug-95	18-Aug-95	1995	1A05---S	CST-18 STAFF	24.00			$54.00		95.31	121.14	132.04	$3,169.00	
Process through MAT	45	21-Aug-95	19-Oct-95	1995	1A05---S	CST-18 STAFF	24.00			$54.00		95.31	121.14	132.04	$3,169.00	
1.10 Operating Documentation				1995												
Review Title I and II design	5	3-Mar-95	9-Mar-95	1995	1A05---S	CST18 STAFF	2.00			$54.00		95.31	121.14	132.04	$264.08	2
				1995	1A05---O	CST-18 OTHER		1.00		$30.00		52.95	67.30	73.36	$73.36	
Summarize essential information	5	10-Mar-95	16-Mar-95	1995	1A05---S	CST18 STAFF	2.00			$54.00		95.31	121.14	132.04	$264.08	2
				1995	1A05---O	CST-18 OTHER		1.00		$30.00		52.95	67.30	73.36	$73.36	

WATER REACTIVE WASTE SKID

	DURATION	START	FINISH	FISCAL	RESOURCE	RESOURCE	STAFF	TECH	CONTR	BASE SALARY	DIRECT	WITH LANL	WITH GROUP	WITH DIVISION		FUNDING
Start Up/Shut Down Procedures	15	17-Mar-95	6-Apr-95	1995	1A05---S	CST18 STAFF	12.00			$54.00		95.31	121.14	132.04	$1,584.50	2
				1995	1A05---O	CST-18 OTHER		3.00		$30.00		52.95	67.30	73.36	$220.07	
General Procedures	40	7-Apr-95	1-Jun-95	1995	1A05---S	CST18 STAFF	55.00			$54.00		95.31	121.14	132.04	$7,262.28	2
				1995	1A05---O	CST-18 OTHER		43.00		$30.00		52.95	67.30	73.36	$3,154.33	
Safety/Emergency procedures	10	2-Jun-95	15-Jun-95	1995	1A05---S	CST18 STAFF	6.00			$54.00		95.31	121.14	132.04	$792.25	2
				1995	1A05---O	CST-18 OTHER		2.00		$30.00		52.95	67.30	73.36	$146.71	
Maintenance Procedure	10	16-Jun-95	29-Jun-95	1995	1A05---S	CST18 STAFF	0.00			$54.00		95.31	121.14	132.04	$0.00	2
LANL Review	0	29-Jun-95	29-Jun-95	1995			0.00					0.00	0.00	0.00	$0.00	2
Implement Document	0	29-Jun-95	29-Jun-95	1995			0.00					0.00	0.00	0.00	$0.00	2
TOTALS							1355.00	1008.00	560.00		$264,150.00				$647,671.36	

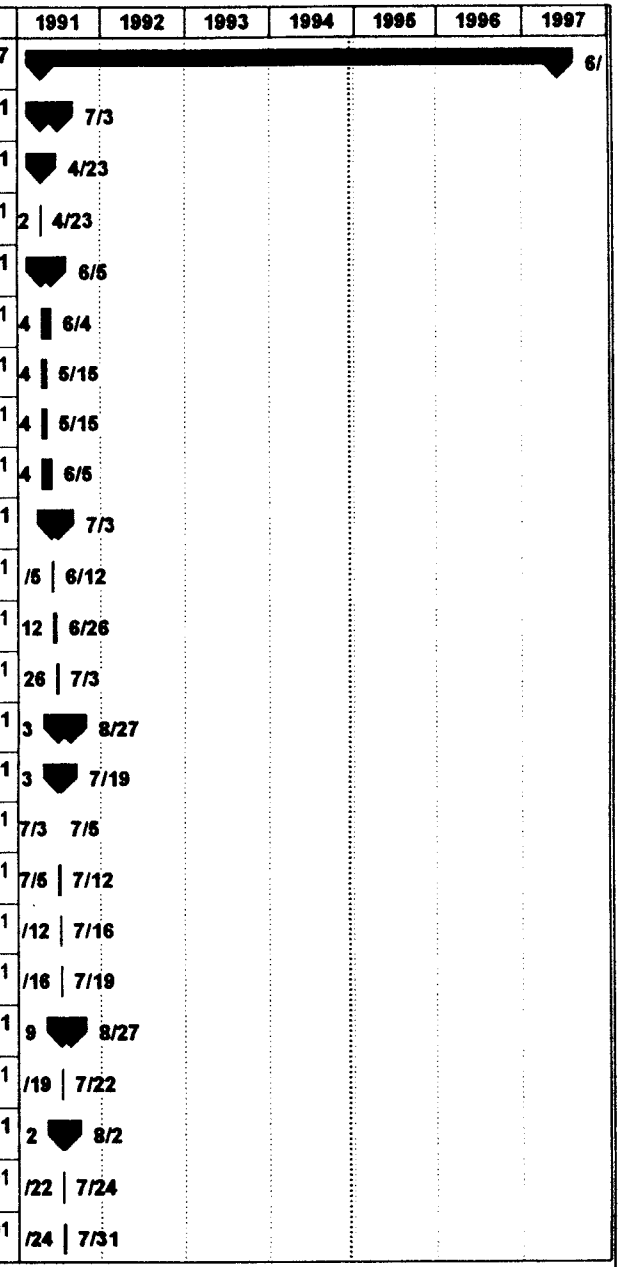
ID	Task Name	Duration	Start	Finish
1	1 water-reactive waste treatment process	1598d	4/22/91	6/5/97
2	1.1 Identifying treatment technology	52.3d	4/22/91	7/3/91
14	1.2 process selection	39d	7/3/91	8/27/91
30	1.3 preconceptual design	17d	8/27/91	9/19/91
38	1.4 bench scale testing	880d	2/17/92	6/30/95
60	1.5 title I design (conceptual design)	185d	10/15/93	6/30/94
73	1.6 title II design (final design)	220d	5/2/94	3/3/95
81	1.7 title III (fabrication and construction)	441d	3/6/95	11/11/96
98	1.8 environmental permitting	492d	8/1/94	6/19/96
119	1.9 safety documentation	392.01d	3/5/95	9/4/96
146	1.10 operating documentation	85d	3/3/95	6/29/95
156	1.11 cold testing of equipment with modifications	134d	7/2/96	1/6/97
178	1.12 hot testing (with wastes)	108d	1/6/97	6/5/97
197	2 optional steps	339.04d	3/26/97	7/14/98
198	2.1 NEPA for operation	339.04d	3/26/97	7/14/98



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task
Critical Task
Milestone
Summary

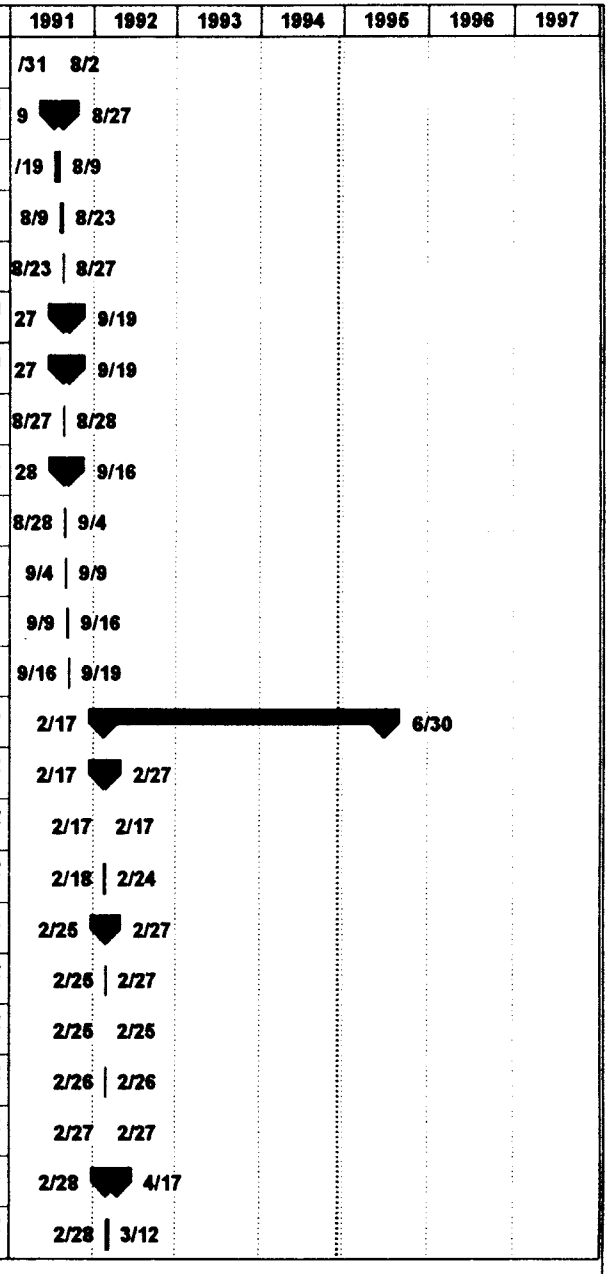
ID	Task Name	Duration	Predecessors	Start	Finish
1	**1 water-reactive waste treatment process**	**1598d**		**4/22/91**	**6/5/97**
2	**1.1 Identifying treatment technology**	**52.3d**		**4/22/91**	**7/3/91**
3	**1.1.1 prepare search plan**	**2d**		**4/22/91**	**4/23/91**
4	1.1.1.1 outline search plan	2d		4/22/91	4/23/91
5	**1.1.2 Literature search**	**30.3d**		**4/24/91**	**6/5/91**
6	1.1.2.1 study primary sources	6w	4	4/24/91	6/4/91
7	1.1.2.2 check references in primary sources	3.03w	6SS	4/24/91	5/15/91
8	1.1.2.3 contact DOE sources	3.03w	6SS	4/24/91	5/15/91
9	1.1.2.4 contact industrial sources	6.06w	6SS	4/24/91	6/5/91
10	**1.1.3 Results from literature search**	**20d**		**6/5/91**	**7/3/91**
11	1.1.3.1 consolidate information	1w	8,9,7,6	6/5/91	6/12/91
12	1.1.3.2 evaluate results	2w	11	6/12/91	6/26/91
13	1.1.3.3 document results	1w	12	6/26/91	7/3/91
14	**1.2 process selection**	**39d**		**7/3/91**	**8/27/91**
15	**1.2.1 process evaluation**	**12d**		**7/3/91**	**7/19/91**
16	1.2.1.1 develop evaluation criteria	2d	13	7/3/91	7/5/91
17	1.2.1.2 perform initial screening based on criteria	1w	16	7/5/91	7/12/91
18	1.2.1.3 refine criteria input for remaining technology	2d	17	7/12/91	7/16/91
19	1.2.1.4 score technologies against criteria	3d	18	7/16/91	7/19/91
20	**1.2.2 verify and choose processes**	**27d**		**7/19/91**	**8/27/91**
21	1.2.2.1 select technologies	1d	19	7/19/91	7/22/91
22	**1.2.2.2 verify process**	**9d**		**7/22/91**	**8/2/91**
23	1.2.2.2.1 collate influent data and physical properties	2d	21	7/22/91	7/24/91
24	1.2.2.2.2 simulate process unit	1w	23	7/24/91	7/31/91



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task
Critical Task
Milestone
Summary

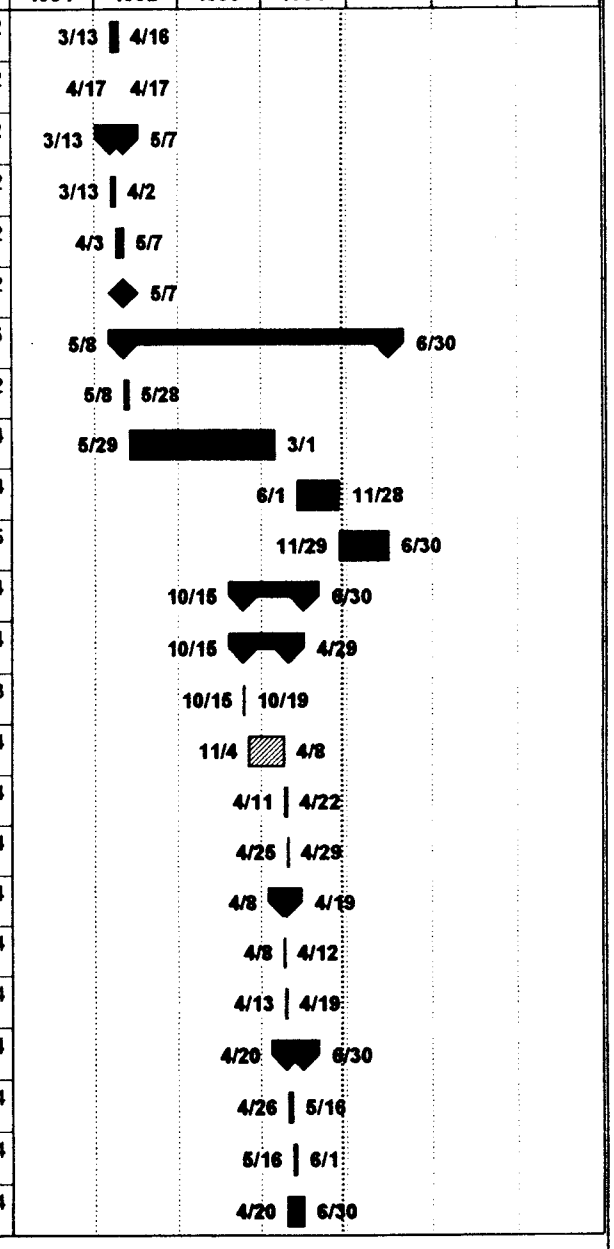
ID	Task Name	Duration	Predecessors	Start	Finish
25	1.2.2.2.3 evaluate performance of units	2d	24	7/31/91	8/2/91
26	**1.2.2.3 preliminary risk analysis**	**27d**		**7/19/91**	**8/27/91**
27	1.2.2.3.1 review process	3w	21SS	7/19/91	8/9/91
28	1.2.2.3.2 identify hazards/prepare FMEA	2w	27	8/9/91	8/23/91
29	1.2.2.3.3 prepare document	2d	28	8/23/91	8/27/91
30	**1.3 preconceptual design**	**17d**		**8/27/91**	**9/19/91**
31	**1.3.1 develop preliminary flow sheet**	**17d**		**8/27/91**	**9/19/91**
32	1.3.1.1 evaluate process selection	1d	29	8/27/91	8/28/91
33	**1.3.1.2 develop preliminary flow sheet**	**13d**		**8/28/91**	**9/16/91**
34	1.3.1.2.1 construct flow sheet	1w	32	8/28/91	9/4/91
35	1.3.1.2.2 select controls	3d	34	9/4/91	9/9/91
36	1.3.1.2.3 simulate for m/e balances	1w	35	9/9/91	9/16/91
37	1.3.1.3 identify data needed for design	3d	36	9/16/91	9/19/91
38	**1.4 bench scale testing**	**880d**		**2/17/92**	**6/30/95**
39	**1.4.1 prepare bench scale plan**	**9d**		**2/17/92**	**2/27/92**
40	1.4.1.1 review design data	1d		2/17/92	2/17/92
41	1.4.1.2 develop plan	1w	40	2/18/92	2/24/92
42	**1.4.1.3 document plan**	**3d**		**2/25/92**	**2/27/92**
43	1.4.1.3.1 identify equipment and layout	3d	41	2/25/92	2/27/92
44	1.4.1.3.2 identify fluid and test parameters	1d	41,43SS	2/25/92	2/25/92
45	1.4.1.3.3 identify run conditions	1d	44	2/26/92	2/26/92
46	1.4.1.3.4 write plan	1d	45	2/27/92	2/27/92
47	**1.4.2 procure equipment and supplies**	**36d**		**2/28/92**	**4/17/92**
48	1.4.2.1 prepare purchase order and specification	2w	43	2/28/92	3/12/92



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task
Critical Task
Milestone
Summary

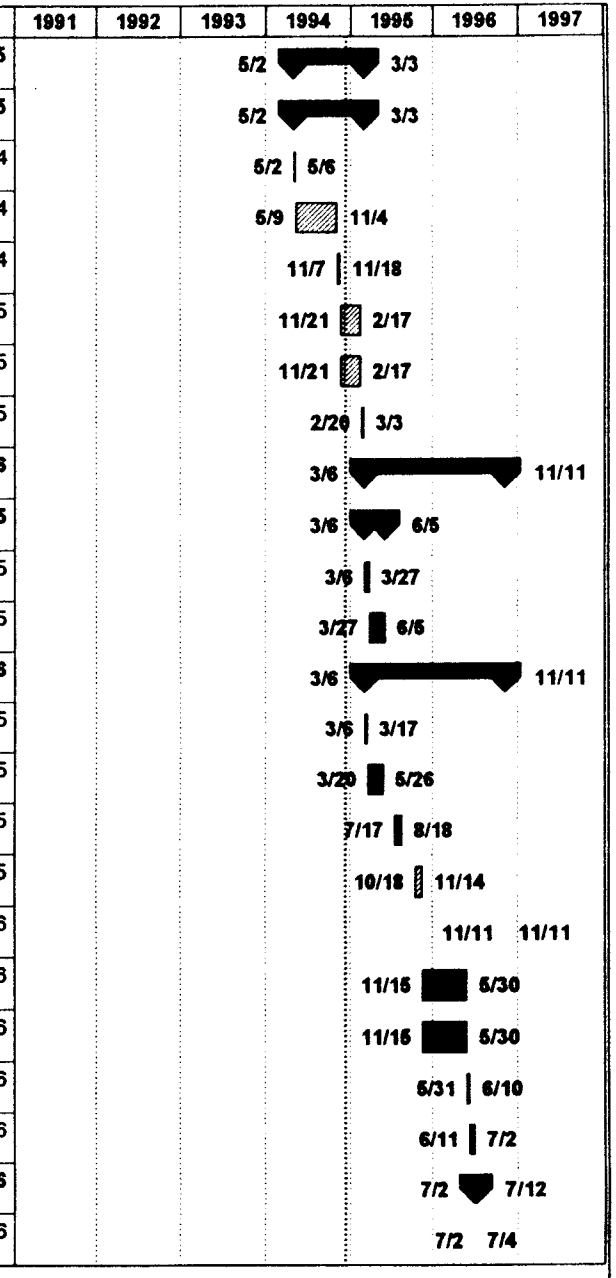
ID	Task Name	Duration	Predecessors	Start	Finish
49	1.4.2.2 process through MAT	5w	48	3/13/92	4/16/92
50	1.4.2.3 receive equipment and supplies	1d	49	4/17/92	4/17/92
51	**1.4.3 prepare safety documentation**	**40d**		**3/13/92**	**5/7/92**
52	1.4.3.1 write SOP	3w	48	3/13/92	4/2/92
53	1.4.3.2 HS SOP review	5w	52	4/3/92	5/7/92
54	1.4.3.3 SOP approval	0d	53	5/7/92	5/7/92
55	**1.4.4 test**	**821d**		**5/8/92**	**6/30/95**
56	1.4.4.1 set up bench scale test	3w	54,50	5/8/92	5/28/92
57	1.4.4.2 run tests using humid N2 and LiH	91.6w	56	5/29/92	3/1/94
58	1.4.4.3 run water test using LiH	25.8w	56	6/1/94	11/28/94
59	1.4.4.4 run water tests using other wastes	30.8w	58	11/29/94	6/30/95
60	**1.5 title I design (conceptual design)**	**185d**		**10/15/93**	**6/30/94**
61	**1.5.1 task release**	**141d**		**10/15/93**	**4/29/94**
62	1.5.1.1 prepare scope	3d		10/15/93	10/19/93
63	1.5.1.2 process thru MAT	22.4w	62	11/4/93	4/8/94
64	1.5.1.3 review proposal	2w	63	4/11/94	4/22/94
65	1.5.1.4 release task	1w	64	4/25/94	4/29/94
66	**1.5.2 reevaluate flow sheet**	**8d**		**4/8/94**	**4/19/94**
67	1.5.2.1 evaluate bench scale data	3d		4/8/94	4/12/94
68	1.5.2.2 develop usable flow sheet	1w	67	4/13/94	4/19/94
69	**1.5.3 preliminary PFD, P&ID, piping**	**52d**		**4/20/94**	**6/30/94**
70	1.5.3.1 PFD mass/heat balance	3w		4/26/94	5/16/94
71	1.5.3.2 preliminary P&ID	2.6w		5/16/94	6/1/94
72	1.5.3.3 identify major equipment components	52d		4/20/94	6/30/94



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task — Milestone
Critical Task — Summary

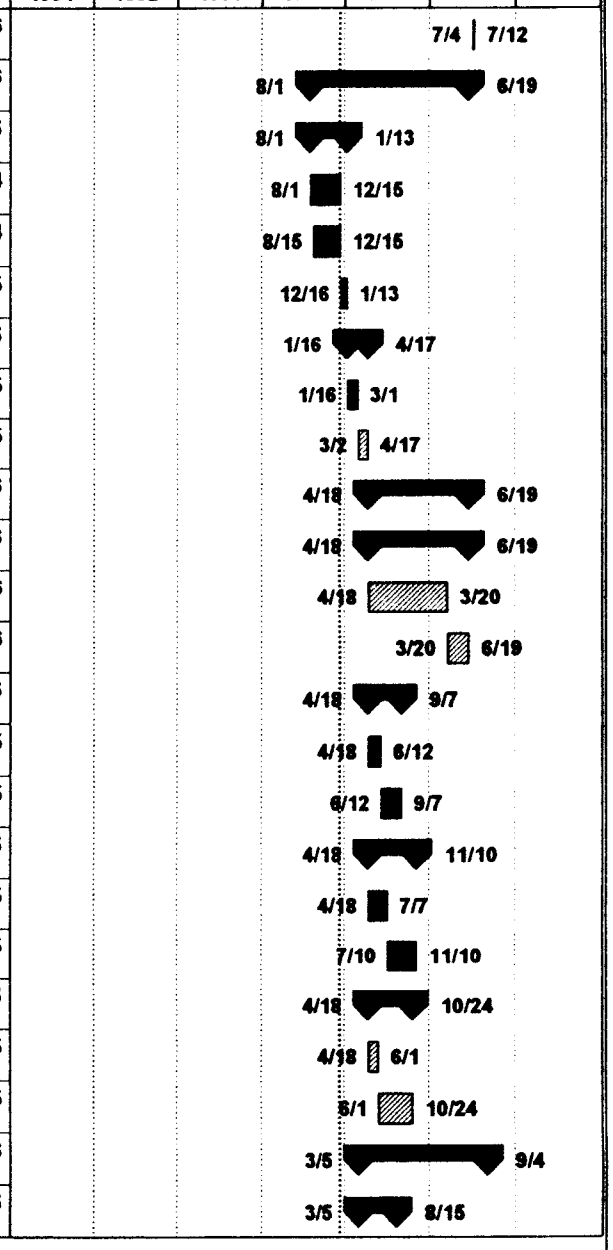
ID	Task Name	Duration	Predecessors	Start	Finish
73	**1.6 title II design (final design)**	**220d**		**5/2/94**	**3/3/95**
74	**1.6.1 title II by subcontractor**	**220d**		**5/2/94**	**3/3/95**
75	1.6.1.1 prepare data package	1w	65	5/2/94	5/6/94
76	1.6.1.2 contractor draft design 1	26w	75	5/9/94	11/4/94
77	1.6.1.3 design review 1	2w	76	11/7/94	11/18/94
78	1.6.1.4 feed prep glovebox design	65d	77	11/21/94	2/17/95
79	1.6.1.5 contractor final design	13w	77,78FF	11/21/94	2/17/95
80	1.6.1.6 design review final	2w	79	2/20/95	3/3/95
81	**1.7 title III (fabrication and construction)**	**441d**		**3/6/95**	**11/11/96**
82	**1.7.1 site preparation**	**65.15d**		**3/6/95**	**6/5/95**
83	1.7.1.1 operating site doc.	3.03w	80	3/6/95	3/27/95
84	1.7.1.2 prepare site	10w	83	3/27/95	6/5/95
85	**1.7.2 construction**	**441d**		**3/6/95**	**11/11/96**
86	1.7.2.1 prepare spec package	2w	80	3/6/95	3/17/95
87	1.7.2.2 process through MAT	10w	86	3/20/95	5/26/95
88	1.7.2.3 review proposals	5w	87	7/17/95	8/18/95
89	1.7.2.4 release purchase order	4w	88,109,118	10/18/95	11/14/95
90	1.7.2.5 EPA notice	1d		11/11/96	11/11/96
91	1.7.2.6 fabricate skids	28.4w	89	11/15/95	5/30/96
92	1.7.2.7 fabrication tracking/inspection	28.4w	91SS	11/15/95	5/30/96
93	1.7.2.8 acceptance inspection	1.4w	91	5/31/96	6/10/96
94	1.7.2.9 shipping	3.2w	93	6/11/96	7/2/96
95	**1.7.3 set up**	**8d**		**7/2/96**	**7/12/96**
96	1.7.3.1 set skids	2d	94	7/2/96	7/4/96



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task
Critical Task
Milestone
Summary

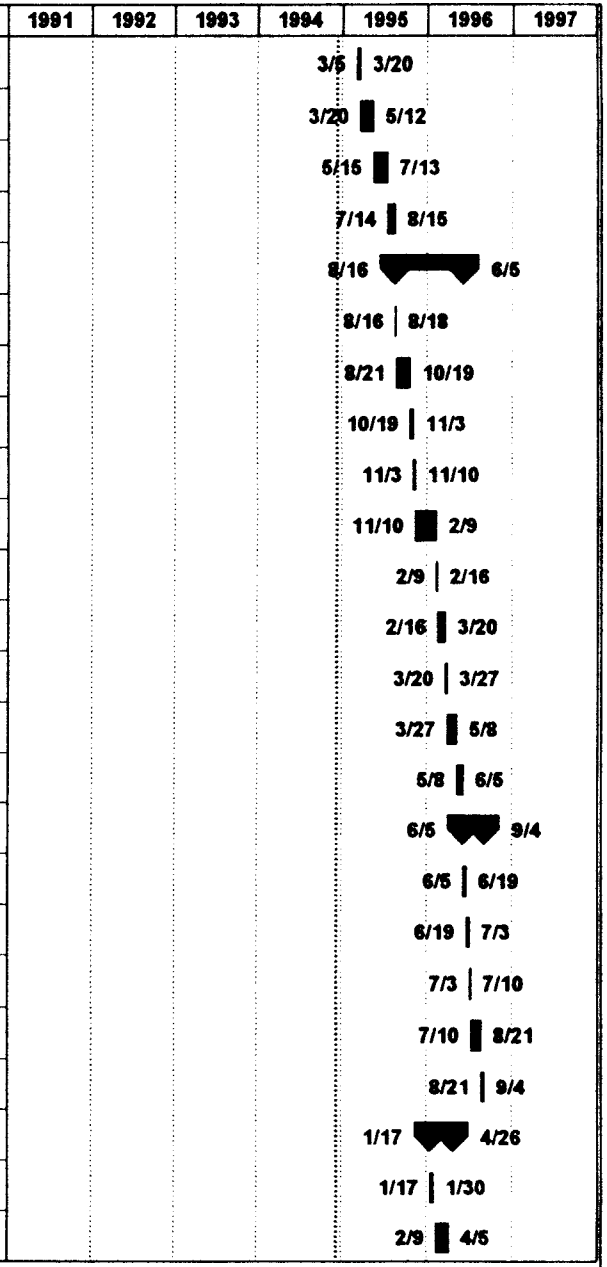
ID	Task Name	Duration	Predecessors	Start	Finish
97	1.7.3.2 hook up utilities	1.2w	96	7/4/96	7/12/96
98	**1.8 environmental permitting**	**492d**		**8/1/94**	**6/19/96**
99	**1.8.1 initiate permitting sequence**	**120d**		**8/1/94**	**1/13/95**
100	1.8.1.1 determine potential emissions & secondary wastes	19.8w		8/1/94	12/15/94
101	1.8.1.2 prepare ES&H questionnaire	17.8w		8/15/94	12/15/94
102	1.8.1.3 ES&H questionnaire review period	4.2w	101	12/16/94	1/13/95
103	**1.8.2 permit preparation**	**66d**		**1/16/95**	**4/17/95**
104	1.8.2.1 obtain decision on permit requirements	6.6w	102	1/16/95	3/1/95
105	1.8.2.2 determine data needed for permits	6.6w	104	3/2/95	4/17/95
106	**1.8.3 obtain permits (following interim design review)**	**306d**		**4/18/95**	**6/19/96**
107	**1.8.3.1 EA/NEPA (for piloting)**	**306d**		**4/18/95**	**6/19/96**
108	1.8.3.1.1 NEPA Prep.	48.2w	105	4/18/95	3/20/96
109	1.8.3.1.2 NEPA Review	13w	108	3/20/96	6/19/96
110	**1.8.3.2 NESHAPS**	**102d**		**4/18/95**	**9/7/95**
111	1.8.3.2.1 NESHAPS appl. prep.	7.8w	105	4/18/95	6/12/95
112	1.8.3.2.2 NESHAPS permitting	12.6w	111	6/12/95	9/7/95
113	**1.8.3.3 RCRA**	**149d**		**4/18/95**	**11/10/95**
114	1.8.3.3.1 RCRA appl. prep.	11.8w	105	4/18/95	7/7/95
115	1.8.3.3.2 RCRA permitting	18w	114	7/10/95	11/10/95
116	**1.8.3.4 State Air**	**135d**		**4/18/95**	**10/24/95**
117	1.8.3.4.1 STATE air appl.	6.4w	105	4/18/95	6/1/95
118	1.8.3.4.2 STATE air permitted	20.6w	117	6/1/95	10/24/95
119	**1.9 safety documentation**	**392.01d**		**3/5/95**	**9/4/96**
120	**1.9.1 preliminary hazard analysis**	**117d**		**3/5/95**	**8/15/95**



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task
Critical Task
Milestone
Summary

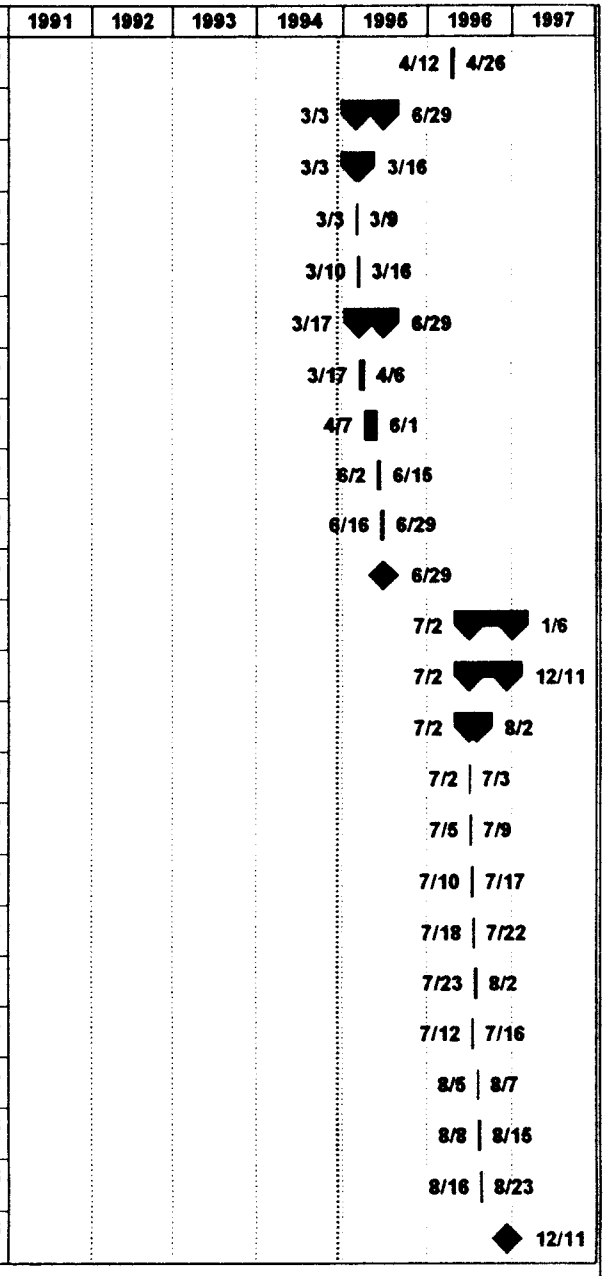
ID	Task Name	Duration	Predecessors	Start	Finish
121	1.9.1.1 ID hazards/perform analysis	2.2w	80	3/5/95	3/20/95
122	1.9.1.2 prepare PHA	8w	121	3/20/95	5/12/95
123	1.9.1.3 DOE review	8.8w	122	5/15/95	7/13/95
124	1.9.1.4 resolve comments	4.6w	123	7/14/95	8/15/95
125	**1.9.2 PSAR (if needed)**	**210.01d**		**8/16/95**	**6/5/96**
126	1.9.2.1 prepare task scope	3d	124	8/16/95	8/18/95
127	1.9.2.2 process through MAT	8.6w	126	8/21/95	10/19/95
128	1.9.2.3 review proposals	2.2w	127	10/19/95	11/3/95
129	1.9.2.4 release task	1w	128	11/3/95	11/10/95
130	1.9.2.5 prepare draft PSAR	13w	129,80	11/10/95	2/9/96
131	1.9.2.6 draft review	1w	130	2/9/96	2/16/96
132	1.9.2.7 prepare final PSAR	4.6w	131	2/16/96	3/20/96
133	1.9.2.8 review final PSAR	1w	132	3/20/96	3/27/96
134	1.9.2.9 DOE review	6w	133	3/27/96	5/8/96
135	1.9.2.10 resolve comments	4w	134	5/8/96	6/5/96
136	**1.9.3 FSAR (if needed)**	**65d**		**6/5/96**	**9/4/96**
137	1.9.3.1 update descriptions/info	2w	135	6/5/96	6/19/96
138	1.9.3.2 update analysis	2w	137	6/19/96	7/3/96
139	1.9.3.3 update document	1w	138	7/3/96	7/10/96
140	1.9.3.4 DOE review	6w	139	7/10/96	8/21/96
141	1.9.3.5 resolve DOE comments	2w	140	8/21/96	9/4/96
142	**1.9.4 SOP's**	**72.5d**		**1/17/96**	**4/26/96**
143	1.9.4.1 develop SOPs	2w	154	1/17/96	1/30/96
144	1.9.4.2 LANL reviews	8w	143FS+1.5w	2/9/96	4/5/96



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task — Milestone
Critical Task — Summary

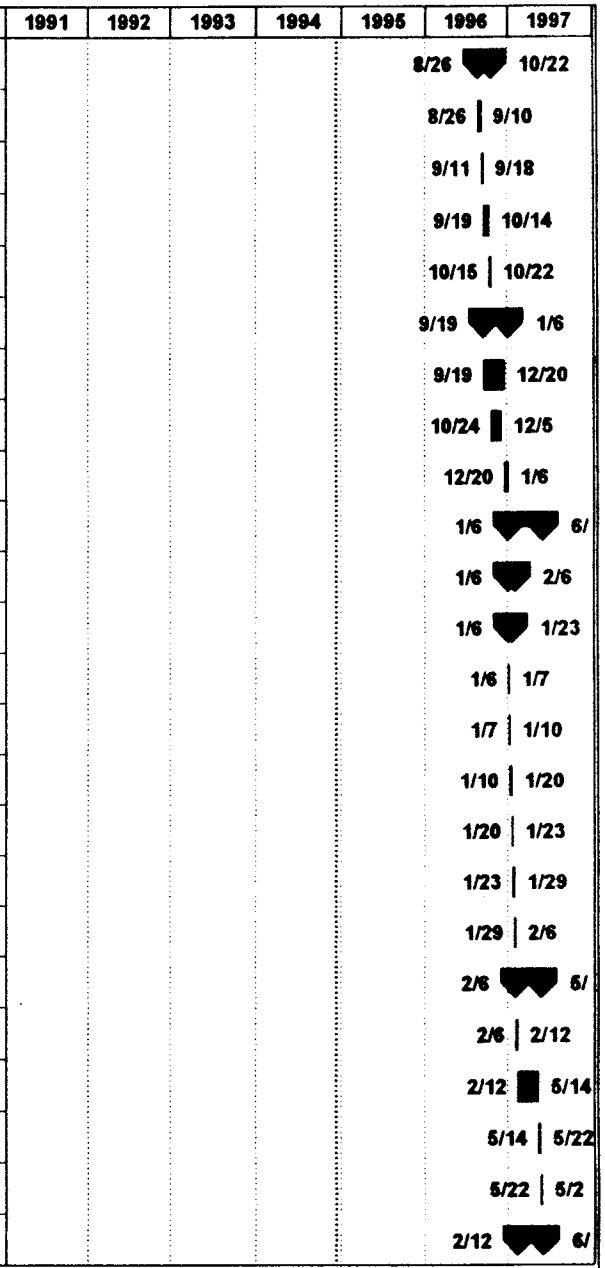
ID	Task Name	Duration	Predecessors	Start	Finish
145	1.9.4.3 incorporate comments into SOP	2w	144FS+1w	4/12/96	4/26/96
146	**1.10 operating documentation**	**85d**		**3/3/95**	**6/29/95**
147	**1.10.1 documentation assessments**	**10d**		**3/3/95**	**3/16/95**
148	1.10.1.1 review title I and II design	1w	80	3/3/95	3/9/95
149	1.10.1.2 summarize essential information	1w	148	3/10/95	3/16/95
150	**1.10.2 write document**	**75d**		**3/17/95**	**6/29/95**
151	1.10.2.1 start up/shut down procedures	3w	149	3/17/95	4/6/95
152	1.10.2.2 general procedures	8w	151	4/7/95	6/1/95
153	1.10.2.3 safety/emergency procedures	2w	152	6/2/95	6/15/95
154	1.10.2.4 maintenance procedures	2w	153	6/16/95	6/29/95
155	1.10.2.5 implement document	0d	154	6/29/95	6/29/95
156	**1.11 cold testing of equipment with modifications**	**134d**		**7/2/96**	**1/6/97**
157	**1.11.1 preparation**	**116d**		**7/2/96**	**12/11/96**
158	**1.11.1.1 develop cold test program**	**24d**		**7/2/96**	**8/2/96**
159	1.11.1.1.1 define test	2d	91SS	7/2/96	7/3/96
160	1.11.1.1.2 identify test conditions	3d	159	7/5/96	7/9/96
161	1.11.1.1.3 prepare test	1.2w	160	7/10/96	7/17/96
162	1.11.1.1.4 document	3d	161	7/18/96	7/22/96
163	1.11.1.1.5 order run supplies	1.8w	162	7/23/96	8/2/96
164	1.11.1.2 assemble test crew	2d	97	7/12/96	7/16/96
165	1.11.1.3 schedule test runs	3d	163,164	8/5/96	8/7/96
166	1.11.1.4 prepare equipment	1.2w	165	8/8/96	8/15/96
167	1.11.1.5 train crew	1.2w	166	8/16/96	8/23/96
168	1.11.1.6 EPA notice	0d	189SF-45d	12/11/96	12/11/96



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task — Milestone
Critical Task — Summary

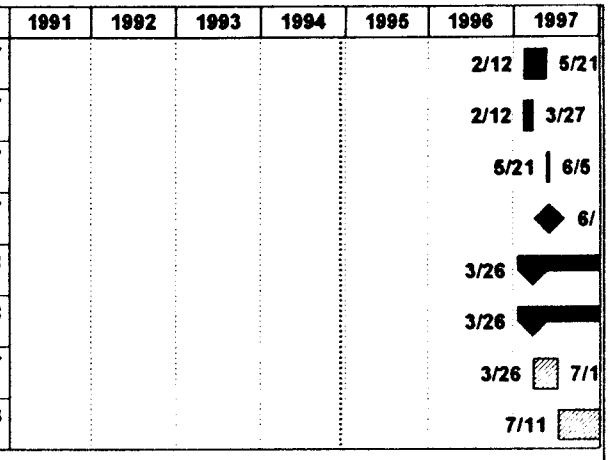
ID	Task Name	Duration	Predecessors	Start	Finish
169	**1.11.2 test runs**	**42d**		**8/26/96**	**10/22/96**
170	1.11.2.1 test equipment on water	2.4w	167	8/26/96	9/10/96
171	1.11.2.2 test equipment on cold waste	1.2w	170	9/11/96	9/18/96
172	1.11.2.3 investigate different operating conditions	3.6w	171	9/19/96	10/14/96
173	1.11.2.4 clean up	1.2w	172	10/15/96	10/22/96
174	**1.11.3 analyze tests**	**77d**		**9/19/96**	**1/6/97**
175	1.11.3.1 analyze test data	13.2w	172SS	9/19/96	12/20/96
176	1.11.3.2 correct problems	6.2w	172SS	10/24/96	12/5/96
177	1.11.3.3 document results	2.2w	175	12/20/96	1/6/97
178	**1.12 hot testing (with wastes)**	**108d**		**1/6/97**	**6/5/97**
179	**1.12.1 preparation**	**23d**		**1/6/97**	**2/6/97**
180	**1.12.1.1 develop hot test program**	**13d**		**1/6/97**	**1/23/97**
181	1.12.1.1.1 define test objectives	1d	177	1/6/97	1/7/97
182	1.12.1.1.2 identify test conditions/parameters	3d	181	1/7/97	1/10/97
183	1.12.1.1.3 prepare test plan	1.2w	182	1/10/97	1/20/97
184	1.12.1.1.4 documentation	3d	183	1/20/97	1/23/97
185	1.12.1.2 schedule test runs	4d	184	1/23/97	1/29/97
186	1.12.1.3 prepare equipment	1.2w	185	1/29/97	2/6/97
187	**1.12.2 test run**	**77d**		**2/6/97**	**5/26/97**
188	1.12.2.1 run equipment check	4d	186,176	2/6/97	2/12/97
189	1.12.2.2 run test with hot waste	13w	188	2/12/97	5/14/97
190	1.12.2.3 clean up and decontamination	1.2w	189	5/14/97	5/22/97
191	1.12.2.4 wrap	2d	190	5/22/97	5/26/97
192	**1.12.3 analyze test**	**81d**		**2/12/97**	**6/5/97**



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task — Milestone
Critical Task — Summary

ID	Task Name	Duration	Predecessors	Start	Finish
193	1.12.3.1 analyze test data	14w	189SS	2/12/97	5/21/97
194	1.12.3.2 correct problems	6.2w	189SS	2/12/97	3/27/97
195	1.12.3.3 document results	2.2w	193	5/21/97	6/5/97
196	1.12.4 ready to go!	0d	195,194,190	6/5/97	6/5/97
197	**2 optional steps**	**339.04d**		**3/26/97**	**7/14/98**
198	**2.1 NEPA for operation**	**339.04d**		**3/26/97**	**7/14/98**
199	2.1.1 preparation	15.6w	189SS+6w	3/26/97	7/11/97
200	2.1.2 permitting	52.21w	199	7/11/97	7/14/98



Project: Water-Reactive Waste Treatm
Date: 12/6/94

Noncritical Task
Critical Task
Milestone
Summary