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Mr. W. A. Strauser
Declassification Branch
Office of Classification
U. S. Atomic Energy Commission
P. O. Box E
Oak Ridge, Tennessee

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Dear Mr. Strauser:

The analysis by Mr. Robert L. Jackson of the HES text (Division VII, volume 3) prepared by Mound Laboratory on the subject of polonium has been studied by personnel of this Laboratory. It is the opinion of these personnel that Chapters 1 through 13 can be published as an unclassified volume after certain changes, which are described below and which are based on Mr. Jackson's analysis, are made in the textual matter.

When classification review of this volume was initiated, Chapters 1, 2, 6, 10, 12, and 13 were written and had been shipped to FIS at Oak Ridge for preparation of galley proof. The remaining chapters were in various stages of completion. At the time when issuance of this volume as an unclassified text was considered, it was felt that it would be more profitable to complete the text in the then accepted style and to modify the galley proofs wherein sensitive material was presented. The limited time available to the various chapter authors for completion of their contributions made this decision mandatory. This philosophy has worked quite well with Chapter 14, which is to be presented as a classified supplement to Chapters 1 through 13, since the technology presented in this chapter initially bordered the Top Secret classification: at the

MOUND DECLASSIFICATION REVIEW	
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AUTHORITY: <input type="checkbox"/> AOC <input checked="" type="checkbox"/> ADC <input type="checkbox"/> AED	1. CLASSIFIED
NAME: Tim Flanagan	2. CLASSIFIED
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AUTHORITY AND NAME: [Signature]	4. COORDINATE
	5. CLASSIFIED
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present time a lower classification is indicated because of the critical review and rewriting of this chapter by the Mound Laboratory editorial staff. Reference the September 9, 1954, memorandum of Mr. R. L. Jackson to Mr. R. L. Matter; symbol D: RLJ.

It is recognized that even if each of the first thirteen chapters are written so as to be unclassified, the collection of all of these chapters in one volume may impose restrictions on their release in this manner; however, Mound Laboratory feels that no such restrictions need be impressed upon the distribution of this volume. The most important factor to be considered in this respect is the quantity of, and the context of, those Mound Laboratory publications which have or will have appeared in the unclassified literature prior to the publication of the NEES volume on polonium. An analysis of this factor will show that a significant number of reports dealing entirely, or in part, with the subject of polonium have already been released; these reports are in addition to and exclusive of the many Mound Laboratory reports which have been released under unclassified TID-4500 distribution. A detailed breakdown of these published or soon to be published reports is as follows:

Mound Laboratory Report Publication Status as of January 19, 1955

Reports placed on public sale	10
Reports published in Technical Journals (unclassified)	31
Reports presented orally (Abstract or preprint published)	26
Total	<u>67</u>
Reports accepted for Journal Publication	11
Articles in process in Journal offices	11
Total	<u>22</u>
Articles in Process:	
In process by Technical Editor	9
In process by Authors	15
Total	<u>24</u>
Overall Total	113

The above report tabulation contains no duplications; thus, an oral report which may have been presented in abstract form and is published later in a journal, is counted in the latter category only.

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Included in the 113 reports published, or in process for publication, are nine whose major theme is polonium; one contains extensive material on polonium; one discusses remote control equipment for the preparation of neutron sources (which use polonium); one describes the spectrographic analysis of bismuth for impurities; the bismuth is that which is irradiated by neutrons for the formation of polonium; one describes factors involved in the fabrication of polonium-powered thermal batteries, a recent Mound Laboratory release which has been widely reported in the press and trade journals. Several reports expressing the biological research aspects of polonium are contemplated for publication in the not-too-distant future. The remainder of the reports emanating from this Laboratory encompass interests other than polonium, and it is felt that no undue interest in polonium on the part of Mound Laboratory should be evident when all interests are considered in toto.

The reports which have been issued from this Laboratory have established a specific interest in alpha emitters, of which polonium is of importance; hence, a specific interest in polonium on the part of Mound Laboratory is logical, although it has never been, nor should it ever be, indicated that polonium has been the major interest at this Laboratory. To date, reports from this Laboratory have indicated that approximately 40 persons (authors, co-authors, cited references, etc.) have performed some phase of research on polonium at one time or another. An even greater number of persons have been cited in reports covering other phases of research and development performed at Mound Laboratory.

Historically, it has been established that work on polonium at Mound Laboratory encompasses the time period from somewhat prior to January 22, 1945, through 1953. Many cited references in reports from this Laboratory indicate that most of the research work on polonium was accomplished in 1945, 1946, and 1947, and the presence of extensive unpublished work is also indicated. Many of the personnel associated with polonium are also associated with other interests; these facts are borne out by cursory examination of Mound Laboratory unclassified reports, journal articles, and oral presentation abstracts. It may be stated thus - Mound Laboratory has had a major interest in polonium, although polonium has not been the major interest of Mound Laboratory. This has been established.

The production of polonium in substantial (but unclassified) quantities for research on the element can be justified on the basis that polonium was one of the few elements about which little was known; however, this will not completely answer all questions which could arise regarding the extensive research which has been completed on the element. An additional, logical, and unclassified

reason for producing polonium will go far toward resolving this problem: the production of neutron sources and alpha sources, using polonium as the alpha emitter, is a "natural" for this purpose. There should be no need of justifying an early, and an expanding, need for such sources, and polonium is the most logical element to select as the alpha emitter for such sources. It is the belief that NRES volume VII-3 could, and should, present the theme that the primary objective of Mound Laboratory's interest in polonium was as a constituent in neutron sources and in alpha sources, and that the production of purified polonium was essential to the fulfillment of this objective. It logically follows that, since little was known about the element, studies of the pure and applied physics and chemistry of polonium would be required.

In their present form, the first thirteen chapters of NRES VII-3 do not amplify or carry through the theme suggested above; however, it would be simple to modify these chapters, especially the chapter introductions, so as to direct attention to this concept.

The limitations expressed in the directive AEC-654/2, Appendix 'A', 6, which refers to the release of a large number of papers on the same subject, thereby arousing undue interest in Mound Laboratory and its functions, may well be resolved by the time the volume on polonium is published. Major portions of the content of some of the volume chapters have been, or will have been, published and/or issued in the unclassified literature. This is especially true of chapters 3, 4, and 5, which describe the physical, chemical, and biological properties of polonium. Significant portions of the other chapters have been, or will have been, published, although in many cases in no great detail. It may well be that the polonium volume could represent a compilation and enlargement of previously published information. At the same time it will have been established that Mound Laboratory has, and had, several other major and minor interests.

Bismuth, of unusually high purity, for irradiation in a nuclear reactor has always been purchased by Mound Laboratory on an unclassified basis. The quantities procured over extended periods of time are indicative of the production of significant amounts of polonium; however, by presenting a logical use for relatively large quantities of polonium, any undue interest in this Laboratory and its functions will be allayed. It was with this thought in mind that Chapter 12, "Neutron Sources and Alpha Sources," was prepared in its present form wherein it is stated that hundreds of sources, using thousands of curies of polonium, have been fabricated at Mound Laboratory for use at other sites. At this time it is known that Mound Laboratory is a supplier of neutron and alpha sources: many purchase requests and inquiries

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regarding these types of sources are received directly from non-AEC consumers, and all that is required prior to the shipment of a source is the approval of the Oak Ridge Isotopes Division. The unclassified neutron and alpha source program at Mound Laboratory tends to camouflage any classified programs using polonium which are, or may have been, in existence at this Laboratory. (See OC DDC-32, 2. C).

The "technology" of the production of polonium, as expressed in Chapters 7 and 8 of NRES VII-3, considers the applied physics and chemistry of polonium, but does not present a specific process, nor do these chapters indicate if one process is more acceptable than any other process. Presented in this manner, the number of possible combinations and permutations of production processes is quite large, and would require extensive developmental and pilot plant investigations before a workable process could be attained. Laboratory scale production of polonium at high cost, could be realized from the information presented in these chapters; however, those scientists who have been associated with the production of polonium feel that the achievement of a reasonably-efficient, continuous, large-scale, production process would be extremely difficult if based only on the information presented in Chapters 7 and 8. It is the opinion of informed Mound Laboratory personnel that these chapters do not reveal the technology of polonium production.

Other chapters of NRES VIII-3 are known to require some modification and change-in-emphasis to delete possible sensitive inferences, and these changes will be incorporated into the text when galley proof of Chapters 1 through 13 is received at Mound Laboratory.

As an example the contemplated changes in the textual content of the various chapters of NRES VII-3, the deletions and modifications to the context of Chapter 10, "Calorimetry," are described in some detail. In the INTRODUCTION to this chapter, the use of calorimeters for assaying the alpha-emitting element in neutron sources and alpha sources will be introduced. Mention will also be made in this section of the fact that alpha emitters other than polonium are routinely assayed by calorimeters at Mound Laboratory.

In Section 2 (HISTORICAL BACKGROUND) of Chapter 10, the discussion presented will be modified in such manner that no indication of large-scale production of polonium is inferable. For example, the second sentence of the first paragraph of this section will be rephrased from:

"By 1945, however, the quantities of polonium produced were large enough to warrant the use of calorimeters for assay purposes."

to a much more ambiguous sentence such as:

"The higher precisions attainable with calorimeters as compared to the alpha-counting equipment available at that time, recommended the use of calorimeters for the routine alpha assay of neutron sources and alpha sources."

In the first paragraph on page 10-3, all mention of production (which may indicate large quantities of polonium) will be eliminated. This same philosophy will be extended to the last paragraph on page 10-3.

Section 3 (THEORY OF CALORIMETRY) of Chapter 10 should require no change in context.

In section 4 (CALORIMETRIC ASSAY OF POLONIUM) the entire first paragraph will be completely rewritten. This paragraph was specifically cited in Jackson's analysis, and mentions the number of calorimeters presently in use at Mound Laboratory for assaying polonium samples, and also states what the daily sample-capacity and sample-size range is. This entire section will be finally presented in an unclassified manner.

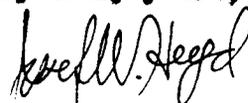
In section 4.3, page 10-23, the tie-in with the Los Alamos Scientific Laboratory will be deleted. The comparison between Mound Laboratory calorimeters and the National Bureau of Standards ice calorimeter will be retained. Also, calorimeter sample-capacity data presented in this section will be deleted.

Section 5.2, page 10-24 (4th sentence), notes that a great number of irradiated bismuth slugs have been received at this Laboratory. This section also notes that several reactor channels are used solely for irradiating bismuth for polonium production purposes. Some qualification of this section is therefore contemplated.

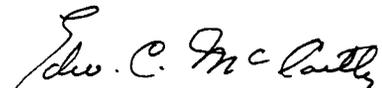
All remaining sections of Chapter 10 contain no references to sensitive information; hence, they should present no classification problems.

It is therefore the belief of Mound Laboratory personnel that, with important though rather minor modifications in the present text, the issuance of the first 13 chapters of Division VII, Volume 3 as an unclassified volume would not violate the intent and purpose of directive AEC-654/2.

Very truly yours,



Josef W. Heyd, Secretary
Technical Advisory Board



E. C. McCarthy, Chairman
Technical Advisory Board

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