PREAMBLE

The following analysis of Guide topics under which information may be declassified divides all such topics into two classes. Those topics which are marked "O.K." mean that they are entirely compatible with the Atomic Energy Act of 1946 and that no troublesome questions concerning them have arisen in the declassification program. All other topics are marked "Questionable."

In examining topics which are O.K. the reader should bear in mind that there are associated prohibitive topics in the Guide which take precedence over those releasing material.

In determining the compatability of a certain topic with Section 10 (a) (1) of the Act the following procedure was used: The meaning of "use of atomic energy for industrial purposes" is understood to apply only to processes critical in the development of atomic energy. This means that the release of instruments important to industry as a whole, which were not critical items on the project, is considered in harmony with the Act. In other words, certain advances in ionization chambers and radiation meters are not to be considered as undeclassifiable merely because they are of use in project plants. It is felt that this procedure may achieve a proper distinction between Section 10 (a) (1) and 10 (a) (2) of the Act.

Lastly it should be noted that the discussion of each topic is by no means complete, rather it gives only the salient features. The reader is referred to the source material for a complete discussion.

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ANALYSIS OF DECLASSIFICATION GUIDE TOPICS (U)

1-005: Questionable

Intent of this topic completely within Act in that "basic scientific and technical information" not uniquely applicable or developed for atomic energy is permitted. Difficulty arises in considering specific fields of work within this meaning. For instance, mathematical theory, such as integral equations of general interest in many fields, was applied to weapon problems. The difficulties involved with such specific fields under this topic are discussed under 5-005 and its subdivisions.

This topic also raises the general question as to whether or not a calculational method, say for critical masses, is releasable when illustrated as pure mathematics. However, many clear-cut questions, such as general heat flow problems not developed for a specific application, fall within this topic.

1-105: O. K.

General theory well known and many industrial applications are in existence. Technology as applied to separation of heavy isotopes should not be revealed, but this is not implied by this topic and it is prohibited by 10-135.

1-175: Questionable

Certainly within scope of 10 (a) (2). Those aspects of industrial or weapon interest which might conflict with the Act are adequately covered by the restrictive portions of the Guide, in particular Section V. This topic in conjunction with the present topics 10-180 and Section V may be too restrictive. For instance the values of α energies from thorium could not be declassified as presently written. The detailed discussions on this topic

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may be found in Ref. (1)* p. 9-13. On the other hand it permits the declassification of nuclear properties of reflector substances such as graphite and D_{20} which is in conflict with topic 40-180 which does not permit declassification of reflector properties. The question can be raised whether 40-180 was only intended to prevent the declassification of such properties as the slowing-down length for fission neutrons. The latter value can of course be approximated from separate nuclear constants of the material and the rough values of the fission spectrum in the pre-project literature without too much trouble.

1-180: Questionable

One of major questionable topics in the Guide. The Tolman Committee when considering this made an attempt to restrict information on piles to that which would not enable another nation to develop power or production piles by which fissionalbe materials could be produced before adequate controls were established. At the same time it attempted to permit the release of such information as would permit the development of experimental units which as such could not be used for production purposes. This broad policy is still entirely compatible with both 10 (a) (1) and 10 (a) (2) of the Act.

When the Tolman Committee wrote these recommendations, it appeared that American non-Government laboratories would soon be permitted to have experimental reactors to further nuclear research. The establishment of National Laboratories decreased the need for such units to some extent. Nevertheless, the release of a certain amount of basic information regarding piles is of great national benefit in training manpower not working on the Project. This basic issue,

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*Numbers in parenthesis refer to references at end of report.

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whether or not any information on piles is releasable, may require reaffirmation at the present time. In any case, extensive revisions in the above topic are required. This is due to the fact that the various Guide topics are not sufficiently definitive to permit a distinction to be drawn between material dealing with experimental and production piles. The present topics 40-155 and 40-165 are too vague and topic 40-180, which prohibits the declassification of material on reflectors, is in direct conflict with 1-180.

At the first meeting of the Senior Responsible Reviewers this problem occupied a major portion of their attention and recommendations, which were approved by Fermi, Morrison, Oppenheimer and Wigner, to define more clearly this delineation were given in the First Report of the Committee of Senior Responsible Reviewers. (Ref. (1) p. 2-9) In the course of preparing consistent recommendations which would permit the declassification of experimental reactors it became apparent that a certain liberalization of the Tolman Report was inevitable. In essence, the recommendations permit the release of certain average nuclear data (in spite of the present restrictions in topic 10-180) which is adequate for the purposes intended but does not permit the design of optimum lattice structures. It was also recommended that 40-180 be deleted from the Guide.

On the whole the recommendations are largely concerned with experimental procedures and results. The question of theoretical pile physics has not been so well defined as yet. Its present status is given under 4-155.

1-205: O.K. when applied as written in conjunction with footnote. Responsible Reviewers may have difficulty in deciding whether the preparation of certain materials used in the manufacture of fissionable materials is critical. As an example, new chemical procedures for detecting small amounts of iron in calcium may or may not be critical to the preparation of pure uranium.

1-220: Questionable

In general this topic presents no complications. Questionable cases arise in the analytical methods for determining small amounts of impurities in fissionable materials. A case in point is whether or not the intent of the topic is violated when the determination of boron in steel is released even though this particularly sensitive method was developed for detecting boron in plutonium.

1-225: O.K.

Remarks under 1-220, however, may apply to a lesser degree since the advances are more fundamental to pure science.

1-250: O.K.

1-305: Questionable

Extrusion techniques for beryllium are now being developed specifically for use with power piles. Declassification of this may be contrary to Section 10 (a) (1) of the Act. Metallurgy as distinct from metallurgical techniques for unclassified substances, which is clearly releasable, is not provided for.

1-501: O.K.

This section was discussed by the Committee of Senior Responsible Reviewers and it was recommended that the majority of its sub-topics be considered as unclassified when a new security manual is prepared (see Ref. (1) p. 17-18).

Certain additional topics dealing with physical instrumentation were recommended for release in the Second Tolman Committee Report (Ref. (2)).

1-502: O.K.

1-505: O.K.

1-508: O.K.

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1-511: O.K. since plant size mass-spectrometer is not releasable because of footnote page 1 of Guide. Dr. A. J. Dempster has frequently pointed out that any mass-spectrometer design would be useful to a foreign country for the separation of isotopes.

1-514: O.K.

1-517: O.K.

1-520: O.K. but change in wording from "ion" to "particle" accelerates suggested in Ref.(1) p. 14 should be used.

1-523: O.K.

1-905: O.K.

This topic and 1-910 completely within intent of Act; however, qualifying phrases suggested at Berkeley meeting of Senior Responsible Reviewers (Ref. (1) p. 14) would serve to clarify intent. It is believed that the wording "already published" should refer only to publication prior to March 30, 1946. This excludes current foreign literature as serving to declassify Project data under this topic. This interpretation makes desirable the frequent re-examination of the Guide in view of information in current literature.

1-910: O.K. (See discussion under 1-905.)

2-110: O.K. Basic science.

2-115: Questionable

Although actual Plant geometries are excluded by the present wording, certain theoretical work [redacted] is novel, and its application is vital to the success of the plant. b(3)

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2-135: O.K.

Basic physics. (Most work on this at Berkeley was done after Plant was operating so not essential for production).

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2-140: O.K.

This is a continuation of pre-project technological development applicable to many fields, hence, this should not be considered as specific project technology. (See Ref. (4)).

2-145: O.K.

Wording of topic and footnote prohibits circuits unique to plant, although some difficulty is experienced in deciding just when a circuit is unique to a plant. A better wording for this topic was proposed in the "Second Report of the Committee of Senior Responsible Reviewers," Ref. (4).

3-103: O.K.

Extension of basic theories known for some time and applicable to many fields.

3-110: O.K.

Extension of basic theories known for some time and applicable to many fields.

3-130: Questionable

Although many techniques were known previously and new information would be valuable for other industries (engraving screens, filters, etc.), technology of controls used in barrier fabrication may be revealed.

3-210: O.K.

Basic science applicable to many fields. Practical plant applications are excluded.

3-220: O.K.

New materials which have been given wide publicity and useful in many fields. Specific uses in project plants prohibited, although it is impossible to hide possible uses of materials when characteristics are given. (See Ref. (1) p. 14).

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3-230: O.K.

Considerable pre-project information on fluorine is available. Major Project contribution was development of cell for mass production of element. Information on conditioning of equipment with fluorine to prevent corrosion will not be revealed by this topic. (See Ref. (4)).

4-140: O.K.

Basic physics and chemistry. Information needed for design and operation of piles will not be revealed by this topic.

4-155: Questionable

Much that falls under this topic and topic 5-020 can be classed as mathematical theory and as such it falls under Section 10 (a) (2) of the Act. Its application to the specific problems of atomic energy may however bring it in conflict with 10 (a) (1).

The main question which needs to be resolved here is whether it is desirable to release computational methods which have been developed specifically for the calculation of weapon and pile assemblies, even when numerical magnitudes on specific designs are not thereby revealed. Topics 4-155 and 5-020 seem to be in direct conflict with topic 50-155, which prohibits the release of "critical masses." Conflict can be avoided if one interprets 50-155 to refer to the values of rather than the general subject of critical masses.

Theoretical neutron problems are principally divided into fast and slow neutron problems. In the first case the neutrons emitted on fission are not slowed down and this is the type of problem extensively investigated at Los Alamos for bomb problems. The problems consist largely in predicting critical masses for all possible systems.

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In the second case the neutrons are slowed down by a moderating substance such as graphite and the major problems are concerned with pile design (see also discussion of topic 1-180). In this class are slowing-down theories, more elaborate diffusion theories, including multi-velocity cases (i.e. many groups of neutron velocities) and the calculation of optimum lattice structures. So far no significant release of multi-velocity methods has been made by us. The British have also held back on this material. We have advised the Canadians to withhold declassification of multi-velocity work until we have arrived at more clear-cut directives. The prediction of critical sizes including the effect of neutron reflectors on purely theoretical grounds and by theoretical extropolation from small non-reacting structures also falls under this heading. (In this connection it bears on topic 40-180.) Lastly, the theoretical behaviour of running chain-reactors is to be included here. It is believed that the Tolman Committee attempted to use the word "elementary" in such a manner as to prevent the release of data on the actual design of piles. Such a distinction is very hard to draw and was not achieved in the March 30th Guide. The Committee of Senior Responsible Reviewers, in conjunction with the re-evaluation of topic 1-180, has tried to rewrite topic 4-155 and associated topics in great detail in order to achieve this purpose. Their first report gives an extensive discussion. (Ref. (1) p. 7-9). Since these recommendations were not acted on by General Groves the committee reconsidered its proposal at the December meeting and voted to put into effect an interim policy which restricted the release of any further data on this subject as well as fast neutron theory except in cases where it closely followed certain previous releases by the District. (Ref. (5) p. 2)

Such an interim policy is by no means satisfactory and was adopted only for the sake of expediency.

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The question of fast neutron theory is almost an entirely separate one. It is connected more closely with the bomb and is not in essential conflict with industrial applications. Its most questionable point is that of treating the effect of a reflector in detail. It is of interest to note that much of the theory of integral equations developed in this connection is a direct extension of problems treated in stellar physics and the results obtained on the project would be of interest to pure mathematicians. After much discussion during the summer 1946 with most of the numbers of the theoretical division at Los Alamos* and recent talks with Fermi and Teller a certain sentiment on this subject has been formulated. It has not yet been voted on formally by the Committee of Senior Responsible Reviewers. In essence it says that:

> Declassification should be recommended for all mathematical methods of treating stationary neutron diffusion, including those particularly suited to the calculation of critical masses with any type of reflector. Illustrations should be chosen so as to avoid suggestive geometries of the bomb.
>
> This, however, should not be construed to permit the declassification of detailed methods for the calculation of optimum lattice structures of piles which is prohibited as explained under the slow neutron problems.

In the last analysis this liberal interpretation of the policy is based on the belief that only <u>experimental</u> measurements of critical masses are considered basic progress in any bomb development program. Further declassification of theoretical calculations on our part may speed the completion of a foreign project by a few months but not by years.

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* Informal meeting at Los Alamos August 22, 1946 attended by Feynman, de Hoffmann, Hoyt, Oppenheimer, Richtmeyer, Schiff, Serber, Teller and Weisskopf.

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In part at least the question of releasing theoretical methods for the one-velocity fast neutron problem is an academic one since the British have recently declassified a large fraction of the basic methods dealing with one velocity problem which they interpreted to fall within the topics permitted by the present Guide. Their methods are not however completely identical with ours.

4-210: O.K.

Basic chemistry. Release of decontamination and separation chemistry prohibited by 40-220.

4-325: O.K.

Clearer wording would be "Ceramics without reference to classified applications." This also covers ceramics for power piles, etc.

4-705: O.K. when used as written. Difficulty comes when enthusiasm of isotope people extend meaning, however, this is not serious since rough values of flux were recommended for release by Committee of Senior Responsible Reviewers. (Ref. (5))

5-005: Questionable

The general philosophy of this section has been discussed under 1-005. The specific sections which are in part questionable are taken up in detail below.

5-010: Questionable

The wording of this section is ambiguous. Shock-hydrodynamics enters into the calculation of the implosion as well as the outgoing blast wave. The idea of the implosion might be revealed by discussing such questions as multiply-intersecting shock-waves leading to jet formation or the hydrodynamics of explosives (see also 5-030). Such material would only originate from Los Alamos and great care is being exercised at Los Alamos on this point.

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As a further protective measure the Committee of Senior Responsible Reviewers proposed that the wording of this section and the restrictive section 50-135 deal more specifically with the dangers of revealing the idea of implosion by implication (Ref. (1) p. 15).

5-015: O.K.

5-020: Questionable

This topic should be considered in conjunction with 4-155 and is discussed in detail under that topic.

5-025: O.K.

Care is being exercised by Los Alamos reviewers not to permit discussion of pressure regions of interest to the implosion.

5-030: Questionable

It is a basic question whether any material on explosives should be released from Los Alamos. It is true that the Smyth Report reveals explosive work at Los Alamos. However any more extensive release might lead to correct guesses that explosives work was not primarily for the gun gadget.

5-035: O.K.

Classified application, for instance calculations for uranium, are excluded by the present wording.

5-110: O.K.

Topic refers to outgoing blast waves and not to implosion. Of mathematical interest primarily since only theory is released.

6-905: O.K.

It should be remembered, however, that purely medical reviewers often do not realize the importance to the project of analytical processes used by them. Complete review of medical papers therefore usually calls for chemistry and sometimes physics review.

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6-910: O.K.

Comments under topics 6-905 apply also to this topic.

Section V: Questionable

One of the basic questions in this section is that of determining the proper scope of the heading "nuclear physics." The prevelant opinion is that it is too restrictive. As explained in the discussion of topic 1-175, at present Section V prohibits the release of such information as α energies, half lives, etc. of all isotopes listed there. In most instances, this data is of little significance to the production of fissionable materials or the construction of weapons. The Committee of Senior Responsible Reviewers recommended that the heading "nuclear physics" be changed to "neutron and fission physics" and at the same time provided for certain exceptions. For a detailed discussion of this proposed change and its bearing on topic 10-180 see Ref. (1) p. 9-13.

The question of tritium nuclear physics was considered in great detail. The committee pointed out that the specific exclusion of information may be of great danger since it may point towards the subject of the super. A detailed discussion may be found on page 10 of Ref. (1).

In the recommendations referred to will be found the changes in Section V; made largely for the sake of consistency with recommendations made in other parts of Ref. (1).

References:

1.) Report of the Meeting of Senior Responsible Reviewers held 12-14 August 1946*.

2.) Third Report of Committee on Declassification, 21 June 1946.

3.) Proposed Declassification Guide 1 August 1946.
(Prepared for consideration at August 12-14 meeting of Senior Responsible Reviewers.)

4.) Second Report of the Committee of Senior Responsible Reviewers, 21 November 1946.

5.) Third Report of the Committee of Senior Responsible Reviewers, 31 December 1946.

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* Some of the "A" and "R" topics in this report refer to topics in Ref. (3).