

P.E. J  
K-C-817

INDIVIDUAL FACILITIES AND MANPOWER AT ORGDP  
ENVIRONMENTAL POLLUTION AS A CASE STUDY

APPROVAL FOR RELEASE

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Title/Subject INDIVIDUAL FACILITIES AND MANPOWER

AT ORGDP ENVIRONMENTAL POLLUTION AS A CASE...  
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*Arvin Strait*

2/1/63

K-25 Classification & Information Control Officer

Date

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**UNION CARBIDE CORPORATION**  
NUCLEAR DIVISION

Operating the

- OAK RIDGE GASEOUS DIFFUSION PLANT
- OAK RIDGE NATIONAL LABORATORY
- OAK RIDGE Y-12 PLANT
- PADUCAH GASEOUS DIFFUSION PLANT

For the Atomic Energy Commission  
Under U.S. Government Contract W7405 eng 26



UNION CARBIDE CORPORATION

NUCLEAR DIVISION

P. O. BOX P, OAK RIDGE, TENNESSEE 37831

Since the preparation of this letter, clearance for public release of the booklet, "Joint Biomedical Engineering Program" has been received.

January 25, 1966

United States Atomic Energy Commission  
Post Office Box E  
Oak Ridge, Tennessee

Attention: Mr. C. A. Keller, Director  
Production Division

Gentlemen:

Research and Development Capabilities for Environmental  
Pollution at Oak Ridge Gaseous Diffusion Plant

Reference is made to Mr. S. R. Sapirie's letter to Dr. C. E. Larson, "Federal Facilities for Research and Development," dated January 14, 1966.

The attached document, "Individual Facilities and Manpower at ORGDP-- Environmental Pollution as a Case Study," (K-C-817) is intended to provide the information requested. The topic headings and subheadings conform to those given in the attachments to the letter of Dr. Edward Wenk, Jr., of the Library of Congress, to Dr. Glenn Seaborg, a copy of which was forwarded to us. Enclosed with K-C-817 are three booklets which provide the supplemental information requested. These are "Union Carbide in Nuclear Energy," "Joint Biomedical Engineering Program," and K-L-2035.

Please note that the booklet "Joint Biomedical Engineering Program" appended to K-C-817 has not been cleared for release to the public at this time. Our request for this clearance is pending. It is based on the importance of the booklet to this presentation and the fact that this kind of information is contained in our semi-annual reports in even greater detail and is available to the public.

U.S.A.E.C.

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January 25, 1966

We will be pleased to furnish any additional information that may be desired.

Very truly yours,

  
\_\_\_\_\_  
R. G. Jordan, Superintendent  
Oak Ridge Gaseous Diffusion Plant

RGJ:egc

Attachments: 4

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Report No.: K-C-817

Date: January 25, 1966

INDIVIDUAL FACILITIES AND MANPOWER AT ORGDP

ENVIRONMENTAL POLLUTION AS A CASE STUDY

UNION CARBIDE CORPORATION  
NUCLEAR DIVISION  
Oak Ridge Gaseous Diffusion Plant  
Oak Ridge, Tennessee

INDIVIDUAL FACILITIES AND MANPOWER AT ORGDP  
ENVIRONMENTAL POLLUTION AS A CASE STUDY

A. IDENTIFICATION

1. Oak Ridge Gaseous Diffusion Plant, commonly abbreviated as ORGDP.
2. Post Office Box P, Oak Ridge, Tennessee 37830.
3. The ORGDP is a Government-owned production facility operated under contract by the Union Carbide Corporation for the United States Atomic Energy Commission. This facility for the large scale separation of the fissionable uranium-235 isotope from uranium-238 has support facilities for the manufacture of special chemicals essential to the operation, and research and development laboratories for process improvement activities. In the area of pollution, personnel dosimetry collaborative work with other installations is occasionally carried out where either specialized skills are involved or commonality of interests prevail. The other installations, also Government-owned and operated by Union Carbide Corporation for the AEC are: the Y-12 Plant in Oak Ridge, the Oak Ridge National Laboratory, and the Gaseous Diffusion Plant at Paducah, Kentucky.
4. Mr. R. G. Jordan, Plant Superintendent.
5. In early 1943, Carbide and Carbon Chemicals Company, a Subsidiary of Union Carbide and Carbon Corporation at that time, was asked to design, engineer, and operate for the Government, ORGDP for the separation of fissionable uranium-235 from natural uranium.

B. MISSION HISTORY

1. The contract, W-7405-eng-26, under which the ORGDP is operated by Union Carbide Corporation stipulates in essence that the Corporation shall abide by all applicable laws of the Federal, State and local Government. The contract also assigns to UCC the responsibility for originating and conducting research and development programs aimed specifically at maintaining U. S. leadership in gaseous diffusion and the production of U-235 at minimum cost. Throughout the history of ORGDP, programs directed toward improvements in control of environmental pollution as related to the gaseous diffusion plant operation have been proposed<sup>1)</sup> and accepted by AEC in the form of approval of the fiscal year

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1) An example of such a proposal is K-AD-745, entitled "Oak Ridge Operations, ORGDP Budget Estimates, Program O2, Process Development, FY-1967," dated May 17, 1965. (SECRET).

financial plan for research and development.

Examples of legislation and executive orders regarding water pollution and waste disposal are Public Law 660, Federal Water Pollution Act (1956), and Executive Order 11258 (Nov 1965). In the former, Congress directed Federal Agencies to cooperate with the Department of Health, Education, and Welfare, and any applicable State or Interstate Agency or Municipality, in the prevention and control of water pollution. Executive Order 11258 directs the heads of Federal agencies to provide leadership in the nation-wide effort to improve water quality in the U. S. through preventive control and abatement of water pollution arising from Government activities. This order also directs that sufficient surveys are to be made to ensure that discharges of waste effluents shall conform to requirements of AEC's 10CFR 20, "Standards for Protection Against Radiation," and policies and guidance of the Federal Radiation Council. AEC in turn has implemented these requirements with respect to ORGDP in the form of AEC Manual Chapter 0524, entitled "Standards for Radiation Protection."

2. In the initial operation of the gaseous diffusion plant at Oak Ridge, the primary mission of environmental research consisted principally of the development and application of improved methods for disposal of effluents from this process which were mainly radioactive or radioactive-bearing gases, liquids, and solids. Although the separation process is essentially gaseous in nature, facilities were operated for the decontamination of equipment and recovery of the valuable, isotopically enriched U-235. As stated in B-1 above, the research and development activities were aimed at more economical and efficient methods, for reducing pollution of the air, water, and soil by the development of better trapping methods, and greater sensitivity in the detection of minute quantities of pollutants such as various chemical forms of uranium, fluorine, etc. Some illustrations of significant contributions to pollution research and detection technology are given in a list of references appended to Section C, item 7.
3. Although the gaseous diffusion capacity has been greatly enlarged since the initial operations, the prime mission of the environmental pollution research and development has remained the same. However, the scope of the activity has been broadened in several important ways. In the mid 1940's, a barrier manufacturing facility was placed in operation at Oak Ridge for the purpose of providing the gaseous diffusion plant with replacement barrier. The development of improved barrier has necessitated consideration of the possible hazards and appropriate control of a variety of airborne particulate matter. Detailed studies of the microscopy of airborne particulates are now under way. In the field of engineering development, the air

filter test facility, operated at ORGDP for the Commission, has been modified to permit testing of completely assembled absolute filters manufactured by private industry. This improved test procedure detects frame and gasket leakage as well as providing an evaluation of the efficiency of the filter core itself. These adaptations have been incorporated at the other two filter quality assurance centers operated under the auspices of the Commission. In still another development area, the Commission approved for FY 1966 a new research program aimed at determining the applicability of liquid ultracentrifuges for the separation of contaminants and trace materials in natural waters. This endeavor is the result of a technological spin-off from the Joint AEC-NIH Zonal Centrifuge Development Program<sup>2</sup>). Under the auspices of the AEC-NIH program, advanced model liquid centrifuges and associated analytical systems have been developed for the isolation, in highly pure form, of sub-cellular particulate and macromolecular components.

4. As stated in B-2 above, some development work was initiated in the early 1940's with primary effort on effective control of toxic and/or radioactive off-gases.

C. RESEARCH ACTIVITIES AND DEVELOPMENT OF RESEARCH AND DEVELOPMENT SOURCES

1. In table I, the man-years are based on 260 working days per year with no allowance for vacations, illness, etc. The labor shown is either scientific or technical labor and does not include clerical, craft, or other non-technical labor. The technical labor, in our case, has training beyond the high school level.
2. This facility has many skills and abilities which would be of considerable value in environmental pollution research and development. These people are actively engaged in programs for the AEC including the environmental pollution work cited in table I. Whether they could be redeployed will depend on the importance and status of the programs involved. About 20% of the technical staff have skills of significant value to this work, including such specialties as physical chemistry, advanced analytical methods development, instrument development, optical and electron microscopy, chemical process engineering, and biomedical engineering.

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2) This program is described in a booklet, entitled "Joint Biomedical Engineering Program," a copy of which is attached. Some of the equipment developed in this program is described in a second booklet, K-L-2035, a copy of which is also appended.



TABLE I

EFFORT ON ENVIRONMENTAL POLLUTION (Cont.)

AREA OF POLLUTION	Origin--			Transport--			Control & Abate.,		
	R&D Sci. Act.	Routine Samp. Act.	R&D Sci. Act.	Dispersion of Poll., Incl. Detect., Ident. & Tracing Poll. as they Enter and Are Trans- ported in Environment	Routine Samp. Act.	R&D Sci. Act.	Routine Samp. Act.	Incl. Develop. & Demonstration of Equip. & Methods	
c. Sci/Tech Man-Years									
Sci. Adm.									
Ph.D.									
Masters			0.25						
d. FY 1966 Funds			118,000						

III. Soil Pollution

- a. No. Projects
- b. Sci/Tech Man-Years, R&D  
High School & below

IV. Total No. of Personnel

- a. No. Projects
- b. Sci/Tech Man-Years, R&D  
Ph.D.  
Masters  
Bachelors  
High School & Below
- c. Sci/Tech Man-Years,  
Sci. Adm.  
Ph.D.  
Masters  
Bachelors  
High School & Below

	Origin--			Transport--			Control & Abate.,		
	R&D Sci. Act.	Routine Samp. Act.	R&D Sci. Act.	Dispersion of Poll., Incl. Detect., Ident. & Tracing Poll. as they Enter and Are Trans- ported in Environment	Routine Samp. Act.	R&D Sci. Act.	Routine Samp. Act.	Incl. Develop. & Demonstration of Equip. & Methods	
a. No. Projects	1		2		1			6	
b. Sci/Tech Man-Years, R&D	0.3		0.5						
Ph.D.			0						
Masters			1.3					0.1	
Bachelors	0.2				0.1			0.3	
High School & Below									
c. Sci/Tech Man-Years,	0								
Sci. Adm.	0.1		0.25						
Ph.D.	0								
Masters									
Bachelors									
High School & Below	0								

- a. Scientific or technical - 60
- b. Scientist administrators - 9

It is difficult to state a value for capital equipment which could be readily redeployed since most is being used for on-going projects. We estimate that \$200,000 in monitoring and measuring equipment could be made available for intermittent use; more is available which would be valuable on pollution studies and which could be redeployed depending on program requirements.

3. Equipment records currently being maintained do not delineate usage.
4. Capital equipment used at least intermittently for total environmental pollution is estimated to be in the range of \$50,000 to \$500,000<sup>3)</sup>. This does not include an IBM-7090 Central Data Processing facility which is used in connection with the research and development work.
5. There is no one applicable report covering the specific information requested. All of the research and development activities are summarized in a Plant Quarterly Report to the Commission. Complete property and equipment records are maintained, but not according to project usage.
6. See 5, above.
7. Supplemental Information.

Four items of information are introduced at this point for elaboration on the type of work which has been done and to present a more complete picture of the pertinent capabilities of ORGDP. The selected bibliography referred to in B-3 follows. Enclosed with this report are three booklets, "Union Carbide in Nuclear Energy," "Joint Biomedical Engineering Program," and "Equipment and Instruments Developed Under the Joint NIH-AEC Zonal Centrifuge Development Program," (K-L-2035).

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3) The range conforms to one of those cited in the report guide furnished to us and is not intended to reflect the degree of uncertainty in the estimate.

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