

Monthly Letter Status Report for August 1985

Published November 1985

(FIN-A-4171-5)

Performing Organization: National Bureau of Standards
Gaithersburg, MD 20899

Sponsor: Nuclear Regulatory Commission
Office of Nuclear Materials Safety and Safeguards
Silver Spring, MD 20910

Task 1 - Review of Waste Package Data Base

In August, we continued to concentrate on obtaining further information by reading pertinent documents from the list of reports, "Categories of Waste Package Related Reports," which had been supplied earlier by the NRC. From this list of documents, we identified those reports that focused on the three areas of interest, namely, tuff, basalt, and salt, and identified which of these had been reviewed previously in the Draft Biannual Report NUREG/CR-2482, BNL-NUREG-51494. In addition, three Corrosion Group workers were assigned to lead our review and evaluation work for, and keep abreast of, the DOE work in these three areas: E. Escalante is responsible for NNWSI, R. Shull for BWIP, and M. Kaufman for ONWI. In addition, we determined which of those reports on the list had been received by NBS and those that we did not have at this time. Because we did not have the majority of the reports, we informed Everett Wick of the problem and requested that the NRC attempt to supply us with copies of the various documents so that we might update our overall collection and identify which of these documents should be reviewed.

Contacts were made with personnel of the Statistical Engineering Division (SED) of the NBS to outline the work of this program and solicit the aid of workers of that division. A tentative plan was developed for future actions that will satisfy our needs for their assistance. It involves our working with a principal contact person who will develop a background on this program and serve as our contact with others in the SED. This person would attend meetings, etc., as needed, to gain an understanding of the program, the objectives, and the principal problem areas.

Task 2 - Data File for Waste Package Performance Analysis

On August 6, 1985, a meeting was held at NRC (Willste Building) to discuss a pilot project demonstration of an Issues Management System (IMS) and an Issue Tracking and Management System. Those in attendance were T. Johnson and E. Wick (NRC), R. Johnson (Aerospace), and C. Interrante and S. Harrison (NBS). The objective of the demonstration is to have an

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operational issue tracking and management system and improve information retrieval and dissemination capabilities to facilitate daily operations, with the initial implementation being restricted to the database covering the NNWSI Project, and Congressional questions and answers.

The present status of the work was described by the Project Manager, Avi Bender. He described the type of information that will be stored and how it will be retrieved, and he indicated that the IMS would be implemented using IBM's "STAIRS," a full text storage and retrieval system. Items such as the full text for memoranda, letters, reports, etc., will be stored in the system, and there are various methods by which items may be retrieved under this system. For example, a full text search can be done using any word; and searches can be done by accession number, date prepared, contract number, project code, etc.

A question that arose is whether the small (microcomputer) storage-and-retrieval system that has been proposed for use at the NBS for reviews and evaluations of HLW data is a duplication of this large (main-frame) full-text storage system. It was concluded that while there are some common elements to the storage and retrieval of information, the two systems can be regarded as being operated independent of one another. The small NBS system is expected to be a very cost-effective vehicle for aiding the NBS workers in the process of conducting reviews and evaluations of DOE work. This small system will likely prove to be an efficient reference for use by both NRC workers and NRC contractors. Later, if the need arises, the information developed on the reviews, can be transformed (or ported) from the microcomputer onto the larger full-text storage system. Portability is one of the requirements for the microcomputer-based DBMS that is being sought for this application. In any event, the workers at the NBS, and perhaps those at NRC and other users (like NRC contractors), would also likely want to have access to the small system developed on microcomputers.

At the NBS, the work of C. Sheppard and the Scientific Computing Division continues. The requirements of a DBMS for use in storage and retrieval of our reviews and evaluations have been more clearly defined. Various available commercial software packages are being studied in relation to these requirements. At this early stage of the work, our inspection of the literature on available DBMSs indicates that Revelation seems to contain most of the features needed to satisfy the requirements of our proposed database. It appears that even if all other systems under consideration are found lacking for some major reason(s), Revelation is likely to be a viable system for this application.

In addition, it has been deemed desirable to supplement this work with a study aimed at the establishment of a set of elements that have been specifically tailored to the HLW data application. This study and related tasks that require special expertise will be undertaken by a contractor who has had considerable experience in working with automated data and text handling.

A contract was written and submitted to NRC for approval, along with a biographical sketch on the suggested contractor, Ms. C. Messina. For her qualifications, see the memorandum for Procurement dated August 12, 1985, and Ms. Messina's biographical sketch, which are appended to this report.

The essence of this contract includes two primary tasks: (1) To create a suggested architecture for use in computer storage and retrieval of reviews created for a proposed HLW database, and (2) to develop formats for generating reports using outputs from this database. The architecture will include a list of data elements (with a description of each) that are to be combined into sets of files. A file is a logical group of elements that is structured to facilitate data entry and retrieval. Part of this work will involve transposing 20 reviews from the reporting form that predates this work into the form developed under this contract. The results will be entered into a DBMS.



UNITED STATES DEPARTMENT OF COMMERCE
National Bureau of Standards
Gaithersburg, Maryland 20899

September 23, 1985

MEMORANDUM FOR Procurement

From: C. G. Interrante *CBQ*
Program Manager
High Level Nuclear Waste

Subject: Personal Service Contract with Ms. Carla Messina of
Bethesda, MD

Ms. Messina has capabilities and educational background important to the development of a database for the high level waste program. In her years at NBS, she has collaborated with Data Centers which dealt with crystal structure, chemical kinetics, thermodynamics, energetic ions, radioactive chemistry, ceramics, molten salts, spectroscopy, and U.S. Army ballistic firing tables, to name a few. She is designer and programmer of the Database System (ABCUP) used by the American Ceramic Society to store and process textual information related to phase diagrams for ceramics.

Ms. Messina has a Masters Degree in Physics and possesses the wide background in science and the knowledge of scientific database design, development and implementation, which are needed to successfully design and implement the HLW Database on a small modern personal computer. In addition to her capabilities and educational background, Ms. Messina possesses prior experience, of a highly specialized nature, not possessed by others, which is vital to the proposed effort.

During her tenure as an NBS employee, from 1968 to 1984, Ms. Messina was a principal member in the Data Systems Design Group (DSDG), which is part of the NBS Office of Standard Reference Data (OSRD).

The Office of Standard Reference Data was created by Congress to locate and assist persons and groups that can critically analyze scientific data. Ms. Messina collaborated with OSRD Data Centers. This required her to have general knowledge of various fields in physical sciences (i.e. chemistry and physics), and a familiarity with physical science terminologies, annotations and nomenclature.

The Data System Design Group used the existing NBS computers and interfaced with the computers used by the Data Centers. Carla Messina's duties in the Data System Design Group included writing, integrating, and maintaining computer programs to manipulate scientific text and data files. She also prepared searchable files, indexes, and publication lists for the Data System Design Group. One of her main responsibilities was to adapt commercially available software to specialized coding requirements, so as to meet various requirements for physical science data of NBS workers and for OSRD Data Centers. This work included preparation and maintenance of computer typesetting routines and preparation of other related computer programs. Taken together along with her training in physical science, these experiences and her familiarity with vendor supplied data base software will be of great value in assisting the NBS in designing and implementing a database for the high level waste program.

Currently she works as a research associate for another group at the NBS, Phase Diagrams for Ceramists (PDFC), in a joint project of the American Ceramic Society and the National Bureau of Standards. This work is equally relevant to this contract, and it is mentioned above.

Thus, Ms. Messina has specialized capabilities and broad experiences in the development of databases, in conducting critical analyses of scientific data, and in computer programming and typesetting related to scientific text and data files; these will permit her to be most effective in this task.

Carla G. Messina holds two degrees in physics, B.S. (1959), summa cum laude, from the University of Maryland and M.S. (1962) from the George Washington University. She is the co-author of a set of definitive tables on the thermodynamic properties of highly ionized gases and a major contributor to the Omnitab Subroutine Library. As a physicist in the Office of Standard Reference Data at the National Bureau of Standards (1967-1984), she identified and solved complex computational problems arising in the critical analysis of data. Much of her career has been computer oriented and she was also the chief designer of the NBS Typographic System. She has been responsible for the ABC Program Series currently in use at NBS, especially by the Ceramic Phase Diagram Data Center. As a systems analyst/programmer, she has developed interfaces between data banks, text editors, and typesetting devices.

Mrs. Messina has facility in the following programming languages:

FAP (IBM)
FORTRAN II-FORTRAN 77
BASIC
BAL (VIDECOMP 500)
BEDFORD MARKUP

She has programmed for the following computers:

IBM 704-IBM 7090
CDC 3600
SPERRY (UNIVAC)
INTERACT
HP-1000

She has designed programs and prepared material for the following typesetting devices:

LINOFILM
LINOTRON 1010
VIDECOMP 500
BEDFORD

Publications

Hilsenrath, J., Messina, Carla G., and Evans, William H., "Tables of ideal gas thermodynamic functions for 73 atoms and their first and second ions to 10,000 °K," Air Force Weapons Laboratory, Report No. AFWL-TDR-64-44, pp. 441, August 1964.

"Molecular Biophysics," Academic Press, Edited by B. Pullman and M. Weissbluth. Carla G. Messina contributed to Chapter, "Compact Single Strand Nucleic Acids," 1965.

Hilsenrath, J., Ziegler, C. G., Messina, C. G., Walsh, P. J., and Herbold, R. J., "OMNITAB: A general-purpose program for numerical and statistical analysis," National Bureau of Standards Handbook 101, Superintendent of Documents, Washington, DC, March 1966.

Hilsenrath, J., Messina, C. G., and Klein, M., "Table of thermodynamic properties and chemical composition of argon in chemical equilibrium including second virial corrections from 2400 °K to 35,000 °K," Arnold Engineering Development Center, Report No. AEDC-TR-66-248, pp. 120, December 1966.

Messina, C. G., and Hilsenrath, J., "EDPAC: Utility programs for computer assisted editing, copy production and data retrieval," Technical Note 470, Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402, January 1969.

Messina, C. G. and Hilsenrath, J., "Edit-Insertion Programs for Automatic Typesetting of Computer Printout," Technical Note 500, Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402, April 1970.

Messina, C. G., Sherwood, G. B., and Seymour, C., "Production of the 1984 Journal of Physical and Chemical Reference Data Author, Material, and Property Indexes." National Bureau of Standards Standard Reference Data in house publication (1984).

Whitehead, J. H. and Messina, C. G., "The Electronic Typesetting Program Programmer's Manual, U. S. Army Armament Research and Development Center, Ballistic Research Laboratory, Aberdeen Proving Ground, MD 21005 (August 1984) ARBRL-MR-03379.

Scientific Presentations

Case Study of NBS Typesetting System September 24-26, 1975. Graphic Communications Computer Association of Printing Industries of America, Inc., Conference of Tabular Composition, Washington, DC.

A Simple-minded Algorithm for Automatic Typesetting of Displayed Mathematics July 22-27, 1973. CODATA symposium on Man-Machine Communication for Scientific Data Handling, Freiburg, Germany.

Abstracts in Machine-readable Form July 13, 1973. IAEA-INIS Section, Vienna, Austria.

Honors, Awards, and Fellowships Received

Fellow of the Washington Academy of Sciences, October 1973.

Silver Medal Award for Meritorious Service, Department of Commerce, October 1971.

Outstanding Performance Rating, NBS, April 1968.

Certificate of Commendation for Superior Performance of Official Duties, NBS, June 1965.

Certificate of Award, NBS, February 1964.

Teaching Fellowship, The George Washington, University, September 1959-June 1962.

Sigma Pi Sigma, 1958.

General Motors Company four-year scholarship to University of Maryland, 1955-1959.

Washington Junior Academy of Sciences Member, 1955.

Certificate of Merit from Washington Academy of Sciences, 1955.

BIOGRAPHICAL
OF
CHARLES L. SHEPPARD

Business Address:

National Bureau of Standards
Building 225 Room A265
Gaithersburg, MD 20899

Birth Date: [REDACTED]

EDUCATION

The American University, Washington, D.C., 1975-1978.
Master of Science degree in Computer Science
granted May 1979. Studies emphasized the manage-
ment aspects of computer science. Employed full
time at National Bureau of Standards during the
program.

North Carolina Agriculture and Technical University,
Greensboro, North Carolina, 1967-1971. Bachelor of
Science degree in July 1971. Majored in Mathemat-
ics. Alpha Phi Omega fraternity.

EXPERIENCE

NBS/ICST in Division 642

1982-present, manager of database laboratory, responsi-
ble for purchasing, installing, testing, and docu-
menting test results on all data management
software available in the database laboratory. The
data management software that I have installed,
tested, and is presently testing range across both
mini and microcomputer environments. The list of
commercial and noncommercial data management pack-
ages include Dayflo, dBASE II, dBASEIII, Condor
Series 20, RMS, RQL, UNIBASE, ORACLE, RBase 4000,
Powerbase, QPro4, Knowledgeman, Infostar, PC-
Focus, PC:File, and Revelation.

Install both hardware and software on the IBM PC,
XT, and AT microcomputers.

Install software and assist in the day to day operations of our UNIX operating system on a VAX 11/750.

1980-1982, provided analyst and documentation concerning the feasibility of implementing potential standard specifications for the transfer of data from source to target DBMSs. Work included writing high-level software programs that can dump data in the potential standard format (from a source DBMS on to magnetic tape) and load data from format (at target DBMS from tape).

Designed and implemented high-level software programs to test prototype DBMSs. Work included installing prototype DBMS software and writing appropriate application software programs to interface with a prototype as well as interface with a prototype via its interactive facility.

1974-1980, prepared and evaluated RFPs concerning database management research efforts. Work entailed defining work statements and deliverables as well as evaluating proposals and monitoring contract efforts.

Designed and implemented high-level software programs to test BASIC compilers. Work entailed writing and documenting validation routines in accordance with standard specifications.

John A. Holmes High School

1971-1974, taught mathematics. Work entailed teaching general mathematics, algebra, and geometry to ninth and tenth graders, and trigonometry to advanced students.

PUBLICATIONS

Gilsinn, D.E. and C. L. Sheppard, "BASIC Validation Routines", rep. NBSIR, December, 1977.

Sheppard, C.L., "Guide for Selecting Microcomputer Data Management Software", currently in WERB process for 1985 publication.

TECHNICAL REPORTS

"Studying the Spectra of Microcomputer Database Management Systems", IEEE Newsletter, 1984.

NBS Monthly Letter Status Report - FIN-A-4171-5

Cost Analysis - July

Pay Periods 14A, 14B, and 15 (June 23-August 3, 1985)

| | Costs (Dollars) | | Projection by Month Dollars in Thousands--to 11-30-85 | | | |
|------------------------|--------------------|-------------------|--|-------------|------------|------------|
| | <u>This Period</u> | <u>Cumulative</u> | <u>Aug</u> | <u>Sept</u> | <u>Oct</u> | <u>Nov</u> |
| Personnel Expenditures | \$25,298* | \$58,015 | 17 | 25 | 25 | 40 |

Travel Costs
(Individual and Trip)

| | | |
|-----------------------------|-------|-------|
| E. Escalante, LLNL, (\$815) | | |
| C. Interrante, LLNL (\$940) | 1,755 | 1,755 |

Costs (by Item):

| | | |
|--------------------------|-------|-------|
| Publications/Weld. Res. | | |
| Assoc. Coun. (\$600) | | |
| Publications/Assoc. Iron | | |
| & Steel Eng. (\$131) | | |
| Lecture Fees (C. | | |
| Messina) (\$370) | | |
| Graphic Arts (\$810) | | |
| Stores/Supplies (\$101) | 2,012 | 2,033 |

Uncosted Obligations:

None

*Total hours this report (see attached labor journals): 533

Total hours cumulative: 1,116

450 450 4500480

LABOR JOURNAL

AR-3

FOR PAY PERIOD 14A, 06/23/85 TO 07/06/85

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COST CENTER NUMBER 4500480

| ASGD DIV | WORK ORDER | REQ DIV | EMPLOYEE NAME | HOURS PAID + | COMP WORK - | LEAVE USED = | HOURS WORK | HOURS THIS | CC | BASE RATE[1] | BASE COST | AVG RATE[2] | TOTAL COST | ADJUSTMENTS NBS-12 PP |
|-------------|---------------|------------|-------------------------|-----------------|----------------|-----------------|---------------|---------------|----|-----------------|--------------|----------------|---------------|--------------------------|
| 450 | | | ESCALANTE, EDWARD | 80 | | 8 | 72 | 5 | | 29.39 | 147 | 58.55 | 293 | |
| 450 | | | HARRISON, STEVEN A | 80 | | 8 | 72 | 40 | | 7.29 | 291 | 14.52 | 581 | |
| 450 | | | INTERRANTE, CHARLES G | 80 | | 10 | 70 | 70 | | 31.07 | 2175 | 61.90 | 4333 | |
| 450 | | | KAUFMAN, MICHAEL J | 80 | | 48 | 32 | 8 | | 22.70 | 182 | 45.23 | 362 | |
| 450 | | | PUGH, EDISON M | 80 | | 8 | 72 | 6 | | 37.52 | 225 | 74.75 | 449 | |
| 450 | | | SMALL, ROBERT D | 80 | | 24 | 56 | 10 | | 24.16 | 242 | 48.13 | 481 | |
| | | | TOTAL SPONSOR LABOR | | | | | 139 | | | 3262 | | 6499 | |
| | | | COST CENTER TOTAL LABOR | | | | | 139 | | | 3262 | | 6499 | |

[1] BASE RATE INCLUDES 18.3% LEAVE SURCHARGE

[2] AVERAGE RATE IS OBTAINED BY APPLYING THE FOLLOWING OVERHEAD RATES TO THE SUM OF THE BASE RATE PLUS BENEFITS (10.5%):

BUREAU OH 44.5%, LAB OH 5.7%, CENTER OH 30.1%, BLDG DEPR/DOC OH .0%.

<<< THIS RECORD IS BEING DISCLOSED FROM A PRIVACY ACT SYSTEM OF RECORDS (COMMERCE/DEPT-1).

FURTHER DISCLOSURES SHOULD BE RESTRICTED ON A NEED-TO-KNOW BASIS, AND THE RECORD SHOULD BE DESTROYED WHEN IT IS NO LONGER OF USE >>>

*** GRID N 03 ***

COST CENTER NUMBER 4500480

450 450 4500480

LABOR JOURNAL

AR-30

FOR PAY PERIOD 148, 07/07/85 TO 07/20/85

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COST CENTER NUMBER 4500480

| ASGD DIV | WORK ORDER | REQ DIV | EMPLOYEE NAME | HOURS PAID + | COMP WORK - | LEAVE USED = | HOURS WORK | HOURS THIS | BASE CC | BASE RATE(1) | BASE COST | AVG RATE(2) | TOTAL COST | ADJUSTMENTS NBS-12 PP |
|-------------|---------------|------------|-------------------------|-----------------|----------------|-----------------|---------------|---------------|------------|-----------------|--------------|----------------|---------------|--------------------------|
| 450 | | | BERTOCCHI, UGO | 80 | | | 80 | 8 | 36.53 | 292 | 72.94 | 584 | | |
| 450 | | | ESCALANTE, EDWARD | 80 | | | 80 | 16 | 29.39 | 470 | 58.68 | 939 | | |
| 450 | | | HARRISON, STEVEN A | 80 | | | 80 | 64 | 7.29 | 466 | 14.56 | 932 | | |
| 450 | | | INTERRANTE, CHARLES G | 80 | | | 80 | 80 | 31.07 | 2485 | 62.04 | 4965 | | |
| 450 | | | KAUFMAN, MICHAEL J | 80 | | | 80 | 10 | 22.70 | 227 | 45.33 | 453 | | |
| 450 | | | PUGH, EDISON M | 80 | | 8 | 72 | 12 | 37.52 | 450 | 74.92 | 899 | | |
| 450 | | | SHULL, ROBERT D | 80 | | | 80 | 10 | 24.16 | 242 | 48.24 | 482 | | |
| | | | TOTAL SPONSOR LABOR | | | | | 200 | | 4632 | | 9252 | | |
| | | | COST CENTER TOTAL LABOR | | | | | 200 | | 4632 | | 9252 | | |

[1] BASE RATE INCLUDES 18.3% LEAVE SURCHARGE

[2] AVERAGE RATE IS OBTAINED BY APPLYING THE FOLLOWING OVERHEAD RATES TO THE SUM OF THE BASE RATE PLUS BENEFITS (10.5%);

BUREAU ON 44.5%, LAB ON 6.1%, CENTER ON 30.1%, BLDG DEPR/DOC ON .0%.

<<< THIS RECORD IS BEING DISCLOSED FROM A PRIVACY ACT SYSTEM OF RECORDS (COMMERCE/DEPT-1).

FURTHER DISCLOSURES SHOULD BE RESTRICTED ON A NEED-TO-KNOW BASIS, AND THE RECORD SHOULD BE DESTROYED WHEN IT IS NO LONGER OF USE >>>

*** GRID N 03 ***

COST CENTER NUMBER 4500480

FOR PAY PERIOD 15, 07/21/85 TO 08/03/85

PAGE 309

COST CENTER NUMBER 4500480

| ASGD DIV | WORK ORDER | REQ DIV | EMPLOYEE NAME | HOURS PAID + | COMP WORK - | LEAVE USED = | HOURS WORK | HOURS THIS CC | BASE RATE[1] | BASE COST | AVG RATE[2] | TOTAL COST | ADJUSTMENTS NBS-12 PP |
|-------------|---------------|------------|-------------------------|-----------------|----------------|-----------------|---------------|------------------|-----------------|--------------|----------------|---------------|--------------------------|
| 450 | | | BERTOCCI UGO | 80 | | | 80 | 6 | 36.53 | 219 | 72.94 | 438 | |
| 450 | | | ESCALANTE EDWARD | 80 | | 40 | 40 | 40 | 29.39 | 1175 | 58.68 | 2347 | |
| 450 | | | HARRISON STEVEN | 80 | | | 80 | 48 | 7.29 | 350 | 14.56 | 699 | |
| 450 | | | INTERRANTE C | 80 | | 4 | 76 | 76 | 31.07 | 2361 | 62.04 | 4715 | |
| 450 | | | KAUFMAN MICHAEL | 80 | | | 80 | 8 | 22.70 | 182 | 45.33 | 363 | |
| 450 | | | PUGH EDISON | 80 | | | 80 | 8 | 37.52 | 300 | 74.92 | 599 | |
| 450 | | | SHULL ROBERT | 80 | | | 80 | 8 | 24.16 | 193 | 48.24 | 386 | |
| | | | TOTAL SPONSOR LABOR | | | | | 194 | | 4780 | | 9547 | |
| | | | COST CENTER TOTAL LABOR | | | | | 194 | | 4780 | | 9547 | |

[1] BASE RATE INCLUDES 18.3% LEAVE SURCHARGE

[2] AVERAGE RATE IS OBTAINED BY APPLYING THE FOLLOWING OVERHEAD RATES TO THE SUM OF THE BASE RATE PLUS BENEFITS (10.5%):

BUREAU OH 44.5%, LAB OH 6.1%, CENTER OH 30.1%, BLDG DEPR/DOC OH .0%.

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COST CENTER NUMBER 4500480

*** GRID 6 03 ***