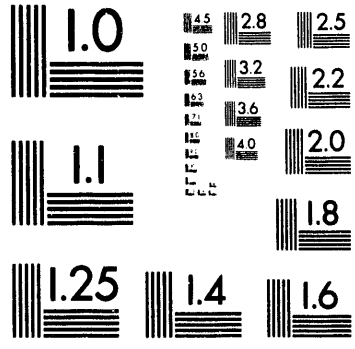
1.0
1.1
1.25
1.4
1.6
1.8
2.0
2.2
2.5
2.8
3.2
3.6
4.0
4.5
5.0
5.6
6.3
7.1

1 of 1

UCRL- JC- 114930
PREPRINT

A REAL-TIME MONITORING/EMERGENCY RESPONSE MODELING WORKSTATION FOR A TRITIUM FACILITY

Bryan S. Lawver and John M. Sims
University of California
Lawrence Livermore National Laboratory
Livermore, CA 94551-0099

Ronald L. Baskett
EG&G, Inc
Pleasanton, CA 94566

This paper was prepared for submittal to
ANS 1993 Winter Meeting
San Francisco, CA
November 14–19, 1993

July 1993

A REAL-TIME MONITORING/EMERGENCY RESPONSE MODELING WORKSTATION FOR A TRITIUM FACILITY*

Bryan S. Lawver
John M. Sims
Lawrence Livermore National Laboratory
P.O. Box 808 , L-262
Livermore, Ca. 94550
510-422-1857

and

Ronald L. Baskett
EG &G Energy Measurements, Inc.
P.O. Box 8051
Pleasanton, CA 94588
510-423-6731

July 12, 1993

ABSTRACT

At Lawrence Livermore National Laboratory (LLNL) we developed a real-time system to monitor two stacks on our tritium handling facility. The monitors transmit the stack data to a workstation which computes a 3D numerical model of atmospheric dispersion. The workstation also collects surface and upper air data from meteorological towers and a sodar. The complex meteorological and terrain setting in the Livermore Valley demands more sophisticated resolution of the three-dimensional structure of the atmosphere to reliably calculate plume dispersion than afforded by Gaussian models. We experience both mountain valley and sea breeze flows. To address these complexities, we have implemented the three-dimensional diagnostic MATHEW mass-adjusted wind field and ADPIC particle-in-cell dispersion models on the workstation for use in real-time emergency response modeling. Both MATHEW and ADPIC have shown their utility in a variety of complex settings over the last 15 years within the Department of Energy's Atmospheric Release Advisory Capability (ARAC[1, 2]) project.

**This work was performed under the auspices of the U.S. Department of Energy at Lawrence Livermore National Laboratory under contract number W-7405-Eng-48 and EG&G under contract number DE-AC08-88NV10617.

INTRODUCTION

Faster workstations, and real-time instruments allow utilization of more complex 3D models which provides a foundation for building a real-time monitoring and emergency response workstation for a tritium facility. The stack monitors are two ion-chambers per stack. One chamber has a 2 liter volume with a range of 1 curie to 100 curies while the other has a 200 ml volume and a range of 100 microcuries to 10 curies.

We chose ARAC's regional scale model which runs on large multi-user computers. In the ARAC operational environment, this model requires an experienced user who can manipulate over 100 input variables. By fixing several of the input parameters, the model is suitable as a workstation based real-time emergency response tool. Many parameters are computed or extrapolated from the input data leaving a "knobless and buttonless" control of the models. This constrained use of the ARAC models allows personnel with limited modeling experience to obtain better and more accurate predictions than the simpler non-3D models.

SYSTEM COMPONENTS

Figure 1 illustrates the essential components of the system. Surface and upper air meteorological measurements are needed to initialize the wind field in the vicinity of the facility. Conventional meteorological towers are used to measure the lowest layer near the ground. Each tower has a programmable data logger which formats and transmits data to the workstation once every 15 minutes over dial-up or leased line modems. Three towers are located in the vicinity of LLNL.

The stack monitors collect real-time measurements from the stack vents on the tritium handling facility. These monitors are networked to a single computer-controlled data logger which transmits periodically to the workstation. The monitoring data logger is programmed to send high readings immediately and to transmit routine background concentrations at a lower priority. The data logger is a personal computer which runs a laboratory automation package, LabView, which comes with hundreds of interface modules for most laboratory instruments.

The workstation computer uses a RISC-class UNIX-based platform with color graphics monitor, disk, modems and laser printer. This configuration is common in engineering offices which use complex Fortran applications. Even the most advanced personal computers are not fast enough to support our real-time 3-D dispersion models. The multitasking capability of UNIX is essential for the concurrent data collection effort, the dispersion modeling and producing graphical output on the laser printer.

CONCLUSIONS

The cost, reliability and performance of workstations provide an opportunity to utilize advanced real-time dispersion modeling for facility monitoring and emergency accident assessment. Near continuous (15 minute update resolution) displays of real-time assessments for ambient facility effluent dispersion conditions can reside on workstation displays in facility control rooms and emergency coordination centers. The workstation in the emergency response center now can perform tasks which previously required very large computers and the results were available only in a post accident evaluation phase.

All parts of this system have been demonstrated and it is expected that the complete system will be on-line during the summer of 1993.

REFERENCES

[1] T. J. Sullivan. ARAC: Evolution by accident. Technical Report UCRL-98022, LLNL, Livermore, CA, 1988.

[2] T. J. Sullivan and etal. Atmospheric release advisory capability: Real-time modeling of airborne hazardous materials. Accepted for publication in the Bulletin of the American Meteorological Society.

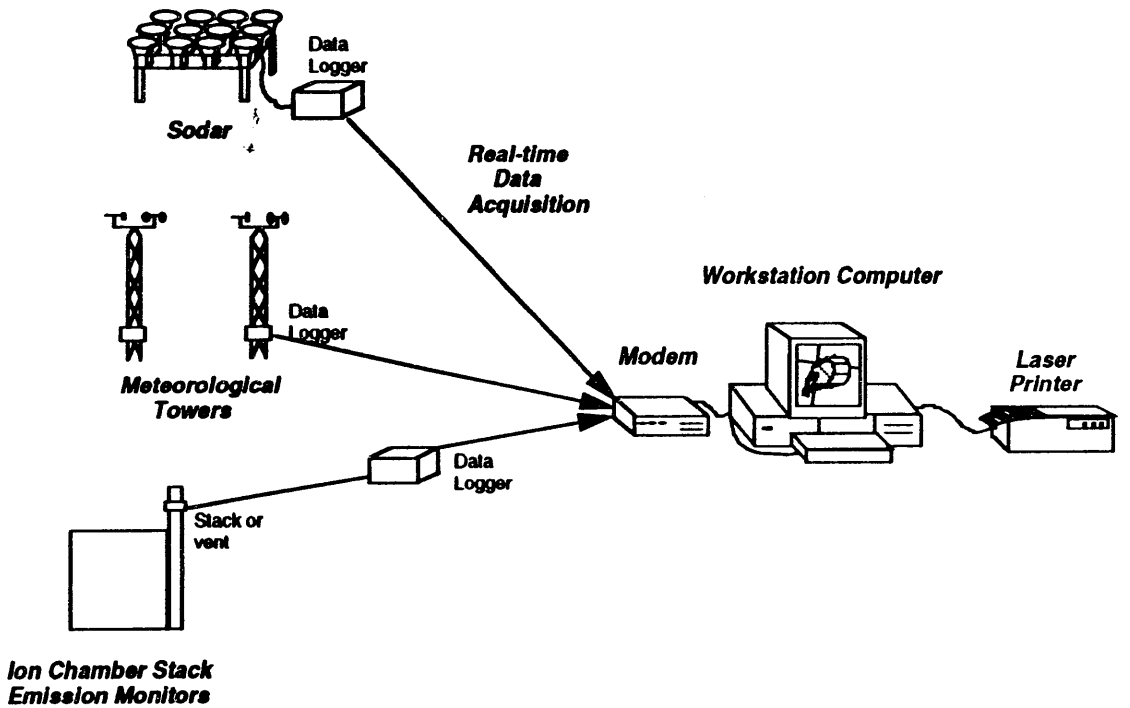

Figure 1 Monitoring/Emergency Response System
For LLNL Tritium Handling Facility

DATE
FILMED
10/13/93
END