A Survey on the Use of National Standard Reference Data System Publications

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Received June 19, 1972

The purpose of this mail survey to purchasers of National Standard Reference Data System publications was to assess what benefits the publications provided its users and to obtain feedback on user experience, requirements, and problems of use. Survey returns gave evidence that NSRDS publications were helpful to users in meeting their data requirements. Specific uses and benefits were identified. The greatest use of NSRDS publications was in connection with basic research. Because NSRDS compilations have utility in the applied areas as well, their usefulness needs to be promoted among applied workers and engineers.

An information system's reason for being is the use to which it is put; the user is the most important component in the information cycle. To stay viable—to check policy and performance—information systems often institute a research and surveillance activity to understand the present and future requirements of its actual and potential users, as well as to find the most effective means for meeting those requirements.

This paper reports a surveillance study conducted by mail of the users of the publications issued by the National Standard Reference Data System (NSRDS) of the National Bureau of Standards (NBS). The NSRDS was established in 1963 to facilitate the availability of critically evaluated data in the physical sciences. (Detailed background information on the NSRDS may be found in the list of references on the NSRDS in Appendix A.) As a component of NBS, the Office of Standard Reference Data (OSRD), the program management vehicle of the NSRDS, has two major goals:

1. To provide reliable data on the physical and chemical properties of well-defined substances that are needed by the nation's scientists and engineers, and
2. To help improve the quality and productivity of scientific and technological measurements by means of the program's published evaluations and criteria.

PURPOSE OF SURVEY

Since its establishment, the NSRDS has generated more than 50 reference data compilations and an equal number of bibliographies and other ancillary publications. Most of the publications have been printed by the U.S. Government Printing Office (GPO) and sold by its Superintendent of Documents. During the summer of 1971, the Office of Standard Reference Data constructed a survey mail questionnaire which had the following objectives:

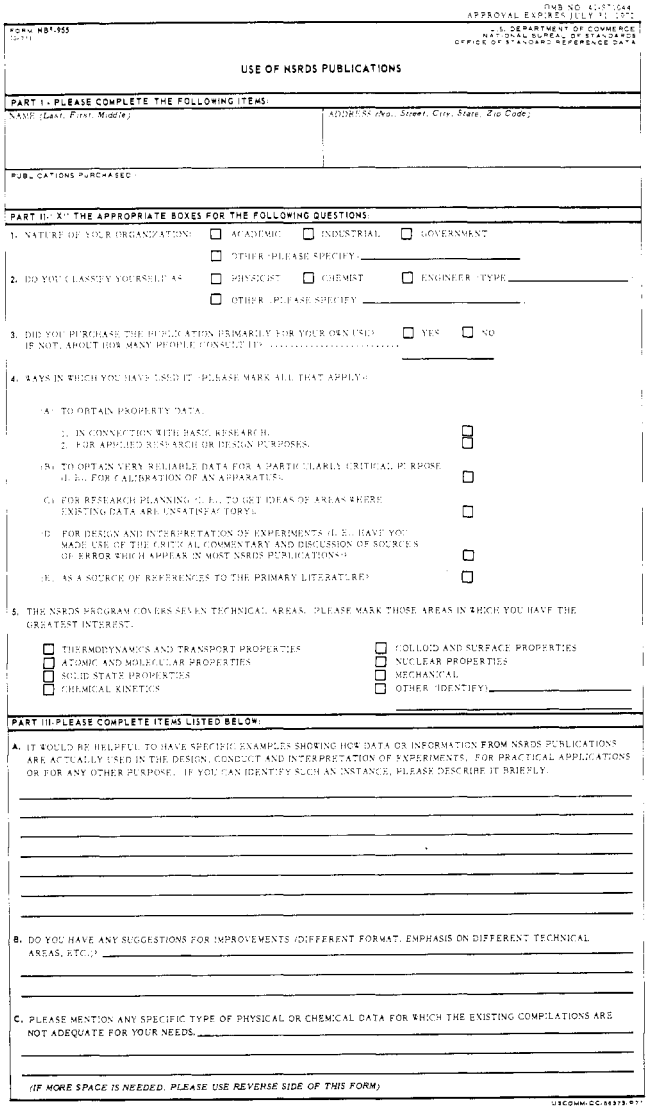
1. To assess the usefulness of NSRDS publications
2. To obtain background details of the purchasers and users of NSRDS publications
3. To find out how the purchaser used the NSRDS publications
4. To obtain additional feedback on user experience, requirements, and problems of use
5. To obtain suggestions on ways to improve both coverage and format of NSRDS publications

SURVEY PROCEDURES

The survey was to be mailed to purchasers of NSRDS publications. A critical problem in any interaction between the OSRD and purchasers is that OSRD has no direct contact with them. Purchasers must send prepaid orders to the Superintendent of Documents of the GPO. NSRDS orders are only a very small fraction of sales handled by the Superintendent of Documents. In the order-processing routine, as soon as an order is filled, the order form is discarded. No records are kept.

Early in 1969, OSRD negotiated with the Superintendent's office to provide Xeroxed copies of NSRDS publication orders. Over a period of two years, nearly 2000 Xeroxed order forms were accumulated, but slightly less than 1600 were found usable, mainly for reasons of legibility.

During August 1971, a survey questionnaire, Figure 1, was mailed to 1579 purchasers. By the end of October 1971, 799 responses were received, exclusive of 29 envelopes which the Post Office had returned as undeliverable. The heart of the questionnaire, as will be noticed in Figure 1, begins with Part II. Table I tabulates replies to question 1 of Part II, the nature of the purchaser's employing organization; Table II tabulates replies to question 2, Part II, the field or discipline of the purchaser; Table III tabulates replies to question 3, Part II, as to whether the publication was purchased for own use; Table IV tabulates replies to question 4, Part II, the ways the publication was used; Table V tabulates replies to question 5, the NSRDS program areas (types of properties) of greatest interest; and Table VI supplements and summa-



OMB NO. 41-R7.044
APPROVAL EXPIRES JULY 31, 1972

FORM NBS-955
(3-71)

U.S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
OFFICE OF STANDARD REFERENCE DATA

USE OF NSRDS PUBLICATIONS

PART I - PLEASE COMPLETE THE FOLLOWING ITEMS:

NAME (Last, First, Middle) | ADDRESS (No., Street, City, State, Zip Code)

PUBLICATIONS PURCHASED:

PART II - X" THE APPROPRIATE BOXES FOR THE FOLLOWING QUESTIONS:

1. NATURE OF YOUR ORGANIZATION: ☐ ACADEMIC ☐ INDUSTRIAL ☐ GOVERNMENT
☐ OTHER (PLEASE SPECIFY: _____)

2. DO YOU CLASSIFY YOURSELF AS: ☐ PHYSICIST ☐ CHEMIST ☐ ENGINEER (TYPE _____)
☐ OTHER (PLEASE SPECIFY: _____)

3. DID YOU PURCHASE THE PUBLICATION PRIMARILY FOR YOUR OWN USE? ☐ YES ☐ NO
IF NOT, ABOUT HOW MANY PEOPLE CONSULT IT? _____

4. WAYS IN WHICH YOU HAVE USED IT (PLEASE MARK ALL THAT APPLY):

(A) TO OBTAIN PROPERTY DATA:
1. IN CONNECTION WITH BASIC RESEARCH: ☐
2. FOR APPLIED RESEARCH OR DESIGN PURPOSES: ☐

(B) TO OBTAIN VERY RELIABLE DATA FOR A PARTICULARLY CRITICAL PURPOSE (I. E., FOR CALIBRATION OF AN APPARATUS): ☐

(C) FOR RESEARCH PLANNING (I. E., TO GET IDEAS OF AREAS WHERE EXISTING DATA ARE UNSATISFACTORY): ☐

(D) FOR DESIGN AND INTERPRETATION OF EXPERIMENTS (I. E., HAVE YOU MADE USE OF THE CRITICAL COMMENTARY AND DISCUSSION OF SOURCES OF ERROR WHICH APPEAR IN MOST NSRDS PUBLICATIONS?): ☐

(E) AS A SOURCE OF REFERENCES TO THE PRIMARY LITERATURE? ☐

5. THE NSRDS PROGRAM COVERS SEVEN TECHNICAL AREAS. PLEASE MARK THOSE AREAS IN WHICH YOU HAVE THE GREATEST INTEREST:

☐ THERMODYNAMICS AND TRANSPORT PROPERTIES
☐ ATOMIC AND MOLECULAR PROPERTIES
☐ SOLID STATE PROPERTIES
☐ CHEMICAL KINETICS
☐ COLLOID AND SURFACE PROPERTIES
☐ NUCLEAR PROPERTIES
☐ MECHANICAL
☐ OTHER (IDENTIFY): _____

PART III - PLEASE COMPLETE ITEMS LISTED BELOW:

A. IT WOULD BE HELPFUL TO HAVE SPECIFIC EXAMPLES SHOWING HOW DATA OR INFORMATION FROM NSRDS PUBLICATIONS ARE ACTUALLY USED IN THE DESIGN, CONDUCT AND INTERPRETATION OF EXPERIMENTS, FOR PRACTICAL APPLICATIONS OR FOR ANY OTHER PURPOSE. IF YOU CAN IDENTIFY SUCH AN INSTANCE, PLEASE DESCRIBE IT BRIEFLY.

B. DO YOU HAVE ANY SUGGESTIONS FOR IMPROVEMENTS (DIFFERENT FORMAT, EMPHASIS ON DIFFERENT TECHNICAL AREAS, ETC.)?

C. PLEASE MENTION ANY SPECIFIC TYPE OF PHYSICAL OR CHEMICAL DATA FOR WHICH THE EXISTING COMPILATIONS ARE NOT ADEQUATE FOR YOUR NEEDS.

(IF MORE SPACE IS NEEDED, PLEASE USE REVERSE SIDE OF THIS FORM)

USCOMM-DC-56373-P71

Figure 1

rizes the replies of the questions 1, 2, 4 and 5 of Part II, and records totals to responses to questions A, B, and C of Part III.

Part III of the questionnaire required fill-in responses. Question A asked for specific examples of how the user utilized data or information from NSRDS publications. Question B solicited suggestions for improvement. Question C asked identification of any specific type of physical or chemical data for which existing compilations were inadequate for the user's needs. Of the 799 responders, 375 answered Question A; 272 answered B; and 270 answered C.

DISCUSSION OF RESULTS

The OSRD recognized that the Xeroxed orders represented neither an ideal macrocosm of users nor a random sampling of them, but that they did represent actual purchasers of NSRDS publications who could be queried for the information that might fulfill the objectives of the survey. The 51.5% survey returns and the responses they contained provided much pertinent data on the purchasers/users of NSRDS publications and on their experience of use. As Table III shows, more than three-quarters of the purchasers are direct users.

The majority of responders (55.5%) work in academic institutions; less than a third (30.3%) work in industry; a small number (7.6%) work in government; and a still smaller grouping (6.6%) have other types of work affiliations. More chemists (about 41%) than workers in other fields have purchased NSRDS publications; next come physicists with almost 30%; engineers follow with a percentage of 18.6%; the remaining 15% comprises a miscellaneous grouping.

Replies to question 4 showed that more than two-thirds of the users of NSRDS publications use them for the purpose of obtaining property data in connection with basic research. Next, and slightly less than two-thirds, use NSRDS publications as a source of reference to the primary literature. There is probably a direct relationship between these two high users. More than a third of the users needed property data for applied research or for design purposes. A third of the responders use NSRDS publications for aiding in the design and interpretation of experiments. Slightly fewer use the publications for research planning purposes, that is, for discerning areas where existing data are unsatisfactory. The last use-grouping, consisting of more than a fourth of the users, was for a particular and critical purpose—as for example, the calibration of an instrument. Responders also volunteered the following uses: as an aid to lectures and classwork, 4.6%; assign student reference reading, 4.8%; aid to preparation of papers and patents, 2.9%. In the latter case, several forwarded reprints in which NSRDS publications were cited.

For management purposes, the scope of properties covered by the NSRDS program has been divided into seven broad technical areas. These were listed in question 5 and users were asked to check those areas in which they had the greatest interest. Table V shows the result. The two areas checked most have received the greatest financial support—atomic and molecular properties (checked by 58.9% of the responders) and thermodynamics and transport properties (checked by 44.4% of the responders). An obvious comparison to make is that of the percentage of purchasers' area of interest with the percentage of the OSRD financial investment in each technical area for data publication generation. A factor probably influencing the response to question 5 is the number of publications available for purchase falling within the technical area category. Publications within the atomic and molecular category outnumber all other categories. Thermodynamic and transport properties publications are next in availability. Comparisons are shown in Table VII.

Readers should guard against casual inferences based on the data in Table VII—as for example, that the atomic and molecular category indicates greatest interest and productivity and, therefore, should receive greatest financial support from OSRD. Responders were not a scientifically representative sample. Two previous surveys (an American Chemical Society survey of its membership in 1965 and an OSRD survey of Special Librarians, 1970)[1,2] showed properties most often used by members of the technical community were in the thermodynamics and transport properties category. Nevertheless, OSRD recognizes that data needs within technical areas important to large segments of the U.S. technical community are not being met.

SURVEY COMMENTS AND SUGGESTIONS

Part III of the survey questionnaire required responders to fill in answers. Question A asked for elaboration of de-

Table I. Use of NSRDS Publications Survey

Nature of Purchaser's Organization[a]	No.	%
Academic	464	55.5
Industrial	253	30.3
Government	64	7.6
Other	55	6.6

[a] Some checked more than one type of affiliation.

Table II. Use of NSRDS Publications Survey (Of Purchasers)

Field of Purchaser[a]	No.	%
Chemist	329	41.2
Physicist	237	29.5
Engineer	149	18.6
Other	121	15.1

[a] Some checked more than one field.

Table III. Use of NSRDS Publications Survey (Publication(s) Purchased for Own Use)

Yes	609	76.2%
No	183	22.9%
No answer	7	0.9%

Table IV. Use of NSRDS Publications Survey

Use(s) Made of Publication	No.	Users Responding, %[a]
Basic research	519	67.8
Literature source	464	60.6
Applied research	296	38.6
Experimental design	253	33.0
Research planning	238	31.1
Critical use, e.g., calibration	205	26.8
Students[b]	37	4.8
Lecture & class[b]	35	4.6
Papers, patents[b]	22	2.9

[a] Only 766 out of 799 respondents answered this question.
[b] Unasked uses, volunteered by respondents.

Table V. Use of NSRDS Publications Survey

Program Area of Interest	No.	Users Responding, %
Atomic and molecular	471	58.9
Thermodynamics and transport properties	355	44.4
Chemical kinetics	311	38.9
Solid state	217	27.2
Colloid and surface	92	11.5
Mechanical	90	11.3
Nuclear	84	10.5
Other	69	8.6

tails or specifics of the use checked in the previous question 4. Question B asked for suggestions for improvements, and C for suggestions for data needs not being met by existing compilations. About half of the responses provided comments to at least one of the questions in Part III. Details of specific instances of use in question A provided ample evidence that the availability of NSRDS data publications aided in improving the quality and productivity of the users, and inherently saved them effort and costs. Here are some typical comments:

Table VI. Use of NSRDS Publications Survey (Summary Table)

PART II

Nature of Organization	Academic	Industrial	Government	Other
Total Counts[a]	464	253	64	55
Field				
Physicist	159	45	24	9
Chemist	204	86	23	16
Engineer	47	79	7	16
Other	54	43	10	14
Total[a]	464	253	64	55
Publication Purchased for Own Use				
Yes	371	179	55	42
No	93	74	9	13
Total[a]	464	253	64	55
Use(s) Made of Publication				
A1. Basic Research	406	80	45	22
A2. Applied Research	80	175	28	27
B. Critical Use	123	63	13	20
C. Research Planning	157	55	24	14
D. Experimental Design	155	68	15	23
E. Literature Source	284	131	37	33
F. Lectures & Class	35	0	0	0
G. Students	32	1	2	2
H. Papers, Patents, etc.	13	6	1	2
Total[a]	1285	579	165	143
Program Area(s) of Interest				
Thermo. & Transport	197	122	24	23
Atomic & Molecular	329	89	47	31
Solid State	117	78	17	15
Chemical Kinetics	171	114	23	23
Colloid & Surface	39	53	8	9
Nuclear	56	31	8	14
Mechanical	17	60	7	13
Other	27	17	9	6
Total[a]	953	564	143	134

PART III

Question A, 375 responses
Question B, 272 responses.
Question C, 270 responses.

[a] Counts are based on the actual number of responses to each question in the 799 returns; 3 respondents did not answer Question 2; 7 respondents did not answer Question 3; 32 did not answer Question 4; 16 did not answer Question 5.

Table VII

Prog. Area	Available NSRDS Publs. in Tech. Area, No.	Responders Checking Interest in Area, No.	Responses of Interest, %[a]	Financial Support in Area by OSRD, %
Therm. & Transport Properties	18	355	44.4	45
Atomic & Molecular	26	471	58.9	28
Solid State	1	217	27.7	14
Chem. Kinetics	6	311	38.9	8
Coll. & Surface Properties	1	92	11.5	[b]
Nuclear	3	84	10.7	5
Mechanical	—	90	11.3	[b]
Other	—	69	8.6	—

[a] Percentage is more than 100 because responders may have checked several areas.
[b] Less than 1%.

NSRDS data have over the years become a leading reference source for data in our space and atmospheric sciences work. Of particular interest is the reference material on thermodynamics, results of which are utilized in heat transfer work on spacecraft and reentry vehicles. Data in the area of chemical kinetics have been valuable in our materials technology work. In essence, our multicomplex R&D work utilized virtually all data generated as a NSRDS publication or report.

(From a manager of libraries of a large industrial corporation)

I have recently published a paper [*J. Opt. Soc. Am.* **61**, 1101 (1971)] in which I predicted energy levels of lanthanide and actinide atoms. I think this will be a useful paper, but I would not even have considered attempting this work without the availability of NBS Special Publication 306 and its bibliography. I could enumerate countless instances where NSRDS publications saved me considerable time and trouble and many instances in which the experiments would not have been attempted without the availability of the information in the NSRDS publications.

(From a prominent academic researcher)

We have used kinetic data on gas-phase reactions in analyzing some aspects of the formation of photo-chemical smog. These data are particularly important for computer simulation of the over-all process.

(From a user in a government laboratory)

C. Moore's Energy Level Tables are indispensable to basic thermodynamic calculations. Kieffer's Cross Section Data are used to analyze ionization data and in the design of advanced mass spectrometers.

(From a user in aerospace industry)

Specifically, I have designed and built a high-power, pulsed infrared source, partially with the aid of the data from "Wiese, Smith and Glennon" [NSRDS-NBS 4]. The performance is remarkably close to theoretical expectations. The present application, hence the device, is in a classified area, but the general theory may be released within the coming year.

(From a user in an academic institution)

There were very few suggestions for improvement offered in replies to question B, and none that might be considered to be of any great consequence. More often than not, question B was left blank or the word, "No," written as the response. It was gratifying and perhaps surprising that replies to a question soliciting criticism should elicit no derogatory remarks about the program. There were several complaints about the length of time it took the Superintendent of Documents to fill orders. Several responders suggested an index to the NSRDS publications be published; others suggested current listings of NSRDS publications be disseminated periodically. There were also suggestions for greater emphasis of subject areas of interest to the responder as for example:

To me, it is important to concentrate upon lines in infrared—and to *expand* the valuable work which has been done to other atomic and molecular species.

(From an academic user)

More bibliographic studies—for example in Polarography.

(From an industrial user)

Among the few suggestions for improvement of format submitted were:

I would like to see individual data sheets so that the reader who requires all values for, e.g., lanthium fluoride, can get a set, and the reader who wants all dielectric constants at 500°C can get a set.

(From an academic user)

Some of the graphs [NSRDS-NBS 8 and 16] are hard to read because of too much information on them.

(From an academic user)

Keep handbooks hard-bound—*not* paper!

(From an industrial user)

More emphasis on diagrams in atomic and molecular physics would be useful addition—e.g.: energy level diagrams, interatomic potential functions, etc.

(From an industrial user)

There were many complimentary comments to question B. The following are typical:

Very good as is.

(From an academic user)

I think your presentation excellent and well presented. I don't see any other improvement unless you want to show some application, an addition which would not be absolutely necessary.

(From a foreign industrial user)

Responses to question C, which asked users to mention types of physical and chemical data for which compilations did not exist or were inadequate, identified few, if any, areas unknown to the OSRD. A few were actively being worked on in the program; some were scheduled for compilation, some were to be scheduled as funds became available; there were others of recognized importance but low in the program's priority or out of its scope. Typical comments included:

H. S. Johnston's [NSRDS-NBS 20] is *excellent.* I would like to see similar study (by same author if possible) of nitrogen oxides. Also similar reports for Hydrogen, Nitrogen and Hydrogen Oxides. Report by Krupenie [NSRDS-NBS 5] is also excellent. We need more of these especially for N_2, NO, H_2, O_2, OH to suggest several . . . I mentioned the above because of prominence in atmospheric studies. (Author's note: A monograph on molecular oxygen has subsequently been published;[3] a monograph on N_2 is in process.) These data are *useful,* not just of interest to us ivory-tower types.

(From an academic user)

I believe it would be useful for chemists to have a handbook of properties of inorganic compounds much more extensive than the "Handbook of Chemistry & Physics." Such a compilation should contain, in addition to the data already in the handbook, thermal property data and perhaps other data such as the strong IR bands, magnetic properties and the strongest powder x-ray diffraction lines. As a practicing inorganic chemist in a large laboratory, I find that many scientists in other disciplines make extensive use of these tables and are completely unacquainted with other sources. As an example at a recent Gordon Research Conference, several theorists were speculating on the possibility of diamond-like structures for Silicon and Germanium. These structures have been known for nearly a decade and should be listed in standard tables cheap enough to be purchased as individually owned copies, and regularly revised.

(From an industrial user)

Data for colloid and surface chemistry seem to be particularly in need of organization and compilation.

(From an industrial user)

Compilations of experimentally determined electron affinity values are presently incomplete . . . Up-to-date information on the electronic states of simple molecules and *ions would* be useful—similar to Herzberg, Vol. III tables

(1966); information on the fundamental properties of negative ions is generally lacking.

(From an academic user)

Transport data of liquid Argon, Krypton, Xenon are only sparsely available in the literature and certainly not compiled in one source completely to my knowledge.

(From an academic user)

Critical survey of molecular constants of diatomic and polyatomic molecules (that means: dissociation energies, rotational constants, anharmonicity factors, vibrational energies, etc.) similar to "Atomic Energy Levels" are needed.

(From foreign industrial user)

Would like ΔG° of solution of metals in various liquids, alloys and metals. Particularly reactive metals on tin, lead, zinc solvent metals.

(From an academic user)

The above are but a representative sample of the 270 suggestions offered by responders.

A number of respondents used the space in Part III of the questionnaire to ask for specific data or information. Replies to these requests were provided. Further, all comments were carefully culled and where a response was called for, a response was sent, as, for example, when a response to question C suggested a compilation already in existence, he was informed of its availability together with convenient ordering forms. Works in progress were also identified for interested responders, together with an estimated date of their availability. All appropriate purchasers who were not on the program's mailing list were added to it so that the current information and the program's newsletter could be sent to them. Finally, the authors of those NSRDS publications which were identified by a specific comment in the responses were sent copies of the survey response for their information. Many users seemed unaware of compilations available within their fields of interest.

CONCLUSIONS

While OSRD could take comfort from a number of findings in the survey, some provide pause for thought and even concern. Positive aspects in the results included:

1. If the responders of this survey are typical of NSRDS users, the program—as seens evident from Tables I, IV, and VI and the excerpted comments—meets its two major goals of:
   a. making available reliable physical and chemical reference data to the technical community;
   b. helping to improve the quality and productivity of scientific and technological measurements by means of its published evaluations and criteria.
2. The high rate of returns—over 51%—makes it logical to assume purchasers/users are interested in the NSRDS program.
3. The program has made available reliable physical and chemical reference data at least to some segments of the technical community.
4. NSRDS publications were helpful to some users in meeting their data requirements.
5. Specific uses of and benefits from the data in the publications were identified.

The survey results brought no astonishing disclosures. Actually, the items of concern revealed by the analysis of the results only reinforced the agonizing task to which OSRD has been subjecting itself in trying to coordinate and support a national program with a very finite budget and with almost limitless requirements. There were no complaints about technical areas covered, but there were indications that there were areas important to technology that were not receiving coverage. Need for reference data associated with some environmental problems were suggested. Of course, no program, no matter how affluent, can offer universal coverage. But a melancholy factor in the picture is that other agencies who have been supporting data evaluation programs are reducing or even eliminating their support. A related finding, not altogether unknown to the program, showed that while there was an awareness and use of NSRDS publications among academics and scientists in basic research, many engineers and other applied workers seem unacquainted with NSRDS publications. This could be attributed to insufficient promotion among this potentially largest number of users, but it is unfortunately true the OSRD has not had the resources to support generation of reference data compilations in many of the properties which pertain to the applied fields of technology.

Finally, it should be mentioned that the program, despite its very modest level of activity, is attempting to enhance usage of its data by repackaging them for specific mission needs in environmental problems and in technology. An example of this is a forthcoming handbook on thermodynamic information needed in the design of industrial incinerators for waste disposal being prepared by the NSRDS Chemical Thermodynamics Data Center for the American Society of Mechanical Engineers.

LITERATURE CITED

(1) Weisman, Herman M., "Needs of American Chemical Society Members for Property Data," *J. Chem. Doc.* **7,** 9–14 (1967).
(2) Weisman, Herman M., Technical Librarians and the National Standard Reference Data System," *Special Libraries* **63,** 69–76 (1972).
(3) Krupenie, Paul H., "The Spectrum of Molecular Oxygen," *J. Phys. Chem. Ref. Data* Vol. **1,** No. 2 (1972).

APPENDIX A

References on the National Standard Reference Data System

1. Brady, Edward L. and Wallenstein, Merrill B., *National Standard Reference Data System, Plan of Operation,* NSRDS-NBS 1, Superintendent of Documents, U.S. Government Printing Office, 1964.
2. Rossini, Frederick D., "Historical Background of Data Compiling Activities," *Journal of Chemical Documentation,* Volume 7, No. 1, American Chemical Society, February 1967.
3. Brady, Edward L., "The National Standard Reference Data System," *Journal of Chemical Documentation,* Volume 7, No. 1, American Chemical Society, February 1967.
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5. Brady, Edward L. (Editor), *Status Report, National Standard Reference Data System, April 1968,* NBS Technical Note 448, Superintendent of Documents, U.S. Government Printing Office, 1968.
6. Lide, David R., Jr. (Editor), *Critical Evaluation of Data in the Physical Sciences—A Status Report on the National Standard Reference Data System, June 1970,* NBS Technical Note 553, Superintendent of Documents, U.S. Government Printing Office, 1970.

APPENDIX B

Publications of the National Standard Reference Data System

Publications Issued in the NSRDS Series

NBS-NSRDS-1, (C13.48:1) **National Standard Reference Data System—Plan of Operation,** by E. L. Brady and M. B. Wallenstein. 1964 (15 cents).

NBS-NSRDS-2, (C13.48:2) **Thermal Properties of Aqueous Uni-univalent Electrolytes,** by V. B. Parker. 1965 (45 cents).

NBS-NSRDS-3, Sec. 1, (C13.48:3/Sec. 1) **Selected Tables of Atomic Spectra, Atomic Energy Levels and Multiplet Tables, Si II, Si III, Si IV,** by C. E. Moore. 1965 (35 cents).

NBS-NSRDS-3, Sec. 2, (C13.48:3/Sec. 2) **Selected Tables of Atomic Spectra, Atomic Energy Levels and Multiplet Tables, Si I,** by C. E. Moore. 1967 (20 cents).

NBS-NSRDS-3, Sec. 3, (C13.48:3/Sec. 3) **Selected Tables of Atomic Spectra, Atomic Energy Levels and Multiplet Tables, C I, C II, C III, C IV, C V, C VI,** by C. E. Moore. 1970 ($1).

NBS-NSRDS-3, Sec. 4, (C13.48:3/Sec. 4) **Selected Tables of Atomic Spectra, Atomic Energy Levels and Multiplet Tables, N IV, N V, N VI, N VII,** by C. E. Moore. 1971 (55 cents).

NBS-NSRDS-4, (C13.48:4/Vol. I) **Atomic Transition Probabilities, Vol. I, Hydrogen Through Neon,** by W. L. Wiese, M. W. Smith, and B. M. Glennon. 1966 ($2.50).

NBS-NSRDS-5, (C13.48:5) **The Band Spectrum of Carbon Monoxide,** by P. H. Krupenie. 1966 (70 cents).

NBS-NSRDS-6, (C13.48:6 Pt. 1) **Tables of Molecular Vibrational Frequencies, Part 1,** by T. Shimanouchi. 1967. Superseded by NBS-NSRDS 39.

NBS-NSRDS-7, (C13.48:7/Pt. 1) **High Temperature Properties and Decomposition of Inorganic Salts, Part 1, Sulfates,** by K. H. Stern and E. L. Weise. 1966 (35 cents).

NBS-NSRDS-8, (PB189698) **Thermal Conductivity of Selected Materials,** by R. W. Powell, C. Y. Ho, and P. E. Liley. 1966 ($3).

NBS-NSRDS-9, (C13.48:9) **Tables of Bimolecular Gas Reactions,** by A. F. Trotman-Dickenson and G. S. Milne. 1967 ($2).

NBS-NSRDS-10, (C13.48:10) **Selected Values of Electric Dipole Moments for Molecules in the Gas Phase,** by R. D. Nelson, Jr., D. R. Lide, Jr., and A. A. Maryott. 1967 (40 cents).

NBS-NSRDS-11, (C13.48:11/Pt. 2) **Tables of Molecular Vibrational Frequencies, Part 2,** by T. Shimanouchi. 1967. Superseded by NBS-NSRDS 39.

NBS-NSRDS-12, (C13.48:12) **Tables for the Rigid Asymmetric Rotor: Transformation Coefficients From Symmetric to Asymmetric Bases and Expectation Values of P_x^2, P_x^4, and P_x^6,** by R. H. Schwendeman. 1968 (60 cents).

NBS-NSRDS-13, (C13.48:13) **Hydrogenation of Ethylene on Metallic Catalysts,** by J. Horiuti and K. Miyahara. 1968 ($1).

NBS-NSRDS-14, (C13.48:14) **X-Ray Wavelengths and X-Ray Atomic Energy Levels,** by J. A. Bearden. 1967 (40 cents).

NBS-NSRDS-15, (C13.48:15/Vol. 1) **Molten Salts: Vol. 1, Electrical Conductance, Density, and Viscosity Data,** by G. J. Janz, F. W. Dampier, G. R. Lakshminarayanan, P. K. Lorenz, and R. P. T. Tomkins. 1968 ($3).

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