

RFP-4406

The Terrain-Responsive Atmospheric Code (TRAC)

RFP--4406

DE90 007293

PROJECT PLAN

Development of a Hazardous Materials
Dispersion Modeling Capability
with
Application to Ambient Air Monitoring
Network Design

JUNE 1989

Revised: July 1989



Rockwell International

Aerospace Operations
Rocky Flats Plant

UNITED STATES DEPARTMENT OF ENERGY

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PROJECT PLAN

Development of a Hazardous Materials
Dispersion Modeling Capability
with
Application to Ambient Air Monitoring
Network Design

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Emergency Preparedness

Rockwell International
Rocky Flats Plant

June 26, 1989
Revised: July 7, 1989

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EXECUTIVE SUMMARY

The Rocky Flats Plant is applying the Terrain-Responsive Atmospheric Code (TRAC) for developing a monitoring network design for airborne hazardous materials around the Rocky Flats site. This project is being implemented in response to a recent agreement between the State of Colorado and the Department of Energy.

The Hazardous Materials version of TRAC (and resulting monitor siting plan) will be developed in a series of 63 tasks which will involve modification of the TRAC model to account for continuous emissions, source configuration and hazardous materials. After testing these modifications, a long-term archival meteorological data base will be implemented and used to produce the monitoring design.

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OBJECTIVE

The Hazardous Materials Model Development Project has three primary objectives:

- o Develop, implement, and apply Terrain Responsive Atmospheric Code (TRAC) for assessment of continuous, long-term releases of hazardous materials from the Rocky Flats Plant. Apply the model to design of an ambient air monitoring network for airborne hazardous releases.
- o Develop, implement, and apply TRAC model for rapid assessment of historical hazardous material releases. Test the model to evaluate impacts of episodic releases within hours or days of events.
- o Upgrade the emergency response version of the TRAC model to treat hazardous materials. Apply the model to make real-time predictions of impacts from plant operations which produce episodic hazardous material releases. Apply model for emergency response evaluations should an unplanned hazardous materials release occur.

INTRODUCTION

On June 16, 1989, Roy Romer, Governor of Colorado, and James Watkins, Secretary of Energy, reached an agreement to increase environmental monitoring at the Rocky Flats Plant. This agreement included implementation of an ambient monitoring program for non-radiological hazardous materials. The Department of Energy's (DOE) Environmental Management Team and DOE/RFAO Environmental Health Branch are leading the implementation of this project.

The DOE/RFAO has requested in a June 19, 1989, letter to Rockwell International that TRAC be modified for treating continuous releases of hazardous materials and be applied to meet these objectives. The TRAC development team (a unit of the Emergency Preparedness Program) is conducting the project with support from the Health, Safety

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and Environment and Safeguards and Security organizations.

PROJECT PLAN

The Rocky Flats Plant has designed a comprehensive project plan which will complete development, installation, and application of the TRAC model to meet the objectives above. Twelve major program elements comprise the plan:

- Project Management,
- Modify TRAC for Continuous Emissions,
- Verify Dispersion/Concentration Algorithms,
- Modify TRAC for Source Configurations,
- Modify TRAC for Hazardous Materials,
- Test Model
- Apply TRAC for Monitor Siting Study,
- Modify TRAC User Interfaces,
- Document the Project,
- Implement Meteorological Data Archival,
- Develop Episodic Near-Real-Time Hazardous Material Modeling Capability, and
- Develop/Implement Real-Time Hazardous Materials Modeling Capability.

Table 1 presents a task-by-task breakdown of the twelve program elements.

Figure 1 is a network diagram showing the relationship of tasks in the overall project effort.

Figure 2 presents a time/task analysis of all project tasks.

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Table 1. Task-by-task Breakdown of the TRAC Model Hazardous Materials Version Development.

I. Project Management

- I.1 Develop Project Plan and Schedule
- I.2 Identify/Obtain Resources
- I.3 Monitor/Report Project Progress
- I.4 Liaison with Rocky Flats Groups
- I.5 Liaison with DOE and Offsite Groups

II. Modify TRAC for Continuous Emissions

- II.1 Remove Unnecessary Coding
- II.2 Convert Coarse Wind Module to Look-Up
- II.3 Identify Candidate Calculations for Look-Up Tables
- II.4 Convert Fine Wind Module to Look-Up
- II.5 Convert Selected Calculations to Look-Up
- II.6 Restructure Release Module for Continuous Emissions
- II.7 Restructure Driver for Continuous Emissions
- II.8 Restructure Puff Manager for Continuous Releases
- II.9 Restructure Other Modules for Continuous Emissions

III. Verify Dispersion/Concentration Algorithms

- III.1 Verify Dispersion Theory and Derivation
- III.2 Compare Dispersion to Pasquill-Gifford
- III.3 Verify Concentration Algorithm

IV. Modify TRAC for Source Configuration

- IV.1 Determine Source Configuration(s)
- IV.2 Implement Area Source Capability
- IV.3 Implement Multiple Point Source Capability
- IV.4 Implement Other Source Configurations

V. Modify TRAC for Hazardous Materials

- V.1 Select Hazardous Materials
- V.2 Determine Source/Release Characteristics
- V.3 Determine Physical/Chemical Characteristics
- V.4 Identify Methods of Modeling Physical/Chemical Characteristics

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Table 1. Task-by-task Breakdown of the TRAC Model Hazardous Materials Version Development (continued)

V.5	Implement Algorithms for Physical/Chemical Characteristics
V.6	Remove Dose and Other Unnecessary Code
V.7	Implement Statistics Module
VI. Test Model	
VI.1	Verify New/Modified Modules
VI.2	Verify Total Modeling Package
VII. Apply for Monitor Siting Study	
VII.1	Obtain Detection Thresholds for Monitoring Equipment
VII.2	Select Time Period for Detailed CCL4 Mode
VII.3	Support Development of MIS for Rocky Flats Meteorological Data
VII.4	Obtain Upper Air Data for Detailed Modeling
VII.5	Obtain PROFS Data for Detailed Modeling
VII.6	Obtain Rocky Flats Plant Meteorological Data for Detailed Modeling
VII.7	Build Meteorological Data Base for Detailed Modeling
VII.8	Run Model
VII.9	Produce Long-term Concentration Contours
VII.10	Identify Optimum Monitoring Locations
VII.11	Finalize Results
VII.12	Present Results to DOE
VII.13	Finalize and Implement Standard Model for Continuous Releases
VIII. Modify TRAC User Interfaces	
VIII.1	Develop Basic Hazardous Materials User Interface Modules
VIII.2	Upgrade Real-time User Interface
VIII.3	Implement User Interface for Episodic Releases
VIII.4	Implement User Interface for Continuous Hazardous Materials Releases

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Table 1. Task-by-task Breakdown of the TRAC Model Hazardous Materials Version Development (continued)

IX. Document Project

- IX.1 Obtain Reference Documents
- IX.2 Debrief Researchers Daily
- IX.3 Prepare Daily Debriefing Notes
- IX.4 Prepare Progress Reports
- IX.5 Prepare Draft Reports, Updated Daily
- IX.6 Prepare Final Project Reports - Long-term CCL4 Impacts and CCL4 Ambient Air Monitoring Network Design
- IX.7 Prepare Final Report - Episodic Model
- IX.8 Prepare Final Project Report - Real-time Model

X. Implement Meteorological Data Archival

- X.1 Complete Draft Security Plan for MicroVAX
- X.2 Implement Software for Archiving Meteorological Data
- X.3 Implement System for Tape Transfer and Long-term Archival

XI. Develop Episodic Hazardous Materials Modeling Capability

- XI.1 Arrange Temporary Source for Upper Air Data
- XI.2 Implement Upper Air Data Base Service
- XI.3 Obtain Upper Air Data in Near-real-time
- XI.4 Begin Arrangement for Real-time Upper Air Data from NOAA
- XI.5 Modify TRAC Model for Episodic Releases
- XI.6 Implement TRAC Model for Episodic Releases
- XI.7 Report Results to DOE

XII. Develop/Implement Real-Time Hazardous Materials Modeling Capability

- XII.1 Upgrade Emergency Response Version of TRAC for Hazardous Materials
- XII.2 Establish System for Obtaining Real-time Release Information
- XII.3 Begin Predicting Impacts of Episodic Releases Before/During Events
- XII.4 Report Results to DOE

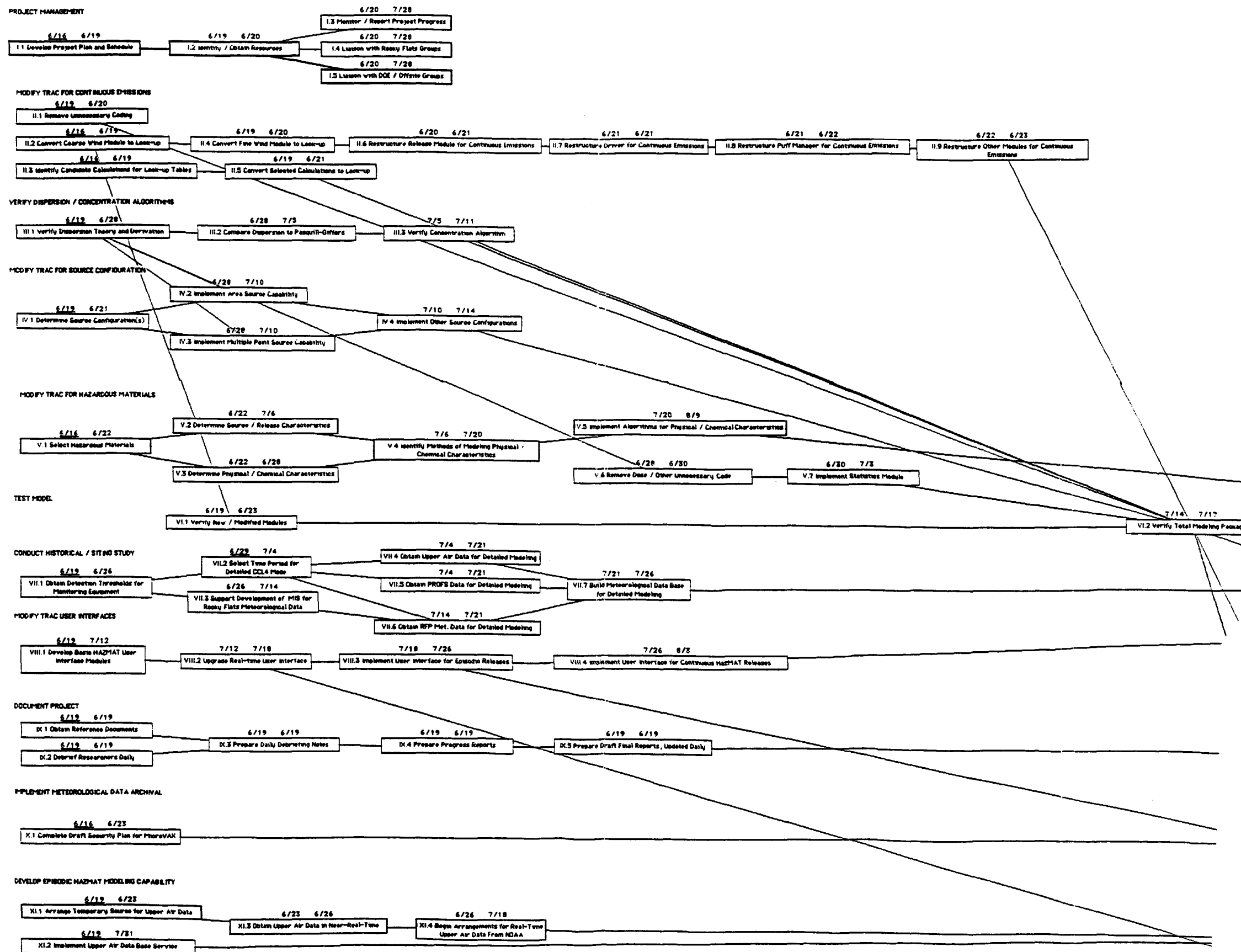


Figure 1. Network Diagram Showing Relationship of Tasks in Overall Project Effort

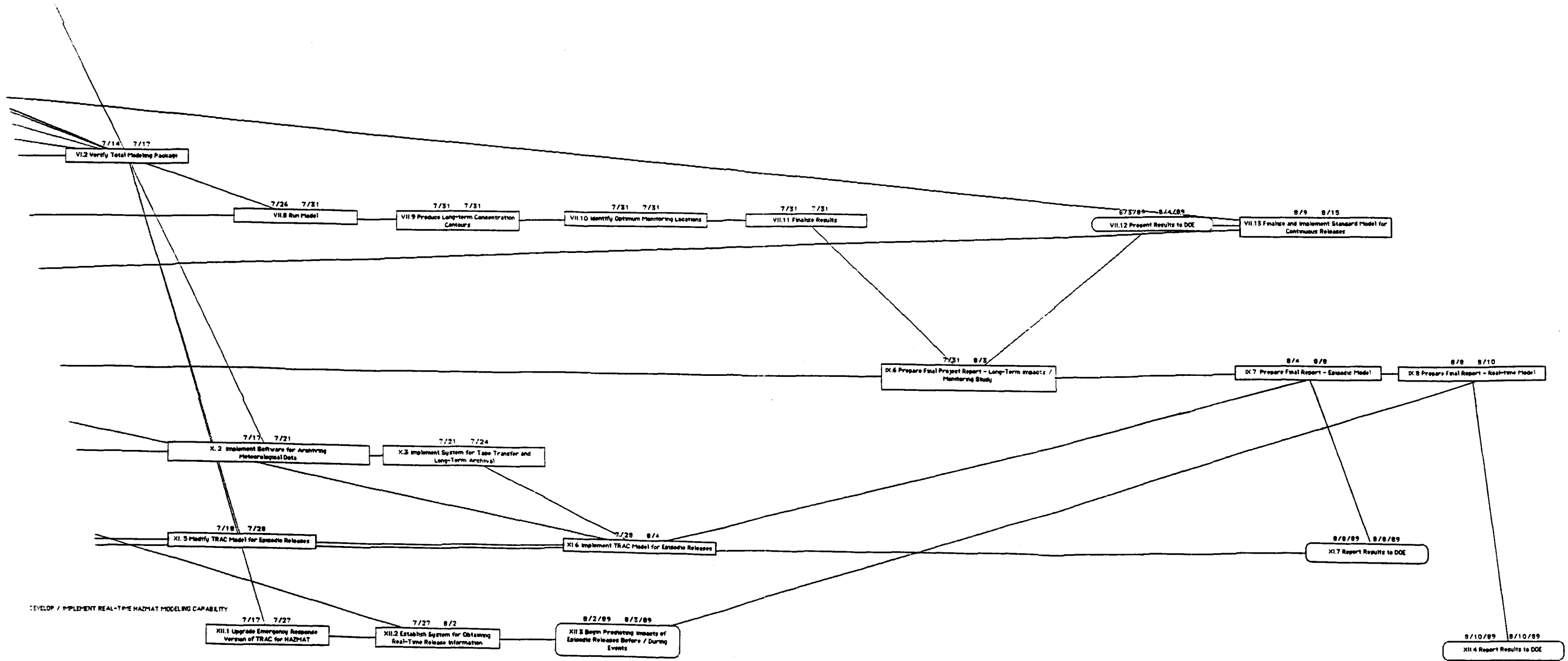


Figure 1. Network Diagram Showing Relationship of Tasks in Overall Project Effort (continued)

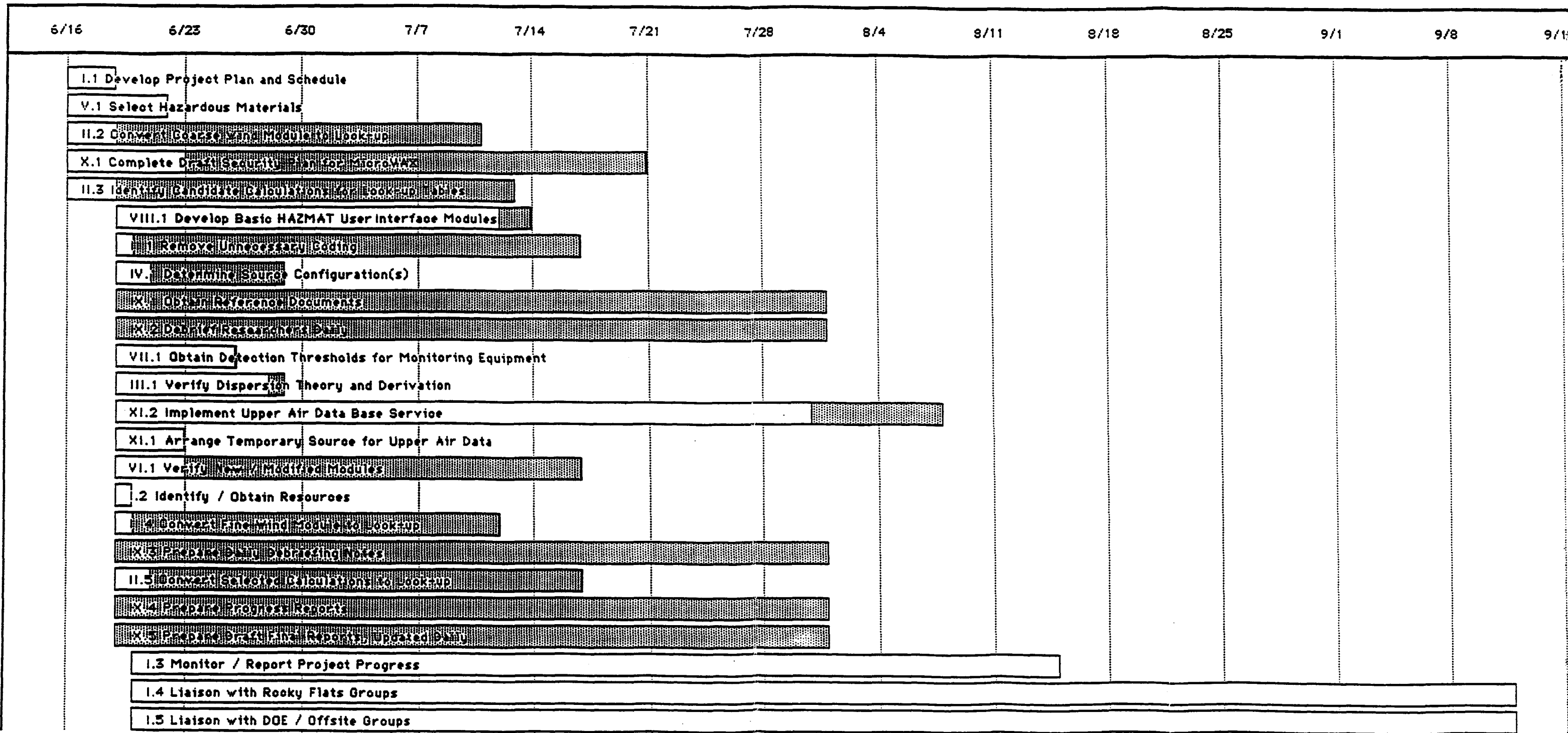


Figure 2. Time/Task Analysis of All Projects Tasks

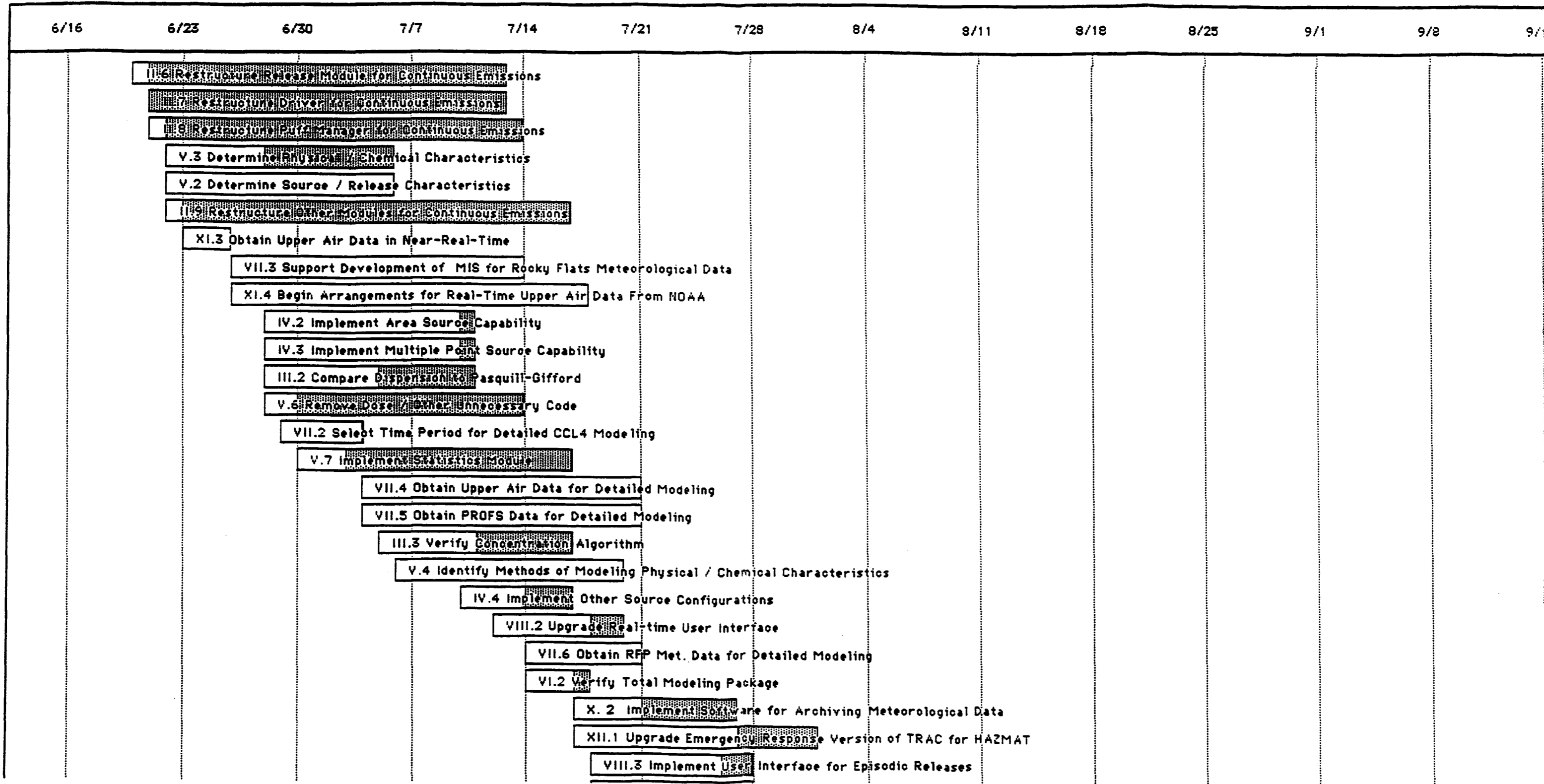


Figure 2. Time/Task Analysis of All Project Tasks (continued)

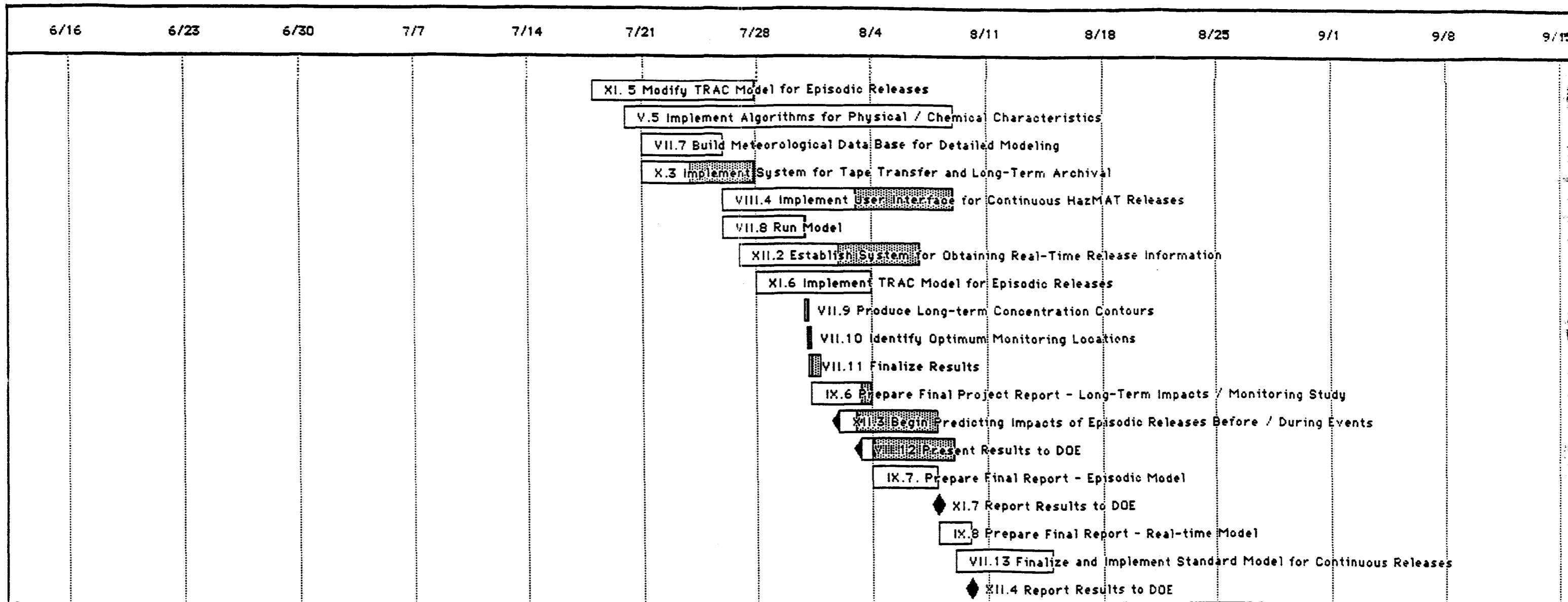


Figure 2. Time/Task Analysis of All Project Tasks (continued)

INDIVIDUAL TASK LISTING

I. Project Management

The project leader will coordinate and manage the program to ensure that the project objectives are fully met within the committed schedule. Project management will continuously monitor effort applied to the program to ensure that all results are of the highest quality standards.

Task I.1 Develop Project Plan and Schedule

The TRAC Team will develop a detailed project plan for the Hazardous Materials model development project. The plan will include identification of tasks, task inter-relationships, critical path analysis, task scheduling, resource identification, and resource allocation. The plan will be summarized in a formal report submitted to Rockwell management and DOE.

Task I.2 Identify/Obtain Resources

As part of the project planning process, project management will identify the resources needed to successfully complete the project within the requested schedule. Project management will then work with Rockwell management and DOE/RFAO to obtain the personnel and material resources identified.

Task I.3 Monitor/Report Project Progress

Project management will coordinate technical effort for the project and monitor progress on all technical tasks on a continuous basis. Project management will monitor the project progress against the schedule identified in the project plan and will adjust allocation of resources and staff efforts to ensure that the project objectives are met on schedule.

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Task I.4 Liaison with Rocky Flats Groups

The project team will liaison with Rocky Flats groups and management to the full extent necessary to ensure that the project satisfies needs and reflects the operations of all parties. These groups will include, but will not be limited to, Environmental Management, Industrial Hygiene, Waste Operations, Safeguards and Security, Safeguards and Security management, and Plant management.

Task I.5 Liaison with DOE and Offsite Groups

The project team will liaison with Rocky Flats groups and management to the full extent necessary to ensure that the project satisfies needs and reflects the operations of all parties. These groups will include, but will not be limited to, DOE/RFAO, DOE Environmental Monitoring Team, U.S. Environmental Protection Agency - Region 8, National Oceanic and Atmospheric Administration, Colorado Department of Health.

II. Modify TRAC for Continuous Emissions

The project team will convert the existing Emergency Response version of the TRAC program to one which efficiently and effectively treats long-term, continuous emissions. This will allow us to evaluate the annual average concentration patterns that the client wishes to use in designing the hazardous materials ambient monitoring network.

Task II.1 Remove Unnecessary Coding

Remove or work around testing and other coding within the TRAC model not necessary for this application. This will help reduce model run time in this resource-intensive project.

Task II.2 Convert Coarse Wind Module to Look-Up

Convert the coarse scale wind module (which calculates preliminary airflow patterns for TRAC) to a stand alone program. Recalculate coarse

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scale wind fields for the monitor siting study to reduce the run time of the model during the final analyses.

Task II.3 Identify Candidate Calculations for Look-Up Tables

Identify complex calculations within the TRAC model which can be precalculated and placed into look-up tables. These look-up tables will reduce model run time during final analyses for the monitor siting study.

Task II.4 Convert Fine Wind Module to Look-Up

Convert the fine scale wind module (which calculates detailed airflow patterns for TRAC) to a stand alone program. Recalculate fine scale wind fields for the monitor siting study to reduce the run time of the model during the final analyses.

Task II.5 Convert Selected Calculations to Look-Up

Convert the complex calculations selected under Task II.3 to precalculated look-up tables. Implement and test in the TRAC model.

Task II.6 Restructure Release Module for Continuous Emissions

Restructure the TRAC model puff generation module to efficiently treat long-term, continuous (annual average), emissions. The TRAC model is currently configured for episodic (Emergency Response) applications.

Task II.7 Restructure Driver for Continuous Emissions

Restructure the TRAC model internal task management module to efficiently treat long-term, continuous (annual average), emissions. The TRAC model is currently configured for episodic (Emergency Response) applications.

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Task II.8 Restructure Puff Manager for Continuous Releases

Restructure the TRAC model puff transport module to efficiently treat long-term, continuous (annual average), emissions. The TRAC model is currently configured for episodic (Emergency Response) applications.

Task II.9 Restructure Other Modules for Continuous Emissions

Restructure other TRAC model modules as identified to efficiently treat long-term, continuous (annual average), emissions. The TRAC model is currently configured for episodic (Emergency Response) applications.

III. Verify Dispersion/Concentration Algorithms

In this element the project team will conduct a final verification that the complex dispersion and concentration algorithms in the TRAC model are operating as designed. This comparison will quantify the differences to be expected if a standard straight-line Gaussian model were used to conduct the same study.

Task III.1 Verify Dispersion Theory and Derivation

Conduct reverification for appropriateness of dispersion theory and accuracy in transferring theory to computer code. Compute and graphically compare differentiated form of dispersion equations and model against integrated form of equations in literature.

Task III.2 Compare Dispersion to Pasquill-Gifford

Graphically compare dispersion algorithm and TRAC model against standard (Pasquill-Gifford) dispersion algorithm and off-the-shelf models.

Task III.3 Verify Concentration Algorithm

Reverify TRAC model concentration approach to ensure the theory has been accurately transferred to computer code. Graphically compare against

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standard straight-line Gaussian model concentration calculations.

IV. Modify TRAC for Source Configuration

The project team will identify the types and distributions of release points for the hazardous materials to be treated and modify the TRAC model to accommodate those source configurations.

Task IV.1 Determine Source Configuration(s)

Determine location and nature of hazardous material emissions of interest. Determine whether sources are configured as single point sources, multiple point sources, or area sources.

Task IV.2 Implement Area Source Capability

Develop and install a capability for area source releases in the TRAC model.

Task IV.3 Implement Multiple Point Source Capability

Develop and install a capability for multiple point source releases in the TRAC model.

Task IV.4 Implement Other Source Configurations

Develop and install capability for treating other source configurations in the TRAC model as such configurations are identified.

V. Modify TRAC For Hazardous Materials

The project team will determine the physical and chemical characteristics of the hazardous materials to be simulated in the TRAC model. Theory for treating methods of simulating these processes will be identified and the TRAC model will be modified accordingly.

Task V.1 Select Hazardous Materials

Develop a ranking method for hazardous material releases from Rocky Flats based upon quantities released and Threshold Limit Values. Apply ranking method to 1987 SARA Title III emissions

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report. Identify two to four substances of primary interest.

Task V.2 Determine Source/Release Characteristics

Determine the nature of the sources of the hazardous materials at Rocky Flats. Determine the characteristics that are important for modeling of the materials, including source location, size of source (single-point, multiple-point, area), nature of release (continuous, episodic, diurnal, seasonal), exit velocity, exit temperature, release height.

Task V.3 Determine Physical/Chemical Characteristics

Determine the special physical or chemical characteristics of the hazardous substance which may affect their transport or monitoring. Characteristics may include density, physical transformation (e.g., vapor to aerosol), and chemical transformation (e.g., nitric acid to NO_x).

Task V.4 Identify Methods of Modeling Physical/Chemical Characteristics

Identify usable algorithms for simulating the physical and chemical processes identified in Task V.3. Review new literature, government reports, existing model user manuals, and other published documents. Identify, contact and interview research or applied groups working in the field.

Task V.5 Implement Algorithms for Physical/Chemical Characteristics

Convert algorithms identified in Task V.4 to computer code. Verify that the code reproduces the theory as stated in the algorithm and the intent of the theory authors. Modify the TRAC model to accept the new computer code. Install the new computer code in the TRAC model.

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Task V.6 Remove Dose and Other Unnecessary Code

Remove or logically route around radionuclide dosimetry code and other codes not used in hazardous materials applications.

Task V.7 Implement Statistics Module

Identify the output statistics which will best help the client in establishing a hazardous materials ambient monitoring network. Statistics may include contour maps of mean concentration, median concentration, modal concentration, maximum concentration, percent of time that concentration exceeds sampling threshold. Develop algorithm for calculating these statistics, develop computer code to implement the algorithm. Modify TRAC model to accept the code. Install the code in the TRAC model.

VI. Test Model

All changes, upgrades, and development of new code for the TRAC model will be thoroughly tested before the model is used in this application.

Task VI.1 Verify New/Modified Modules

Conduct a line-by-line verification in debug mode of all modifications made to existing TRAC modules and all new modules created as part of the project.

Task VI.2 Verify Total Modeling Package

Thoroughly test all new and modified modules working together as a composite revised model to ensure that data are being transferred, input, utilized, and output as expected.

VII. Apply For Monitor Siting Study

Once the hazardous materials version of the TRAC model has been developed, tested, and installed, the project team will use it to develop annual average concentration patterns representative of the area around Rocky Flats. The team will then use this output to design an optimum monitoring

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network for the hazardous chemicals in question.

Task VII.1 Obtain Detection Thresholds for Monitoring Equipment

Work with DOE/HQ environmental monitoring team and other groups to determine detection thresholds for monitoring equipment which will be used in the hazardous materials ambient monitoring network.

Task VII.2 Select Time Period For Detailed CCL4 Mode

The project team will work with Environmental Management, Production personnel, the DOE Environmental Team, and DOE-RFAO to determine the appropriate time period for a historical study of carbon tetrachloride impacts on the environment and public health. The time period will be dictated mostly by the availability of detailed carbon tetrachloride use information.

Task VII.3 Support Development of MIS for Rocky Flats Meteorological Data

A Meteorological Data Base, suitable for use as model input, must be developed to exactly match the modeling time period determined in Task VII.2. This data base must include quality assured meteorological data representative of the Rocky Flats Plant. HS&E Environmental Management, with support from Information Systems Management, is developing a Management Information System (MIS) for decoding, analyzing, quality assuring, and managing meteorological data collected at the Rocky Flats Plant. This Environmental Management Project is now on the critical path for conducting the health effects and monitor citing study for carbon tetrachloride. Environmental Management and Information Systems Management will accelerate completion of the MIS. The TRAC team will provide support to Environmental Management wherever requested.

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Task VII.4 Obtain Upper Air Data for Detailed Monitoring

Detailed upper air data for the modeling period selected under Task VII.2 must be obtained for merging with the overall meteorological data base. Temperature and wind data for the atmosphere above our study area will be obtained from the twice daily radiosonde soundings conducted by the National Weather Service at Stapleton International Airport. The project team will work with the Rocky Flats Purchasing Department to procure magnetic tapes of the data from the National Oceanic and Atmospheric Administrations National Climatic Center in Ashville, North Carolina.

Task VII.5 Obtain PROFS Data for Detailed Modeling

Rocky Flats has a contract with the National Oceanic and Atmospheric Administration for PROFS regional meteorological data. NOAA supplies magnetic tapes of archived data as part of the contract. The project team will work with NOAA personnel to accelerate submittal of archival PROFS tapes for the modeling period identified in Task VII.2. The raw PROFS data will be provided on magnetic tape.

Task VII.6 Obtain Rocky Flats Plant Meteorological Data for Detailed Modeling

Environmental Management will use their newly-completed Meteorological Management Information System to provide computer files of analyzed Rocky Flats meteorological data for the time period identified in Task VII.2. These data will be provided in a form usable by the TRAC model.

Task VII.7 Build Meteorological Data Base for Detailed Modeling

The project team will merge the upper air, PROFS, and Rocky Flats Plant meteorological data sets developed in Task VII.4, VII.5, VII.6 into an overall meteorological data base for use by the TRAC model.

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Task VII.8 Run Model

Run the TRAC model to simulate an entire year of long-term emissions of the selected hazardous materials. Utilize the unclassified VAX cluster for the model run which is expected to require several calendar days.

Task VII.9 Produce Long-term Concentration Contours

The project team will use the grided concentration data produced by the TRAC model to develop contour maps of long term carbon tetrachloride impacts for the modeling period determined in Task VII.2. Contour plots will include average concentrations, mode concentrations, median concentrations, maximum concentrations, and analyses of concentration gradients. Concentration frequency diagrams will be produced for multiple locations of interest (such as proposed monitor sites and population centers).

Task VII.10 Identify Optimum Monitoring Locations

Evaluate output contour maps to determine optimum sites for continuous monitoring of hazardous materials. Base decisions on location of maxima, concentration gradients, and frequency of impact.

Task VII.11 Finalize Results

Review results with development team and management. Conduct additional verification of data. Select final monitor locations for presentation to DOE.

Task VII.12 Present Results to DOE

Present TRAC model contour maps and recommended monitoring locations to DOE.

Task VII.13 Finalize and Implement Standard Model for Continuous Releases

Clean up internal model coding and commenting. Remove testing code and other unnecessary code remaining in model from monitoring siting study

application. Convert any code "hardwired" into model for monitoring siting study into generalized code for future use. Finalize general model for use and continuous long-term release of hazardous materials.

VIII. Modify TRAC User Interfaces

The user interface for the Emergency Response (real-time) version of the TRAC model will be upgraded to accommodate user inputs concerning hazardous materials releases. New user interfaces will be developed for the episodic and annual average versions of the model.

Task VIII.1 Develop Basic Hazardous Materials User Interface Modules

Identify generic hazardous materials interface modules which will allow users to input special information about the hazardous materials to be simulated. Develop conceptual design of modules. Write computer code to implement these modules. Test the basic user interface modules prior to use.

Task VIII.2 Upgrade Real-time User Interface

Install hazardous materials user interface modules in the existing TRAC model real-time user interface. Test the user interface to ensure that new modules are operating properly.

Task VIII.3 Implement User Interface for Episodic Releases

Modify the TRAC real-time user interface for use in a diagnostic (historical) version of the model which treats episodic releases.

Task VIII.4 Implement User Interface for Continuous Hazardous Materials Releases

Modify the TRAC real-time user interface for use in a diagnostic (historical) version of the model which treats continuous releases.

IX. Document Project

The project team will fully document all efforts on the project including a project plan, daily written progress reports, and a final report on the project.

Task IX.1 Obtain Reference Documents

Rapidly identify, obtain, and supply published research documents concerning dispersion and transport of hazardous materials to development team as requested.

Task IX.2 Debrief Researchers Daily

Debrief each member of the project team every day during the performance of the project. Obtain detailed information concerning progress, schedule, accomplishments, problems, and information for each task on which each team member is working. Transcribe the debriefing notes.

Task IX.3 Prepare Daily Debriefing Notes

The project team will prepare formal, typed copies of the debriefing notes compiled daily under Task IX.2. These notes will be published on a daily basis for the information of the project team members, management, and clients.

Task IX.4 Prepare Progress Reports

Develop and publish one-to-three page progress reports twice weekly based on the daily researcher debriefings. Present the progress reports to Rockwell management and DOE.

Task IX.5 Prepare Draft Final Reports, Updated Daily

Prepare the following draft final reports:

- o Hazardous Materials Model-Compliance Version
- o Long Term Impacts from Routine Releases of CCL4 at the Rocky Flats Plant
- o Design of an Ambient Air Monitoring Network for routine releases of CCL4 from the Rocky

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- o Hazardous Materials Model-Episodic Version
- o Hazardous Materials Model-Real Time Version

Update the draft final reports daily as they are being developed to ensure that they are always current and can be submitted in draft form as an interim project report.

Task IX.6 Prepare Final Project Reports - Long-term CCL4 Impacts and Ambient Air Monitoring Network Design

Develop and publish as camera-ready copy final reports on the modeling study of long term CCL impacts and the ambient air monitoring network design study. The reports will include objectives, background, methodology, task by task discussions and results, conclusions, and recommendations.

Task IX.7 Prepare Final Report - Episodic Model

Develop and publish as camera-ready copy a final report on the model for episodic releases of hazardous materials study. Report should include model development, methods, analysis, results, and recommendations.

Task IX.8 Prepare Final Project Report - Real-time Model

Develop and publish as camera-ready copy a final report on the model for real-time assessment of hazardous materials releases. Report should include model development, methods, analysis, results, and recommendations.

X. Implement Meteorological Data Archival

Historical and near-real-time data bases of meteorological data, both onsite and offsite, will be developed and maintained for use in historical studies of hazardous materials releases.

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Task X.1 Complete Draft Security Plan for MicroVAX

Complete the draft security plan for the micro VAX system in the Rocky Flats Emergency Operations Center (Building 115). The security plan will allow linking of the micro VAX to the unclassified cluster for real-time modeling of hazardous materials. Submit draft security plan to Computer Security for review. Support Computer Security in review of plan.

Task X.2 Implement Software for Archiving Meteorological Data

Develop, install, and test computer code for storing Rocky Flats and PROFS meteorological data on unclassified VAX cluster for use in treating episodic releases of hazardous materials.

Task X.3 Implement System for Tape Transfer and Long-Term Archival

Develop, install, test, and operate the system for transferring meteorological data from unclassified VAX cluster to 9-track digital tape. Work with unclassified VAX management and operational personnel to establish system for producing and storing the tapes.

XI. Develop Episodic Hazardous Materials Modeling Capability

The project team will develop, test, install, and apply a special version of the TRAC model for treating episodic hazardous material releases. The version will be developed so that these releases can be analyzed within hours of the event.

Task XI.1 Arrange Temporary Source for Upper Air Data

Identify and make arrangements to obtain upper air data for Denver, Colorado in near-real-time (hours to days after data are collected). Arrange temporary support from offsite agency while permanent system is being implemented.

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Task XI.2 Implement Upper Air Data Base Service

Identify permanent source for Denver upper air data (computerized data base service). Prepare purchasing documentation for contracted service. Work with purchasing department to establish contracted service.

Task XI.3 Obtain Upper Air Data in Near-real-time

Obtain and archive upper air data within hours to days of real-time. Use temporary resources followed by permanent capability. Archive upper air data for use in modeling of hazardous materials episodes.

Task XI.4 Begin Arrangement for Real-time Upper Air Data from NOAA

Work with National Oceanic and Atmospheric Administration to establish availability and cost of direct real-time link into PROFS upper air data base. Begin contractual arrangements for establishing this service.

Task XI.5 Modify TRAC Model for Episodic Releases

Modify and add code to the TRAC model for effective and efficient simulation of episodic hazardous materials releases.

Task XI.6 Implement TRAC Model for Episodic Releases

Implement completed episodic TRAC model on unclassified VAX cluster. Conduct final testing. Begin applications with model.

Task XI.7 Report Results to DOE

Report final development of episodic version of TRAC model for hazardous materials to DOE. Report availability for use in applications.

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XII. Develop/Implement Real-time Hazardous Materials Modeling Capability

The project team will upgrade the Emergency Response version of the TRAC model to treat any unplanned releases of hazardous materials.

Task XII.1 Upgrade Emergency Response Version of TRAC for Hazardous Materials

Modify existing Emergency Response version of TRAC model to treat hazardous materials including physical and chemical transport characteristics.

Task XII.2 Establish System for Obtaining Real-time Release Information

Work with operations and other groups to ensure that modeling team is notified of hazardous materials releases of interest and that needed information is provided for conducting TRAC simulations. Implement the system as designed.

Task XII.3 Begin Predicting Impacts of Episodic Releases Before/During Events

Apply the real-time hazardous materials modeling capability to predict the impacts of episodic releases (e.g. associated with cleaning activities) so that expected monitoring results and impacts on ambient air can be determined before events and appropriate agencies notified.

Task XII.4 Report Results to DOE

Report final development of real-time hazardous materials modeling capability to DOE. Report availability for use in applications.

TRAC - Hazardous Materials Project

PROGRAM ORGANIZATION

The TRAC Hazardous Materials development project will be pursued by the Emergency Preparedness Department at the Rocky Flats Plant. Completion of the project described above will require substantial effort in several technical areas. A multi-disciplinary technical team will be assembled and dedicated to the program. Figure 3 represents the organization of the TRAC Hazardous Materials team. The structure shown has been specifically designed to meet the needs of the project.

Technical Functions

Several technical functions have been established for the Hazardous Materials project. These functions represent areas of expertise rather than specific staff positions. A team approach is being applied to each function - most will be performed by staff members working together. The following sections summarize the TRAC Hazardous Materials project technical functions.

Administrative Management

The administrative team management function will have overall responsibility for financial, human resource and logistical management of the TRAC Hazardous Materials project.

Dispersion Meteorology

The dispersion meteorology function will develop, evaluate, and implement dispersion meteorology theory for the TRAC Hazardous Materials project. The position will review and adapt existing theory from the published literature, review and utilize recent research results from other groups, and develop new technology as necessary. The position will support other team members in application of meteorological approaches.

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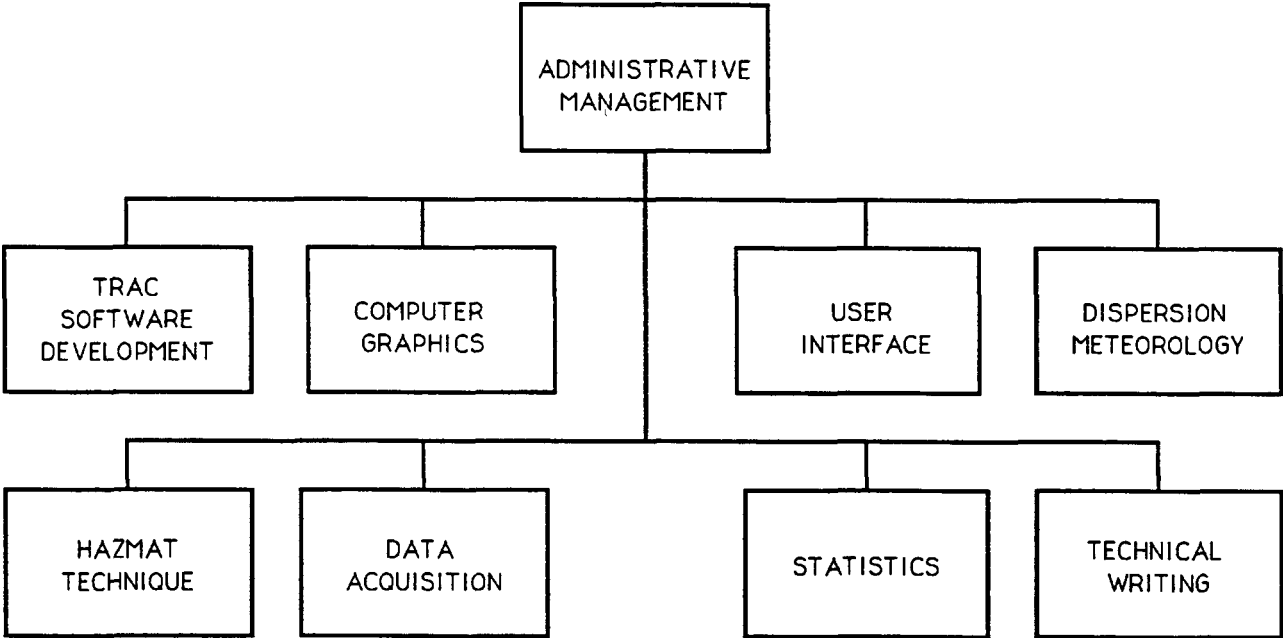


Figure 3. Organizational Chart for Hazardous Materials Dispersion Model Development Team

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TRAC Software Development

The software analysis functions will provide systems design and programming support for the development, evaluation, and implementation of the TRAC Hazardous Materials project. The analysis function will modify, optimize, and verify existing software and develop new software for the model.

Computer Graphics

The graphics programming function will design, develop, and install dedicated color graphics products for the TRAC Hazardous Materials project. The function will create a series of graphical displays and hard copy outputs.

Data Acquisition

This function will obtain the meteorological, source, and other information needed to run the TRAC model for the monitor siting study and episodic hazardous release analyses. This function will quality assure and convert the data to a form which can be used by the TRAC model. The position will identify the sources of data, develop and coordinate the purchase of data as appropriate, and contain the data in permanent archival.

Hazardous Materials Technical

This function will identify the hazardous materials that should be modeled in this project. The function will determine the physical, chemical, and source characteristics needed for TRAC model simulation. This function will compile and interpret the needed information for input to the TRAC model, and will assist in interpreting model results.

User Interface

This function will develop user-friendly interfaces for interactive entry of input

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information for use in TRAC model simulations of hazardous material releases. This function will design, develop, test, install, and operate the user interfaces for the continuous release, episodic release, and real-time versions of the model.

Statistics

This function will develop the statistical measures of hazardous materials impacts which will be calculated by the model and output as contour maps. The function will develop the algorithms for the statistical calculations and assist programming personnel in implementing the module in the TRAC model or as a stand-alone program. The Statistics Function will participate in testing of the statistics module and in interpretation of model results.

Level of Effort

It is projected that approximately fifty person-weeks of effort will be required to meet the objectives of this project. This effort will be distributed among the technical and administrative functions discussed above. This effort includes full-time support from two Rockwell International personnel; part-time support from two Rockwell International personnel; full-time support from seven contract computer programmers, statisticians, technical writers, and clerical; and part-time support from one contract technical writer. Estimated total expenditure in contract funds is \$60,000.