NUCLEAR TECHNICIAN MANPOWER IN THE
WESTERN UNITED STATES

Development of a Survey Population for
A U. S. Atomic Energy Commission Study
of Nuclear Technician Manpower Supply
and Demand in the Western Region

Submitted to:
Division of Labor Relations
U. S. Atomic Energy Commission

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Abstract

This report describes the work performed by the Western Interstate Nuclear Board (WINB) under USAEC Contract No. AT(11-1)-2330 in developing a survey population for a nuclear technician supply and demand study being conducted by the U. S. Atomic Energy Commission in the Western United States. WINB efforts in identifying actual and/or potential employers and sources of supply of nuclear-related technicians and in preparing mailing lists for the USAEC study are discussed.

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Arizona	Donald C. Gilbert, Arizona Atomic Energy Commission
California	Dr. Simon Kinsman, California Dept. of Public Health
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Wyoming	Robert Sundin, Wyoming Environmental Protection Department

1. Introduction

In view of the continuing growth of the nuclear industry in the Western United States, the Western Interstate Nuclear Board has over the past three years explored with a number of different groups the desirability of determining the supply and demand for nuclear technician personnel and the adequacy of nuclear technician training programs in the WINB Region. Discussions with industry, medical, and educational organizations have indicated a need for more "supply and demand" information to facilitate long-range planning.

Similar surveys have been conducted in the 17-state Southern Region and in sections of the Midwest.* The American Nuclear Society and the USAEC have performed national surveys on certain segments of the nuclear industry (e.g., utility staffing for nuclear power plants); however, these nationwide studies have not provided information as to where the technicians are needed, which institutions are likely to supply such trained personnel, nor in the detail necessary for state-level or regional planning. Nor has such a regional survey been conducted in the Western area of the nation.

In an effort to develop information on employment requirements and educational needs for nuclear technicians in the Western Region, the WINB submitted proposals to conduct jointly with the U. S. Atomic Energy Commission a "supply and demand" survey for the Western United States. Subsequently, WINB was awarded USAEC Contract No. AT(11-1)-2230 dated May 15, 1973 to perform the initial phases of such a supply and demand survey.

2. Purpose and Objectives

In undertaking the scope of work described below, the WINB sought to develop essential information toward the conduct of a Western regional survey by the USAEC of current employment, employment needs in the near-term

* See Bibliography, references 4 and 8.

future, and sources of supply for nuclear technician occupations. Based on the survey population identified in this WINB project, USAEC is undertaking the regional survey utilizing questionnaires and a computerized data reduction system. USAEC plans to incorporate the Western region survey results into its newly-developed national information system for nuclear-related technician manpower.

3. Scope of Work

The tasks performed under this contract consisted of:
 (a) development of a population (or "universe") of actual or potential employers and sources of supply of nuclear and nuclear-related technicians in the twelve (12) member states* of the Western Interstate Nuclear Compact; and (b) preparation of mailing lists and address labels for subsequent use by USAEC in conducting a supply-demand survey for nuclear technicians in the Western United States.

All identifiable technical occupations in the nuclear field (including radiologic health, medical arts, industry, and other segments of the field) requiring specialized formal or "on-the-job" training beyond high school, but below the baccalaureate level were included. Also surveyed were nuclear-related occupations in "conventional" industries such as industrial radiographers and chemical plant operators who work with radioisotopes, process radiation, among others.

On the "supply" side, educational programs for nuclear technicians offered by industry, hospitals, government agencies, and educational institutions throughout the WINB Region were identified as actual or potential sources of supply or training.

On the "demand" side, all major segments of the nuclear energy industry, conventional industries involved in atomic energy activities, research facilities, medical

* Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. (Hawaii was solicited for participation, but did not respond.)

clinics and institutions, government agencies, federal contractor organizations, and educational institutions which are employers or prospective employers were sought to be included in the population.

4. Development of the Survey Population: Methodology

a. Project Design and Planning

In designing the project plan, WINB drew extensively from the experiences of the Southern Interstate Nuclear Board (SINB) in conducting a nuclear technician supply/demand survey for the 17 Southern states in 1970-71. Expertise developed in the USAEC's nuclear manpower information program was drawn upon during the proposal preparation, planning, and implementation phases. Based upon these experiences and WINB's knowledge of the characteristics of the nuclear industry in the West, it was decided to employ the services of a steering committee to assist the WINB staff in developing its plans and contacts and in reviewing progress.

Because of their central role in regulating nuclear energy and the extensive information that they maintain, state radiation control agencies and USAEC regulatory offices were key sources of assistance. Other educational, industry, and government sources were also contacted.

The flow chart (Figure 1) summarizes the sequence of activities, sources of information, and procedures used in developing the survey population.

b. Implementation

(1) Preliminary data from the States and the USAEC

A primary source of preliminary data was the listings of licensees of radioactive materials, registrants for X-ray, radium, etc. provided by USAEC and state radiation control agencies. These listings identified 2,953 radioactive materials licenses and 52,325 registrations for X-ray and other radiation sources in the West. Table A

Figure 1
Flow Chart - Development of Survey Population

Table A

RADIOACTIVE MATERIALS AND RADIATION SOURCES

UNDER STATE AND FEDERAL REGULATION IN THE WINB REGION

<u>State</u>	<u>Agreement State</u>	<u>State Radioactive Material Licenses*</u>	<u>USAEC Mat'ls. Licenses*</u>	<u>Totals-State and Federal</u>	<u>State X-ray, other Radiation Sources**</u>	<u>Totals-All Sources</u>
Alaska	No	--	27	27	241	268
Arizona	Yes	203	14	217	2,136	2,353
California	Yes	1,290	184	1,474	33,026	34,500
Colorado	Yes	240	47	287	2,999	3,286
Idaho	Yes	95	1	96	850	946
Montana	No	--	56	56	1,273	1,329
Nevada	Yes	61	12	73	600	673
New Mexico	No	--	109	109	1,262	1,371
Oregon	Yes	152	18	170	2,884	3,054
Utah	No	--	111	111	1,691	1,802
Washington	Yes	248	34	282	5,363	5,645
Wyoming	No	--	51	51	(1)	51
WINB Region		2,289	664	2,953	52,325	55,278
National Totals		8,733	8,013	16,746	NA	NA

* Data from U. S. Atomic Energy Commission as of December 31, 1972.

**Data from WINB survey of state radiation control programs as of January 1, 1973.

(1) Wyoming does not have a mandatory registration program.

NA = Not available

contains a state-by-state breakdown of this data. Of course, the number of license holders and registrants was considerably less since many organizations possess more than one license or registration. Nevertheless, this provided an indication of the overall potential population to be identified.

It was recognized that USAEC and state regulatory data would not be comprehensive in coverage, since some organizations that may employ or train nuclear technicians may not utilize radiation sources requiring State or federal licensure or registration. Thus it was necessary to utilize additional sources of information for developing preliminary listings. The initial listing of categories of potential employers and supply sources for the population is as follows:

Potential Population by Category

Employers

- (a) Licensees (medical, industrial, other) of radioactive materials (obtained from USAEC and "agreement state" agencies)
- (b) Registrants for X-ray, radium, other non-agreement radioactive materials, and other radiation sources (obtained from State agencies)
- (c) Radiological health organizations, public and private (obtained from U. S. Environmental Protection Agency, HEW Bureau of Radiological Health, AEC, state agencies, others)
- (d) Private firms producing "N" stamp components, X-ray equipment, etc. but not necessarily requiring state and AEC licenses (obtained from American Society of Mechanical Engineers, American National Standards Institute, Nuclear News Buyers Guides, American Association for Advancement of Science's Guide to Scientific Instruments, AEC)

- (e) Federal agencies (research, operations, regulatory) (obtained from AEC)
- (f) Reactor operations (utilities, universities, etc.) (obtained from AEC)
- (g) AEC contractors including university and company-operated laboratories (obtained from AEC)
- (h) Other industrial (engineering, exploration, consulting, etc.)

Training Organizations

- (a) Colleges and universities (obtain from state educational agencies, educational associations, National Center for Educational Statistics.)
- (b) Vocational schools (state agencies)
- (c) Hospitals, medical clinics, and medical schools (state agencies, medical societies)
- (d) "On-the-job" training (obtain info. via AEC questionnaire)

Upon receipt and initial evaluation of listings from state agencies and USAEC, it became obvious that supplementary data was needed, particularly "key contact" information (names of individuals in the organizations to whom questionnaires and other communications are addressed). The steering committee offered numerous suggestions and provided additional sources of contacts. Subsequently, state agencies were re-contacted to supply key contacts wherever possible. Additional listings providing this information were supplied by several states.

During sessions with the steering committee, it was decided to eliminate from the population individual physicians, veterinarians, and others who typically employed only one or a few medical assistants not requiring special training in X-ray or nuclear technology. Usually, such physicians either perform X-ray procedures themselves or train their medical assistants to perform such procedures which comprise only a small fraction of their time.

Thus, the population was narrowed considerably and was limited to those organizations that employed technicians requiring specialized training and whose work responsibilities included a significant fraction of their time devoted to X-ray and/or other nuclear-or radiation-related procedures.

(2) Data from other Sources

Supplementary information on potential employers and sources of supply, not available in some cases from USAEC and the state agencies, was obtained from such sources as American Nuclear Society's Nuclear News Buyer's Guide, 1973; Companies Holding Certificates of Authorization for Use of Code Symbol Stamps, 1971, and its 1972 Supplement; Technician Yearbook, 1971-72; Educational Directory, 1972-3, by the National Center for Educational Statistics; "Official Roster of Affiliate Societies", American Society of Radiologic Technologists, and American Association for the Advancement of Science's, Guide to Scientific Instruments, 1971-72.

Organizations located in the Western Region were extracted from these supplementary sources and were placed on the preliminary lists.

(3) "Key contact" information

After review by the steering committee, it was determined that a brief questionnaire should be sent to those organizations for which the WINB staff had not previously been able to identify key contacts. These totalled approximately 919. Figure 2 shows the self-addressed, stamped card questionnaire; the letter of transmittal is shown in Figure 3.

Allowing a six-week period for returns of these questionnaires, the staff received approximately 335 replies plus 22 envelopes returned as "undeliverable" or due to incorrect address, etc.

Figure 2

WINB-USAEC NUCLEAR TECHNICIAN SURVEY	
ORGANIZATION _____	
ADDRESS _____	
CITY-STATE-ZIP CODE _____	
NAME OF KEY PERSON TO WORK WITH THIS PROJECT _____	
TITLE _____	PHONE NO. _____
1. Do you now <u>EMPLOY</u> technicians in nuclear or radiation related jobs; or expect to do so within the next five years? Yes ☐ No ☐	
2. Do you now <u>TRAIN</u> such technicians or expect to do so within the next five years? Yes ☐ No ☐	
PLEASE RETURN AS SOON AS POSSIBLE

WESTERN INTERSTATE NUCLEAR BOARD P. O. BOX 15038 LAKEWOOD, COLORADO 80215	

Figure 3

WESTERN INTERSTATE NUCLEAR BOARD

P.O. BOX 15038 • LAKEWOOD, COLORADO 80215 • (303) 238-8383

ALFRED T. WHATLEY
Executive Director

(This letter mailed to 919 recipients
on September 6, 1973)

Gentlemen:

The Western Interstate Nuclear Board (WINB) and the U. S. Atomic Energy Commission are jointly conducting a survey of employment and educational programs for technicians in nuclear- and radiation-related occupations in the 13-state Western Region served by WINB. This regional survey will become a part of a national information system for nuclear-related manpower operated by USAEC with the cooperation of the Bureau of Labor Statistics, National Science Foundation, and other agencies.

The objective of the survey and the information system is to supply data needed by individual firms, educational institutions, and public agencies in planning for recruitment, employment, and training.

WINB's current efforts in this survey consist of identifying employers and educational institutions as possible participants in the joint WINB-AEC survey. If your organization currently employs technicians and/or offers training programs for any type of technicians in nuclear or radiation-related occupations, or if you anticipate doing so within the next five years, we would greatly appreciate your filling out the attached postal card and forwarding it to us at your earliest convenience. We would especially like to know the key person in your organization with whom we might correspond concerning this project.

Organizations indicating a "yes" response and supplying the requested information on the attached card will receive more detailed questionnaires directly from the USAEC. Respondents to the AEC survey will receive copies of the survey results.

Thank you for your cooperation. Please call us collect if you have any questions concerning this project.

Yours truly,

Alfred T. Whatley
Alfred T. Whatley
Executive Director

Attachment

Additionally, USAEC regional operations offices in Albuquerque, Idaho Falls, San Francisco, and Richland, Washington were contacted to obtain supplementary information as to key contacts and addresses of major federal contractors, laboratories, consultants, and other suppliers.

Development of key contact data consumed considerable time and effort and necessitated numerous telephone calls and exchanges of letters.

(4) Preparation of master list and mailing address labels

Upon completion of additional screening, cross-checking and other reviews, all source data selected for inclusion in the population was categorized and coded to permit subsequent IBM key-punch and other data processing. The letter code* used is as follows:

I = Industry
 M = Medical, dental, and veterinarian
 E = Educational
 G = State, local, and federal government
 C = AEC contractor

The above categories were designed to facilitate processing of the mailing labels and envelopes, and to aid in sorting the separate demand and supply questionnaires to be sent to the population.

IBM cards were punched for each entry, and these were processed by (1) category; and (2) by zip code, to permit expeditious handling during the mailing process. A master IBM print-out and several duplicate sets of address labels were prepared. Address labels were printed on IBM format and were of the "peel off" type permitting easy transfer from the lists directly to the mailing envelopes.

* USAEC is understood to be using 15 symbol codes in its categorization for a more detailed breakdown.

One master list and three (3) sets of address labels were furnished to USAEC. A total of 3,009 entries were included in the lists. Table B provides a breakdown of the survey population on a state-by-state basis.

Table B

SURVEY POPULATION BY STATE
AND CATEGORY

<u>State</u>	<u>Industry</u>	<u>Medical</u>	<u>Contractor</u>	<u>Gov't</u>	<u>Educational</u>	<u>Total</u>
Alaska	3	9		13	6	31
Arizona	98	158	1	50	21	328
California	627	341	14	206	223	1,411
Colorado	91	309		19	26	445
Idaho	30	79	5	14	7	135
Montana	10	38		6	3	57
Nevada	24	21	12	12	5	74
New Mexico	21	21	4	3	10	59
Oregon	49	49		18	14	130
Utah	16	7		2	14	39
Washington	84	55	7	19	20	185
Wyoming	29	12		8	5	54
Other*	<u>58</u>	<u>1</u>	<u>2</u>	<u>—</u>	<u>—</u>	<u>61</u>
Totals	1,140	1,100	45	370	354	3,009

* Organizations having operations or facilities in the Western Region, but which identified their principal addresses outside the West.

(5) Chronology

- (a) Receipt of notice of contract award -- April 23, 1973.
- (b) Receipt of contract -- June 26, 1973
- (c) Planning and project organization -- June 30 thru early July, 1973.
- (d) Completion of preliminary data collection -- September 1, 1973.
- (e) Project review meetings -- August 16-17, 1973; October 26, 1973.
- (f) Questionnaires sent to 919 recipients -- September 6, 1973.
- (g) Follow-up information collection completed -- November 5, 1973.
- (h) Preparation of final lists, address labels -- November 5 thru December 7, 1973.
- (i) Submission of final lists, etc. to USAEC -- December 10, 1973.

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April 10, 1974

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Arthur A. Churn, Director
Patent Division

FINAL REPORT, CONTRACT NO. AT(11-1)-2330, WESTERN INTERSTATE NUCLEAR BOARD

Enclosed is one copy of the final report for this contract.

I would appreciate receiving your recommendations regarding close-out of this contract insofar as the patent clearance is concerned.

Technical Approval has been received from Headquarters.

Marshall Joseph
Senior Contract Administrator
Contracts Management Office

CMO:CM

Enclosures:

1. Final Report No. C00-2330-1
2. Memo, Herrick to Miller, April 2, 1974

cc: Technical Information Center, Oak Ridge, Tenn., (THRU CH PATENT DIVISION) - w/encl. and AEC-427

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