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October 23, 1961

TO: DISTRIBUTION

Re: Large Staff Conference
Sandia Corporation's Strengths

The attached is background material for the discussions of Sandia Corporation's strengths, which will be presented in the period of 10:15 to 12:15, October 31, 1961


D. R. COTTER - 9100

DRG:9100:jg

Enc.
RS 9100/13

SANDIA SYSTEMATIC DECLASSIFICATION REVIEW DOWNGRADING OR DECLASSIFICATION STAMP	
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<u>Exempted</u> <u>See ph 1-30-77</u>	RECORD ID: <u>975N494</u>
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1st Review Date: 12-19-99
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3rd Review Date: [Redacted]
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SANDIA CORPORATION STRENGTHS

It would seem wise to periodically assess the strengths of the Corporation, and determine if any changes in the technical program appear desirable. The need for re-examination at this time is mandatory if one considers the following:

- technology is an ever evolving thing and the changes wrought in the past few years indicate an immense impact may be felt in new weapons and the resulting demand for new components and systems designs.
- world politics have presented this country with a most serious challenge, the answer to which could be seen in a notable way in a greatly increased weapon development load. On the other hand, political maneuvering on the international level may result in a re-imposition of the test moratorium, limited testing only, decreased weapon development effort, stopping of further weapon production, or dismantling of the present stockpile of weapons.

If one does a conscientious job of assessing strengths, there is going to appear a by-product -- that of recognizing one's weaknesses and limitations. The need for considering both strengths and weaknesses objectively is not felt to warrant any further argument in a group such as the Large Staff.

For the purpose of preparing for the Large Staff discussion and the implied theme of the future of Sandia Corporation Laboratories, the following has been prepared. It is thought that this fairly establishes the in-being capabilities of the laboratories. Following this will be a series of statements which will attempt to characterize attributes of "proper" programs for Sandia to undertake in the furtherance of an expanded weapons program, or different responsibilities in the present one. "Tests" for non-weapons activities will also be listed.

GENERAL CONSIDERATIONS

Job Assignment

To assure that we are all on common ground, it is felt necessary to review the assigned role of the laboratories and most importantly, what our bosses (the AEC) think our role is in the AEC program.

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 DATED: 12/19/99

INVENTORIED
 DATE AUG 6 1965

INVENTORIED
 DATE SEP 29 1964

INVENTORIED
 DATE OCT 15 1963

INVENTORIED
 DATE SEP 5 - 1962

APR 25 1962
 MAR 06 1973



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The Atomic Energy Commission has two primary laboratory efforts in its make-up -- "Multi-program" and "Project-engineering." The Sandia Laboratory is defined as a "project engineering" laboratory -- one of five operated by industrial type organizations.

According to the AEC,* project engineering laboratories are characterized as "having one or a limited number of specific development objectives" and conducting their work almost exclusively, "to meeting military requirements." Also, according to the AEC, "basic research is a minor function."

In Sandia's case, the total effort is directed toward providing the military services with nuclear weapons and their ancillary equipment. Policy, program direction, and funding are handled by the AEC's Division of Military Applications.

There are six multi-program laboratories, two of which are our weapons development compatriots, Los Alamos Scientific Laboratory and Lawrence Radiation Laboratory. The character of multi-program work is, by AEC definition: "A wide range of research and development activities, both as to the fields of science and technology involved and the type of work conducted -- basic research, applied research, and general developments."

Present Strengths

The following general areas define Sandia's strengths:

- Ability to organize and carry out development programs of a highly technical and complicated nature, crossing many technical fields, and covering development from inception to use. In other words, systems management is a definite talent.
- Definition, design, and readying for production vastly complicated systems and components.
- Designing and production engineering components that must withstand long term storage, operate under severe environments, and when called on to operate for the first and only time, do so with extremely high reliability.
- Design of completely automated test equipment; data-handling and recovery methods development.

*Ref. JCAE Report October 1960. "Future Role of the AEC Laboratories"

- Reliability engineering, and statistical sampling methods.
- Instrumentation, recording, telemetry, sensor, and transducer development.
- Quality control and manufacturing process development.
- Materials research and engineering, non-destructive testing, environmental testing (instrumentation and facilities).
- Full scale and non-nuclear field testing.
- Research capability pertaining to nuclear burst phenomenology and response to weapons effects, particularly weapon vulnerability.
- Radiation effects on materials.

Experiences in using outside industry
Tests for "Proper" Programs

In discussing "proper" programs for Sandia to undertake, one must make a distinction between weapons and non-weapons activities.

Weapons

Even though weapon engineering is our only authorized activity, it may surprise some to find that there is argument against expanding our weapon support job while efforts are being made to diversify Corporation activity into non-weapons areas. (see below) The non-weapons activity argument will be dealt with later. The arguments for expanded weapons support to the nuclear labs, in particular LRL at Livermore, needs some outline as to the future of the weapons effort.

Things to be done even in the face of the moratorium or the present limited testing program are impressive. If testing were to resume a la the "good old days" and assuming a true desire to recoup our position as nuclear weapons leaders, the task for Sandia is monumental. What are the big problems?

Regardless of testing considerations, there are three major areas for weapon capability improvements needed:

- Providing warheads which would enhance our ICBM and IRBM "penetration" capability (less vulnerable, lighter, and more efficient components and systems).
- Providing bombs and warheads (and their sub-systems and components) which are highly compatible with advanced "command control" military systems.

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--Providing bombs and warheads which have greatly increased safety.

It is important to note that all of the above is primarily and historically Sandia's main-line business.

With unlimited testing the possibilities, in addition to those above would include:

- energy conversion components for use in all-fusion weapons.
- components and mechanical system designs for "expandable" warheads
- research program for nuclear burst phenomenology in a space and very high altitude environment
- micro-miniaturized components for very small nuclear systems
- support of LRL in "device" engineering for nuclear testing

It is important to note that the "new" activities would tie Sandia closer to the nuclear laboratories' historical main-line responsibility.

Here are some of the questions which are asked about weapon program characteristics to determine if it is "proper":

- Is it in line with Sandia's historic responsibility?
(i.e. -- does it transgress into the nuclear laboratories areas of responsibility -- detonators, high explosives, exotic source materials, part of the "physics" system, etc., etc., etc.)
- Does it transgress into the Department of Defense's area of responsibility? (is it powered, have wings, guided, look like a parachute, or otherwise ruled out by the AEC-DOD agreement of March 21, 1953?)
- Can it be taken on in consonance with other authorized programs and without increases in budget or ceilings?

We will leave the examination of these questions and the discussion of future of the nuclear weapons programs to the conference.

Non-weapons Programs

Some may be bemused by the fact that, at this time, we are considering accepting work which is not of a weapons nature. The propriety of this we will also leave to the conference, if only for academic investigation. Our purpose is to see what type of activity might fit if we assume one or more of the following:

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- a. No interference with the weapons program
- b. A need to keep a vigorous technical force under an indefinite test moratorium or depressed weapon development activity.
- c. A need for Sandia as a national resource to survive if the weapons program were abolished altogether.

As a tax-supported laboratory, and one which has an engineering oriented staff Sandia would have some special problems. A discussion of the staff makeup will follow later. Here are what have been suggested as some important characteristics for non-weapons program effort:

- The eventual outcome should fill an urgent national need
- The program is not of immediate interest to the industrial community because of high development cost, technical limitations, and no clear profit guarantee.
- The technology used or developed should complement or supplement the weapons program (assumptions a. and b.)

Practical considerations are:

- The talents and technical facilities necessary to undertake the task must be largely available now. Further acquisitions could be made as the program progresses successfully.
- The program should have "hardware" or "project" connotations. Scheduling and "mileposts" are important to assure a budget which is predictable and continuing. General investigation areas, for example "Radiation Damage Studies," do not fit this criterion and are therefore susceptible to budget cuts or diversions.
- Additional "ceiling slots" must not be requested. Tightening up in service and some technical areas could make "slots" available (assumption a.).

In addition to these, consideration must be given to the make-up of the staff of Sandia and its effect on the types of programs which could originate with any high degree of probability. To start, a comparison is made of the staffs of IRL/LASL and Sandia.

The make-up of the technical staff of the nuclear laboratories is important to note. There is a balance, suited to the tasks, of the scientific and technical disciplines available to undertake any of a variety of programs of national interest. For example, ROVER, PLUTO,

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Sherwood, Plasma Thermocouple, Biological effects of radiation and "exotic" materials, etc.

The technical staff of Sandia is almost exclusively devoted to engineering, or the support of the engineering effort. This figure accounts for the large preponderance of the staff being academically trained in the engineering sciences. More than 80% of the technical degrees (B.S. through Ph. D.) are in the engineering field. The physical sciences and mathematics disciplines account for the remainder of the technical degrees with about 10% of the total staff being trained at the advanced level (see chart).

By contrast, approximately 60% of the technical staff at the physics laboratories at LRL and LASL have advanced training in the physical sciences and mathematics.

It would seem that one serious roadblock in obtaining responsibility in areas other than weapons engineering is this lack of broad based scientific talent. An interim solution may exist, however. This would be to select areas of effort which would allow applying technology developed in ordnance engineering to other urgent national problems. If the problems are of wide enough appeal and technically challenging one might be able to attract more diversely interested scientific personnel.

It is suggested that the conference be prepared to discuss the logic of the assumptions as well as the characteristics cited.

As additional background, a copy of a letter from the Assistant General Manager for Research and Industrial Development, Hqs, USAEC, to the Directors and Field Office Managers on the subject of Research and Development work for other Agencies in AEC Laboratories is attached.

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COMPOSITION OF SAUDA CORPORATION STAFF

Technical Staff Members
as of August 31, 1961

	<u>AERO.</u>	<u>CHEM. ENGR.</u>	<u>CIVIL[#]</u>	<u>ELEC.</u>	<u>GENERAL[±]</u>	<u>MECH.</u>	<u>ENG. PHYS.</u>	<u>NUCLEAR ENG.</u>	<u>OTHER*</u>	<u>TOTAL</u>
Ph. D.				5		4	1	1	1	
M. S.	13	8	18	100	2	104		2	8	
B. S.	37	24	31	604	26	444	15	1	22	
	50	32	49	709	28	552	16	4	31	1,471
	<u>BIO- MED.</u>	<u>CHEM.</u>	<u>PHYS.</u>	<u>METAL.</u>	<u>MATH & STATIS.</u>	<u>METEOR.</u>	<u>GEOL.</u>			<u>TOTAL</u>
Ph. D.		17	40		26					
M. S.	2	11	50	5	33	5				
B. S.		42	60	10	32		3			
	2	70	150	15	91	5	3			336

In addition to the above, there are a total of 55 people who have college work with no degrees, who have not been tabulated.

* "Other" includes: agriculture, ceramics, petroleum, mining, plastics

"Civil" includes the West Point degrees

± "General" includes Annapolis degrees

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June 2, 1961

TO : Those Listed Below

FROM : A. Tammero, Assistant General Manager for
Research and Industrial Development, Hqs.

SUBJECT : R&D WORK FOR OTHER AGENCIES IN AEC LABORATORIES

RD:CA:WMB

You will recall that the possibility of performing work for other government agencies in AEC laboratories was mentioned in the report to the JCAE on The Future Role of the AEC Laboratories and was also suggested by the Chairman in his recent talk before the American Physical Society.

The enclosed draft statement has been prepared to provide appropriate guidelines to both the laboratories and the AEC staff in the treatment of proposals for such work.

I would appreciate having your comments, and the comments of our laboratory directors, before submitting this statement to the General Manager for his approval.

Because a number of proposals, generated by both laboratories and other government agencies, are now pending in the Headquarters Office, comments should be in my hands no later than June 23, 1961.

Enclosure:
Draft Statement

Addressees:

- Charles L. Dunham, Director, Div. of Biology & Medicine
- Paul W. McDaniel, Director, Div. of Research
- G. F. Quinn, Director, Div. of Production
- Neil D. Naiden, General Counsel, Office of the General Counsel
- Don S. Burrows, Controller, Div. of Finance

- K. F. Hertford, Manager, Albuquerque Operations Office
- E. C. Shute, Manager, San Francisco Operations Office
- THRU: Brig. General Austin W. Betts, Director, Div. of Military Application
- Kenneth A. Dunbar, Manager, Chicago Operations Office
- S. R. Sepirie, Manager, Oak Ridge Operations Office
- Joseph C. Clarke, Manager, New York Operations Office
- THRU: Frank K. Pittman, Director, Division of Reactor Development

RESEARCH AND DEVELOPMENT
FOR OTHER GOVERNMENT AGENCIES
IN AEC LABORATORIES

PROPOSED POLICY AND PROCEDURE STATEMENT

The Commission will consider the assignment to AEC Laboratories of research and development work for other Government agencies on a case-by-case basis under the following procedures and criteria:

- A. Except as provided under Paragraph F below, all proposals for research and development work for other Government agencies in an AEC Laboratory are to be submitted to the AEC Headquarters Division administratively responsible for the Laboratory for a determination as to whether or not such work should be undertaken.
- B. In determining whether negotiations should be undertaken with other Government agencies looking toward the assignment of work as proposed, Headquarters Division Directors will be guided by the following criteria:
 1. The proposed work must either: (a) be an urgent matter of National concern calling for out-of-the-ordinary arrangements, effort, and ability, or (b) require facilities and capabilities which are unique to the AEC Laboratories.
 2. The proposed work must not unduly interfere with the accomplishment of assigned Commission programs.
 3. The proposed work will not result in an increase in the authorized size of the Laboratory staff.
 4. The proposed work will not require major new facilities.
- C. All negotiations with other agencies looking toward the assignment

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of work proposed will be under the direction of the Headquarters Division Director with administrative responsibility for the Laboratory concerned.

- D. As determined in consultation with the other agency concerned, the proposed work must be of a nature that cannot be performed more appropriately in private facilities.
- E. The work is to be conducted under an agreement with the AEC, or with the operating contractor, which will assure proper cost segregation, give effect to the uniform pricing policy of the AEC, and incorporate appropriate patent and indemnity provisions.
- F. If performance of the work necessitates unrestricted access to a security area or to classified information, the participant shall have obtained necessary security clearances.
- G. Headquarters Division Directors administratively responsible for laboratories may delegate to Managers of Operations authority to approve research and development work for other Government agencies, provided: (a) the work will require not more than 10 man-years of scientific effort over any 12-month period, and (b) the work meets the standards set forth above.
- H. Proposed work which does not clearly fit within these standards will require the prior approval of the General Manager. This statement does not affect existing arrangements with other agencies.

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