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UNIVERSITY OF CALIFORNIA
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GUIDE FOR PREPARATION OF UCRL REPORTS

Margaret Foss Folden

Revised March 23, 1954

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GUIDE FOR PREPARATION OF UCRL REPORTS

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* The Contents of a report is an organizational chart of the report arranged according to the order of subject presentation. It serves to give a quick comprehension of the major subjects dealt with in the report.

GUIDE FOR PREPARATION OF UCRL REPORTS

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Revised March 23, 1954

ABSTRACT

Each UCRL report should include an informative abstract. An informative abstract gives a general picture of the material covered in the report and summarizes the conclusions. It is designed to give those readers who do not have time to read the report the principal ideas of the report in brief but usable form. The Abstract may also be used by Technical Information Service, USAEC, Oak Ridge, in Nuclear Science Abstracts or Abstracts of Classified Reports.

GUIDE FOR PREPARATION OF UCRL REPORTS

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Revised March 23, 1954

INTRODUCTION

The Introduction gives the writer an opportunity to refer to work done by others in the field and to survey the plan to be followed in the report. The Guide is intended to illustrate UCRL format for editing and stenographic procedure and to establish rules for grammar and punctuation problems that seem to arise most frequently at UCRL. Available methods of reproduction of manuscripts and of drawings and photographs are dealt with, as well as some rules to be followed for material to be published.

BODY OF REPORT

In general, the body of a scientific report includes descriptions of apparatus and procedures used, the results obtained with their use, and a discussion of these results. Presentation in logical sequence is more surely obtained when writing from a well-planned outline. A function in editing a report is to judge the success of this presentation.

Format

This report is intended to illustrate the format used in UCRL reports. Four or five main types of headings are used: title, section (chapter) heading, subhead, sidehead, and perhaps also paragraph head. Preferred placement of sections and forms to be used for references, footnotes, appendices, and acknowledgments are used in this report. Reports should be typed on 8-1/2-by-11-inch size paper. Margins should be 1 inch on all sides. On theses the left margin should be 1-1/2 inches. Differences in format when classified information is reported are shown by illustration in Appendix I.

Where the report is short or presented simply, the section heading (in caps centered) may be omitted; the format then consists of title, subheading, and paragraph heading.

Manuscript

The manuscript for a research and development report may be presented to the Information Division in draft form. Such a manuscript should be made up following the rules presented in this report as closely as possible. From some groups in the Laboratory, the Multilith masters are presented to the Information Division for processing.

Distribution Pages

The distribution page given as an example at the beginning of this report shows acceptable placement and form. Report TID-4500 is Standard Distribution Lists for United States Atomic Energy Commission Nonclassified Research and Development Reports. For Standard Distribution Lists for USAEC Classified Research and Development Reports, refer to Report No. M-3679.

Figures and Graphs

Illustrations are prepared in final form by draftsmen in the Information Division. Whenever possible, drawings should be planned for 8-1/2-by-11-inch size paper. This is obviously a matter of convenience.

Equations

Equations present special problems to the typist. Authors and editors must take particular care to present this material clearly. Equations may be numbered for reference; however, it is not necessary to number equations that will not be referred to. A few examples[1, 2] are presented below:

$$\Delta E \cdot \Delta t \sim h \tag{1}$$

$$q = \frac{Q}{(4\pi \tau)^{3/2}} e^{-r^2/4\tau} \tag{2}$$

$$\tau = \frac{1}{3\xi (1 - \cos \phi)_{av}} \int_{\epsilon}^{0} \lambda^2 (\epsilon') d\epsilon' \tag{3}$$

$$_{50}Sn^{118} + p \rightarrow Na^{24} + {}_{40}Zn^{94} + n \tag{4}$$

$$Bn^{79} (p, p\ 7n\ 7\alpha)\ Se^{44} \tag{5}$$

When referring to equations in the text, one writes Equation (1) or Eq. (1). The equation numbers are in parentheses to clearly separate them from portions of the equations.

When equations are included in the text, such as $\phi/(d\phi/dx) = 0.7\ \lambda_t$, they should be typed on one line as shown whenever possible.

Tables

Simplicity is suggested in presenting tabular data. Where it is possible to present data in vertical columns without lines as shown in the example, Table I,[3] this form is suggested.

Table I

Cross Sections in Millibarns (10^{-27} cm^2) for Alpha-Particle Bombardment of Pure Pb^{208} (using 52 percent as Concentration of Pb^{208} in natural lead) to Produce the Activity Indicated.

Bombarding Energy (Mev)	0.52 second	25 second	2.2 minute
18	2.6	0.01	0.01
20	14.8	0.17	0.01
21-1/2	95; 80	2.3	0.01
23	46.1	4.6	0.01
24-1/2	30.4	5.5	0.07
26	24.7	4.7	0.11
27	12.8, 10.4	3.4; 2.0	0.54
28	9.6		
30-1/2	8.2		
33-1/2	5.9		
36	5.2		
37-1/2	4.8		
39	4.1	2.2; 2.4	3.8; 3.6

When headings are more complicated or have subdivisions, the form indicated in Table II[3] is suggested.

Table II

Relative Yields from Alpha-Particle Bombardments of Lead Targets

Bombarding Energy (Mev)	Ratio Tabulated	Value for Nat'l Pb	Value for Pb enriched in 207	Value for Pb enriched in 208
35	N_{130}/N_{25}	2.4	2.0	2.2
20	$N_{0.52}/N_{25}$	3.3	3.8 3.4	. . .
18	$N_{0.52}/N_{25}$	9.6	10.0 10.5	. . .

Columns of numbers should be aligned by the decimal point. In numbers less than one, a zero should precede the decimal except if all numbers in a column are less than one, in which case only the first and last numbers are preceded by a zero. As a general rule, tables of less than one-half page in length should be included with the text; tables of length greater than one-half page should be put on a separate page. When a table is so long that it must be continued on a following page or pages, the bottom ruling is omitted from all but the final page. The stub, caption, and title are repeated on each page with "continued" being indicated by (Cont.) after the final word of the title. If there is any chance that the meaning of a heading will be misunderstood, a footnote should be used with the table to make the meaning clear. Vertical rulings may be used in tables if desired. However, all tables in a report should be consistent in format.

References and Footnotes

References are given whenever mention is made in a report of work attributable to other workers or authors. The name of the author or the idea mentioned is followed by a superscript number, thus:

Stars initiated by alpha particles have been studied by E. Gardner.[4]

Where two or more authors are used, the reference number follows the last author, thus:

Stars initiated by deuterons have been studied by E. Gardner and W. Peterson.[5]

The references themselves are shown in proper form under the section of that name at the end of this report.

A footnote is not numbered in the reference series and is usually denoted by *, the second by **. Where there are more than three footnotes on a page, superscripts a, b, c etc. may be used. A footnote appears at the bottom of the page on which the * appears. An example is taken from Glasstone's "Sourcebook on Atomic Energy," p. 205[6]:

> "Therefore, toward the end of 1941, he and his associates set out to improve the design of the apparatus, devoting particular attention to methods for increasing the strength of the ion beam without impairing too seriously the efficiency in isotopic separation.*"

---

* The apparatus was called a calutron, a contraction of California University cyclotron, because it made use of the magnet from one of the University of California cyclotrons.

Rules are given below for preparing references for a bibliography.[7]

Book. Show the senior author's name, and co-authors, title of book, name of editor or translator when necessary, short name of publisher, place of publication, edition number when necessary year of publication, and volume and page numbers of the citation when necessary in order listed

1. R. J. Myers, Advances in Colloid Science, E. O. Kraemer, ed., Interscience, New York, 1952, Vol I, p. 317-51.
2. A. H. Compton and S. K. Allison, X-rays in Theory and Experiment, 2nd ed., Van Nostrand, New York 1935, p. 38.
3. A Manual of Style, 11th ed., University of Chicago Press, Chicago, 1949, p. 150-53.

Periodical. Show the senior author's name, and co-authors, title of paper or article* (in quotation marks), name of periodical, series if necessary, volume number (underlined), issue number if necessary, page numbers, and year of publication (parenthesized) in the order listed.

4. R. B. Richards, "The Phase Equilibria between Crystalline Polymer and Solvents," Trans. Faraday Soc. 42, 10-28 (1946).
5. J. P. Taylor, "Photoelectric Densitometer," Electronics 10, No 3, 24 (1947).
6. G. J. Dienes and H. F. Klem, "Theory and Application of the Parallel Plate Plastometer," J. Appl. Phys. 17, 458-71 (1946).

Report. Show the senior author's name, and co-authors, title of report, issuing and originating agencies, document number, date of publication, and page number if necessary in the order listed.

7. Clyde E. Wiegand, Measurement of the Positive π-Meson Lifetime, University of California Radiation Laboratory Report No. UCRL-952, October 16, 1950.
8. W. T. Miller, The Use of Perfluoro- and Chloroperfluoro-Olefins in the Synthesis of Fluorocarbon Materials, S.A.M. Laboratories, Report No. M-3113, MDDC-1177, 1946, p. 2-7.
9. E. Fermi and L. Marshall, Spin Dependence of Scattering of Slow Neutrons by Be, Al, and Bi, Argonne National Laboratory, Report No. MDDC-844, April 30, 1947

---

* Often this is omitted.

Patents. References to patents should give the patentee, country, the word "Patent," the number, and date of granting.

10. C. E. Maynard, U.S. Patent 1,795,875, March 10, 1931.

General Bibliographic Information. In abbreviating journal names, it is essential that uniform abbreviations are used; the list of periodicals abstracted by Chemical Abstracts[8] should be consulted for proper abbreviations. In case the journal does not appear in this list, it is best to use the full title.

In bibliographic lists it is not necessary to underline the names of periodicals or enclose book titles in quotes, but in textual material this should be done.

Notebook References. When one desires to make reference to the notebook in which the original work can be found, the references should be placed directly after the assembled bibliography. The proper form is shown below.

Foster, J. S., UCRL Classified Notebook Number 85, p. 13-17.

Grammar and Punctuation[9, 10]

In addition to the question of good English usage, which applies to all writing, scientific and nonscientific, there occur many technical points that should be observed in the preparation of a scientific manuscript for publication. The accepted usage in this case differs somewhat in different publications. The statements to be given apply particularly to the journals published by the American Institute of Physics and represent current practice in such journals. The "Style Manual of the United States Government Printing Office"[11] is the principal source of authority. If the author observes these practices in the preparation of his manuscript, the various editors will be saved a vast amount of purely routine editing.

1. Decimal Fractions. Place a cipher before all proper fractions. Thus: 0.23 mm. Write 45.62×10^5 cm, $(45.62 \pm 0.03) \times 10^5$ cm.

2. Numbers in Body of Manuscript. In the case of isolated numbers in the body of the manuscript, use words for the integers one to ten, but use in general numbers for high integers and always use numerals for nonintegers. Thus: a four-hour period, and a 6.3-minute period. Use numbers to express physical dimensions and in statistical statements: a range of 1 to 4 meters; a board 2 inches thick.

3. Nouns used with Fractions. For a proper fraction use a singular noun. Thus: 0.23 ohm, not 0.23 ohms. In certain compound expressions for units; the plural may be used with numbers greater than unity. Thus: 5000 volts/cm (or 5000 volts per cm), 1000 cycles/sec. For more abstract units it is better to use only the singular. Thus: erg sec, cm degree, erg $gauss^{-1}$.

4 Subscripts and Superscripts. In the case of a symbol with both subscript and superscript, write the former first. Thus: B_o'', not B''_o, H_2^+, etc. (It is possible, on a typewriter, to write both subscript and superscript directly following the symbol; this may be done if the result does not look crowded or confused.)

5. Italics. Underline all letters (aside from those in equations) that are to be printed in italics.

6. Typing Fractions. Write e/m, not $\frac{e}{m}$, and try in general to arrange expressions so that they may be printed on a single line. This may require the use of parentheses. Thus: a/(b + c) means $\frac{a}{b+c}$, but a/b + c means $\frac{a}{b} + c$. Write $a\sqrt{b}$, rather than $\sqrt{b}\,a$, in order that there may be no uncertainty as to whether a is under the radical or not.

Where long expressions must be set up in fraction form, try to avoid use of other symbols that may be confused or overlooked in juxtaposition to the dividing line of a built-up fraction. Thus: $\frac{a(x+y)}{\langle x+y\rangle + n\langle p-q\rangle}$ is preferable to $\frac{a(x+y)}{(x+y) + n(p-q)}$ and $b = \frac{m^2 x}{(4y-z)^{1/2}}$ is preferable to $b = \frac{m^2 x}{\sqrt{4y-z}}$.

7. Correct Indications for Figures, Equations and Tables. Write Fig. 2, Figs. 2 and 3, Eq. (2), Eqs. (2) and (3), Table II, Tables II and III, column 2, columns 2 and 3. Here the type of character, abbreviation and spacing are all to be strictly observed.

8. Correct Indications for Units of Measure. Write 2140A, λ2140, λλ2140 and 2160 (or λ2140 and λ2160), 22°C, 22 cm^{-1}, 4.1-hour period, 53 ± 3-minute period, 8.4-cm range, 60-cycle ac.

9. The Letter "ℓ". Since the typewritten number for unity is identical with the lower-case letter l, one should indicate in the margin which symbol is meant, in all doubtful cases.

10. Proper Tense. The question of the proper tense to use is often a troublesome one. The only general rule is that statements of scientific fact,

which presumably are just as true today as at the time the fact was discovered, should be in the present tense. Statements of the actual work performed may be in the past tense, or in the present perfect tense. Thus:

"Observations were taken (or have been taken) which show a linear relation of. . ." etc.

11. Dangling participle and dangling gerund. A gerund is a participial clause used as a noun. "After eating dinner" has in general the same significance as "after dinner." Whenever a clause of this type is used, the reader should take care that the subject of the sentence governs the participle as well as the main verb. The mistake is obvious in the three following examples: "Having eaten our lunch the steamer departed," "After taking our seats the chairman called the meeting to order," and "Not many years ago a mummy of a prehistoric miner was found while clearing a cross-cut in a copper mine." The mistake is less obvious, but none the less present in the following examples culled from current papers: "Assuming a linear correlation, a normal solution is obtained." "Judging from the size of the probable error, the unevenness of the figures may be ascribed to accidental fluctuation." Some writers have the idea that the mistake can be avoided by merely changing the type of clause. In "On the assumption of linear correlation, a normal solution is obtained" the dependent clause dangles just as surely as it did in the participial form. The correct form of statement would be "Assuming a linear correlation one finds the following normal solution."

Let the reader, whenever he writes a word ending in "ing," hang out a red flag until he has checked against the pitfalls of a dangling construction.

13. Dangling "this." Such structure as the following is common in scientific writings: "The polar axis ran on ball bearings, with the far end of this tied to the driving drum of the clock-worked control. This gave a fairly smooth motion in right ascension." In reading this sentence we are never sure whether this this means this or this. At the risk of repetition, it is advisable to avoid ambiguity, by saying "this axis" and "this procedure." Or, even better, say "..with its far end tied to the. . ." The suggestion has been made that if the writer will remember that the word "this" is always followed by "silly" in the mind of the reader unless the antecedent is repeated or made entirely obvious, he will perhaps avoid some confusion.

13. "Which" and "that." One of the most common mistakes of writers in general is a misuse of the relative pronouns "that" and "which." As a matter of fact, the rules are simple and well defined. There is no ambiguity, except in very special cases. "Which" is much more frequently written for "that" than "that" for "which." "That" should always be used in a clause that defines or limits the noun. "Which" should be used if the clause merely adds a fact. A very simple test may usually be applied. If the clause can be detached from the rest of the sentence and put at the end with a conjunction or in a separate sentence, then "which" should be used. If the meaning of the sentence is not clear, then "that" is demanded. Take the case of "This is the house that Jack built." If we mean to say, "This is the house. Jack built it," then we should say "This is the house, which Jack built." But, as we know from the context, we are defining or selecting a certain house as the one that Jack built. In the following sentence the words "which" and "that" should be interchanged. "It is necessary to rub out the autocratic principles which underlie German militarism that threatens the peace of the world."

14. Preposition at end of sentence. The problem about the prepositional ending is generally misunderstood. It is not incorrect to end a sentence with a preposition when, by so doing, we can avoid possible grammatical errors and ambiguities. The question arises most frequently in the "which" or "that" construction discussed above. If we say "Harvard Observatory has one telescope with which the public may observe," we find, on detaching the "which" clause according to the tests of the preceding paragraph, that we infer: "Harvard Observatory has (only) one telescope. The public may observe with it." The meaning is entirely changed. We intended the clause to be defining in nature and "that" must be substituted. We do not say "with that," however; "that" sends the preposition to the end and we have: "Harvard Observatory has one telescope (that) the public may observe with." "That" is enclosed in parenthesis since it may be omitted, but its existence is none the less inferred. The well-known paradoxical expression, so often cited as a bad example, is entirely correct grammatically: "A preposition is a poor word to end a sentence with."

15. "Shall" and "will." It should scarcely be necessary to point out so simple and important a rule as the correct usage of the verb to be. Where simple or conditional futurity is meant, "shall" and "should" are to be employed with the first person, singular or plural, and "will" and "would" with the other persons. Use "I shall now demonstrate" instead of "I will now demonstrate."

16. Split infinitives. This error is so generally understood that no detailed explanation is necessary. A split infinitive, although not desirable in itself, is preferable to ambiguity or to artificiality. The sentence, "Our object is to further cement trade relations," will be ambiguous if "further" is placed either before or after the infinitive. Ambiguity may arise when the adverb may be taken to modify the verb, the infinitive itself, or the object of the infinitive. Thus if the word following the infinitive is an adjective or a participle, or if the adverb may have an adjectival use (as in the above example) confusion may result. In "We desire to economically construct reflecting telescopes, larger than those currently employed in astronomical research," the word "economically" is in the middle of the infinitive. In such examples the split infinitive is definitely sanctioned by the best authorities. But remember that, whereas a truly great writer may split his infinitives purposefully, you may be criticized by those ignorant of the distinction. Recast the sentence, if you wish to play safe.

17. "Provided (that)." Use "provided (that)" only if the main body of the sentence expresses the condition necessary to the rest of the sentence. Test: try "if" in place of "provided." If the meaning of the sentence is not impaired, then "provided" is probably incorrect.

18. "Data" is plural and always takes the plural verb. Do not be illiterate to the extent of writing "Data was kindly supplied by. . . ."

19. "Only." This word is very frequently misplaced. "Only" should be placed in the sentence immediately preceding the precise part qualified by it. It is wrong to say "I only obtained one plate before the clouds came." You actually mean to say "I obtained only one plate. . . ."

20. Squinting modifier. Unless the author is careful, a phrase whose meaning is clear to himself may be capable of a double interpretation. Placed between two parts of a sentence, the phrase may squint backwards and forwards and the reader will have to take his choice of two possible

meanings. An example of the squinting modifier is: "It will be necessary to approach the problem of how a star emits its energy from the other end."

21. "Due" and "owing." The word "due" is very frequently misused in scientific work. The phrase "Due to something or other" is always an adjective, never an adverb. As an adjective, it must govern a noun and the most common way to make it govern the noun is to use it in conjunction with the verb to be. We frequently find statements like the following: "Due to bad weather the series of observations was interrupted." In this example, due has an adverbial construction modifying interrupted rather than the series of observations. Nor may we say "Owing to bad weather, the series etc," because of the dangling participle. We may write "Owing to bad weather, an interruption accurred in the series of observations," or "The interruption in the series was due to bad weather." "Owing to" may be used either as an adverb or as an adjective and it is also correct so say "The interruption in the series was owing to bad weather," although the "due" gives a smoother sentence in this type of construction. As an alternative construction we may say: "Because of bad weather the series. . . ." While the author should know the distinction, he should at least remember that he is much less likely to go wrong if he uses "owing to" rather than "due to." "Due to," at the beginning of a sentence, is a danger signal. "Because of" is generally a safe compromise.

22. "Different than" and "different from." The latter construction is greatly preferable.

23. "Compared with" and "compared to." Which of these two constructions is employed will depend on the meaning the author intends to convey. If he writes "John compared me to Lincoln," he signifies that John puts the author in the same class with Lincoln. If he says "John compared me with Lincoln," he means that John has shown where the author resembled or failed to resemble Lincoln. Where an actual detailed comparison is implied, with possible differences, use the preposition "with." Do not say "The new observations are of excellent quality compared to the old."

24. "However." Many writers are inclined to begin a sentence with the word "However." This procedure is definitely wrong. "However" should come immediately after the word that it qualifies. If such a word is

not obvious or if there seems to be more than one choice, then the author should probably not use the "however" construction.

25. "Whose" and "of which." It is permissible, in fact desirable, to use "whose" in referring to inanimate objects.

26. "Onto." The best usage says that "onto" is not a legitimate word. Use "on," "upon," or "to" instead. Do not try to escape the difficulty by using the word divided into syllables. The only place where "on to" is allowable is when "on" is used as an adverb. "He went on to town."

27. "And so." The introduction of a phrase with "So" or "And so" lends a juvenile appearance to one's writing. "The shutter stuck so we were forced to guess the exposure time." Use conditional clauses instead. "Because the shutter stuck, we were forced to guess the exposure time."

28. Hyphenation. Many authors, basing their actions on the loose statement that hyphenation is out of date, make mistakes. While it is true that we have today a growing tendency for joining together words that were once connected by a hyphen, usage frequently demands hyphenation.

When two nouns are joined together to modify another noun, as "the Harvard-Lick observations," a hyphen is required. It is also required when an adjective, modifying the first noun, does not properly modify the second noun, as in "naked-eye observations." If the hyphen were omitted, the word "naked" would modify observations. We should say, however, "Observations with the naked eye." The adjective "well-known" should be used with a hyphen if it precedes the noun. Thus "Russell's well-known work," is correct, but we should also say "Russell's work is well known."

The numbers from twenty to a hundred should be hyphenated, as in "twenty-five plates were secured." Numbers one to ten are customarily spelled out, except in enumerations and in dimensional specifications. In fractional numbers spelled out, the numerator and the denominator should be connected with a hyphen unless either already contains a hyphen: two-thirds, one-half, thirty one-hundredths, thirty-one hundredths. There is an exception to the general rule quoted above, which will be seen by study of the sentence: "One half of the work was done at Harvard, the other at Bloemfontein."

A list of compound words may be found in Appendix II. In some cases hyphens are used, in other, hyphens are not used, and in still further cases the compound word has become one word.

29. Contractions. Contractions like "isn't," "aren't," and "don't" are not used in formal writing.

30. Abbreviations. Approved abbreviations for UCRL reports may be found in Appendix III.

31. Greek Alphabet. Letters of the Greek alphabet are given in Appendix IV.

32. Chemical Elements. A list of the elements of the periodic table with their atomic numbers and their symbols may be found in Appendix V.

33. Proofreading. A list of signs used in correcting proof is given in Appendix VI.

Every writer should have at hand the following books or their equivalent: a dictionary (the Concise Oxford English Dictionary is perhaps the best for desk references), Fowler's Dictionary of Modern English Usage, Roget's Thesaurus, Genung's "The Working Principles of Rhetoric," and a dictionary of synonyms.

Reproduction

Text

Research and development reports at UCRL are typed from manuscript on Multilith Duplimat masters for reproduction. Special carbon type ribbons are required on typewriters to be put to this use. Special erasers and special pencils for insertions and corrections are also required for these masters. These special materials are obtainable from the Storeroom. In handling the stencils one should exercise care to keep from smudging or leaving fingerprints on them.

Illustrations

Reproduction of half-tones and line drawings is accomplished by making a photographic negative. From the negative, by a photographic process, a multigraph plate is made which is run on the multigraph machine for the desired number of copies. Half-tones may be obtained in as large a size as 8 in. by 10 in. Line drawings may be obtained in one size, 5 in. by 7 in.

Theses

The form suggested for UCRL reports is in general an acceptable form for theses. The title page* required by the Graduate Division is provided by the author. The typists in the Information Division are instructed as to its use and as to variations in thesis distribution from internal and standard distributions.

Internal Reports

Reports that receive only an internal distribution follow the same form as that illustrated in this report. Although these reports are sometimes less formal than other reports, care should be exercised to include authors' names and date of the report. The internal distribution appears on the distribution page. Internal reports may not be sent outside the Laboratory without the permission of the AEC, as obtained by the Information Division.

Publication

Reports of articles to be published may follow the form and rules prescribed by this report. The Information Division prepares publication copies of reports to be published. These copies are printed on one side of the paper only; glossy prints or original drawings of figures are included. The Information Division will submit the copies to the journal if desired.

Reprint order blanks are returned to the authors with page proofs. These blanks should be given to the Information Division since the Laboratory makes a practice of ordering reprints of articles by Laboratory personnel.

Abstracts of all papers contributed for presentation at American Physical Society meetings must be received at the UCRL Information Division on a date to conform with a published deadline some 3 to 4 weeks prior to the meeting. They must consist of a single paragraph and be held within the limit of 200 words. They must be typewritten on a single page, and a carbon copy must be enclosed. Any "display" formula, i e., one which must be printed in a line by itself, and cannot be printed continuous with

* The thesis title page is obtained from the Graduate Division.

the text, counts as forty words. Any footnote counts as ten words, and each line in a table as ten words. Model for such an abstract may be found in Appendix VII.

CONCLUSIONS

The conclusion of a report should answer the question, "What were the results of this work?" It should logically complete the remarks that were made in the Introduction. The Introduction and the Conclusions should be written so as to give a complete summary of the work. The title of this section is sometimes called "Summary" or any other heading that is appropriate to the particular report.

INSTRUCTIONS FOR PROCESSING SECRET REPORTS OMITTED

APPENDIX II

Spelling Guide

Words whose spelling, hyphenation or capitalization have caused uncertainties are listed below:

air equivalent

α-particle
alpha particle

α-ray
alpha ray

audiofrequency

autoionization

bandwidth

bremsstrahlung

build-up

bypass

cathode ray (noun)
cathode-ray (adj.)

center of mass (noun)
center-of-mass (adj.)

Compton effect

Compton line

cooperate

coordinate

cosmic ray (noun)
cosmic-ray (adj.)

coulomb (noun)
Coulomb (adj.)

co-worker

cross section (noun)
cross-section (adj.)

dipole

Doppler effect

d-p

eigenvalue

electrooptical

end point (noun)
end-point (adj.)

erg gauss^{-1}

extranuclear

fine structure

footnote

formulas, formulae

fourier

full width

Gamow barrier

Gamow-Teller selection

gaussian

Geiger-Muller

grating space

half life (noun)
half-life (adj.)

half maximum

half value

half width

hyperfine structure

inch (never use " sign in body of paper)

184-inch

60-inch

infrared

<u>in vivo</u>

isoelectronic

K-capture
K-electron capture
kilocycles
knock-on event
Kurie plot
line breadth
lifetime
magnetooptical
mean free path
mean life
megacycles
microamperes
microphotometer
microvolt
mock-up
n-n
nonnegative
nonradioactive
n-p
one-half
one-tenth
over-all
percent
photocurrent
photoeffect
photoelectric
photomultiplier
pickup
p-p
preoperational
pumpdown
quantum-mechanical
radioactive
radioactivity
radiocarbon, etc.
radioelement
radiofrequency
short-lived (adj.)
singlet-tripled (adj.)
subcooled
superheated
symmetry
thermionic
time of flight (noun)
time-of-flight (adj.)
two-electron
two-prism
ultraviolet
Van de Graaff
wave function
wave length
wave number
wave packet
x axis
x-ray
x-radiation
y axis

APPENDIX III

Abbreviations and Symbols

The list below shows the form which certain common abbreviations should take. Reference works do not all agree on the exact form of these abbreviations. In some cases editorial license has been taken to obtain consistency with majority practice or common usage. No period is used with the symbol for chemical elements.

about (dates)	ca.
absolute	abs.
absolute ampere	abamp
acceleration due to gravity	g
addition	addn.
against (versus)	vs.
alternating current (noun or adjective)	ac
amorphous	amor.
ampere(s)	amp
ampere-hour(s)	amp-hr
and others (and elsewhere)	et al.
angstrom unit	A
anhydrous	anh.
antilogarithm	$\log^{-1}$
approximate(ly)	~ or approx.
atmosphere (unit)	atmos
atmosphere, standard	A_s
atomic mass unit	amu
atomic number	at. no.; Z
atomic weight	at. wt; A
atomic weight unit	awu
audiofrequency	af
automatic gain control	AGC
average	av
barn	spell out
barometer	bar.
barrel	bbl
Baumé	Bé
billion electron volt	Bev
biological	biol.
boiling point	bp
brake horsepower	bhp
Brinell hardness number	Bhn
British	Br.
British thermal unit	Btu
calculated	calc.
calorie(s) (gram)	cal
Calorie (i.e., kilogram-calorie)	kcal
candlepower	cp
capacity, capacitance	C
center of mass	c.m.
Centigrade	C
centimeter	cm
centimeter-gram-second (system)	cgs
centimeters per second	cm/sec

centipoises	cp
chemical	chem.
chemically pure	c.p.
circa	ca
circular mils	c.m.
circumference	circum.
coefficient	coef.
cologarithm	colog
compare	cf.
concentrate(d)	conc.
Continued (or continued)	Contd. (or contd.)
continuous wave	cw
cosecant	csc
cosine	cos
cotangent	cot
counts per minute	cpm
cubic	cu
cubic centimeter	cm^3 or cc
cubic foot	ft^3
cubic feet per minute	cfm
cubic feet per second	cfs
cubic inch	in^3
cubic meter	m^3
cubic micron	μ^3
cubic millimeter	mm^3
cubic yard	yd^3
cycles per second	cps
decibel	db
degree(s)	^{o} (or deg.)
degree(s) Baumé	^{o}Be
degree(s) Centigrade	^{o}C
degree(s) Fahrenheit	^{o}F
degree(s) Kelvin or degree(s) absolute	^{o}K
degree(s) Réaumur	^{o}R
density	d. or ρ
derivative	deriv.
deuteron	d
diameter	diam
dilute	dil.
direct current (noun or adjective)	dc
drawing number	dwg No.
distilled	dist.
division	div.
dozen	doz
dyne	d
edition (or editor)	ed.
efficiency	eff.
electric	elec.
electromagnetic unit	emu
electromotive force	emf
electron volt	ev
electrostatic unit	esu
equation(s)	Eq.
equilibrium	equil.
equivalent	equiv.
erg second	erg sec
estimate	est.
et cetera	etc.
exponent or exponential	exp
Fahrenheit	F
farad	f
feet per minute	fpm
feet per second	fps
Figure (or figure)	Fig.
foot	ft
foot-pound	ft-lb
for example	e.g.

formal (solutions e g 0.5 F)	F
frequency	freq.
frequency modulation	fm
gallon	gal
gallons per minute	gpm
Geiger-Mueller	G-M
gram	g
gram calorie	cal
gram-molecular volume	gmv
gram per liter	g/l
grams per cubic centimeter	g/cm^3 or g/cc
gravity, acceleration of	g
gravity, center of	C.G.
height	ht
henry	h
high explosive	HE
high frequency	hf
high voltage	hv
horizontal	hor.
horsepower	hp
horsepower-hour	hp-hr
hour	hr
hygroscopic	hyg.
hyperbolic cosecant	csch
hyperbolic cosine	cosh
hyperbolic contangent	coth
hyperbolic sine	sinh
in the place cited	loc. cit.
in the same place	ibid.
in the work cited	op. cit.
inch	in.
inch-pound	in.-lb
inductance-capacitance	LC
inside diameter	i.d.
insoluble	insol.
internal resistance	spell out
joule	j
Kelvin	K
kilocalorie	kcal
kilocalorie per mole	kcal/mole
kilocycle(s)	kc
kilocycles per second	kc or kc/sec
kilocurie	kc
kilo-electron-volt	kev
kilogram	kg
kilogram-meter	kg-m
kilograms per cubic meter	kg/m^3
kilograms per second	kg/sec
kilogram-weight	kg-wt
kilojoule	kj
kiloliter	kl
kilometer	km
kilometer per second	km/sec
kiloton	kt
kilovolt	kv
kilovoltampere	kva
kilowatt	kw
kilowatt-hour	kwh
kinetic energy	KE
lambert	L
least common multiple	LCM
lethal dose (subscript means percent)	LD_{50}
liter	l
logarithm, base of natural	e
logarithm (common)	log

logarithm (natural)	ln or $\log_e$
lumen	lu
lumen per watt	lu/w
mass	spell out
maximum	max
mean free path	mfp
mechanical	mech.
medium	med.
megacycle(s)	Mc
megacycle(s) per second	Mc
megavolt-ampere	Mva
megawatt	Mw
megawatt-hour	Mwh
melting point	mp
meter	m
meter-kilogram-second	mks
mho	spell out
microampere	μa
microangstrom	μA
microcurie	μc
microfarad	μf
microgram	μg
microhenry	μh
micromicrofarad	μμf
micromicron	μμ
micromole	μM
micron	μ
microsecond	μsec
microvolt	μv
microwatt	μw
miles per hour	mph
milliampere	ma
milliangstrom	mA
millibarns	mb
millicurie	mc
millicycle	mc
millifarad	mf
milligram	mg
milligram-hour	mg-hr
milligram percent	mg/100cc
millihenry	mh
millilambert	mL
milliliter	ml
millimeter	mm
millimeters of mercury	mm Hg
millimicron	mμ
million electron volts or mega electron volts	Mev
million volts	Mv
milliroentgen	mr
millivolt	mv
milliwatt	mw
minimum	min.
minute (angular)	'
minute (time)	min
molar (with number only, e.g., 0.5M	M
mole	M
mole percent	M% or mole %
molecular weight	mol. wt.
month	mo.
namely	viz.
National Bureau of Standards	NBS
natural logarithm	ln
negative	neg.
neutron	n
normal (solutions; with numbers only, e.g., 0.5N	N

nuclear magneton	nm
Number or number	No.
neutrons per square centimeter per second	neutrons/cm^2/sec or neutrons cm^{-2} sec^{-1}
observed	obs
oersted	use gauss
ohm	Ω or spell out
ohm-centimeter	ohm-cm
outside diameter	o.d.
parts per million	ppm
percent (with numbers, vol., mole, or in tabular form)	%
pint	pt
positive	pos.
potential difference	PD
pound	lb
pound-foot	lb-ft
pound(s) per cubic foot	lb/ft^3
pound(s) per square inch	psi
pound(s) per square inch, absolute	psia
pound(s) per square inch, gauge	psig
power factor	pf
precipitate	ppt.
pressure-volume-temperature (constant)	PVT
probable error	pe
proton	p
pulsed wave	pw
pulses per second	pps
radian	spell out
radiofrequency	rf
radius	rad
reference	ref.
relative biological effectiveness of radiation	RBE
respectively	resp.
rest mass	M_o
revolutions	rev.
revolutions per minute	rpm
revolutions per second	rps
roentgen	r
roentgen equivalent man	rem
roentgen equivalent physical	rep
root mean square	rms
rutherford	rd
secant	sec
second (angular)	"
second (time)	sec
sine	sin
soluble	sol.
solution	soln.
specific activity	sp. act.
specific gravity	sp. gr.
specific heat	sp. ht.
specific volume	sp. vol.
square	sq
square centimeter	cm^2
square foot	ft^2
square inches	in^2
square kilometer	km^2
square meter	m^2
square micron	μ^2
square millimeter	mm^2
square root of mean square	rms

standard	std
Switch designations:	
double-pole	dp
double-pole, single-throw	dpst
double-pole, double-throw	dpdt
triple-pole	3p
4-pole	4p
4-pole, double-throw	4pdt
tangent	tan
tangent, hyperbolic	tanh
technical	tech.
temperature	temp
that is	i.e
thousand electron volts	kev
thousand foot-pounds	kip-ft
thousand pound(s)	kip
thousand ton(s)	kt
ton	spell out
tons per square inch	Tsi
transmit-receive	TR
triton	t
ultrahigh frequency	uhf
U. S. Pharmacopeia	U.S.P.
velocity	vel.
versed sine	vers
versus	vs
vertical	vert.
volt	v
volt-ampere	v-a
volume	vol
volume percent	vol %
watt	w
watthour	whr
weight	wt
weight percent	wt %
yard	yd
year	yr

APPENDIX IV

Greek Alphabet

Alpha	A	α
Beta	B	β
Gamma	Γ	γ
Delta	Δ	δ
Epsilon	E	ϵ
Zeta	Z	ζ
Eta	H	η
Theta	Θ	θ
Iota	I	ι
Kappa	K	κ
Lambda	Λ	λ
Mu	M	μ
Nu	N	ν
Xi	Ξ	ξ
Omicron	O	o
Pi	Π	π
Rho	P	ρ
Sigma	Σ	σ
Tau	T	τ
Upsilon	Υ	υ
Phi	Φ	ϕ
Chi	X	χ
Psi	Ψ	ψ
Omega	Ω	ω

APPENDIX V

Chemical Elements

Actinium (89)	Ac
Aluminum (13)	Al
Americium (95)	Am
Antimony (51)	Sb
Argon (18)	A
Arsenic (33)	As
Astatine (85)	At
Barium (56)	Ba
Berkelium (97)	Bk
Beryllium (4)	Be
Bismuth (83)	Bi
Boron (5)	B
Bromine (35)	Br
Cadium (48)	Cd
Calcium (20)	Ca
Californium (98)	Cf
Carbon (6)	C
Cerium (58)	Ce
Cesium (55)	Cs
Chlorine (17)	Cl
Chromium (24)	Cr
Cobalt (27)	Co
Columbium (see Niobium)	
Copper (29)	Cu
Curium (96)	Cm
Dysprosium (66)	Dy
Emanation* (86)	Em
Erbium (68)	Er
Europium (63)	Eu
Fluorine (9)	F
Francium (87)	Fr
Gadolinium (64)	Gd
Gallium (31)	Ga
Germanium (32)	Ge
Gold (79)	Au
Hafnium (72)	Hf
Helium (2)	He
Holmium (67)	Ho
Hydrogen (1)	H
Indium (49)	In
Iodine (53)	I
Iridium (77)	Ir
Iron (26)	Fe
Krypton (36)	Kr
Lanthanum (57)	La
Lead (82)	Pb
Lithium (3)	Li
Lutetium (71)	Lu
Magnesium (12)	Mg

*Alternative name for Radon.

Maganese (25)	Mn
Mercury (80)	Hg
Molybdenum (42)	Mo
Neodymium (60)	Nd
Neon (10)	Ne
Neptunium (93)	Np
Nickel (28)	Ni
Niobium (41)	Nb
Nitrogen (7)	N
Osmium (76)	Os
Oxygen (8)	O
Palladium (46)	Pd
Phosphorus (15)	P
Platinum (78)	Pt
Plutonium (94)	Pu
Polonium (84)	Po
Potassium (19)	K
Praseodymium (59)	Pr
Promethium (61)	Pm
Protactinium (91)	Pa
Radium (88)	Ra
Radon (see emanation)	
Rhenium (75)	Re
Rhodium (45)	Rh
Rubidium (37)	Rb
Ruthenium (44)	Ru
Samarium (62)	Sm
Scandium (21)	Sc
Selenium (34)	Se
Silicon (14)	Si
Silver (47)	Ag
Sodium (11)	Na
Strontium (38)	Sr
Sulfur (16)	S
Tantalum (73)	Ta
Technetium (43)	Tc
Tellurium (52)	Te
Terbium (65)	Tb
Thallium (81)	Tl
Thorium (90)	Th
Thulium (69)	Tm
Tin (50)	Sn
Titanium (22)	Ti
Tungsten (74)	W
Uranium (92)	U
Vanadium (23)	V
Wolfram (see tungsten)	
Xenon (54)	Xe
Ytterbium (70)	Yb
Yttrium (39)	Y
Zinc (30)	Zn
Zirconium (40)	Zr

Actinide Elements - element 89 and above

Rare Earth (Lanthanide) Elements - elements 57 through 71

APPENDIX VI

Signs Used in Correcting Proof

⁊	Delete; take out.
STET	Let it remain: change made was wrong.
⊙	Insert a period.
‖	The type line is uneven at the side of the page; straighten.
=	A hyphen.
⁀	Join together.
⁊	Take out letter and close up.
center	Put in middle of page, or line.
///	Straighten lines.
⋁	Insert an apostrophe.
⋀	Insert a comma.
⌐¬	Raise the word or letter.
⌐¬	Lower the word or letter.
⊏	Bring matter to the left.
⊐	Bring matter to the right.
#	Make a space.
a	Insert a superior letter or numeral.
1	Insert an inferior letter or numeral.
lead	A thin metal strip used to widen the space between the lines.
space out	Spread words farther apart.
¶	Make a paragraph.
no ¶	Run on without a paragraph.

cap.	Use capitals. r means R
l. c.	Use the lower case (small type), i.e., not capitals. ~~R~~ means r
~~R~~un	Use lower case r.
~~R~~UN	Use lower case throughout.
T~~A~~BLE	Capitalize initial letter only.
hold	Use capital H.
Run or caps	Capital letters.
run or s.c.	Small capitals.
run	Capital letters and small capitals
font	Kind of type.
tr. ∩∪	Transpose.
rom.	Use roman letter.
∧	Indicates where an insertion is to be made.
w.f.	Wrong font - size or style.

APPENDIX VII

An example of an abstract of a paper to be presented at an American Physical Society meeting:

Internal Momentum Distributions from Scattering Experiments. J. B. CLADIS, W. HESS, B. J. MOYER. Radiation Laboratory, Department of Physics, University of California, Berkeley, California.

The mean free path in nuclear material and the de Broglie wave length of a 340-Mev proton are such that a single collision with a nucleon of a light nucleus is expected when the proton is scattered. Thus, at scattering angles greater than about 25°, where interference terms are small, the proton energy spectra reflect the momentum distribution of the nucleons in the target nucleus. An expression for the spectra as a function of momentum distribution and scattering angle has been given by Wolff.[1] Energy spectra of protons scattered from H, D, and C have been obtained at scattering angles of 30° and 40°. These spectra are obtained by deflecting the protons by a magnetic field into channels defined by proportional counters and a bank of 35 Geiger counters. Spectra calculated by inserting the theoretical momentum distribution for the deuteron and the gaussian distribution[2] for carbon into Wolff's formulae fit the data fairly well at both angles. The Chew-Goldberger distribution contains too many high-momentum components.

This work was performed under the auspices of the Atomic Energy Commission.

---

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F	Figures	7
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G	Gerunds, dangling	13
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H	"However"	16
	Hyphenation	17, 24
I	Infinitives, split	15
	Internal reports	19
	Introduction	5
	Italics	12
J		
K		
L	"l" (unit or letter)	12
M	Manuscript	6
	Margins	6
N	Notebook References	11
	Numbers in Body of Manuscript	11
O	"Only"	15
	"Onto"	17
P	Paper size	6
	Participles, dangling	13
	Patent References	11
	Periodical References	10
	Preposition at end of sentence	14
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Q		