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TASK 1.08 RISK ANALYSIS REMEDIAL INVESTIGATION/FEASIBILITY STUDY

11/30/88

JMCA/DOE-FMPC
46
STUDY

G-000-304.2 90

TASK 1.08
RISK ANALYSIS
REMEDIAL INVESTIGATION/
FEASIBILITY STUDY

U.S. DEPARTMENT OF ENERGY
FEED MATERIALS PRODUCTION CENTER
FERNALD, OHIO

FINAL SUBMISSION
NOVEMBER 1988

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PREFACE

John M. Cockerham & Associates, Inc. (JMCA) performed this Risk Analysis - Remedial Investigation/Feasibility Study in accordance with the requirements of Subtask 1.08 of Subcontract 187-JMCA, Modification M002, August 4, 1987, with Lee Wan and Associates, Inc. (DOE Contract No. DE-AC05-870R21692).

The report addresses the schedule and risk to complete the RI/FS at DOE's Feed Material Production Center (FMPC) in Fernald, Ohio. JMCA obtained information to develop the schedule and risk analysis from DOE's contractor at the FMPC, Westinghouse Materials Company of Ohio, the RI/FS subcontractor, Advanced Sciences, Inc., and Advanced Sciences' subcontractor, International Technology Corporation.

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1.0 EXECUTIVE SUMMARY

This second risk analysis of the Remedial Investigation/ Feasibility Study (RI/FS) at the Feed Materials Production Center (FMPC) in Fernald, Ohio, is the final deliverable under a program management support contract for the Department of Energy.

Since the first analysis, the RI/FS deterministic end date for the Record of Decision (ROD) has slipped 15 months, from July 1989 to a currently committed date of September 1990. Exhibit 1 is a summary schedule of milestones committed to the U.S. EPA.

The analysis indicates that the schedule committed to EPA is extremely unlikely to be met. The most probable date for the ROD developed from the risk analysis is May 1991, a slide of 16.5 months from the most likely date from the first analysis. Exhibit 2 is a cumulative time distribution supporting the May 1991 date (50 percent probability of 994 days after the September 6, 1988 base date).

The risk analysis effort consisted of developing and verifying a CPM logic network which is statused under another contract task. Activity durations were adjusted to allow meeting the Exhibit 1 milestone dates, and uncertainty data were elicited from responsible managers. The probabilistic network analysis model was then exercised through 1500 Monte Carlo simulations.

The basic assumption in the analysis is that the RI/FS will be executed as the network model describes--that the network logic represents actual activity relationships and that activity durations and probability distributions are valid. Although the assumption is appropriate for any modelling effort, it should be noted that the network has already changed, principally due to the work stoppage at Fernald.

Model analysis results direct immediate management attention to completing toxicity testing and assessment which drive the most critical path in 1989, the health risk assessment and Remedial Investigation report. Completion of the remedial alternatives report is the next priority for concentration in 1988. Focus on these activities may be expected to minimize further schedule slippage.

In view of the possible penalties for poor schedule performance, implementation of customary program management controls is recommended. These include a cost and schedule performance system, change documentation and control, and detailed near-term schedules. Future schedule commitments should be based on detailed schedules. These recommendations are described specifically in Section 6.0, page 16.

EXHIBIT 1

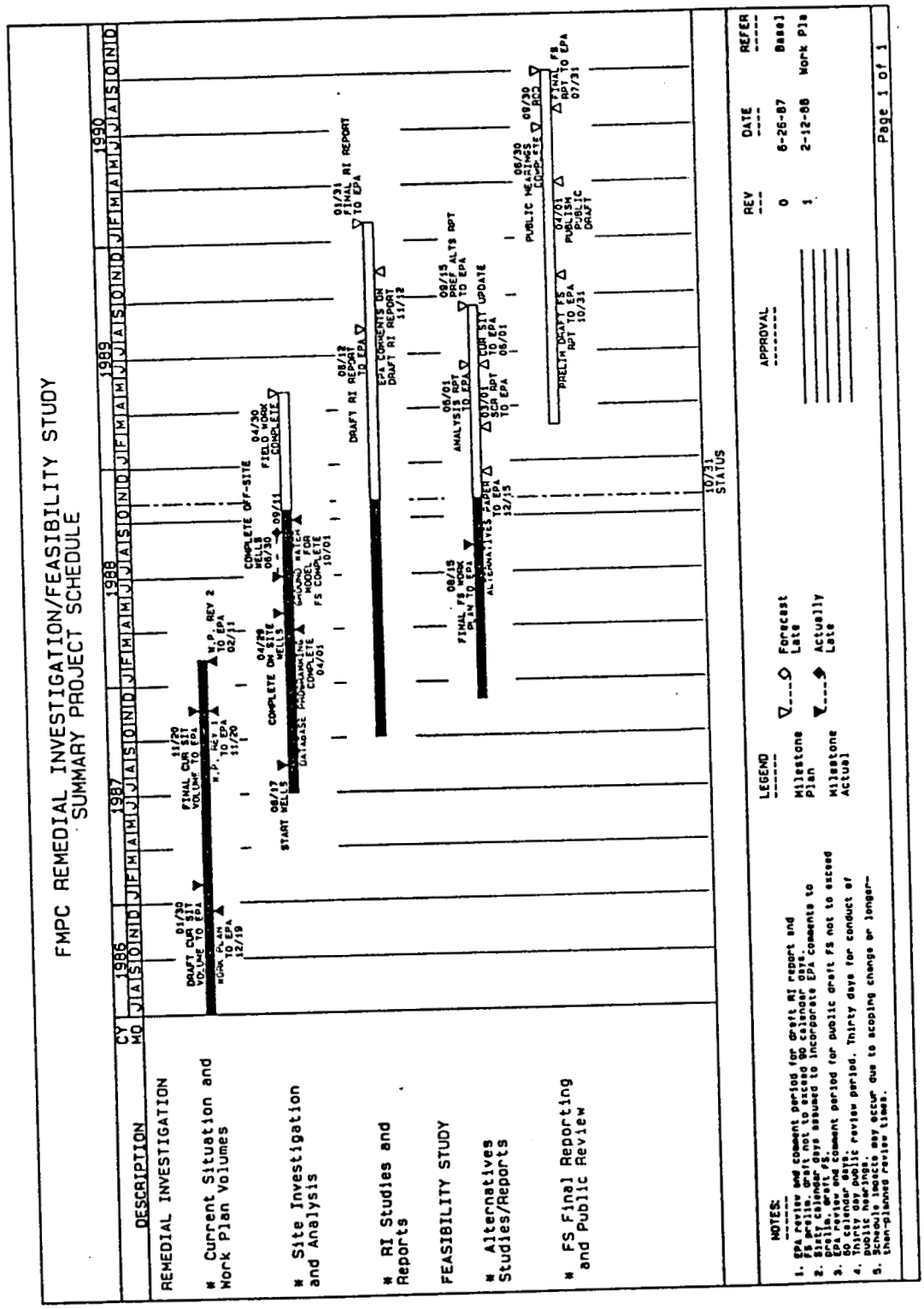
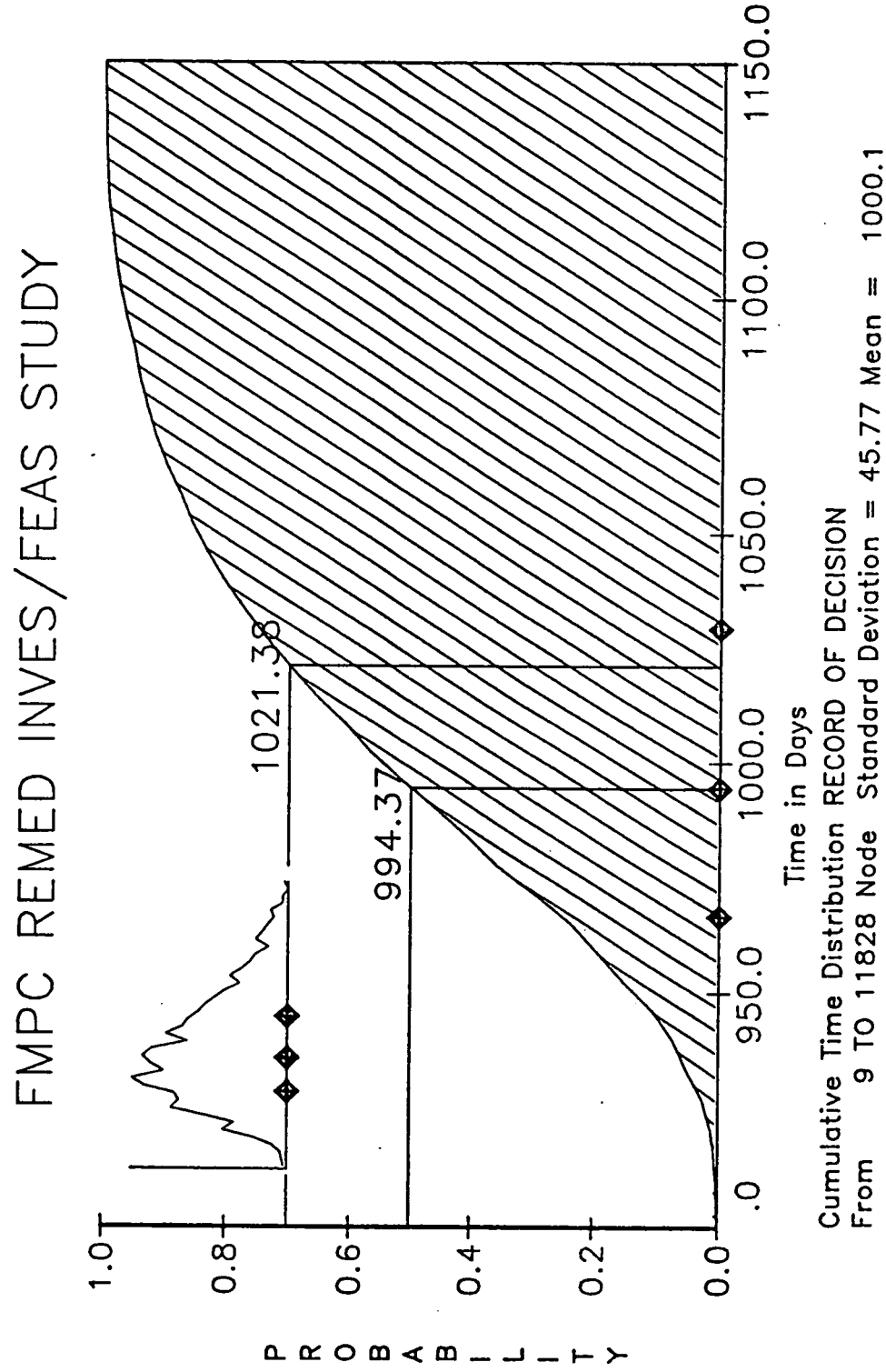

FMPC REMEDIAL INVESTIGATION/FEASIBILITY STUDY
SUMMARY PROJECT SCHEDULE
DESCRIPTION
CY
MO
1986
1987
1988
1989
1990
REMEDIAL INVESTIGATION
* Current Situation and Work Plan Volumes
* Site Investigation and Analysis
* RI Studies and Reports
FEASIBILITY STUDY
* Alternatives Studies/Reports
* FS Final Reporting and Public Review
DRAFT CUR SIT VOLUME TO EPA
WORK PLAN TO EPA
FINAL CUR SIT VOLUME TO EPA
W.P. REV 1 TO EPA
W.P. REV 2 TO EPA
START WELLS
COMPLETE ON SITE WELLS
DATABASE PROGRAMMING COMPLETE
GROUND WATER MODEL FOR FS COMPLETE
COMPLETE OFF-SITE WELLS
FIELD WORK COMPLETE
DRAFT RI REPORT TO EPA
EPA COMMENTS ON DRAFT RI REPORT
FINAL RI REPORT TO EPA
FINAL FS WORK PLAN TO EPA
ALTERNATIVES PAPER TO EPA
ANALYSIS RPT TO EPA
SCR RPT TO EPA
CUR SIT UPDATE TO EPA
PRELIM DRAFT FS RPT TO EPA
PUBLISH PUBLIC DRAFT
PUBLIC HEARINGS COMPLETE
FINAL FS RPT TO EPA
10/31 STATUS
LEGEND
Milestone Plan
Milestone Actual
Forecast Late
Actually Late
APPROVAL
REV
DATE
REFER
0
6-26-87
Basel
1
2-12-88
Work Pla
NOTES:
1. EPA review and comment period for draft RI report and FS prelim. draft not to exceed 90 calendar days.
2. Sixty calendar days assumed to incorporate EPA comments to prelim. draft FS.
3. EPA review and comment period for public draft FS not to exceed 60 calendar days.
4. Thirty day public review period. Thirty days for conduct of public hearings.
5. Schedule impacts may occur due to scoping change or longer-than-planned review times.
Page 1 of 1

EXHIBIT 2


FMPC REMED INVES/FEAS STUDY
1021.38
994.37
1.0
0.8
0.6
0.4
0.2
0.0
PROBABILITY
.0
950.0
1000.0
1050.0
1100.0
1150.0
Time in Days
Cumulative Time Distribution RECORD OF DECISION
From 9 TO 11828 Node Standard Deviation = 45.77 Mean = 1000.1

6

2.0 INTRODUCTION

The Department of Energy (DOE) requested a risk analysis of the RI/FS currently underway at the FMPC in Fernald, Ohio. This task is the final contract deliverable under a program management support contract for DOE.

Other program management support deliverables in the scheduling area have included:

* An initial cost/schedule risk analysis of the RI/FS.
* Work Breakdown Structures for environmental assessment and compliance activities.
* Development of an integrated logic network and schedule for the environmental activities.
* Bi-weekly update of the schedule.
* Development and update of an automated system to track and report environmental milestones/actions.

The Remedial Investigation (RI) is "...to determine the nature and extent of any release, or threat of release of hazardous or radioactive substances, pollutants or containments...and to gather data to support the Feasibility Study." Scope of the RI includes characterizing sources of radiological and chemical contamination, determining the extent of pollutants in air, soil, sediment and surface and groundwater, and characterizing occurrence in organisms on and off site. Pathways and mechanisms for pollutant migration are to be identified and public health risk assessments and environmental impact studies are to be conducted. Site models are to be developed and validated to understand the site environment and to predict impacts with and without remedial actions.

The second part of the program, the Feasibility Study (FS), is to "...develop and evaluate remedial action alternatives and to recommend remedial action(s) to protect the public health, or welfare, or the environment..." In the Feasibility Study, remedial alternatives are to be developed, screened, and analyzed for feasibility, economics and other considerations. A study report submitted to the U.S. EPA is to recommend the alternatives. Following public review and its review, U.S. EPA will issue a Record of Decision (ROD) identifying the selected alternative(s) to be implemented.

The RI/FS was undertaken in accordance with the Federal Facilities Compliance Agreement (FFCA) executed by DOE and the U.S. EPA in July 1986, and pursuant to CERCLA (the Comprehensive Environmental Response, Compensation, and Liability Act).

The initial deterministic schedule, completed in April 1987 under this support contract, indicated the program would require 35.5 months to complete (August 1986 to July 1989). The probabilistic risk analysis on this schedule determined a 50 percent probability of completion by January 1990 (42.4 months). A schedule risk analysis will generally show a most likely date later than the deterministic date because variability data tend to be pessimistic, i.e., the deterministic time to complete an activity is viewed as minimum. Because of a number of RI/FS scope changes and delays, a second risk analysis was provided in the modified contract.

3.0 ASSUMPTIONS

The basic assumption implicit in the analysis is that the remainder of the RI/FS project will be executed as described in the network model, i.e., the network logic represents actual task relationships, activity durations are accurate, and the duration probability distributions are realistic. Collateral assumptions include:

* Technologies to accomplish the RI/FS are achievable. All work will come to a successful conclusion.

* No catastrophic events will occur. The project will be delayed neither by management redirection/redefinition/ termination nor force majeure events.

* Funding and resources will be available to support the schedule.

* Regulatory agencies will accept plans, reports, and analyses as modelled.

* DOE and WMCO will continue to press for performance according to the Work Plan, Revision 3, schedule.

These assumptions are considered appropriate in network scheduling.

4.0 METHODOLOGY

Initial Work

This second risk analysis for the RI/FS was initiated in March 1988 following commitment in February to EPA of the revised milestone dates for the project as shown in the Exhibit 1 summary schedule.

Following the schedule commitment to EPA, ASI generated a set of bar chart schedules, one for each of the 17 RI/FS subtasks (three of the subtasks are ongoing, level of effort work). A proforma logic network was developed for the overall project based on these schedules.

The logic network was reviewed with WMCO, ASI, and IT managers to verify logic ties between the tasks and to add key tasks and logic. The general logic sequence is: obtain and analyze water, soil, biological, etc. samples; model these field results to identify pathways and assess public health risk; evaluate the assessments to select remedial actions; and, publish reports and obtain approvals.

Deterministic (single point) activity durations were elicited from the managers to complete this initial schedule. The schedule forecast a slide of 16 months compared to that committed to EPA. The Record of Decision (ROD) would be delayed from September 1990 to January 1992. Further, preliminary risk data were obtained from ASI and IT and a preliminary probabilistic risk assessment was completed. Model results indicated only a 50 percent probability of completing the ROD by June 1992, five months later than the deterministic date.

Network Rework

A modification to the FFCA provides for enforcement of agreed schedules. Accordingly, the schedule committed to EPA in February 1988 was re-adopted as a baseline, and all efforts made to achieve this schedule.

The baseline network was reworked to accomplish the September 1990 end date. Changes included were:

* Phase II well drilling and sampling were eliminated.
* WMCO and DOE reviews were assumed concurrent.
* Except for final review of the FS report, EPA review times were reduced to 30 days.

* A logic link between the baseline health risk assessment (HRA) and the public health analysis in Task 14 (detailed analysis of alternatives) was eliminated.

* Durations for some internal (ASI/IT) reviews were reduced.

Final Risk Analysis

Risk analysis effort resumed in August 1988 after rebaselining the project. Network logic and durations, revisited in reviews with ASI and IT, were revised as follows:

* Final field data are confirmatory rather than being included in exposure and risk assessments.

* Review of the HRA is assumed concurrent with that of the RI report, of which the HRA is the most significant part.

* Durations were adjusted to achieve each of the intermediate milestones committed to EPA (except for off-site well completion, already delayed).

* Phase II drilling, now considered a certainty, was included in the network in summary form.

Uncertainty data for technical activities in the revised network were elicited from IT, ASI and WMCO, with data from the preliminary risk analysis available for reference. JMCA completed the uncertainty data for the remainder of the activities, generally report preparation, reviews, and the like. Appendix II to this report lists each activity, the type of distribution, uncertainty data, and sources of information for the final risk analysis.

The network was then converted to the probabilistic model and the uncertainty data entered. Also included in the model were three contingent situations developed in discussions with WMCO, ASI and IT:

* If final facility test data are available when the RI/HRA report is started, they will be included, but there is a 50 percent probability the report will be held for these data.

* A 25 percent probability exists that the EPA will reject the RI/HRA report, and additional work will be necessary.

* There is a 10 percent chance the EPA will reject the remedial alternatives selected, also requiring rework.

To complete the risk analysis, the final probabilistic network model was driven through 1500 iterations of the Monte Carlo simulation.

5.0 RESULTS AND DISCUSSION

Milestone Probabilities

The schedule risk analysis indicates that the September 1990 end date committed to EPA is extremely unlikely to be met. There is a 50 percent probability the ROD will be issued eight months later, at the end of May 1991. Two of the near-term milestones, the remedial alternatives paper and completion of field work, have a five percent probability to meet the committed date. A third milestone, the initial screen report, may be expected within a week of the EPA committed date. These drive many of the remaining activities.

Exhibit 3 lists each milestone, the date committed to EPA and dates which the analysis disclose are 50 and 70 percent probable. These probable dates are derived from the cumulative time distribution curves for each milestone included in Appendix I.

To provide a measure of variability in the milestone dates, Exhibit 3 includes the standard deviation about the mean for each milestone. Generally, as would be expected, the variability increases as the milestones are further in the future. However, "Field Work Complete," which may be expected to be only a month and a half late, has a standard deviation of a month in contrast to paper milestones such as the screen report and the analysis report.

Further, in almost every case the 50 percent probable time (i.e., the mode) is less than the mean, indicating that the time distributions are skewed to the right. Review of the inset frequency distributions at the upper left in each Appendix I confirms this skewness. The skewness is undoubtedly due to minimum times for each activity and pessimistic estimates for the longest times.

EXHIBIT 3
FMPC RI/FS RISK ANALYSIS
INTERVAL STATISTICS
(SUMMARY MILESTONE DATA)

Milestone	WP Rev.3 Schedule Date	Risk Analysis Data: 50% Prob. Date	Risk Analysis Data: 70% Prob. Date	Risk Analysis Data: Std. Dev. Days
Alternatives Paper to EPA	12/15/88	12/22/88	12/25/88	5
Screen Report to EPA	03/01/89	03/18/89	03/22/89	7
Field Work Complete	04/30/89	06/17/89	07/08/89	34
Current Situation Update to EPA	06/01/89	09/26/89	10/29/89	48
Analysis Report to EPA	06/01/89	09/27/89	10/05/89	17
Draft RI Report to EPA	08/12/89	01/10/90	02/08/90	45
Preferred Alternatives Report to EPA	09/15/89	01/27/90	02/05/90	19
Preliminary Draft FS Report to EPA	10/31/89	05/02/90	05/26/90	39
EPA Comments on Draft RI Report	11/12/89	04/08/90	05/08/90	44
Final RI Report to EPA	01/31/90	08/08/90	09/08/90	56
Publish Public Draft FS Report	04/01/90	11/01/90	11/27/90	46
Public Hearings Complete	06/30/90	02/01/91	02/27/91	46
Final FS Report to EPA	07/31/90	03/26/91	04/22/91	46
Record of Decision	09/30/90	05/26/91	06/22/91	46

Critical Paths Analysis

The risk analysis program supplies as output a family of probabilistic critical paths and the percentages of time each activity is on the critical path. (Note that the analysis considers only activities leading to the ROD, not intermediate milestones.) Exhibit 4 summarizes this information. At any given time, the total of probabilities must equal 1.00. These results offer management several areas deserving attention rather than forcing concentration on one critical path to the exclusion of activities which may become critical if not attended to.

For example, between the present time and the end of 1988, the three major critical path strings are:

* Toxicity testing and assessment, with a probability of 0.582 of being on the critical path.

* Completion of the draft remedial alternatives report, and next the draft initial screen report (criticality of 0.329).

* Completion of facility tests, including EPA approvals (criticality 0.089).

As might be expected, the most critical path next year is completing the health risk assessment and the Remedial Investigation report (criticality 0.671).

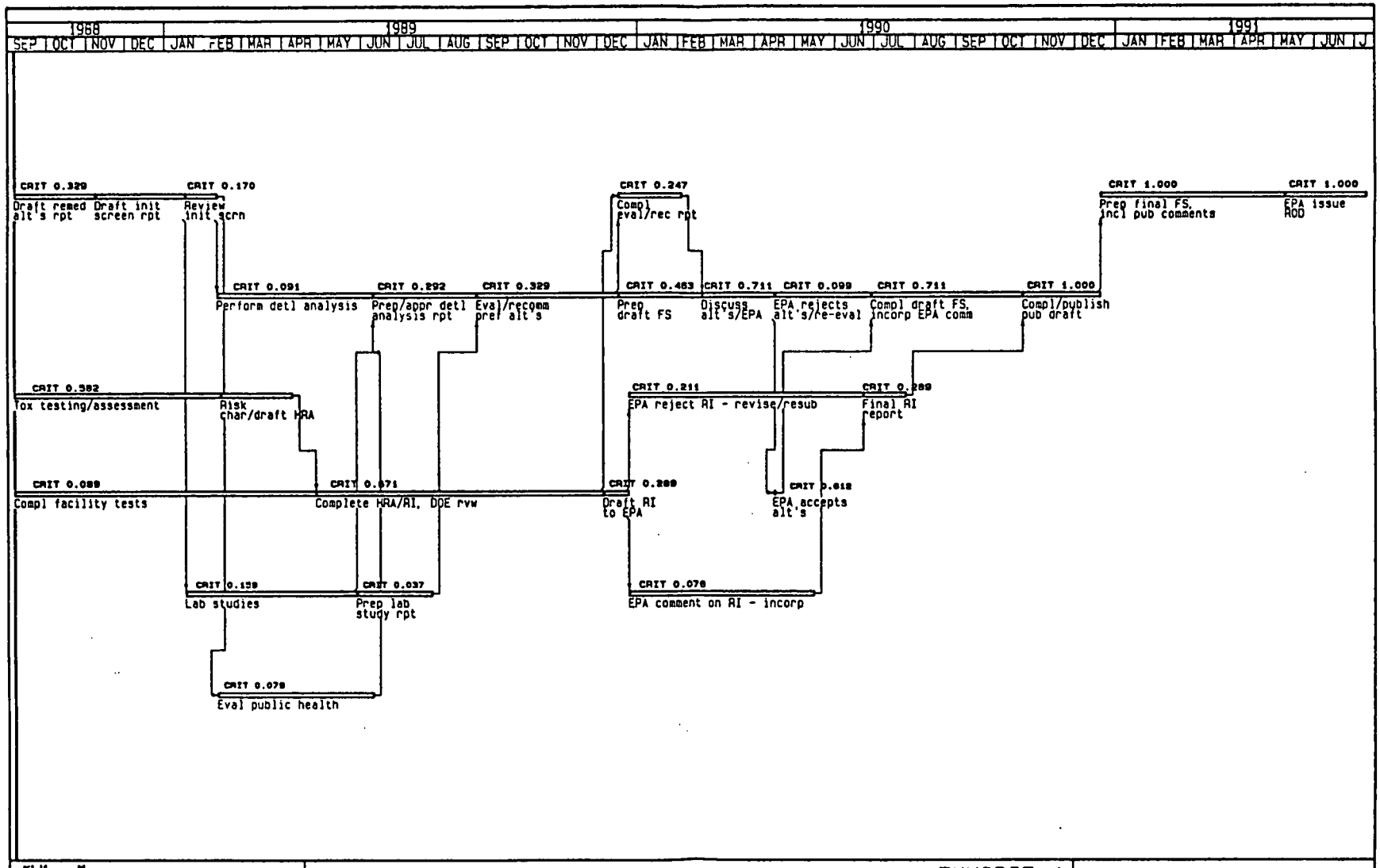
* Considerable delays in EPA approvals. EPA may argue that the delays result from a lack of quality.

The standard deviation associated with the 16.5 month probabilistic ROD slide increased from 37 days to 46 days. With the program over 40 percent complete time-wise, variability would have been expected to decrease, not increase.

The increased variability is due to:

* Larger variations in the individual distributions for each activity, probably resulting from more realistic estimates based on program experience.

* The inclusion of the contingent situations--the possibility that the EPA may reject the RI/HRA report or the remedial alternatives.



Activity Bar/Early Dates

Critical Activity

Primavera Systems, Inc. 1984, 1985, 1986, 1987

Project Start : 6SEP88
Project Finish: 9JUL91

DOE/FMPC
RI/FS RISK ANALYSIS
FAMILY OF CRITICAL PATHS

EXHIBIT 4

Data Date: 6SEP88
Plot Date: 11OCT88

CRITICAL PATHS

Date	Revision	Checked	Approved

Schedule Comparison

Compared to the deterministic schedule generated during the initial risk analysis, the RI/FS program schedule as currently committed to EPA has slipped 15 months. Further, a comparison of probabilistic data for the two schedules indicates that the most likely end date for the ROD has slipped 16.5 months, from mid-January 1990 to the end of May 1991.

The program slides are illustrated as follows:

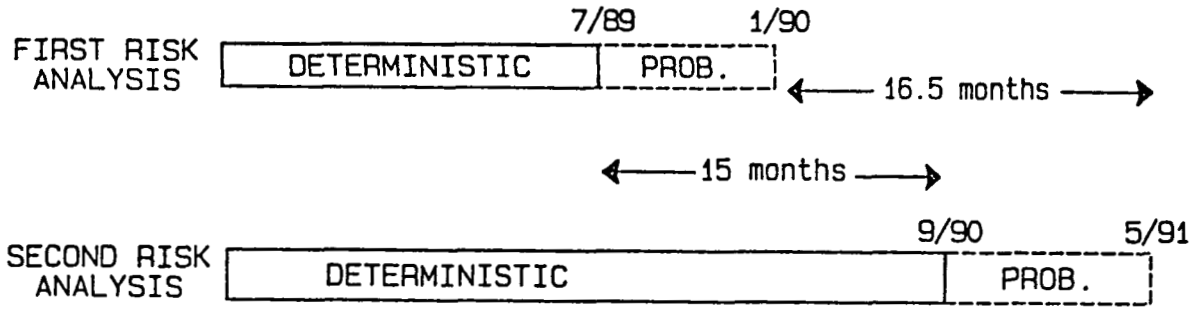


Exhibit 5 contrasts milestone dates for the Work Plan, Revision 3, schedule to those in the schedule developed in April 1987. Individual milestone slides vary from three to 14 months.

The substantial program delay is attributed to:

* Greatly increased scope of work, particularly the field effort.

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EXHIBIT 5
FMPC RI/FS
COMPARISON TO INITIAL RISK ANALYSIS

Milestone	Initial Deterministic Schedule	WP Rev.3 Actual/ Schedule	△ Months
Final Work Plan to EPA	04/16/87	03/31/88 (A)	11.5
Start Wells	05/16/87	08/17/87 (A)	3
Complete Wells	09/01/87	09/11/88 (A)	12
FS Work Plan to EPA	11/16/87	08/15/88 (A)	10
Alternatives Paper to EPA	12/15/87 (1)	12/15/88	12
Screen Report to EPA	03/15/88 (1)	03/01/89	11.5
Field Work Complete	06/16/88	04/30/89	11
Current Situation Update to EPA	02/16/88	06/01/89	10.5
Analysis Report to EPA	07/01/88	06/01/89	11
Draft RI Report to EPA	09/16/88	08/12/89	11
Preferred Alternatives Report to EPA	11/16/88	09/15/89	10
Preliminary Draft FS Report to EPA	01/01/89	10/31/89	10
EPA Comments on Draft RI Report	02/15/89	11/12/89	9
Final RI Report to EPA	03/16/89	01/31/90	10.5
Publish Public Draft FS Report	(2)	04/01/90	---
Public Hearings Complete	(2)	06/30/90	---
Final FS Report to EPA	06/01/89	07/31/90	14
Record of Decision	07/01/89	09/30/90	15

(1) Date estimated; activity not individually scheduled
(2) Work not included in initial schedule
(A) Indicates actual data

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6.0 CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The RI/FS schedule currently committed to the EPA is extremely unlikely to be met. The most probable date for the ROD is May 1991 as opposed to the September 1990 commitment. There is a five percent probability of meeting two milestones, the remedial alternatives paper and completion of field work. According to the risk analysis, the probability of achieving the remainder of the milestones is near zero. The difference between the most likely and the committed dates for the milestones ranges from a week for the alternatives paper to eight months for the ROD.

Critical path analysis, an outcome of the probabilistic model, indicates that management should concentrate attention, in order of priority, on:

* Toxicity testing and assessment.
* The draft remedial alternatives paper.
* Facility testing (which has only a 0.079 probability of being on the critical path).

As expected, completion of the health risk assessment and RI report will become very critical in 1989.

In comparison to the initial schedule and risk analysis on the RI/FS completed in April 1987, the program has slipped 15 months on a deterministic basis and 16.5 months probabilistically, i.e., in comparing the most probable ROD dates for the two analyses. The slide is attributed to increased scope and delay in obtaining approvals. (See page 15 for an illustration of these slides.)

Recommendations

The first modification to the FFCA, under which penalties may be imposed for lack of schedule performance, emphasizes the need for schedule performance. Regardless of the probabilities of meeting the schedule, recently increased pressure to perform should be continued. Specific suggestions are:

* The schedule being statused bi-weekly under another subtask is actually a summary schedule. The RI/FS subcontractor should be required to develop detailed near-term schedules supporting the committed schedule and to report progress weekly (rolling wave concept).

* To assure capture of data on all activities, a complete cost and schedule performance system such as CSCSC, should be imposed on the RI/FS.

* In view of the possible penalties, rationale for actual or anticipated slides to milestones should be formally documented, i.e., a scope change system.

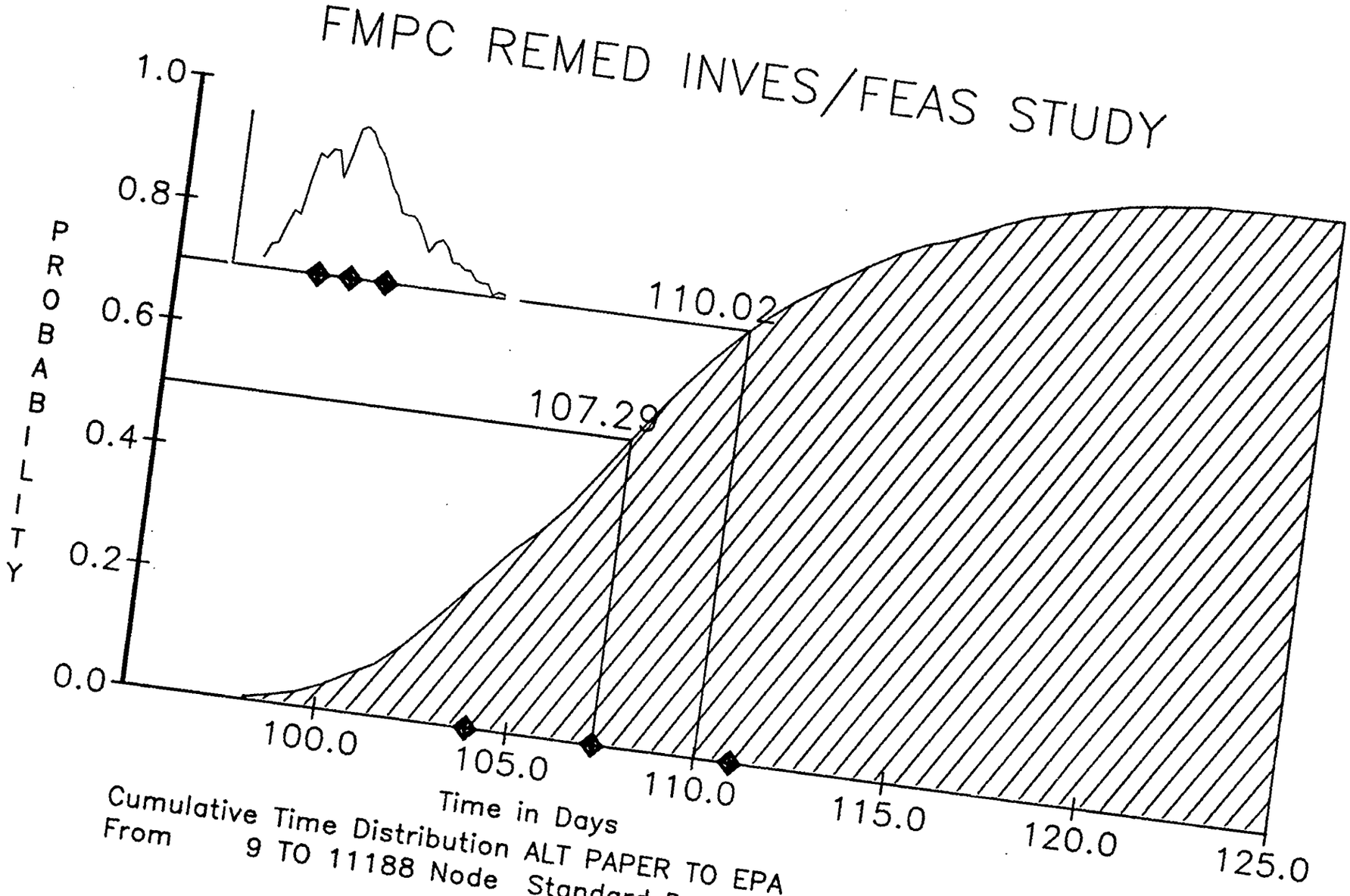
It is further recommended that, in the future, detailed schedules be developed and risk analyses performed prior to milestone commitments. At least some of the difference between deterministic and probable dates could be reserved as a contingency.

Additional risk analyses are recommended at key program milestones, e.g., when field work is near completion, when the HRA/RI is complete, and when remedial alternatives are selected.

APPENDIX I

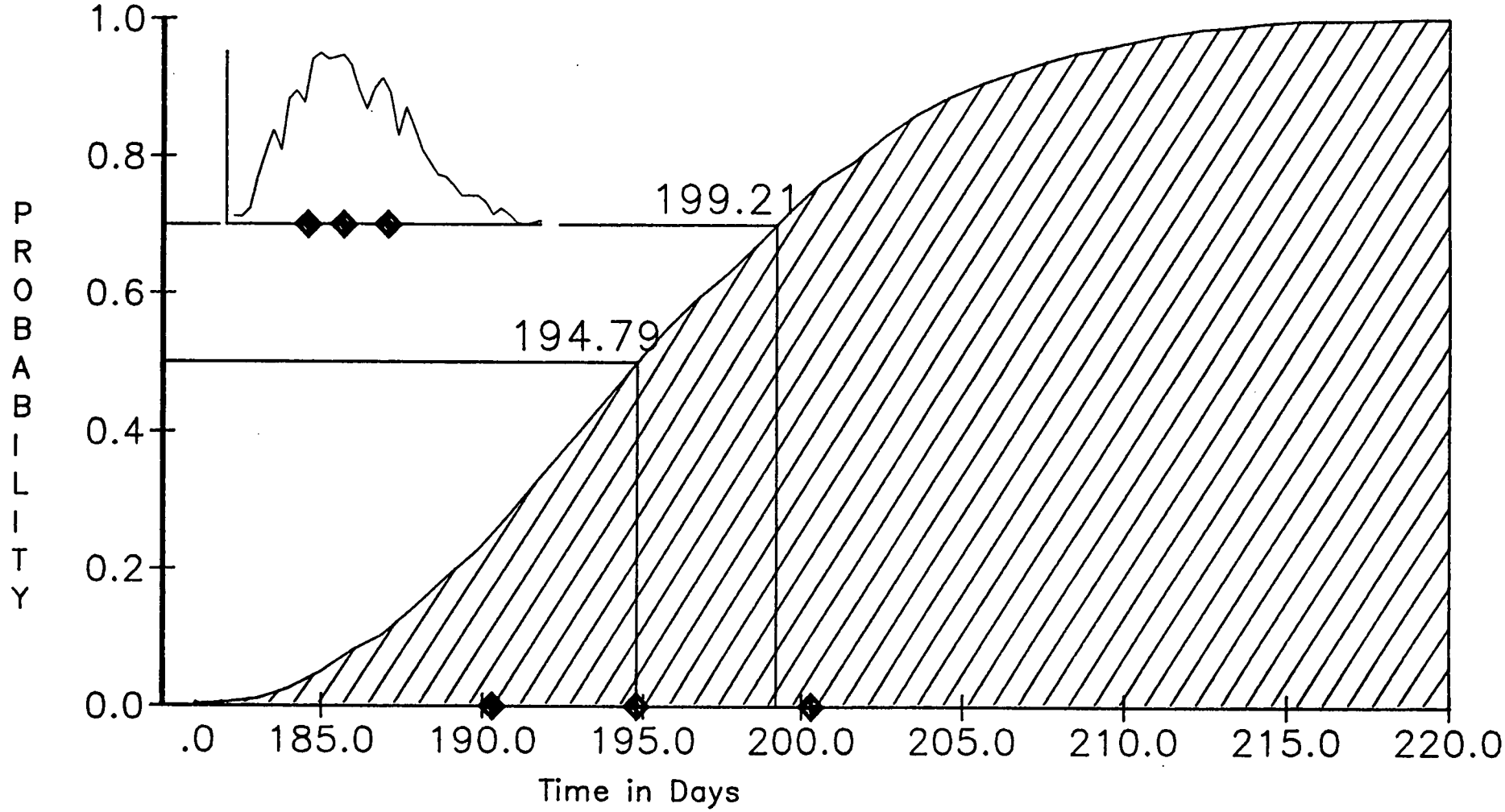
CUMULATIVE TIME DISTRIBUTIONS

MILESTONES



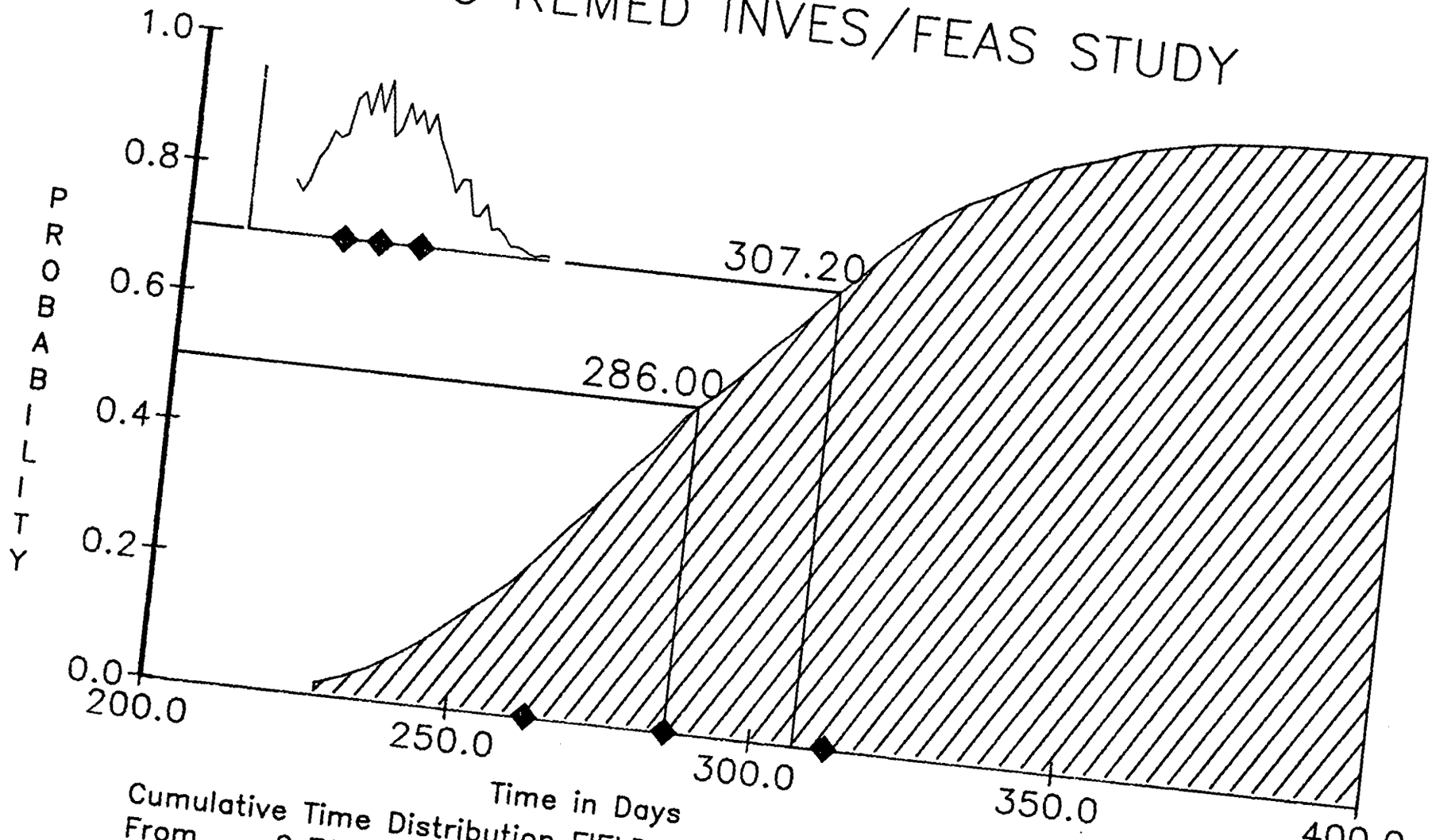
Cumulative Time Distribution ALT PAPER TO EPA
From 9 TO 11188 Node Standard Deviation = 5.08 Mean = 107.8

FMPC REMED INVES/FEAS STUDY



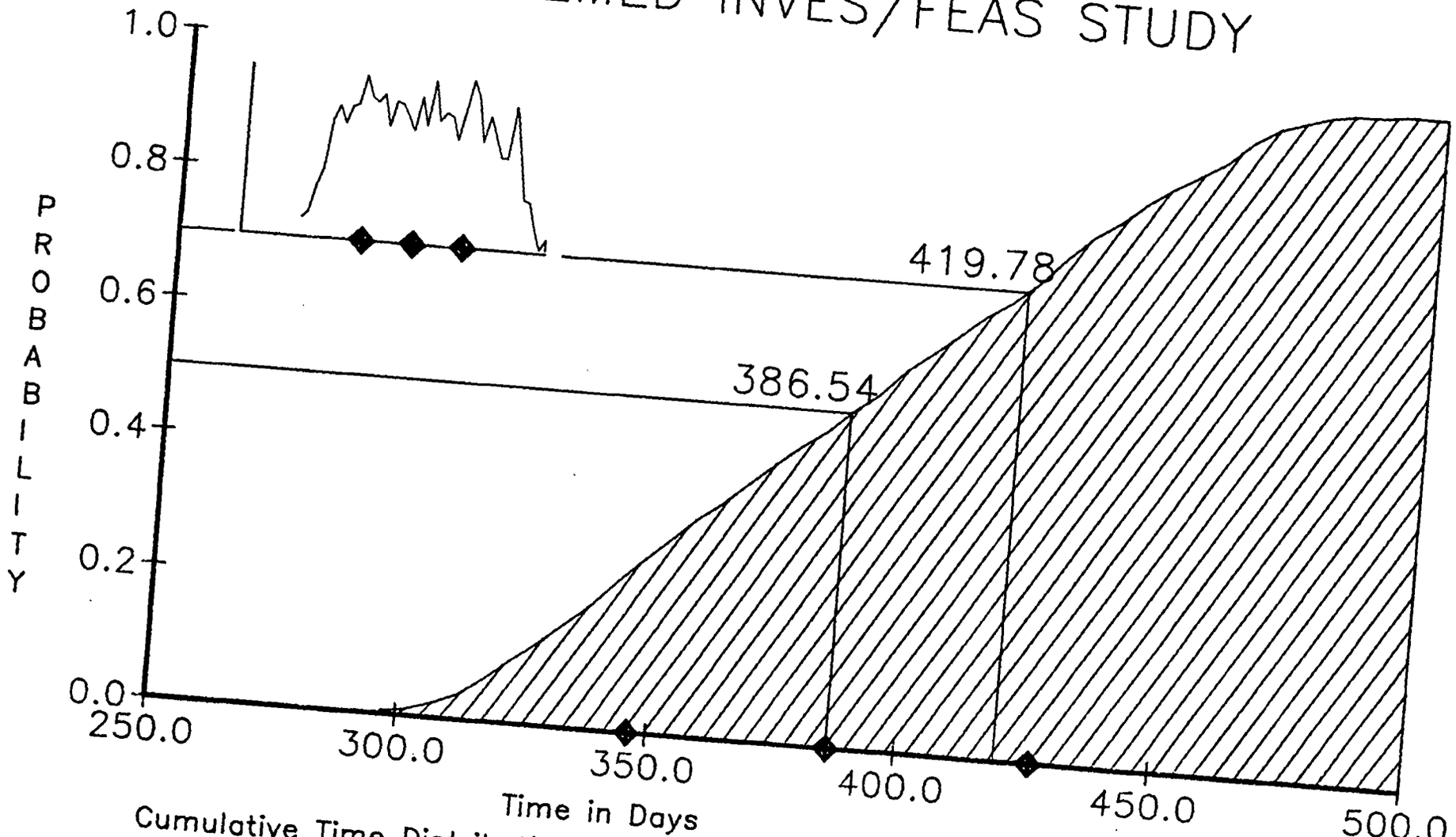
Cumulative Time Distribution SCR RPT TO EPA
From 9 TO 11278 Node Standard Deviation = 7.10 Mean = 195.5

FMPC REMED INVES/FEAS STUDY



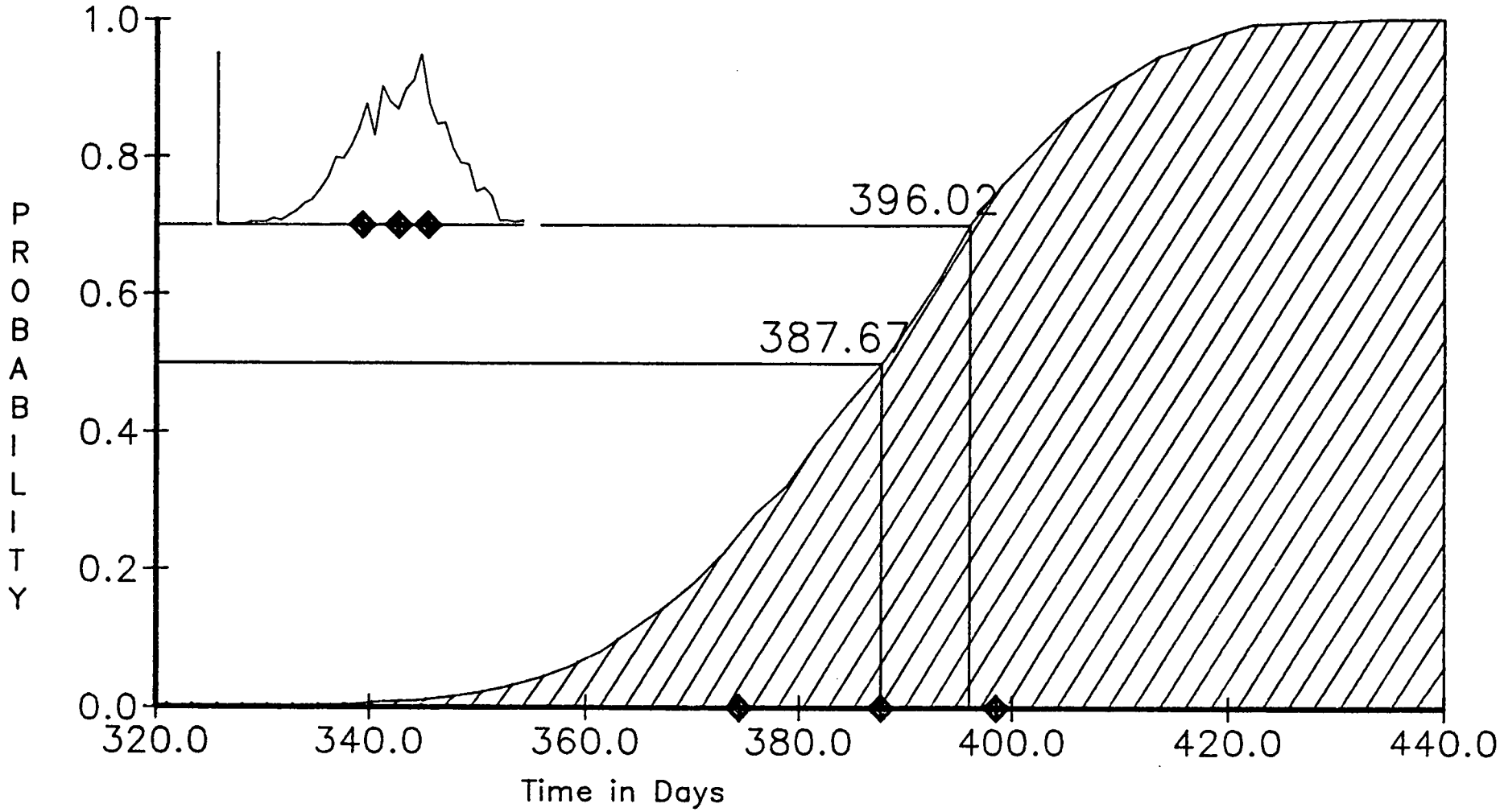
Cumulative Time Distribution FIELD WORK COMPLETE
From 9 TO 14328 Node Standard Deviation = 34.09 Mean = 288.7

FMPC REMED INVES/FEAS STUDY



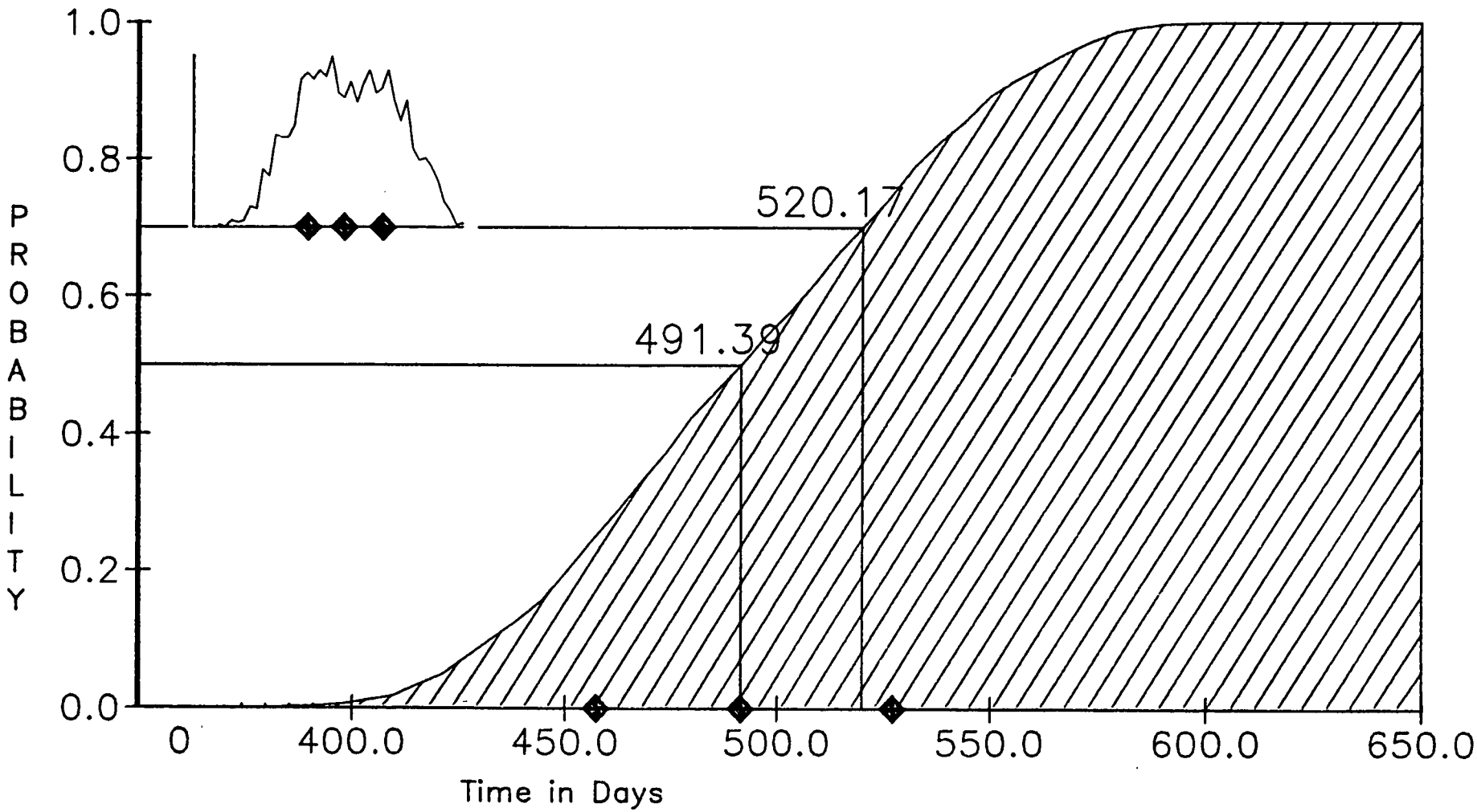
Cumulative Time Distribution CUR SIT UPDAT TO EPA
From 9 TO 11038 Node Standard Deviation = 47.81 Mean = 387.1

FMPC REMED INVES/FEAS STUDY



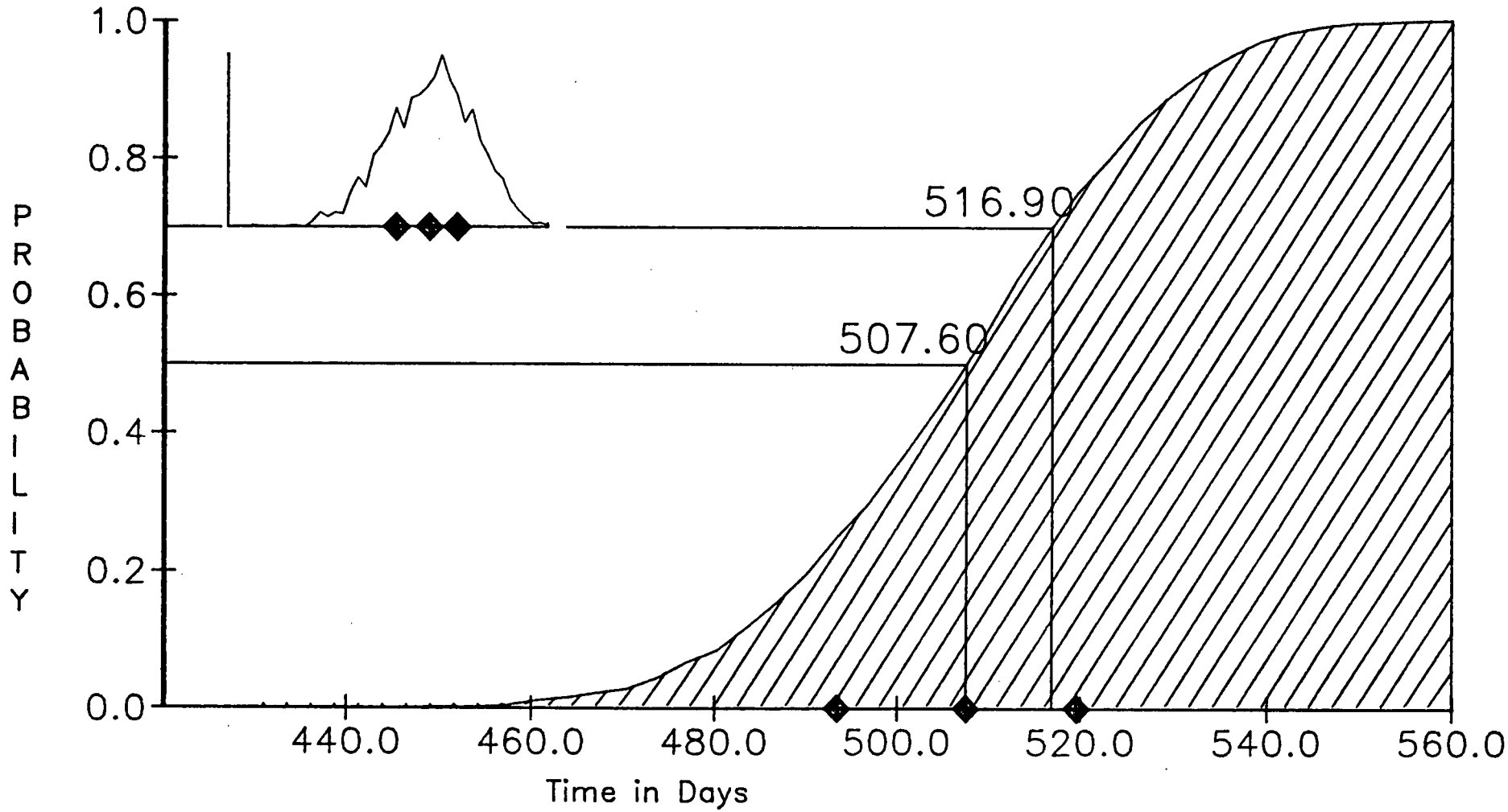
Cumulative Time Distribution ANALYSIS RPT TO EPA
From 9 TO 11388 Node Standard Deviation = 17.48 Mean = 386.4

FMPC REMED INVES/FEAS STUDY

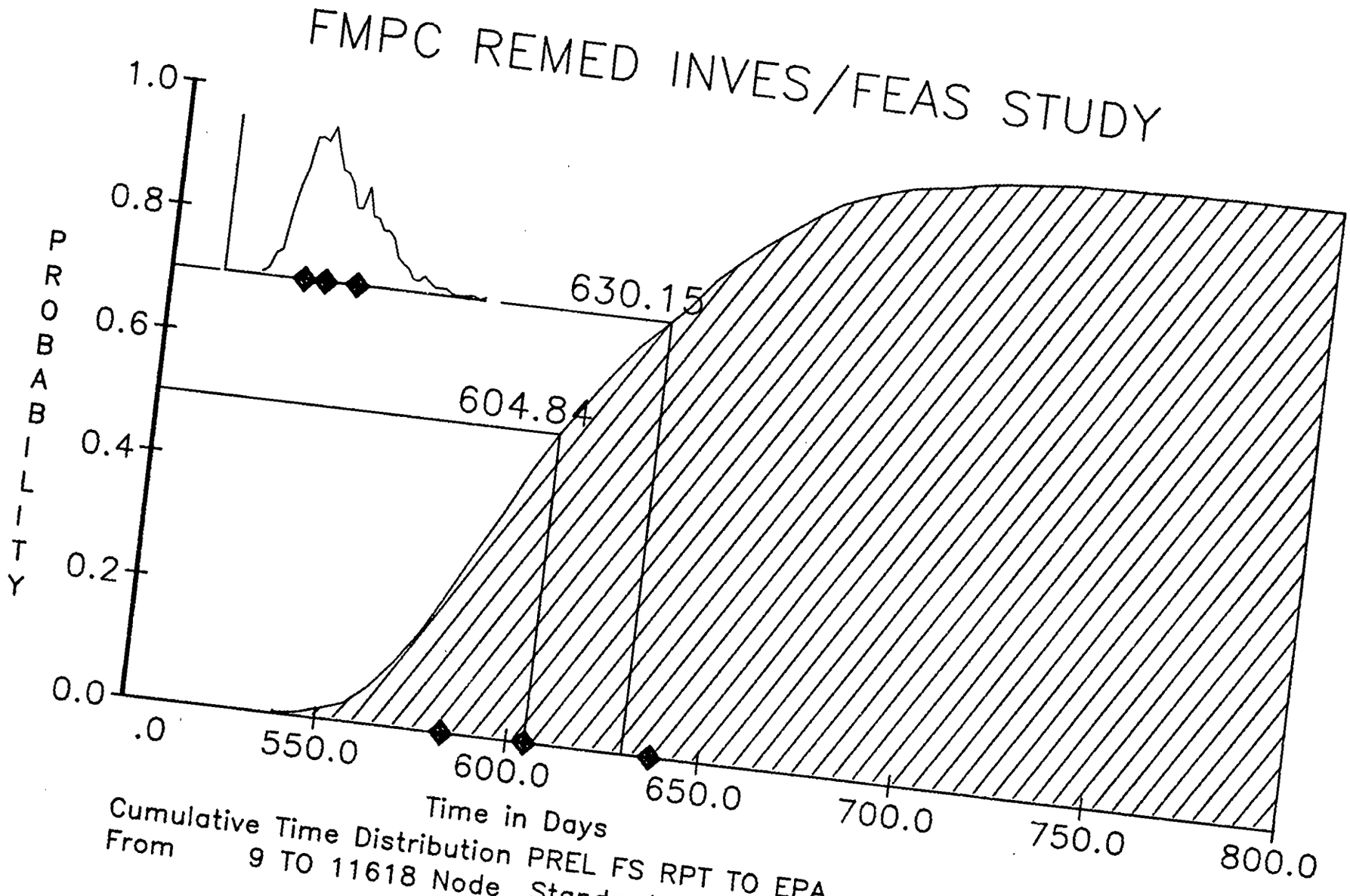


Cumulative Time Distribution DRAFT RI RPT TO EPA
From 9 TO 10838 Node Standard Deviation = 44.65 Mean = 492.1

FMPC REMED INVES/FEAS STUDY

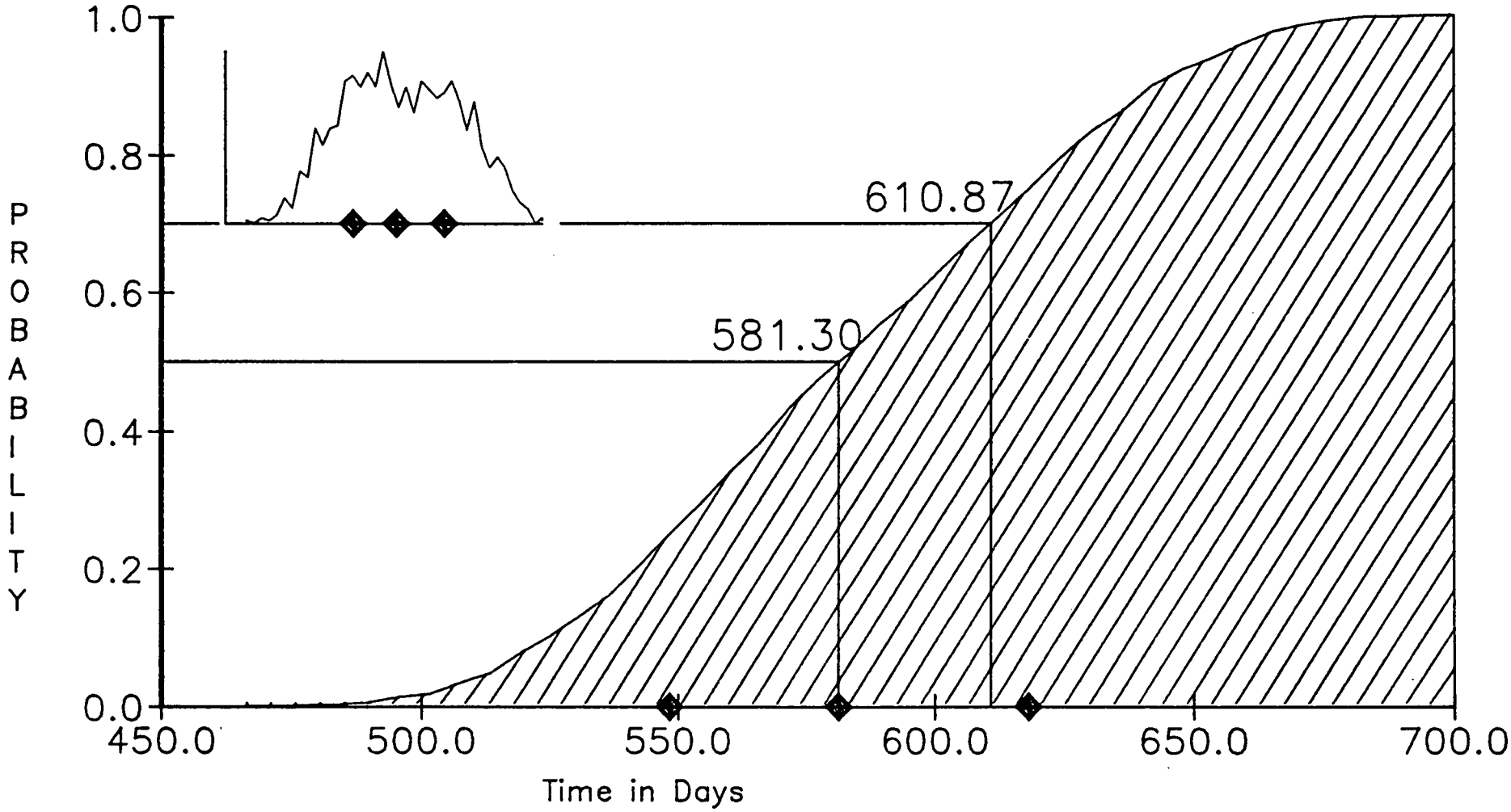


Cumulative Time Distribution PRE ALT RPT TO EPA
From 9 TO 11488 Node Standard Deviation = 18.73 Mean = 506.5



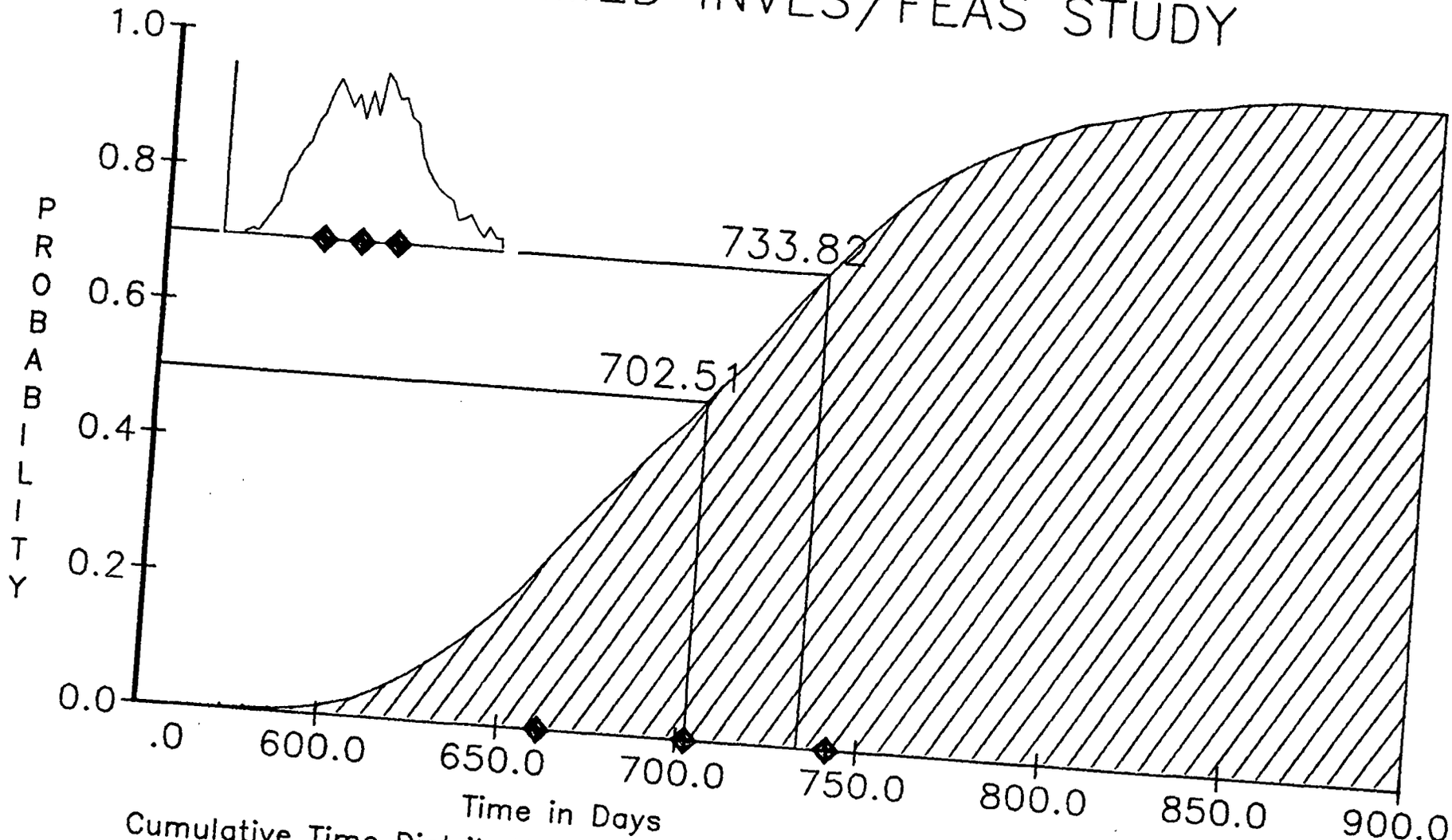
Cumulative Time Distribution PREL FS RPT TO EPA
From 9 TO 11618 Node Standard Deviation = 38.99 Mean = 612.3

FMPC REMED INVES/FEAS STUDY



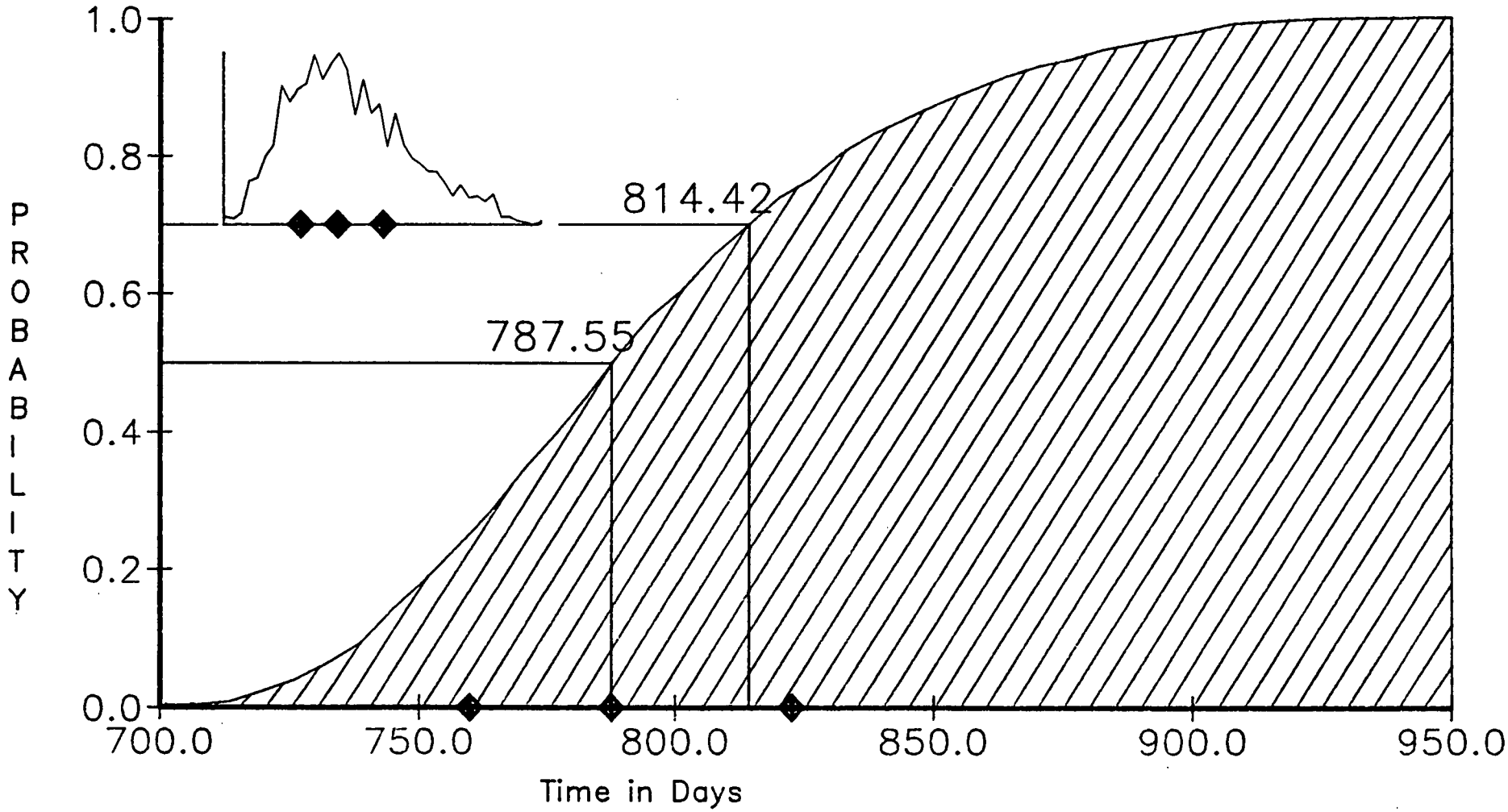
Cumulative Time Distribution EPA COMT'S ON DFT RI
From 9 TO 10858 Node Standard Deviation = 44.43 Mean = 582.9

FMPC REMED INVES/FEAS STUDY

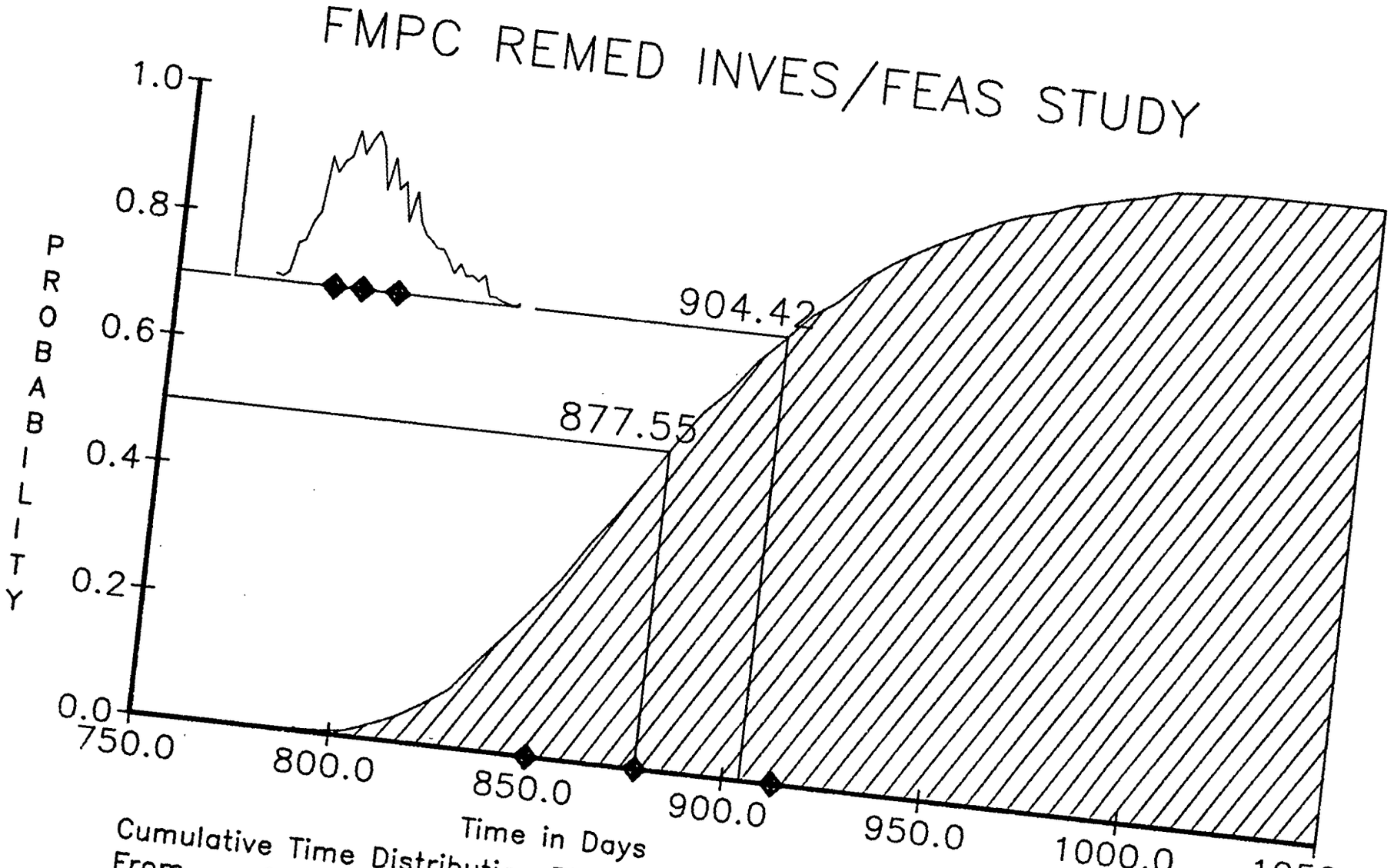


Cumulative Time Distribution FINAL RI RPT TO EPA
From 9 TO 10918 Node Standard Deviation = 56.10 Mean = 704.1

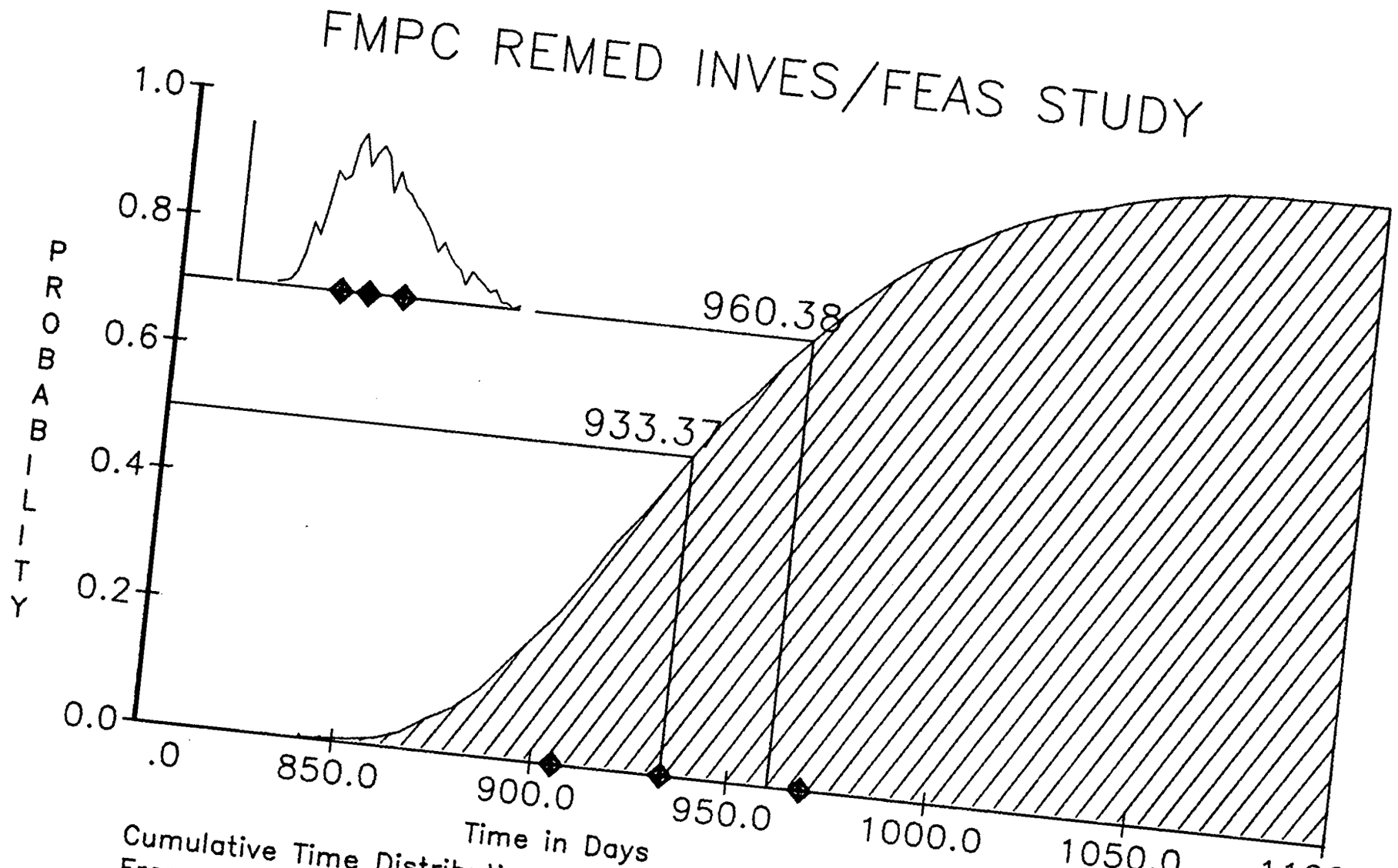
FMPC REMED INVES/FEAS STUDY



Cumulative Time Distribution PUBL PUBLIC FS RPT
From 9 TO 11698 Node Standard Deviation = 45.55 Mean = 793.6



Cumulative Time Distribution PUBLIC HEAR COMPLETE
From 9 TO 11718 Node Standard Deviation = 45.55 Mean = 883.6



Cumulative Time Distribution FINAL FS RPT TO EPA
From 9 TO 11808 Node Standard Deviation = 45.77 Mean = 939.1

APPENDIX II

TIME DISTRIBUTIONS

INDIVIDUAL ACTIVITIES

NOTES FOR APPENDIX II

1. An "A" in this column indicates the activity had started on the date indicated.

2. Deterministic deviation, to meet committed dates.

3. Probability distribution type:

   Point..... Constant estimate, single-point (no uncertainty)

   Text..... Triangular-Exponential

   Continuous.. Uncertainty determined by other activities, i.e., a hammock

4. Distribution Parameters:

   A, B, and C are the time estimates, in days, to match the distribution; P is for triangular-exponential distributions, is the probability of the triangular portion occurring.

5. Source of Probability Information:

   ASI-1..... Initial set of interviews with ASI/WMCO
   ASI-2..... Final set of interviews with ASI
   ASI-1/2..... Combination of interview information
   WMCO..... Westinghouse Materials Company of Ohio personnel
   JMCA..... Analysis contractor judgment

6. Notes:

   N - Extremely near-term completion, no uncertainty data warranted
   M - Milestone activity
   HA - Hammock activity

TIME DISTRIBUTION - INDIVIUAL ACTIVITIES

ACTIVITY DESCRIPTION	EARLY START(1)	EARLY FINISH	DURATION DAYS(2)	TOTAL FLOAT	DISTRIB TYPE(3)	PARAMETERS(4) A	B	C	P	INFO SOURCE(5)	NOTES(6)
REVISE K65 PLAN/XMIT TO EPA	08/24/88 A	09/08/88	3	3	POINT		3				N
EPA REV/APPROVE K65 PLAN	09/09/88	09/30/88	22	3	TEX	23	23	53	0.80	WMCO	
SAMPLE K65 SILOS	10/01/88	10/28/88	28	3	POINT		28			WMCO	
ANALYZE K65 SAMPLES	10/29/88	12/12/88	45	3	TEX	30	45	49	0.10	WMCO	
COMPILE K65 SILO DATA	12/13/88	12/19/88	7	3	POINT		7			WMCO	
WMCO APPROVE TEST PLAN	05/20/88 A	09/09/88	4	2	POINT		4			WMCO	
DOE REVIEW,COMMENT ON FACIL TEST PLN	09/10/88	09/18/88	9	2	TEX	7	12	21	0.50	WMCO	
INCORP DOE COMMENTS/TEST PLAN	09/19/88	09/29/88	11	2	TRIANGULAR	5	7	14		WMCO	
EPA REVIEW FACIL TEST PLAN	09/30/88	10/29/88	30	2	TRIANGULAR	21	30	45		WMCO	
WMCO APPR INIT FACIL TESTING	09/06/88	09/16/88	11	16	TEX	11	11	25	0.70	WMCO	
START INITIAL FACILITIES TESTING	09/17/88	11/30/88	75	16	UNIFORM	60	75			WMCO	
COMPL INIT FACILITY TESTING	12/01/88	02/28/89	90	16	UNIFORM	75	90			WMCO	
START FINAL FACILITIES TESTING	10/30/88	01/27/89	90	2	TRIANGULAR	75	90	180		WMCO	
COMPLETE FINAL FAC TESTING	01/28/89	04/27/89	90	2	TRIANGULAR	75	90	180		WMCO	
PERFORM INITIAL SCREENING	08/17/88 A	09/11/88	6	0	POINT		6			ASI-2	N
PERFORM PHASE I ACUTE TESTING	09/12/88	10/11/88	30	0	POINT		30			ASI-1/2	
PERFORM PHASE II ACUTE TESTING	10/12/88	01/09/89	90	15	POINT		90			ASI-1/2	
CONDUCT CHRONIC TESTING	10/12/88	01/24/89	105	0	UNIFORM	105	270			ASI-2	
COMPLETE TOXICOLOGY DATA ANALYSIS	01/25/89	02/14/89	21	0	POINT		21			ASI-1	
CONDUCT TOXICOLOGY ASSESSMENT	02/15/89	03/16/89	30	0	TRIANGULAR	30	30	60		ASI-1	
PREPARE TOXICOLOGY REPORT	02/15/89	03/14/89	28	515	POINT		28			ASI-1	
INTERN REV OF TOXICOLOGY RPT	03/17/89	04/06/89	21	513	POINT		21			ASI-1	
WMCO REV & APPROVE TOXICOLOGY RPT	04/07/89	04/07/89	0	513	TRIANGULAR	2	7	30		JMCA	
INCORP WMCO COMMENTS - TOXICOLOGY RPT	04/07/89	04/20/89	14	513	TRIANGULAR	7	14	21		JMCA	
DOE REV & APPROVE TOXICOLOGY RPT	04/21/89	05/04/89	14	513	TRIANGULAR	14	14	30		JMCA	
COLLECT ADDL 10% BIO SAMPLES	07/25/88 A	09/30/88	25	46	TRIANGULAR	25	30	60		ASI-2	
ANALYZE ADDL 10% BIO SAMPLES	10/01/88	10/30/88	30	46	POINT		30			ASI-2	
COMPILE FAUNA DATA	07/07/88 A	09/12/88	7	101	POINT		7			JMCA	
COMPILE BIO ANALYSIS DATA	10/31/88	11/06/88	7	46	POINT		7			ASI-1	
COLLECT SURFACE WTR/SEDIMENT SAMPLES	09/06/88	10/16/88	41	12	POINT		41				
COMPLETE SURFACE WTR/SEDIMENT ANALYSIS	09/06/88	11/04/88	60	41	TRIANGULAR	45	60	90		ASI-1	
COMPILE SURFACE WTR/SEDIMENT DATA	11/05/88	11/11/88	7	41	POINT		7				
COMPILE 100 FT RAD MEASUREMENT DATA	06/11/88 A	10/07/88	32	76	TRIANGULAR	25	32	40		JMCA	
SAMPLE SURFACE SOIL - BIASED	10/28/87 A	10/14/88	39	45	TRIANGULAR	32	39	60		JMCA	
COMPLETE BIASED SAMPLE ANALYSIS	10/15/88	10/31/88	17	45	TRIANGULAR	17	17	45		JMCA	
COMPILE BIASED SURFACE SAMPLE DATA	11/01/88	11/07/88	7	45	POINT		7			ASI-1	
COMPLETE OFF SITE DRILLING	07/15/88 A	09/08/88	3	50	POINT		3				N
COMPLETE SUBSUR SOIL SAMPLING	09/06/88	09/08/88	3	50	CONTINUOUS						HA
COMPL SUBSURF SOIL ANALYSIS	09/09/88	10/08/88	30	68	TRIANGULAR	30	30	60		JMCA	
COMPILE SUBSURFACE SOIL DATA	10/09/88	10/15/88	7	68	POINT		7			ASI-1	
COLLECT ROUNDS 3&4 GRND WTR SAMPLES	10/17/88	04/17/89	183	12	POINT		183			ASI-2	
COMPL ANALY RNDS 3&4 GRDN WTR SAMPLES	04/18/89	05/17/89	30	25	TRIANGULAR	30	30	60		ASI-1	
COMPILE RNDS 3&4 GRDN WTR DATA	05/18/89	05/24/89	7	25	POINT		7			ASI-1	
COMPL ANALYSIS ROUNDS 1&2 WTR SAMPLES	10/17/88	11/15/88	30	30	TRIANGULAR	30	30	60		ASI-1	
COMPILE ROUNDS 1&2 WTR SAMPLE DATA	11/16/88	11/22/88	7	30	POINT		7			ASI-1	
COMPLETE ROUNDS 1&2 GRND WTR SAMPLES	07/11/88 A	10/16/88	41	12	POINT		41			ASI-2	
SCOPE PH II WELLS/APPROVE	09/09/88	09/22/88	14	77	TEX	14	21	45	0.50	WMCO	
DRILL PHASE II WELLS	09/23/88	12/21/88	90	77	TEX	60	90	150	0.50	WMCO	

TIME DISTRIBUTION - INDIVIUAL ACTIVITIES

ACTIVITY DESCRIPTION	EARLY START(1)	EARLY FINISH	DURATION DAYS(2)	TOTAL FLOAT	DISTRIB TYPE(3)	PARAMETERS(4) A	B	C	P	INFO SOURCE(5)	NOTES(6)
COMPL PH II GRDWTR SAMPLE ANALYSIS	12/22/88	02/04/89	45	77	TRIANGULAR	30	45	45		WMCO	
COMPILE PH II GRDWTR DATA/ENTER IN DB	02/05/89	02/11/89	7	77	POINT		7			WMCO	
FIELD WORK COMPLETE	04/30/89	04/30/89	0	0							M
INCORPORATE FINAL FIELD RESULTS	04/30/89	06/10/89	42	8	POINT		42			ASI-1	
COMPLETE OUTPUT PROGRAMMING	06/02/88 A	02/17/89	165	589	POINT		165			ASI-2	
DATABASE OPER FOR DATA INTERPRETATION	06/02/88 A	09/15/89	375	0	CONTINUOUS						M
PRELIMINARY GROUNDWATER MODEL	11/30/87 A	09/06/88	1	753	POINT		1				N
REFINE RI/FS GROUNDWATER MODEL	05/15/88 A	09/15/88	10	15	POINT		10			ASI-2	
RI/FS GROUNDWATER MODEL OPERATIONAL	10/01/88	10/01/88	0	0							M
COMPL SOLUTE TRANSPORT MODEL	10/01/88	11/30/88	61	22	TRIANGULAR	61	61	91		ASI-2	
BEGIN EXPOSURE ASSESSMENT	12/20/88	12/20/88	0	3							M
EXPOSURE ASSESSMENT	12/20/88	03/13/89	84	3	TEX	75	84	150	0.50	ASI-1	
RISK CHARACTERIZATION	03/17/89	04/15/89	30	0	TEX	30	40	120	0.70	JMCA	
PREP DRAFT BASELINE HEALTH RISK ASSESS	04/16/89	04/30/89	15	0	TRIANGULAR	15	15	30		JMCA	
PREPARE LAB STUDY WK PLAN	01/17/89	02/05/89	20	0	TEX	31	31	90	0.50	JMCA	
CONDUCT LAB STUDIES	02/06/89	03/27/89	50	0	UNIFORM	50	150			ASI-2	
PREPARE LAB STUDY REPORT	03/28/89	04/06/89	10	0	TRIANGULAR	10	10	30		JMCA	
INTERNAL REV OF STUDY	04/07/89	04/21/89	15	0	TRIANGULAR	7	15	20		JMCA	
WMCO REVIEW OF STUDY	04/22/89	05/06/89	15	0	TRIANGULAR	7	15	30		ASI-1	
DOE REVIEW AND APPROVE STUDY	05/07/89	05/24/89	18	0	TRIANGULAR	18	18	30		ASI-1	
PREPARE REM INVES RPT WK PLAN & OUTLINE	07/01/88 A	10/05/88	30	15	POINT		30			ASI-2	
WMCO REVIEW RIR WORK PLAN & OUTLINE	10/06/88	10/19/88	14	15	TRIANGULAR	14	14	30		ASI-1	
INCORPORATE WMCO COMMENTS	10/20/88	10/26/88	7	15	POINT		7			ASI-1	
DOE REVIEW RIR WORK PLAN & OUTLINE	10/27/88	11/09/88	14	15	TRIANGULAR	14	14	30		ASI-1	
INCORPORATE DOE COMMENTS	11/10/88	11/16/88	7	15	POINT		7			ASI-1	
DRAFT RI REPORT	11/17/88	04/15/89	150	15	POINT		150			ASI-2	
COMPL DRAFT RI RPT/HRA	05/01/89	06/18/89	49	0	TEX	30	49	60	0.70	JMCA	
INTERNAL REV OF DRAFT RI RPT	06/19/89	07/02/89	14	0	POINT		14			ASI-2	
FINALIZE REMEDIAL INVEST REPORT	07/03/89	07/11/89	9	0	POINT		9			ASI-2	
PRODUCE REM INVES RPT DOCUMENT	07/12/89	07/20/89	9	0	POINT		9			ASI-2	
WMCO REVIEW DRAFT RI RPT	07/21/89	07/21/89	0	0	TRIANGULAR	2	7	14		JMCA	
INCORP WMCO COMMENTS - DRAFT RI RPT	07/21/89	07/21/89	0	0	TRIANGULAR	2	7	10		JMCA	
DOE REVIEW DRAFT RI RPT	07/21/89	08/03/89	14	0	TRIANGULAR	14	30	60		ASI-2	
INCORP DOE COMMENTS - DRAFT RI RPT	08/04/89	08/11/89	8	0	TRIANGULAR	8	20	30		ASI-2	
DRAFT REM INVEST RPT TO EPA	08/12/89	08/12/89	0	0							M
EPA REV RI RPT AND SUB COMMENTS	08/12/89	11/11/89	92	0	TEX	92	92	180	0.50	JMCA	
EPA COMMENTS ON DRAFT RI REPORT	11/12/89	11/12/89	0	0							M
INCORPORATE EPA COMMENTS	11/12/89	12/31/89	50	1	TRIANGULAR	50	50	90		ASI-1/2	
PRODUCE FINAL REM INVEST RPT	01/01/90	01/10/90	10	1	POINT		10			ASI-1/2	
WMCO REV & APPROVE REM INV RPT	01/11/90	01/11/90	0	1	POINT		10			ASI-1/2	
DOE REV & APPROVE REM INV RPT	01/11/90	01/22/90	12	1	POINT		12			ASI-1/2	
EDIT AND PRINT RI REPORT	01/23/90	01/29/90	7	1	POINT		7			ASI-1/2	
REMEDIAL INVEST REPORT TO EPA	01/31/90	01/31/90	0	0							M
PRINT ADDITIONAL RI REPORTS	01/31/90	02/13/90	14	228	POINT		14			ASI-1	
DEVEL UPDATE CUR SIT WK PLN/OUTLINE	11/15/88	12/14/88	30	34	POINT		30			ASI-2	
PRELIM FIELD RESULTS	12/20/88	12/20/88	0	29							M
UPDATE CURRENT SITUATION-PRELIM	12/20/88	02/17/89	60	29	POINT		60			ASI-2	
WMCO REVIEW PRELIM SITE UPDATE	02/18/89	03/03/89	14	29	POINT		14			ASI-2	

TIME DISTRIBUTION - INDIVIUAL ACTIVITIES

ACTIVITY DESCRIPTION	EARLY START(1)	EARLY FINISH	DURATION DAYS(2)	TOTAL FLOAT	DISTRIB TYPE(3)	- - PARAMETERS(4) - - A	B	C	P	INFO SOURCE(5)	NOTES(6)
DOE REVIEW & COMMENT PRELIM SITE UPDATE	03/04/89	03/17/89	14	29	TEX	14	30	45	0.70	JMCA	
INTERNAL REVIEW & REV, CUR SIT UPDT DOC	03/18/89	04/01/89	15	29	POINT		15			ASI-1/2	
WMCO REV CUR SIT UPDATE	05/01/89	05/01/89	0	0	TRIANGULAR	2	7	14		JMCA	
INCORP WMCO COMMENTS-CUR SIT UPDATE	05/01/89	05/01/89	0	0	TRIANGULAR	2	7	14		JMCA	
REV FIELD RESULTS, COMPL CUR SIT UPDATE	05/01/89	05/17/89	17	0	TEX	10	17	30	0.50	JMCA	
APPROVE & PUBLISH CURRENT SIT UPDATE	05/18/89	05/31/89	14	0	TEX	14	14	28	0.50	JMCA	
CURRENT SITUATION UPDATE TO EPA	06/01/89	06/01/89	0	0							M
EPA REVIEW FEAS STUDY WK PLAN	08/16/88 A	11/21/88	77	8	TEX	77	77	105	0.50	JMCA	
INCORPORATE EPA COMMENTS-FS WORK PLAN	11/22/88	12/21/88	30	8	TEX	30	30	60	0.50	JMCA	
WMCO REVIEW AND REVISE-FS WORK PLAN	12/22/88	12/28/88	7	8	POINT		7			ASI-1	
DOE REVIEW AND REVISE-FS WORK PLAN	12/29/88	01/04/89	7	8	POINT		7			ASI-1	
EPA FINAL REVIEW-FS WORK PLAN	01/05/89	02/01/89	28	8	POINT		28			ASI-1	
EPA APPROVE FEAS STUDY WK PLAN	02/02/89	02/02/89	0	8							M
PREP REM ALTERNATIVES WK PLAN & OUTLINE	07/15/88 A	09/06/88	1	0	POINT		1				N
PREP DRAFT REM ALTERN RPT	09/07/88	10/28/88	52	0	TRIANGULAR	52	52	72		ASI-2	
INTERNAL REVIEW: REM ALTNS RPT	10/29/88	11/07/88	10	0	POINT		10			ASI-2	
REVISE REMEDIAL ALTERNS REPORT	11/08/88	11/14/88	7	4	POINT		7			ASI-2	
WMCO REVIEW RA RPT	11/15/88	11/15/88	1	4	TRIANGULAR	1	4	7		JMCA	
INCORP WMCO COMMENTS-REM ALTERNS RPT	11/16/88	11/19/88	4	4	POINT		4			ASI-2	
DOE REVIEW REM ATNS	11/20/88	12/03/88	14	4	TRIANGULAR	14	14	21		ASI-2/JMCA	
INCORP DOE COMMENTS-REM ALTERNS RPT	12/04/88	12/10/88	7	4	POINT		7			ASI-2/JMCA	
REM ALTERNATIVES PAPER TO EPA	12/15/88	12/15/88	0	0							M
PREPARE WP & OUTLINE TO SCR REM ALTERS	11/08/88	11/21/88	14	0	POINT		14			ASI-2	
PREP DRAFT INIT SCR REM ALTS RPT	11/22/88	01/16/89	56	0	TRIANGULAR	56	56	76		ASI-2	
INTERNAL REV OF INIT SCRNG DOC	01/17/89	01/26/89	10	0	POINT		10			ASI-2/JMCA	
REVISE INITIAL SCREENING DOCUMENT	01/27/89	02/02/89	7	4	POINT		7			ASI-2/JMCA	
WMCO REV INIT SCRN DOC	02/03/89	02/03/89	0	4	TRIANGULAR	1	4	7		ASI-2/JMCA	
INCORP WMCO COMMENTS- INITIAL SCREEN	02/03/89	02/03/89	0	4	TRIANGULAR	3	3	7		ASI-2/JMCA	
DOE REV INIT SCRN DOC	02/03/89	02/17/89	15	4	TRIANGULAR	15	15	21		ASI-2/JMCA	
INCORP DOE COMMENTS- INITIAL SCREEN	02/18/89	02/24/89	7	4	POINT		7			ASI-2/JMCA	
INIT SCRNG ALTNS RPT TO EPA	03/01/89	03/01/89	0	0							M
PREP DET ANALYSIS WK PLAN & OUTLINE	01/27/89	02/09/89	14	0	POINT		14			ASI-2/JMCA	
PREP DRAFT RPT: DET ANALYSIS	04/02/89	04/16/89	15	0	POINT		15				
PERFORM DET ANALYSIS OF REM ACT ALTS	02/10/89	04/01/89	51	0	TRIANGULAR	51	120	150		ASI-2	
CONDUCT PUBLIC HEALTH EVALUATION	02/10/89	04/01/89	51	0	TRIANGULAR	51	120	150		ASI-2	
INTERNAL REV OF DET ANALYSIS DOC	04/17/89	05/06/89	20	0	POINT		20			ASI-2/JMCA/ASI-1	
REVISE DETAIL ANALYSIS DOCUMENT	05/07/89	05/13/89	7	0	POINT		7			ASI-1/ASI-2/JMCA	
WMCO REV DET ANALYSIS	05/14/89	05/14/89	0	0	TRIANGULAR	7	14	18			
INCORP WMCO COMMENTS - DETAIL ANAL	05/14/89	05/14/89	0	0	TRIANGULAR	7	10	14		JMCA/ASI-2	
DOE REV DET ANALYSIS	05/14/89	05/24/89	11	0	TRIANGULAR	7	14	18		JMCA/ASI-2	
INCORP DOE COMMENTS - DETAIL ANAL	05/25/89	05/31/89	7	0	TRIANGULAR	7	10	14		JMCA/ASI-2	
DET ANALYSIS RPT TO EPA	06/01/89	06/01/89	0	0							M
PREP ALTERNATIVES SELECTION WP & OUTLINE	05/07/89	05/20/89	14	4	POINT		14			ASI-2	
EVAL AND RECOMMEND PREFERRED ALT	05/25/89	06/21/89	28	0	TRIANGULAR	28	28	45		JMCA	
PREP DRAFT EVAL/RECOMMEND RPT	06/22/89	07/18/89	27	0	POINT		27			ASI-2	
INTERNAL REV OF EVAL AND RECOMMEND RPT	07/19/89	08/07/89	20	0	POINT		20			ASI-2	
REVISE EVALUATION AND RECOMMEND REPORT	08/08/89	08/14/89	7	0	POINT		7			ASI-2	
WMCO REV EVAL & RECOMMEND REPORT	08/15/89	08/15/89	0	0	TRIANGULAR	3	7	10		JMCA	

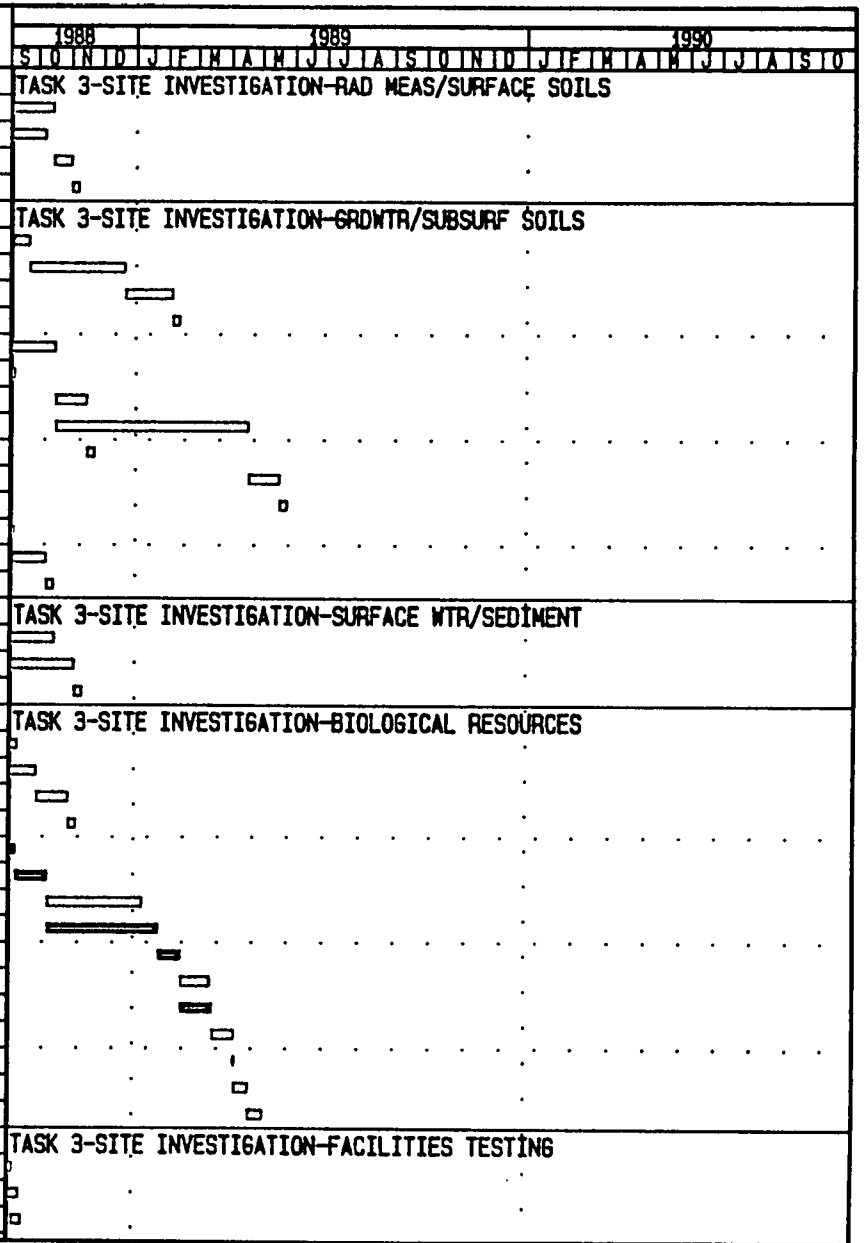
TIME DISTRIBUTION - INDIVIUAL ACTIVITIES

ACTIVITY DESCRIPTION	EARLY START(1)	EARLY FINISH	DURATION DAYS(2)	TOTAL FLOAT	DISTRIB TYPE(3)	- - PARAMETERS(4) - - A	B	C	P	INFO SOURCE(5)	NOTES(6)
INCORPORATE WMCO COMMENTS - EVAL & RECOM	08/15/89	08/15/89	0	0	TRIANGULAR	2	4	7		JMCA	
DOE REV EVAL & RECOMMEND REPORT	08/15/89	09/07/89	24	0	TRIANGULAR	14	24	28		JMCA	
INCORPORATE DOE COMMENTS - EVAL & RECOM	09/08/89	09/14/89	7	0	TRIANGULAR	7	7	14		JMCA	
DELIVER EVAL & RECOMMEND RPT TO EPA	09/15/89	09/15/89	0	0							M
DISCUSS REMED ALTERN WITH EPA	09/15/89	10/05/89	21	1	POINT		21			ASI-2	
PREP DRAFT FS RPT WK PLAN & OUTLINE	05/21/89	06/19/89	30	25	TRIANGULAR	15	15	30		JMCA	
ASI REV & APPROVE WK PLAN & OUTLINE	06/20/89	07/01/89	12	25	POINT		12			ASI-1	
WMCO REV AND APPROVE WK PLAN & OUTLINE	07/02/89	07/13/89	12	25	TRIANGULAR	7	7	12		JMCA	
PREPARE DRAFT FEAS STUDY RPT	08/08/89	09/14/89	38	0	TRIANGULAR	38	38	60		ASI-2	
FINALIZE FORMAT FOR DRAFT FS RPT	06/20/89	08/20/89	62	25	POINT		62			JMCA	
COMPILE AND TYPE DRAFT FS RPT	09/15/89	09/22/89	8	0	TRIANGULAR	8	8	19		JMCA	
INTERNAL REV FINAL DRAFT FEAS STUDY	09/23/89	10/06/89	14	0	POINT		14				
WMCO REVIEW & APPR DRAFT FS RPT	10/07/89	10/07/89	0	0	TRIANGULAR	7	10	14		JMCA	
INCORP WMCO COMMENTS-DRAFT FS REPORT	10/07/89	10/07/89	0	0	TRIANGULAR	3	7	10		JMCA	
DOE REVIEW DRAFT FS RPT	10/07/89	10/20/89	14	0	TRIANGULAR	14	14	21		JMCA	
INCORP DOE COMMENTS-DRAFT FS REPORT	10/21/89	10/30/89	10	0	TRIANGULAR	7	10	14		JMCA	
PRELIM DRAFT FS RPT TO EPA	10/31/89	10/31/89	0	0							M
EPA REVIEW & COMM: DRAFT FS RPT	10/31/89	12/30/89	61	0	TRIANGULAR	61	61	121		ASI-2	
INCORP EPA COMMS IN PUB DRAFT	12/31/89	01/29/90	30	0	POINT		30			JMCA	
WMCO REVIEW PUB DRAFT FS RPT	01/30/90	02/12/90	14	0	TRIANGULAR	7	14	21		JMCA	
INCORP WMCO COMMENTS-PUB DRAFT FS RPT	02/13/90	02/13/90	0	0	TRIANGULAR	3	7	10		JMCA	
DOE REVIEW PUB DRAFT FS RPT	02/13/90	03/03/90	19	0	TRIANGULAR	14	14	21		JMCA	
INCORP DOE COMMENTS-PUB DRAFT FS RPT	03/04/90	03/17/90	14	0	TRIANGULAR	7	7	14		JMCA	
PUBLISH PUBLIC DRAFT FS REPORT	03/18/90	03/31/90	14	0	POINT		14			JMCA	
PUBLISH PUBLIC DRAFT FS RPT	04/01/90	04/01/90	0	0							M
PUBLIC REVIEW AND HEARINGS	04/01/90	06/29/90	90	0	POINT		90			JMCA	
PUBLIC HEARINGS COMPLETE	06/30/90	06/30/90	0	0							M
RESOLVE PUBLIC COMMENTS	04/01/90	06/29/90	90	1	TEX	90	90	180	0.50	ASI-1/JMCA	
COMPLETE PUBLIC REV & HEARINGS	06/30/90	06/30/90	0	1							M
PREP FS FINAL RPT/INCL PUBLIC COMMENTS	05/29/90	06/30/90	33	0	POINT		33			JMCA	
INCORP FINAL PUB COMMENTS IN FS RPT	07/01/90	07/05/90	5	0	TRIANGULAR	5	5	14		JMCA	
ISSUE FINAL FS RPT TO WMCO	07/06/90	07/06/90	0	0							M
WMCO REV & APPR FINAL FS RPT	07/06/90	07/06/90	0	0	TRIANGULAR	7	14	21		JMCA	
DOE REV AND APPROVE FINAL FS REPORT	07/06/90	07/20/90	15	0	TRIANGULAR	15	15	21		JMCA	
EDIT AND PRINT FINAL FS REPORT	07/21/90	07/30/90	10	0	TRIANGULAR	10	15	21		JMCA	
ISSUE FINAL FS RPT TO EPA	07/31/90	07/31/90	0	0							M
EPA APPROVE FINAL FS RPT	07/31/90	09/29/90	61	0	POINT		61			ASI-1	
EPA ISSUE RECORD OF DECISION	09/30/90	09/30/90	0	0							M
PRINT AND DISTRIBUTE FINAL FS RPT	09/30/90	10/29/90	30	0	POINT		30				
EPA REJECTS HRA	/ /	/ /	0	0	POINT		60			ASI-1,2/WMCO	C
REVISE HRA/RI RPT	/ /	/ /	0	0	TEX	30	45	120	0.50	ASI-1,2/WMCO	C
RESUBMIT HRA/RI RPT	/ /	/ /	0	0	TRIANGULAR	30	45	60		ASI-1,2/WMCO	C
EPA REVIEW REVISED HRA/RI RPT	/ /	/ /	0	0	TRIANGULAR	30	45	60		ASI-1,2/WMCO	C
INCORP EPA COMMENTS REVISED HRA/RI RPT	/ /	/ /	0	0	TRIANGULAR	15	30	45		ASI-1,2/WMCO	C
RE-EVAL PREF ALTER'S	/ /	/ /	0	0	TRIANGULAR	30	60	90		ASI-1	C
MOD DRAFT FS REPORT	/ /	/ /	0	0	POINT		14			ASI-1	C

APPENDIX III

BAR CHART SCHEDULES

ACTIVITY ID	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH
03330	SAMPLE SURFACE SOIL - BIASED	28OCT87A	14OCT88
03322	COMPILE 100 FT RAD MEASUREMENT DATA	11JUN88A	7OCT88
03340	COMPLETE BIASED SAMPLE ANALYSIS	15OCT88	31OCT88
03342	COMPILE BIASED SURFACE SAMPLE DATA	1NOV88	7NOV88
03500	SCOPE PH II WELLS/APPROVE	9SEP88	22SEP88
03510	DRILL PHASE II WELLS	23SEP88	21DEC88
03520	COMPL PH II GRDWTR SAMPLE ANALYSIS	22DEC88	4FEB89
03530	COMPILE PH II GRDWTR DATA/ENTER IN DB	5FEB89	11FEB89
03460	COMPLETE ROUNDS 1&2 GRND WTR SAMPLES	11JUL88A	16OCT88
03380	COMPLETE OFF SITE DRILLING	15JUL88A	8SEP88
03450	COMPL ANALYSIS ROUNDS 1&2 WTR SAMPLES	17OCT88	15NOV88
03440	COLLECT ROUNDS 3&4 GRND WTR SAMPLES	17OCT88	17APR89
03452	COMPILE ROUNDS 1&2 WTR SAMPLE DATA	16NOV88	22NOV88
03442	COMPL ANALY RNDS 3&4 GRDN WTR SAMPLES	18APR89	17MAY89
03444	COMPILE RNDS 3&4 GRDN WTR DATA	18MAY89	24MAY89
03430	COMPLETE SUBSUR SOIL SAMPLING	6SEP88	8SEP88
03432	COMPL SUBSURF SOIL ANALYSIS	9SEP88	8OCT88
03434	COMPILE SUBSURFACE SOIL DATA	9OCT88	15OCT88
03270	COLLECT SURFACE WTR/SEDIMENT SAMPLES	6SEP88	16OCT88
03280	COMPLETE SURFACE WTR/SEDIMENT ANALYSIS	6SEP88	4NOV88
03282	COMPILE SURFACE WTR/SEDIMENT DATA	5NOV88	11NOV88
03252	COMPILE FAUNA DATA	7JUL88A	12SEP88
03242	COLLECT ADDL 10% BIO SAMPLES	25JUL88A	30SEP88
03244	ANALYZE ADDL 10% BIO SAMPLES	10CT88	30OCT88
03262	COMPILE BIO ANALYSIS DATA	31OCT88	6NOV88
03140	PERFORM INITIAL SCREENING	17AUG88A	11SEP88
03150	PERFORM PHASE I ACUTE TESTING	12SEP88	11OCT88
03160	PERFORM PHASE II ACUTE TESTING	12OCT88	9JAN89
03170	CONDUCT CHRONIC TESTING	12OCT88	24JAN89
03180	COMPLETE TOXICOLOGY DATA ANALYSIS	25JAN89	14FEB89
03200	PREPARE TOXICOLOGY REPORT	15FEB89	14MAR89
03190	CONDUCT TOXICOLOGY ASSESSMENT	15FEB89	16MAR89
03210	INTERN REV OF TOXICOLOGY RPT	17MAR89	6APR89
03220	WMCO REV & APPROVE TOXICOLOGY RPT	7APR89	7APR89
03225	INCORP WMCO COMMENTS - TOXICOLOGY RPT	7APR89	20APR89
03230	DOE REV & APPROVE TOXICOLOGY RPT	21APR89	4MAY89
03062	WMCO APPROVE TEST PLAN	20MAY88A	9SEP88
03068	WMCO APPR INIT FACIL TESTING	6SEP88	16SEP88
03064	DOE REVIEW, COMMENT ON FACIL TEST PLN	10SEP88	18SEP88



Activity Bar/Early Dates
Critical Activity

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DEPARTMENT OF ENERGY
FMPC RI/FS RISK ANALYSIS SCHEDULE
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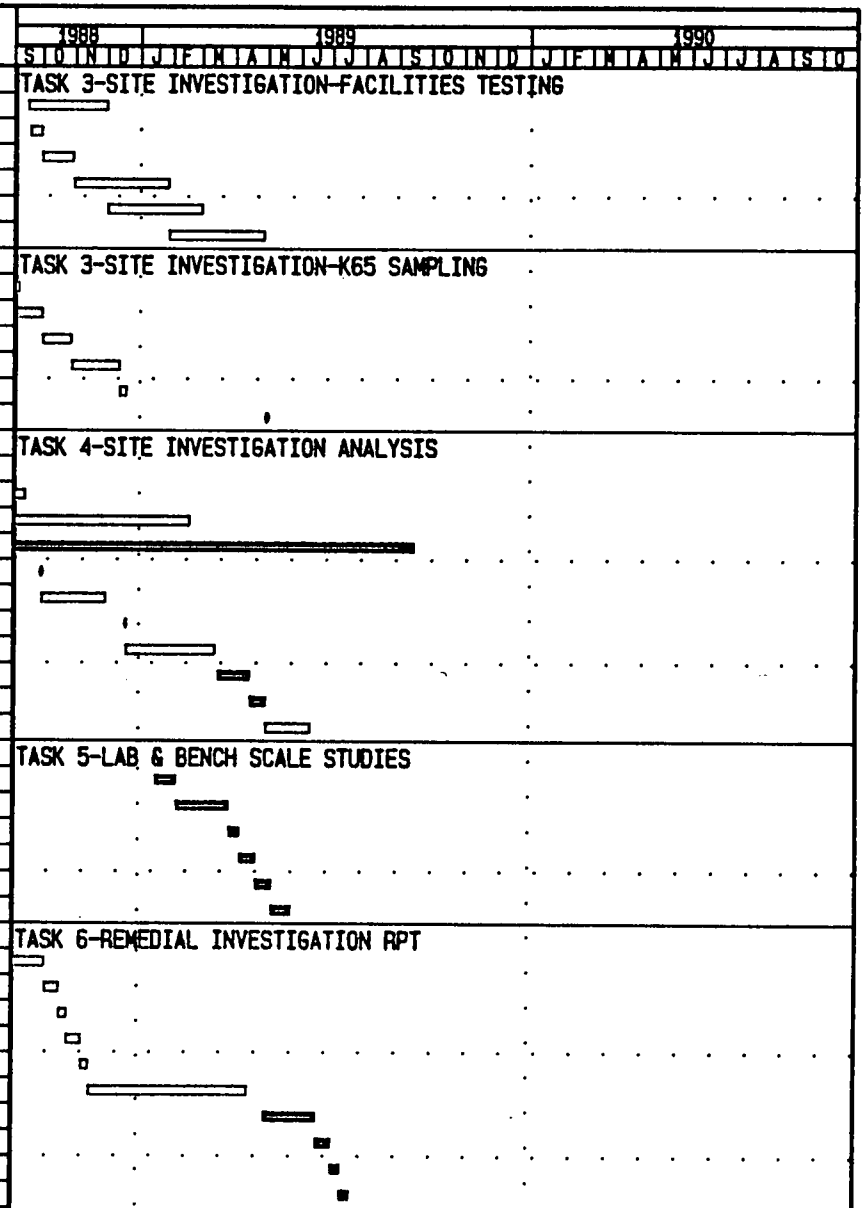
ACTIVITY ID	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH
03080	START INITIAL FACILITIES TESTING	17SEP88	30NOV88
03065	INCORP DOE COMMENTS/TEST PLAN	19SEP88	29SEP88
03066	EPA REVIEW FACIL TEST PLAN	30SEP88	29OCT88
03086	START FINAL FACILITIES TESTING	30OCT88	27JAN89
03085	COMPL INIT FACILITY TESTING	1DEC88	28FEB89
03087	COMPLETE FINAL FAC TESTING	28JAN89	27APR89
03031	REVISE K65 PLAN/XMIT TO EPA	24AUG88A	8SEP88
03032	EPA REV/APPROVE K65 PLAN	9SEP88	30SEP88
03040	SAMPLE K65 SILOS	10CT88	28OCT88
03050	ANALYZE K65 SAMPLES	29OCT88	12DEC88
03052	COMPILE K65 SILO DATA	13DEC88	19DEC88
03900	FIELD WORK COMPLETE	30APR89	30APR89
04110	PRELIMINARY GROUNDWATER MODEL	30NOV87A	6SEP88
04130	REFINE RI/FS GROUNDWATER MODEL	15MAY88A	15SEP88
04030	COMPLETE OUTPUT PROGRAMMING	2JUN88A	17FEB89
04035	DATABASE OPER FOR DATA INTERPRETATION	2JUN88A	15SEP89
04140	RI/FS GROUNDWATER MODEL OPERATIONAL	10CT88	10CT88
04150	COMPL SOLUTE TRANSPORT MODEL	10CT88	30NOV88
04700	BEGIN EXPOSURE ASSESSMENT	20DEC88	20DEC88
04710	EXPOSURE ASSESSMENT	20DEC88	13MAR89
04720	RISK CHARACTERIZATION	17MAR89	15APR89
04730	PREP DRAFT BASELINE HEALTH RISK ASSESS	16APR89	30APR89
03990	INCORPORATE FINAL FIELD RESULTS	30APR89	10JUN89
05010	PREPARE LAB STUDY WK PLAN	17JAN89	5FEB89
05020	CONDUCT LAB STUDIES	6FEB89	27MAR89
05025	PREPARE LAB STUDY REPORT	28MAR89	6APR89
05030	INTERNAL REV OF STUDY	7APR89	21APR89
05035	WMCO REVIEW OF STUDY	22APR89	6MAY89
05040	DOE REVIEW AND APPROVE STUDY	7MAY89	24MAY89
06010	PREPARE REM INVES RPT WK PLAN & OUTLINE	1JUL88A	50CT88
06020	WMCO REVIEW RIR WORK PLAN & OUTLINE	60CT88	190CT88
06022	INCORPORATE WMCO COMMENTS	200CT88	260CT88
06024	DOE REVIEW RIR WORK PLAN & OUTLINE	270CT88	9NOV88
06026	INCORPORATE DOE COMMENTS	10NOV88	16NOV88
06028	DRAFT RI REPORT	17NOV88	15APR89
06030	COMPL DRAFT RI RPT/HRA	1MAY89	18JUN89
06040	INTERNAL REV OF DRAFT RI RPT	19JUN89	2JUL89
06050	FINALIZE REMEDIAL INVEST REPORT	3JUL89	11JUL89
06060	PRODUCE REM INVES RPT DOCUMENT	12JUL89	20JUL89



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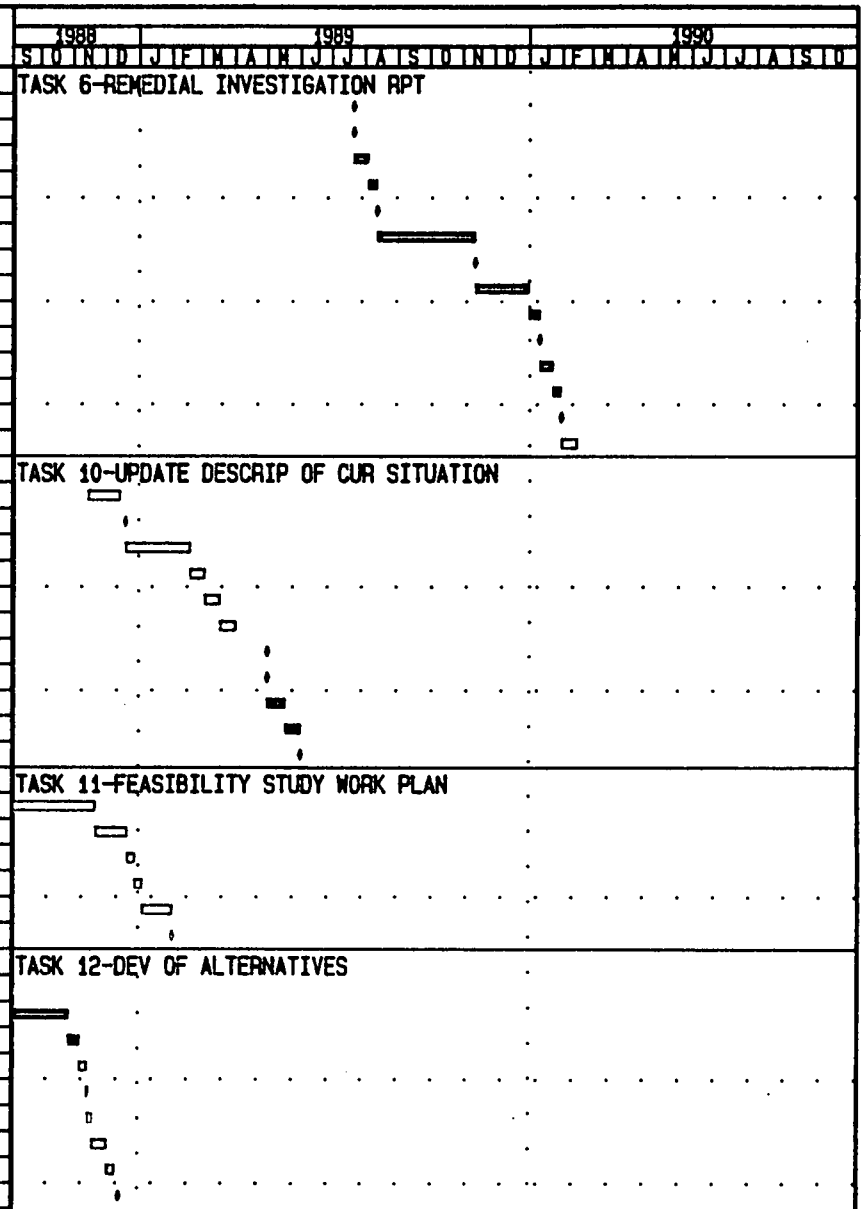
ACTIVITY ID	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH
	TASK 6-REMEDIAL INVESTIGATION RPT		
06070	WMCO REVIEW DRAFT RI RPT	21JUL89	21JUL89
06075	INCORP WMCO COMMENTS - DRAFT RI RPT	21JUL89	21JUL89
06080	DOE REVIEW DRAFT RI RPT	21JUL89	3AUG89
06085	INCORP DOE COMMENTS - DRAFT RI RPT	4AUG89	11AUG89
06090	DRAFT REM INVEST RPT TO EPA	12AUG89	12AUG89
06100	EPA REV RI RPT AND SUB COMMENTS	12AUG89	11NOV89
06102	EPA COMMENTS ON DRAFT RI REPORT	12NOV89	12NOV89
06110	INCORPORATE EPA COMMENTS	12NOV89	31DEC89
06120	PRODUCE FINAL REM INVEST RPT	1JAN90	10JAN90
06130	WMCO REV & APPROVE REM INV RPT	11JAN90	11JAN90
06140	DOE REV & APPROVE REM INV RPT	11JAN90	22JAN90
06145	EDIT AND PRINT RI REPORT	23JAN90	29JAN90
06150	REMEDIAL INVEST REPORT TO EPA	31JAN90	31JAN90
06160	PRINT ADDITIONAL RI REPORTS	31JAN90	13FEB90
	TASK 10-UPDATE DESCRIP OF CUR SITUATION		
10010	DEVEL UPDATE CUR SIT WK PLN/OUTLINE	15NOV88	14DEC88
10020	PRELIM FIELD RESULTS	20DEC88	20DEC88
10030	UPDATE CURRENT SITUATION-PRELIM	20DEC88	17FEB89
10032	WMCO REVIEW PRELIM SITE UPDATE	18FEB89	3MAR89
10034	DOE REVIEW & COMMENT PRELIM SITE UPDATE	4MAR89	17MAR89
10050	INTERNAL REVIEW & REV. CUR SIT UPDT DOC	18MAR89	1APR89
10060	WMCO REV CUR SIT UPDATE	1MAY89	1MAY89
10065	INCORP WMCO COMMENTS-CUR SIT UPDATE	1MAY89	1MAY89
10070	REV FIELD RESULTS, COMPL CUR SIT UPDATE	1MAY89	17MAY89
10075	APPROVE & PUBLISH CURRENT SIT UPDATE	18MAY89	31MAY89
10080	CURRENT SITUATION UPDATE TO EPA	1JUN89	1JUN89
	TASK 11-FEASIBILITY STUDY WORK PLAN		
11100	EPA REVIEW FEAS STUDY WK PLAN	16AUG88A	21NOV88
11102	INCORPORATE EPA COMMENTS-FS WORK PLAN	22NOV88	21DEC88
11104	WMCO REVIEW AND REVISE-FS WORK PLAN	22DEC88	28DEC88
11106	DOE REVIEW AND REVISE-FS WORK PLAN	29DEC88	4JAN89
11108	EPA FINAL REVIEW-FS WORK PLAN	5JAN89	1FEB89
11110	EPA APPROVE FEAS STUDY WK PLAN	2FEB89	2FEB89
	TASK 12-DEV OF ALTERNATIVES		
12010	PREP REM ALTERNATIVES WK PLAN & OUTLINE	15JUL88A	6SEP88
12020	PREP DRAFT REM ALTERN RPT	7SEP88	28OCT88
12030	INTERNAL REVIEW: REM ALTNS RPT	29OCT88	7NOV88
12040	REVISE REMEDIAL ALTERNS REPORT	8NOV88	14NOV88
12050	WMCO REVIEW RA RPT	15NOV88	15NOV88
12060	INCORP WMCO COMMENTS-REM ALTERNS RPT	16NOV88	19NOV88
12070	DOE REVIEW REM ATNS	20NOV88	3DEC88
12080	INCORP DOE COMMENTS-REM ALTERNS RPT	4DEC88	10DEC88
12090	REM ALTERNATIVES PAPER TO EPA	15DEC88	15DEC88



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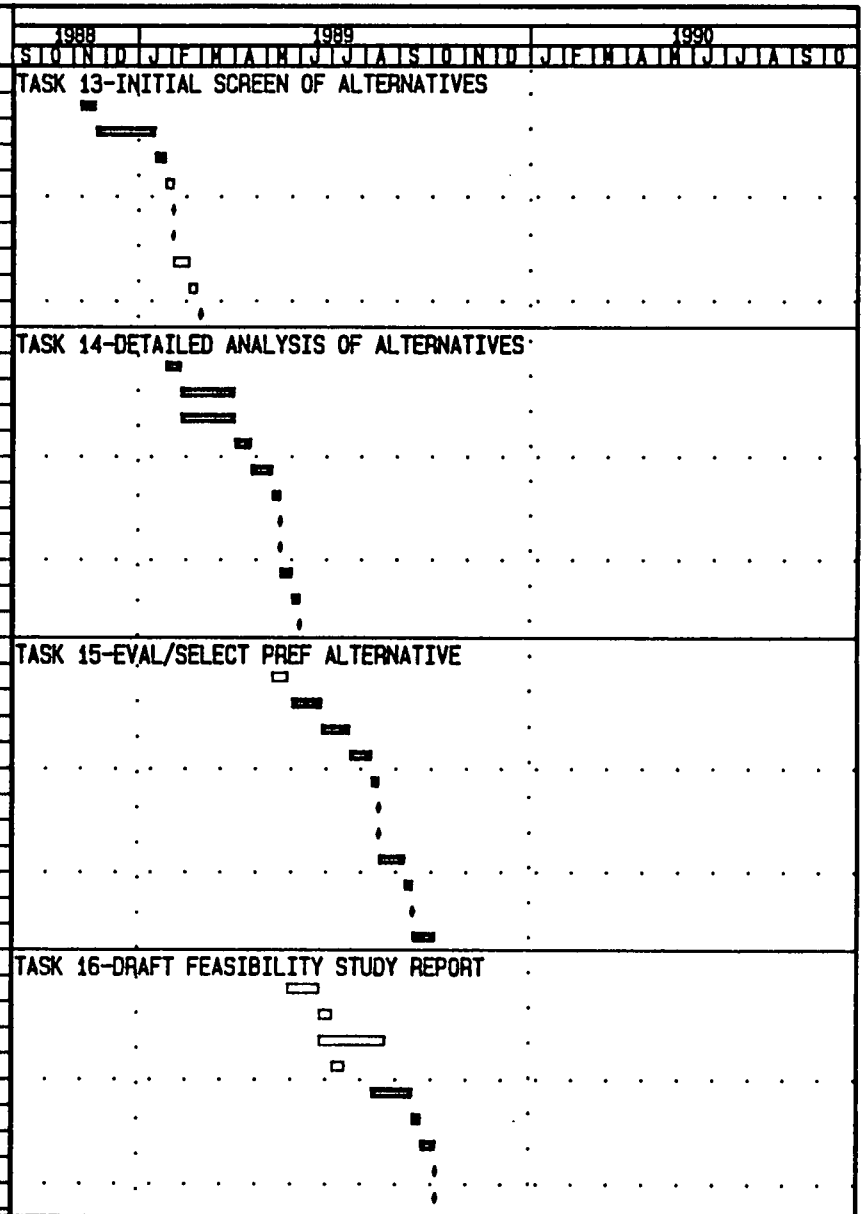
ACTIVITY ID	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH
	TASK 13-INITIAL SCREEN OF ALTERNATIVES		
13010	PREPARE WP & OUTLINE TO SCR REM ALTERS	8NOV88	21NOV88
13020	PREP DRAFT INIT SCR REM ALTS RPT	22NOV88	16JAN89
13030	INTERNAL REV OF INIT SCRNG DOC	17JAN89	26JAN89
13040	REVISE INITIAL SCREENING DOCUMENT	27JAN89	2FEB89
13050	WMCO REV INIT SCRN DOC	3FEB89	3FEB89
13060	INCORP WMCO COMMENTS- INITIAL SCREEN	3FEB89	3FEB89
13070	DOE REV INIT SCRN DOC	3FEB89	17FEB89
13080	INCORP DOE COMMENTS- INITIAL SCREEN	18FEB89	24FEB89
13090	INIT SCRNG ALTNS RPT TO EPA	1MAR89	1MAR89
	TASK 14-DETAILED ANALYSIS OF ALTERNATIVES		
14010	PREP DET ANALYSIS WK PLAN & OUTLINE	27JAN89	9FEB89
14045	CONDUCT PUBLIC HEALTH EVALUATION	10FEB89	1APR89
14040	PERFORM DET ANALYSIS OF REM ACT ALTS	10FEB89	1APR89
14035	PREP DRAFT RPT: DET ANALYSIS	2APR89	16APR89
14050	INTERNAL REV OF DET ANALYSIS DOC	17APR89	6MAY89
14060	REVISE DETAIL ANALYSIS DOCUMENT	7MAY89	13MAY89
14070	WMCO REV DET ANALYSIS	14MAY89	14MAY89
14075	INCORP WMCO COMMENTS - DETAIL ANAL	14MAY89	14MAY89
14080	DOE REV DET ANALYSIS	14MAY89	24MAY89
14085	INCORP DOE COMMENTS - DETAIL ANAL	25MAY89	31MAY89
14090	DET ANALYSIS RPT TO EPA	1JUN89	1JUN89
	TASK 15-EVAL/SELECT PREF ALTERNATIVE		
15010	PREP ALTERNATIVES SELECTION WP & OUTLINE	7MAY89	20MAY89
15020	EVAL AND RECOMMEND PREFERRED ALT	25MAY89	21JUN89
15030	PREP DRAFT EVAL/RECOMMEND RPT	22JUN89	18JUL89
15060	INTERNAL REV OF EVAL AND RECOMMEND RPT	19JUL89	7AUG89
15065	REVISE EVALUATION AND RECOMMEND REPORT	8AUG89	14AUG89
15070	WMCO REV EVAL & RECOMMEND REPORT	15AUG89	15AUG89
15075	INCORPORATE WMCO COMMENTS - EVAL & RECOM	15AUG89	15AUG89
15080	DOE REV EVAL & RECOMMEND REPORT	15AUG89	7SEP89
15085	INCORPORATE DOE COMMENTS - EVAL & RECOM	8SEP89	14SEP89
15090	DELIVER EVAL & RECOMMEND RPT TO EPA	15SEP89	15SEP89
15095	DISCUSS REMED ALTERN WITH EPA	15SEP89	5OCT89
	TASK 16-DRAFT FEASIBILITY STUDY REPORT		
16010	PREP DRAFT FS RPT WK PLAN & OUTLINE	21MAY89	19JUN89
16020	ASI REV & APPROVE WK PLAN & OUTLINE	20JUN89	1JUL89
16040	FINALIZE FORMAT FOR DRAFT FS RPT	20JUN89	20AUG89
16025	WMCO REV AND APPROVE WK PLAN & OUTLINE	2JUL89	13JUL89
16030	PREPARE DRAFT FEAS STUDY RPT	8AUG89	14SEP89
16050	COMPILE AND TYPE DRAFT FS RPT	15SEP89	22SEP89
16060	INTERNAL REV FINAL DRAFT FEAS STUDY	23SEP89	6OCT89
16070	WMCO REVIEW & APPR DRAFT FS RPT	7OCT89	7OCT89
16075	INCORP WMCO COMMENTS-DRAFT FS REPORT	7OCT89	7OCT89



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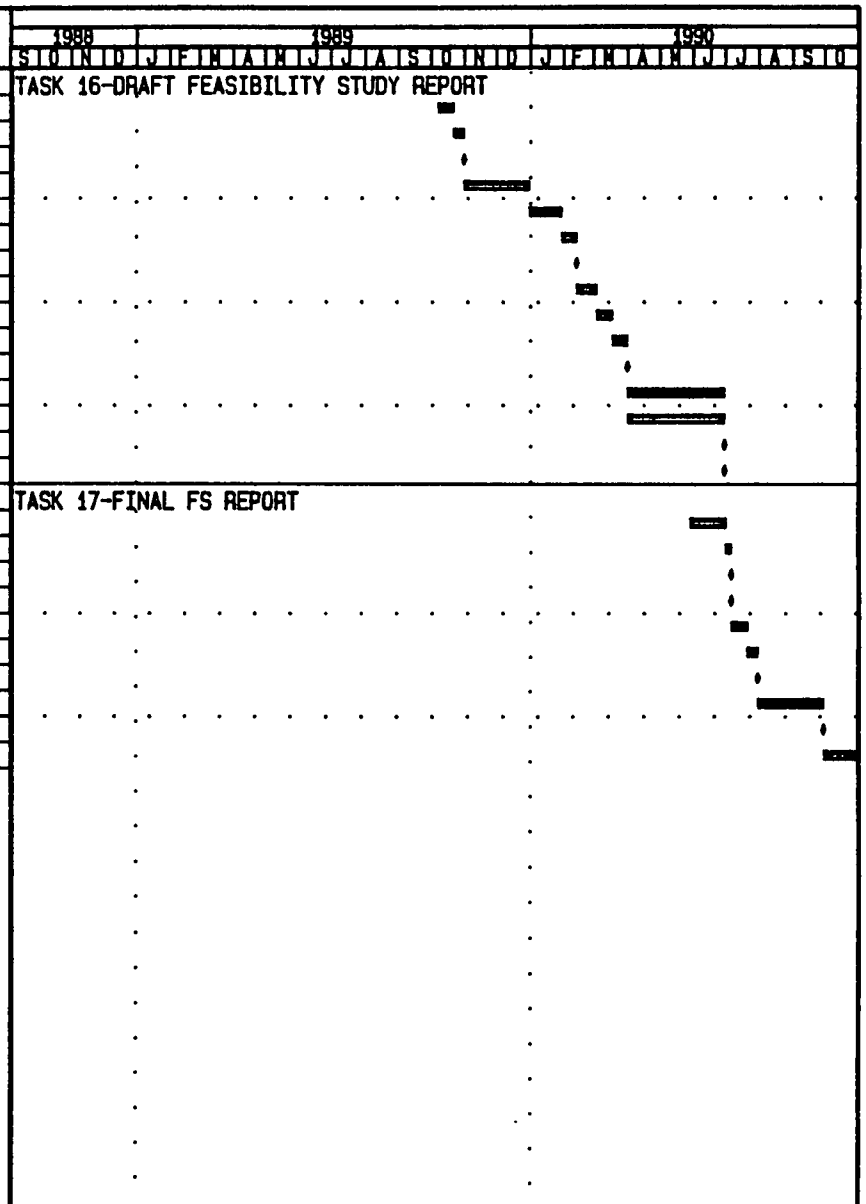
ACTIVITY ID	ACTIVITY DESCRIPTION	EARLY START	EARLY FINISH
	TASK 16-DRAFT FEASIBILITY STUDY REPORT		
16080	DOE REVIEW DRAFT FS RPT	7OCT89	20OCT89
16085	INCORP DOE COMMENTS-DRAFT FS REPORT	21OCT89	30OCT89
16090	PRELIM DRAFT FS RPT TO EPA	31OCT89	31OCT89
16100	EPA REVIEW & COMM: DRAFT FS RPT	31OCT89	30DEC89
16110	INCORP EPA COMMS IN PUB DRAFT	31DEC89	29JAN90
16120	WMCO REVIEW PUB DRAFT FS RPT	30JAN90	12FEB90
16125	INCORP WMCO COMMENTS-PUB DRAFT FS RPT	13FEB90	13FEB90
16130	DOE REVIEW PUB DRAFT FS RPT	13FEB90	3MAR90
16135	INCORP DOE COMMENTS-PUB DRAFT FS RPT	4MAR90	17MAR90
16137	PUBLISH PUBLIC DRAFT FS REPORT	18MAR90	31MAR90
16140	PUBLISH PUBLIC DRAFT FS RPT	1APR90	1APR90
16150	PUBLIC REVIEW AND HEARINGS	1APR90	29JUN90
16160	RESOLVE PUBLIC COMMENTS	1APR90	29JUN90
16152	PUBLIC HEARINGS COMPLETE	30JUN90	30JUN90
16170	COMPLETE PUBLIC REV & HEARINGS	30JUN90	30JUN90
	TASK 17-FINAL FS REPORT		
17030	PREP FS FINAL RPT/INCL PUBLIC COMMENTS	29MAY90	30JUN90
17040	INCORP FINAL PUB COMMENTS IN FS RPT	1JUL90	5JUL90
17044	ISSUE FINAL FS RPT TO WMCO	6JUL90	6JUL90
17050	WMCO REV & APPR FINAL FS RPT	6JUL90	6JUL90
17055	DOE REV AND APPROVE FINAL FS REPORT	6JUL90	20JUL90
17060	EDIT AND PRINT FINAL FS REPORT	21JUL90	30JUL90
17070	ISSUE FINAL FS RPT TO EPA	31JUL90	31JUL90
17080	EPA APPROVE FINAL FS RPT	31JUL90	29SEP90
17090	EPA ISSUE RECORD OF DECISION	30SEP90	30SEP90
17100	PRINT AND DISTRIBUTE FINAL FS RPT	30SEP90	29OCT90



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