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updated July 1997**

Guide to Preparing SAND Reports

Tamara K. Locke, Editor

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

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Guide to Preparing SAND Reports

Tamara K. Locke, Editor
Creative Arts Department
Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185-0619

Abstract

The *Guide to Preparing SAND Reports* contains guidelines for producing SAND Reports and other information releases. Its guidelines reflect DOE regulations and Sandia policy. The Guide includes in Section 1, policies for protecting and reproducing official information at Sandia, SAND number information, and Review & Approval procedures; in Section 2, basic writing instructions, which are illustrated in an annotated sample report; in Section 3, an explanation of the format, layout, and graphics of SAND Reports and a table that details the markings and legends needed for report covers and title pages; in Section 4, the procedures for reproducing and distributing SAND Reports; and in Section 5, information on presentations and conference papers, journal articles, book chapters, and brochures. The appendixes contain sections on Sandia's preferred style, usage, and grammar; equations; report references; and trademarks and copyrights.

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Preface

This guide contains basic information needed to prepare a SAND Report. Although it is addressed primarily to authors who write and format their own reports, and who often computer-generate their own artwork, it will help all persons who process SAND Reports.

The guide is divided into five sections, each dealing with a logical division of the reporting process:

- **Section 1** covers the policies for protecting and reproducing official information; it also explains SAND numbers and the Review & Approval process.
- **Section 2** gives basic guidance on writing a report, as well as information on the peer review process. Most of the actual writing instruction is given in boxed annotations to a sample SAND Report. This method was chosen to provide both instructions and a sample on the same page for convenience. The annotation is a reminder of what should be included in each section of the report.
- **Section 3** covers format, layout, and graphics, with accompanying examples.
- **Section 4** deals with the final processing of masters through printing and distribution.
- **Section 5** covers presentations and conference papers, journal articles, book chapters, and brochures.

The appendixes provide information about Sandia's preferred SAND Report style, usage, and grammar; how to use equations and references in SAND Reports and other information releases; how to use trademark and copyright symbols, and how to get permission to use other another person's work.

SECTION 1

Policies for Protecting and Reproducing Official Information at Sandia National Laboratories; SAND Numbers; and Review & Approval (R&A) of Communications Products

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Guide to Preparing SAND Reports

Policies for Protecting and Reproducing Official Information at Sandia National Laboratories

Introduction

As a contractor to the Department of Energy (DOE), funded under DOE contract DE-AC04-94AL85000, Sandia National Laboratories (SNL) is required to conform to DOE Directive 1430.1D in preparing Scientific and Technical Information (STI) (which is one type of official Sandia information):

. . . in any format or medium which is derived from scientific and technical studies, work, or investigations which relate to research, development, demonstration, and other specialized areas such as environmental and health protection and waste management. Classified, declassified, and sensitive information are included in the scope of the definition. The primary points of origination of DOE-funded Scientific and Technical Information are management and operating contractors, direct DOE-executed prime procurements, and DOE-operated research activities.

In addition, DOE Directive 5650.2B requires a classification review of all public or widespread internal Sandia information releases *before* the information is released. This includes STI, as well as non-STI, information releases.

The *Guide to Preparing SAND Reports* reflects DOE requirements that are concerned with the physical production and protection of information releases. It includes information on SAND numbers, Review & Approval, format of the cover and title pages, elements of the report, required markings, and DOE/OSTI (Office of Scientific and Technical Information) copy requirements. It also reflects Sandia's Laboratory Communications policies.

Protection of Information

The level of protection that must be applied to different types of reports includes—

- (1) Physical protection while the report is being produced.
- (2) Special markings that are applied to the report.

- (3) Distribution limitations as reflected by the markings. The level of protection is divided into three major categories: Unlimited Release, Unclassified Controlled Information (UCI), and Classified:

Unlimited Release—Information in this category requires no special protection and has no distribution limitations.

Unclassified Controlled Information—Information in this category is unclassified but sensitive; it requires both physical protection and marking with limitation statements as specified in DOE Directives. Examples of such categories are Unclassified Controlled Nuclear Information (UCNI) and Export Controlled Information (ECI).

Classified—Information in this category is classified and requires physical protection during document preparation (accountability) and appropriate security markings that show (1) the classification level and category of the information and (2) the physical protection required. Classified information levels are Top Secret, Secret, and Confidential, whereas classified information categories are Restricted Data (RD), Formerly Restricted Data (FRD), and National Security Information (NSI).

See Sample 3-7 for the markings and required physical protection for UCI and classified reports, and their associated access restrictions.

Reproduction of Masters

All reproduction from camera-ready masters for publishing of Sandia reports **must** be processed through the Sandia Print Shop (Printing & Duplicating Dept. 12630 in NM or Technical Communications Dept. 8815 in CA). This practice is in compliance with the regulations issued by the Department of Energy and the Joint Committee on Printing.

In addition to reproducing through the standard printing processes, “reproduction” guidelines extend to duplicating on a copier. Multiple copies of drafts for review may be duplicated by non-Sandia sources (such as contract companies used by Sandia) or by Sandians using copiers, provided that no more than 25 copies of the document are produced per job. Again, these copies that can bypass the Sandia Print Shop are **only for review purposes** and must not be used as the final publication.

NOTE: We recommend that you use the most cost-effective way to produce your draft copies. If you will be copying more than 5,000 pages, we recommend that you consider using the Sandia Print Shop, where copying charges will be less.

Use of Logos on Internal Pages of SAND Report

Laboratory Communications policy says to avoid using the SNL logo (thunderbird) on internal pages of a document. The SNL logo must be used on the lower right corner of every Sandia slide and viewgraph, but if these slides and viewgraphs later appear in a SAND Report, the SNL logo should be deleted. In addition, departmental logos should not be used on figures or viewgraphs used in a SAND Report.

The DOE seal should not be used on any Sandia document unless the document is produced jointly with the Department of Energy.

Creating a Corporate “Common Look and Feel” on Communication Media

One goal of the Public Relations & Communications Center is to create communication media for public release that conveys a consistent, professional image with a unified corporate look.

Sandia’s Corporate Signature

The single most identifiable visual element of a corporation is its corporate signature (Figure 1-1). Our signature (the Sandia thunderbird insignia and the Sandia National Laboratories logo) is a trademark symbol we use to establish and enhance name recognition among our customers and the general public. Applying the Sandia signature consistently, properly, and prominently on all communication media is extremely important.

The preferred signature is the stacked format in Sandia blue (alternatively, the insignia in Sandia blue and the logo in black).

The corporate signature must be used on any Sandia documents that will be released to external audiences (including SAND Reports). It should appear on the front and back covers and on the spine (if applicable) of all distributed documents and publications, as well as on all presentation materials.

Sandia’s corporate signature must always be reproduced from approved official camera copy or computerized versions. The Public Relations and Communications Center 12600 provides consultation on the proper use of the corporate signature. To download computerized versions of the corporate signature, refer to the Public Relations and Communications Center’s Web site (under Services, Lab Communications/New Mexico, “download TIFF or bitmapped files of Sandia and Lockheed Martin logos”).

The corporate signature has only two configurations: the horizontal and the stacked. Within each configuration, the position and size of the thunderbird insignia in relation to the logotype is fixed and must not be altered.



Figure 1-1. Sandia's corporate signature, in horizontal and stacked configurations.

Guidelines for Producing and Releasing Promotional Communication Media (Public Communication)

On July 29, 1996, the Laboratory Operations Council approved the implementation of a corporate process to ensure the review of promotional communication media intended for public release. This process will ensure that a consistent, professional image is conveyed, as well as a unified corporate look.

“Promotional communication media” (or “Public Communication,” as it is referred to in Section 9 of the R&A Form) is any set of communication products created in any medium (for example, video, exhibits, publications, multimedia, Internet/World Wide Web) that is primarily intended for external audiences and not used solely for the purpose of communicating scientific and technical information. Promotional products are created to attract business, promote capabilities, convey general corporate information, or generate goodwill.

Products generally not considered promotional include traditional SAND Reports conveying scientific and technical information, project- and program-level presentations and reports, and Web-based collaborations consisting primarily of scientific and technical works-in-process.

Getting your promotional communication media (Public Communication) reviewed:

1. You should discuss your ideas for creating promotional information with one of the following individuals before committing funds for a product design. They will provide free consultation to help you develop a design that is consistent with the “common look and feel” guidelines.

Bruce Fetzner, 12680 (NM), MS 0129, (505) 844-0587.

Manny Ontiveros, 12690 (NM), MS 0129, (505) 844-8535

Bob Tucker, 8815 (CA), MS 9021, (510) 294-2388

NOTE: The following two required reviews are arranged by the Review and Approval Desk Coordinator (NM) or the Technical Communications Department (CA). See the Instruction for Section 9 of the Review and Approval Form (SF 1008-RA).

2. Your promotional information must be approved by Public Relations & Communications during Review & Approval. The above contacts also approve design concepts as reviewers in the Formal Review & Approval Process.
3. Your promotional information must have DOE approval, which takes considerable lead time. To more rapidly complete the R&A process, start the procedure for getting DOE approval for Public Communications (recorded in Section 9 of the R&A Form) at the beginning of the Review & Approval process, while other R&A steps are being initiated. Contact the Review & Approval Desk Coordinator (NM) at (505) 845-8220 or Technical Communications Dept. 8815 (CA) at (510) 294-2388 for help in obtaining this approval.

Sandia’s Corporate Image

We want to visually affirm and convey our image as a federally funded laboratory dedicated to exceptional service in the national interest and founded to provide the nation’s nuclear deterrent. We are, and will remain, one of the primary providers of engineering and science needed to ensure national security. The following quotes and slogan reflect this image:

- “. . .exceptional service in the national interest.” (quote from Truman letter)
- “We are a National Security Lab” (from Strategic Objectives)
- Ensuring the Nation’s Security—Yesterday, Today, and Tomorrow

Design Elements

The following graphic elements visually reinforce our image. They are a guide in the graphic design of any communication media intended for external audiences. These elements (listed in order of priority) can be used as a whole or in combination to provide a unifying look to communication media:

- Sandia corporate signature
- Red, white, and blue color theme
- American flag
- “. . .exceptional service . . .” slogan
- United States geographic outline
- Sky background or backdrop
- Gold as an accent color

For more information on the use and appearance of the corporate signature, or to see examples of graphic elements that should be incorporated into your promotional product design, use the following address on the internal Web:

<http://www.sandia.gov/SandiaOnly/RevApprov/PromoMed.html>

Select: Graphic Design Resources

SAND Numbers

SAND numbers (for example, SAND97-1234) are used to track official releases of Sandia documents. Official releases are information that reflects or represents Sandia National Laboratories' policies, operations, and activities. SAND numbers are assigned to most Sandia official information releases. The SAND number is made up of the year, the sequential number of the document, and sometimes a suffix that indicates the category of the document (for example, SAND97-1112J for a journal article).

SAND numbers are issued at the final stage of Review & Approval by the R&A Desk Coordinator. This means that documents go through Classification and Sensitive Information Dept. 7447, and through Patent and Licensing Dept. 11500, without a SAND number.

Types of SAND Documents (Information Release)

Listed below are the types of SAND documents and an example of the appropriately suffixed SAND number for each.

Document Type	Suffix	Example
Abstract (brief or extended) ¹	A	SAND97-1112A
Audio/Video/Film	None	SAND97-1112
Conference Paper	C	SAND97-1112C
Conference Presentation	C	SAND97-1112C
Electronic Posting	None	SAND97-1112
Exhibit/Display/Poster	None	SAND97-1112
Internal Memorandum ²	None	SAND97-1112
Journal Article	J	SAND97-1112J
Publication (brochure, newsletter, fact sheet, etc.)	None	SAND97-1112
Report	None	SAND97-1112
Slides/Viewgraphs	C	SAND97-1112C

1. When an abstract is developed into any type of report, use the original SAND number with the appropriate suffix for that type.
2. If you want to disseminate an internal memorandum outside of Sandia at a later date, format it into an official SAND Report and send it through full Review & Approval. (Internal memorandums have been given SAND numbers since early 1993; before that they were tracked by Reference Symbol numbers.)

Note: When you are assigned a SAND number for one type of document, such as an abstract, conference paper, or journal article, and the document later becomes a SAND Report, use the same SAND number with no suffix. Other guidelines are given in the section “SAND Numbers for Changed Type of Report.”

A more detailed description of the various types of SAND documents and how they should be sent through Review & Approval is presented on pages 30-36.

SAND Numbers for Changed Type of Document (Information Release)

If you want to publish a report or present a paper in a form that is different from the form that was originally approved, follow these guidelines:

- **If you did not make substantial technical changes to the document and the new audience does not change the original distribution limitation**, the document does not have to be sent through Review & Approval again. Instead, send a memo to the Review & Approval Desk Coordinator, explaining the circumstances of the new publication. Figure 1-2 shows a sample of this type of memo, and more explanation is given later in this section, under “Review & Approval (R&A) of Communications Products” (subsection, “Changing Types of Approved Communications Products”).

For the document number, use the original SAND number with the appropriate suffix for the new document type. For example: conference paper SAND94-2233C becomes SAND94-2233 if it is published as a SAND Report, or SAND94-2233J if it becomes a journal article (Figure 1-2). **NOTE:** Send five copies of the SAND Report (or one copy in Sandia/CA) to the Technical Library. See page 52.

- **If you did make substantial technical changes to the document**, send the document through the Formal Review & Approval Process, and a new SAND number will be assigned at the Review & Approval Desk 12690, Bldg. 894, Room 201. (At the end of this section, see “Review & Approval (R&A) of Communications Products,” for more information.)
- **If the scope of the distribution or audience has grown beyond the originally approved information release, but you did not make substantial changes to the document**, publish the document as a reprint. On the title page, one space below the “Reprinted” date, insert the following note. Adjust the wording to reflect your situation appropriately:

The only change to this document is the distribution limitation, which has changed from ~~—(old limitation)—~~ to ~~—(new limitation)—~~ .

NOTE: Review & Approval of the document is required — see next page . . .

To document and get approval for a distribution limitation change :

- **When the distribution limitation of a SAND Report changes at Sandia (NM)**

1. Complete either the hardcopy or the Web version of the Review & Approval Form through Section 6 to document the changes and to get required signatures. (The Web version of the Review & Approval Form, called “1008ra,” is located at <http://www-irn.sandia.gov/corpdata/corpforms>.)
2. Send the R&A Form, a copy of the report, and a memo justifying the recommended change to Classification and Sensitive Information Review Department 7447, where the change will be reviewed.
3. The Classification Department will send the information to the R&A Desk Coordinator, who will record the change and forward the information to the Technical Library.
4. The Technical Library will get all necessary approvals and send out notifications of the change.

- **When the distribution limitation of a SAND Report changes at Sandia (CA)**

1. The requestor should send a memo or a Review & Approval Form (SF 1008-RA) to Central Technical Files, 8940-2 (MS 9018), signed by the Classification Department, the Patent Office, and the Director of the issuing organization, authorizing the new distribution (for example, changing from Internal Distribution Only to Unlimited Release).
2. Central Technical Files notifies the original distribution of the new distribution limitation.
3. If it is necessary to reprint the report in order to send copies to the additional distribution, the following notice should be printed below the “Reprinted” date:

~~Note: The distribution limitation for this report has been changed from~~
(old limitation) to (new limitation) .

If you have questions, call the Review & Approval Desk Coordinator (NM) (505-845-8220), Classification Dept. 7447 (505-844-8699), or Technical Communications Department (CA) (510-294-2388).

SAND Numbers for a Revision

If you **made** substantial technical changes to the content of a SAND Report that is to be republished, it becomes a revision. You may choose to

- (1) Keep the original SAND number followed by the word “Revised” (on both the cover and title page). *The choice to keep the original number might be so that the continuity of the information would be immediately apparent or because the original SAND number has been referenced in other publications.*
- (2) Obtain a new SAND number.

NOTE: The **supersession statement** appears below the print date on both the cover and title page of a revision, whether the original SAND number is used or a new SAND number is assigned. Example of a supersession statement:

Supersedes SAND89-0996,
dated October 1993

(Also see cover and title page of this *SAND Guide* for another example.)

SAND Numbers for a Reprint

If you did **not** make substantial technical changes or distribution limitation changes to the content of a SAND Report that is to be republished, it becomes a reprint. Reprints retain the original SAND number. Also, see the third bullet under “SAND Numbers for Changed Type of Document,” on page 22.

Subsequent Presentation of the Same Paper

If you want to present the **same** paper to a group different from the one you originally addressed, and the distribution limitation is unchanged, send a memo explaining the circumstances to the Review & Approval Desk Coordinator, MS 0619 (Figure 1-3). Attach a copy of the original Review & Approval Form.

For a previously approved document to change to a new document type, send an informational memorandum to the Review & Approval Desk Coordinator, MS 0619 (12690). The R&A process does not have to be repeated if you did not make substantial changes to the technical content or if you did not make distribution changes affecting access restrictions.

Sandia National Laboratories
Albuquerque, NM 87185

date: February 7, 1997
to: Review & Approval Desk Coordinator, MS 0619 (12690)

from: (Manager), MS 0767 (9604) ← **Signed by Department Manager**
subject: Presentation of Previously Cleared Material

John Doe will present a conference paper entitled "Microsensors" at Aerojet General in Sacramento, CA, on Tuesday, February 25, 1997. This presentation will cover material previously cleared under SAND97-0641J. The number of the presentation will be SAND97-0641C.

Copy to:
MS 0766 A. C. Smith, 9600
MS 0783 J. D. Doe, 9611

- Attach a copy of the signed-off R&A form from the first version of the document.
- Attach a copy of the title page and distribution list if the document is being changed into a SAND Report.

Sandia National Laboratories
Albuquerque, NM 87185

date: February 7, 1997
to: Review & Approval Desk Coordinator, MS 0619 (12690)

from: (Manager), MS 0533 (2341)
subject: Submission of SAND97-2233C as a Journal Article

John Smith's SAND97-2233C, "Comparisons of Widgets and Gizmos," previously approved as a conference paper, is now being submitted to the *Journal of Solar Energy Engineering* as a journal article, under the number SAND97-2233J.

Copy to:
MS 0533 John Smith, 2341

Figure 1-2. Memorandums informing the Review & Approval Desk Coordinator of changed type of SAND Report.

For subsequent presentation of the same paper to a group different from the one originally addressed, send an informational memorandum to the Review & Approval Desk Coordinator (MS 0619). The R&A process does not have to be repeated if there were no substantial changes made to the technical content or if no distribution changes affecting access restrictions were made.

Sandia National Laboratories
Albuquerque, NM 87185

date: April 12, 1997
to: Review & Approval Desk Coordinator, MS 0619 (12690)

from: (Manager), MS 1175 (6513)
subject: Presentation of Previously Presented Conference Paper

John Doe has been invited to present the conference paper entitled "Microsensors" that he originally presented at Aerojet General in Sacramento, CA, on Tuesday, February 25, 1997, to a new audience at Los Alamos National Laboratories on June 6, 1997. This presentation will cover exactly the same material that was previously cleared under SAND97-0641C.

Copy to:
MS 1143 A. B. Brown, 6500
MS 1146 J. C. Doe, 6505
MS 0173 P. N. Jones, 7400

- Attach a copy of the signed-off R&A form that was prepared the first time the conference paper was presented.

Figure 1-3. Memorandum informing the Review & Approval Desk Coordinator of the subsequent presentation of the same paper.

Review & Approval (R&A) of Communications Products

What is Review & Approval?

Every communications product going outside of Sandia, as well as those internal communications that receive widespread distribution, regardless of format and regardless of whether it is Scientific and Technical Information, is considered an official Sandia information product.

Information released from Sandia—whether it is a report, conference paper, journal article, memo, newsletter, speech, video, or electronic posting—requires appropriate Review & Approval.

Note: *Electronic postings of Sandia information on the external World Wide Web must go through the Formal Review & Approval Process.*

All released communications products go through Sandia's Review & Approval process. This process, established in compliance with DOE Directives 1430.1D and 5650.2B and Sandia National Laboratories directives, applies to all information released by Sandia. In general, information published outside of Sandia must be reviewed by Sandia's Classification Department, Patent and Licensing Department, and finally by the Review & Approval Desk Coordinator (details of the process are provided in "Sandia's Review & Approval Process," later in this section).

Three types of R&A processes used at Sandia:

- ***Formal R&A Process.*** In general, information released outside of Sandia is assigned unique SAND numbers and must be reviewed by Sandia's Classification and Sensitive Information Review Department 7447, Patent and Licensing Center 11500, and finally by the R&A Desk Coordinator in Org. 12690. (At Sandia/CA, Technical Communications Dept. 8815 coordinates these functions.) The R&A Form (SF 1008-RA) must be completed through Section 10.
- ***Organizational R&A Process.*** Other less formal external releases are not assigned SAND numbers and are not required to complete the Formal R&A Process.

However, such releases must be approved by at least organizational management and a cognizant Authorized Derivative Classifier. The originating organization is encouraged to consult with the Classification and Sensitive Information Department and the Patent and Licensing Department before the information is released.

Documentation of approval is recommended. Organizational management may elect to document the R&A process with the SF 1008-RA (R&A) Form, using only desired sections of the form.

- **Individual R&A Process.** The content originator may approve the release of the information with his or her manager's consent and with assistance from an Authorized Derivative Classifier. Reviewers must ensure that the content is not classified or sensitive.

Documentation of approval is recommended. Organizational management may elect to document the R&A process with the SF 1008-RA (R&A) Form, using only desired sections of the form.

For more information on the Review & Approval of all types of information releases, including which types of communication products can be approved by the above processes, refer to the following sources:

1. The Sandia Web page called "Corporate Review and Approval for Communication," located at

<http://creative-arts/RevApprov/RevApprov.html>
2. The Information Management Manual (IMM) Web page called "The Review & Approval Process," which is Chapter 1 of Section 5 of the IMM, located at

<http://www-irn.sandia.gov/corpdata/imm/s5c1.html>
3. Contact: Manny Ontiveros, NM site, (505) 844-8535
Bob Tucker, CA site, (510) 294-2388

Scientific and Technical Information

One type of communications product requiring Review & Approval is Scientific and Technical Information, a broad category that encompasses all aspects of work at Sandia including the technical aspects of administrative, financial, and ES&H efforts.

According to DOE Directive 1430.1D, Scientific and Technical Information is "information in any format or medium which is derived from scientific and technical studies, work, or investigations which relate to research, development, demonstration, and other specialized areas such as environmental and health protection and waste management. Classified, declassified, and sensitive information are included in the scope of the definition. The primary points of origination of DOE-funded Scientific and Technical Information are management and operating contractors, direct DOE-executed prime procurements, and DOE-operated research activities."

Scientific and Technical Information can be found in technical reports, journal articles, Internet and Web postings, brochures, theses or dissertations, scientific or technical conference proceedings, regulatory documents, translations, engineering drawings, computer software, computer output, audiovisual or multimedia presentations, and oral presentations.

Why are Communications Products Sent through Review & Approval?

Before any SNL product can be publicly released, it must go through a Review & Approval process. Getting the proper reviews before information is released protects both the author and the Laboratories.

Participating in a Review & Approval proces—

- Ensures technical and programmatic accuracy.
- Ensures compliance with DOE Directives 1430.1D and 5610.2B and Sandia directives. By providing DOE's Office of Scientific and Technical Information (OSTI) with copies of text, videos, and drawings the communications product's presence is ensured within the DOE complex. OSTI regularly publishes announcements of what it has received, including authors' names and organizations. When your Scientific and Technical Information is sent to OSTI, it reaches a broader audience of your peers and can trigger useful exchanges of ideas and concepts.
- Safeguards data from the consequences of litigation.
- Protects Scientific and Technical Information that is subject to applicable national security controls and the proprietary rights of others. These controls ensure the effective use of federal research and development funds while ensuring the integrity of data, the privacy of records, and the freedom of information.
- Resolves patent and classification issues. Releasing information before it has been adequately reviewed is a risky venture. The risks can come from threats to national security (if the data is classified), patent or copyright loss, appearance of organizational conflict of interest, or inappropriate technology transfer or export. Criminal and civil penalties are associated with unauthorized release.
- Avoids possible embarrassment stemming from mixed messages about Sandia to our external customers, which could result in damage to the Laboratories' image.

Documents Requiring Formal Review & Approval

The following documents must go through the Formal Review & Approval Process:

- Abstracts.
- Any new SAND document.
- A previously reviewed document that is going to an audience not previously authorized.
- A substantial revision to the technical content of a previously reviewed document.
- An internal memorandum that is subsequently being released outside of Sandia.

Details on Completing the R&A Process and Updating the Web for Specific Types of Documents

Abstract

The first step in developing an information release may be to submit an abstract. An abstract is a brief synopsis of what will be covered in a report, journal article, conference paper, or presentation. A more detailed abstract is called an extended abstract.

If your work was DOE-funded, the DOE-Sandia funding statement must appear on your abstract (make sure that the statement includes the current contract number). If some other government agency or company contributed all or part of the funding, appropriately indicate that information as well. The DOE-Sandia funding statement is as follows:

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

The importance of sending your abstract through R&A:

Some Sandians who prepare abstracts for release outside of Sandia are failing to get this information approved through the Formal R&A Process until after the abstracts are sent to a conference or published elsewhere.

You must send your abstract through the Formal R&A Process *before* you send it to a conference or journal. Sandia's R&A sign-off of the abstract, however, does not imply R&A approval of an associated conference paper, presentation, journal article, etc. When the conference or journal accepts your abstract, you'll be expanding the content of the abstract to create the associated document. This additional content must go through R&A again before you present it at a conference or publish it in a journal.

Submitting your abstract for the Web:

After your abstract has gone through Review & Approval, submit the electronic version to Sandia's Technical Library. See "Submitting Your SAND Report for the Web" (page 52) for instructions on how your abstract should be submitted.

To ensure the release of accurate abstracts:

The Unclassified, Unlimited Release abstract that is sent through Review & Approval is the version that will be distributed to requestors and loaded onto Sandia's Internal Restricted Network.

Since the original abstract remains available for distribution from the Technical Library even after the conference paper, presentation, or journal article is developed from it, authors need to ensure the abstract's accuracy by finalizing and (as appropriate) updating their original abstract.

If you made substantial changes to your abstract, you must send it through the Formal Review & Approval Process again, before you send the abstract to the Library.

If you made only minor changes to your information, send one copy of your final version to the Technical Library, Org. 4916, MS 0899. Put the new information on a diskette or send it by anonymous FTP to the following IRN site:

infoserve.library.sandia.gov/pub/sandreport

If your updated abstract is not available in electronic format, send a hardcopy version to:

Reports Receival
Org. 4916, MS 0899

Somewhere on the document, record the original SAND number assigned to the abstract.

Remember: Your original abstract will be distributed as is to requesters until you submit your final version.

Your abstracts can be viewed from the Technical Library's on-line catalog, Horizon. The Library will also load your abstract onto the Internal Restricted Network. By sending the Library an updated copy, you ensure that requesters are receiving your most current information.

Conference Paper

Conference papers are documents presented at conferences around the nation (or the world) and are usually published in a proceedings volume that also contains other papers for that conference. The proceedings sponsor furnishes instructions for preparing the document masters. The SAND number for a conference paper will not appear on the masters prepared for the conference, but it will be assigned for recordkeeping purposes.

The author must provide three copies of the conference paper to the Review & Approval Desk, Dept. 12690, MS 0619 (NM), or to Technical Communications Dept. 8815, MS 9021 (CA).

A funding statement must be included in your conference paper. For more information on the funding statement and on conference papers, see Section 5.

The importance of sending your conference paper through R&A:

Some Sandians who prepare conference presentations for release outside of Sandia are failing to get this information approved through the Formal R&A Process until after their papers are presented.

Sandia's R&A sign-off of your abstract does not constitute R&A approval of an associated conference paper. When the conference accepts your abstract, you'll be expanding the content of the abstract to create the conference paper. You must send this additional content through R&A again before you present it at a conference.

Submitting your conference paper for the Web:

After your conference paper has gone through Review & Approval, submit the electronic version to Sandia's Technical Library. See "Submitting Your SAND Report for the Web" (page 52) for instructions on how your conference paper should be submitted.

To ensure the release of accurate conference papers:

The Unclassified, Unlimited Release conference paper that is sent through Review & Approval is the version that will be distributed to requestors and loaded onto Sandia's Internal Restricted Network.

If you made substantial changes to your conference paper, the information needs to be sent again through the Formal Review & Approval Process.

If you made only minor changes to your paper, send one copy of your final version to the Technical Library, Org. 4916, MS 0899. Put the new information on a diskette or send it by anonymous FTP to the following IRN site:

infoserve.library.sandia.gov/pub/sandreport

If your updated conference paper is not available in electronic format, send the hardcopy conference paper to:

Reports Receival
Org. 4916, MS 0899

Somewhere on the document, record the original SAND number that was previously assigned to your conference paper.

Remember: Your original conference paper will be distributed as is to requesters until you submit your final version.

Your conference papers can be viewed from the Technical Library's on-line catalog, Horizon. The Library will also load your updated conference paper onto the Internal Restricted Network. By sending the Library an updated copy, you ensure that requesters are receiving your most current information.

When your conference paper is published in a proceedings:

If your conference paper is published in a conference proceedings, send the following information to the Technical Library:

- Original SAND number of your conference paper.
- Title of the conference proceedings.
- Date of conference publication.
- Page numbers of your conference paper within the proceedings.

When a Patent Caution is removed from a conference paper:

Notify the Technical Library whenever a Patent Caution is removed from a conference paper. Until the Library receives this information, it cannot release a document with a Patent Caution to requesters.

Conference Presentation

Oral presentations made to conferences (or to companies or public organizations) need to be approved before they are presented.

Document your oral presentation with notes or an outline, and get approval from your organizational or project Authorized Derivative Classifier (ADC) or from the Classification Department. If documentation is not available, at least discuss the presentation with your ADC or with the Classification Department.

Electronic Posting

Electronic postings are Unclassified, Unlimited Release information posted electronically on the Internet, World Wide Web, or external servers, with the intent of providing information about Sandia's technical strengths, current projects, technology interests, technology transfer contacts, etc. Information released on Sandia's Internal Restricted Network, except for new report releases, requires only organizational ADC approval (Complete the R&A Form through Section 6), but information released on the External Open Network must go through the Formal Review & Approval Process (Complete the R&A Form through Section 10).

Internal Memorandum

An internal memorandum is an informal, and sometimes unstructured communication between colleagues within Sandia. The document needs to be reviewed and approved by only the author's manager, the Classification Office, and the Patents Office (but not by the R&A Desk Coordinator).

Call the R&A Desk (845-8220) for a SAND number for internal memorandums. Send five copies of the memorandum to the Technical Library, Dept. 4916, and maintain the original R&A form in the originating organization.

If you want to disseminate an internal memorandum outside of Sandia at a later date, format it into an official SAND Report and send it through the Formal Review & Approval Process. An example of a Classified internal memorandum cover is shown in Sample 3-1. An example of an Unclassified internal memorandum cover is shown in Sample 3-2.

Journal Article

A journal article is submitted for inclusion in technical or nontechnical professional society journals, magazines, and other publications containing separate articles and appearing at regular and frequent intervals. An article submitted to a journal is usually sent to the journal in draft form and is typeset by the journal.

A funding statement must be included on your journal article. For more information on the funding statement and on journal articles, see Section 5.

The importance of sending your journal article through R&A:

Some Sandians who prepare journal articles for release outside of Sandia are failing to get their articles approved through the Formal R&A Process until after their articles are published.

Sandia's R&A sign-off of your abstract does not constitute R&A approval of an associated journal article. When the journal accepts your abstract, you'll be expanding the content of the abstract to create the journal article. You must send this additional content through R&A again before it can be published in a journal.

Submitting your journal article for the Web:

After your journal article has gone through Review & Approval, submit the electronic version to Sandia's Technical Library. See "Submitting Your SAND Report for the Web" (page 52) for instructions on how your article should be submitted.

To ensure the release of accurate journal articles:

The Unclassified, Unlimited Release journal article that is sent through Review & Approval is the version of the article that will be distributed to requestors and loaded onto Sandia's Internal Restricted Network.

If you made substantial changes to your journal article, you must once again send the information through the Formal Review & Approval Process.

If you made only minor changes to your article, send one copy of your final version to the Technical Library, Org. 4916, MS 0899. Put the new information on a diskette or send it by anonymous FTP to the following IRN site:

infoserve.library.sandia.gov/pub/sandreport

If your updated journal article is not available in electronic format, send the hardcopy article to:

Reports Receiving
Org. 4916, MS 0899

Somewhere on the document, record the original SAND number assigned to your journal article.

Remember: Your original journal article will be distributed as is to requestors until you submit your final version.

Your journal article can be viewed by using the Technical Library's on-line catalog, Horizon. The Library will also load your updated article onto the Internal Restricted Network. By sending the Library an updated copy, you ensure that requestors are receiving your most current information.

When your journal article is published:

If your article is published in a journal, send the following information to the Technical Library (Org. 4916, MS 0899):

- Original SAND number of the article.
- Article's title, if it has changed.
- Name of the journal.
- Journal's volume number, publication date, and page numbers for the article.

When a Patent Caution is removed from a journal article:

Notify the Technical Library whenever a Patent Caution is removed from a journal article. Until the Library receives this information, it cannot release a document with a Patent Caution to requesters.

Publication

Publications, as defined in the Review & Approval process, include brochures, fact sheets, newsletters, books, booklets, chapters, folders, flyers, and pamphlets.

Report

A report documents work that was done by (or for) Sandia National Laboratories. Even if only one Sandian co-authors a report with contractors, the report is still considered a Sandia report rather than a contractor report. A contractor report documents work that was done under a Sandia purchase order by an external entity such as a consultant or a company and is authored by that entity.

Slides, Viewgraphs

This type of information release includes overhead transparencies and 35-mm slides. At the end of the R&A process, the Review & Approval Desk 12690 (8815) needs a hard copy of your slides and viewgraphs for the Technical Library.

NOTE: The SNL logo must appear on the lower right corner of every slide or viewgraph.

If your work was DOE-funded, the DOE-Sandia funding statement must appear somewhere on your slides and viewgraphs (make sure that the statement includes the current contract number). If some other government agency or company contributed all or part of the funding, appropriately indicate that information as well. The DOE-Sandia funding statement is as follows:

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

The importance of sending your slides and viewgraphs through R&A:

Some Sandians who prepare slides and viewgraphs for release outside of Sandia are failing to get this information approved through the Formal R&A Process until after the slides and viewgraphs are sent to a conference.

You must send your slides and viewgraphs through the Formal R&A Process *before* you send them to a conference. Sandia's R&A sign-off of slides and viewgraphs, however, does not constitute R&A approval of an associated conference paper, presentation, etc. When a conference accepts your slides or viewgraphs, you'll be expanding the content to

create the associated document. This additional content must go through R&A again before you present it at a conference.

Exceptions to Formal Review & Approval

Documents that do not require full Review & Approval:

- An external document that received no substantial technical changes but is being presented in a different form.
- Subsequent presentation of a previously reviewed external document.
- Reprint of a previously reviewed external document (which requires only approval from the Review & Approval Desk Coordinator).
- Internal memorandum being released within Sandia (which requires the organizational manager's and/or project manager's approval, and reviews from the Classification Department and the Patent and Licensing Department. The internal memorandum does not require review by the Review & Approval Desk Coordinator.

Document the authorization with an SF 1008-RA (R&A) form .

Sandia's Review & Approval Process

Getting a Peer Review

- Sandia directives recommend that information generated at Sandia undergo a programmatic and technical (peer) review.
- The author's information is submitted to his or her manager or director to start the internal (departmental, or peer) review. Review policies are established from within the author's center. When the review is completed, it is the author's responsibility to incorporate changes suggested by the reviewers into the final document.
- Then the information moves into Sandia's Formal Review & Approval Process.

Completing the Review & Approval Form

- The author completes Sections 1 through 6 of the *Review & Approval Form* (SF 1008-RA, dated 4-97), which is used for all information releases. A case number must be included for all SAND Reports and conference papers, but it is not charged—it just indicates the funding source. The author must sign the form in Section 2, thereby assuming responsibility for its content. Then the author must get appropriate signatures in Sections 4 and 6 (Figures 1-4 and 1-5). Instructions are printed on pages 3 and 4 of the form (Figure 1-6), which are to be detached before the form is routed.
- Next, the information release (which can be in a draft form, assuming little or no changes to content will be made after Review & Approval) is mailed (or hand-carried, if very urgent) to the Patent and Licensing Department (845-9536) in NM, or to the Patent Agent in Center 11600 in CA, where Section 7 is completed. These departments review all documents leaving Sandia to identify possible patentable inventions. The Prime Contract requires that such inventions be reported and that the government and Lockheed Martin have certain rights.
- Next, the information release is mailed (or hand-carried, if very urgent) to the Classification and Sensitive Information Department (844-8699), located in Bldg. 802, Room 1108 (or to the Classification Office, Org. 8815 in CA). A reviewer from the Classification Department will examine the contents of the release and affirm the classification given by the originating organization's Authorized Derivative Classifier (ADC) in Section 4. If there is disagreement about the assigned classification, the Classification reviewer will work with the ADC and the author(s) to arrive at an appropriate classification. The Classification reviewer will then sign off Section 8.
- Section 9 approvals will be arranged by the Review & Approval Desk Coordinator (NM) at (505) 845-8220 or by Technical Communications Dept. 8815 (CA) at (510) 294-2388 if your information release contains "Public Communications"—that is, communications products that promote Sandia capabilities. See **Guidelines for Producing and Releasing**

Promotional Communication Media (Public Communication) on page 18. Section 9 approval is also required if your release uses color printing and will be distributed outside of Sandia, or if it uses color printing for two or more colors and will be distributed internally.

Note: *Completing Section 9 requires preapproval of DOE, which takes considerable lead time. To more rapidly complete R&A, you can start the procedure for getting DOE approval for Public Communications or color at the **beginning of the Review & Approval process**, while other Review & Approval steps are being initiated.*

- The Review & Approval Desk Coordinator (845-8220), located in Bldg. 894, Room 201 (NM) or a reviewer from Technical Communications Department 8815, MS 9021 (CA) reviews your information release to ensure that it reflects all of DOE's reporting requirements on the Review & Approval Form. The reviewer ensures that your release has been reviewed for classification and sensitive unclassified restrictions, appropriate release of technical information, and distribution limitations.

Note: *If the information release is a report, make sure that it includes the following before it is sent to the Review & Approval Desk Coordinator or to the Technical Communications reviewer:*

—A title page (see Samples 3-3 and 3-4).

—A distribution list, which includes “housekeeping” copies (see Sample 3-9).

When the Review & Approval process is complete, the Review & Approval Desk Coordinator assigns a SAND number to the information. SAND numbers are used by the Technical Library at Sandia and by OSTI as part of their cataloging and indexing for retrieval.

The R&A Desk Coordinator (or other R&A reviewer) will sign off in Section 10 of the Review & Approval Form if the release meets DOE reporting requirements. If any changes must be made to the release, the reviewer will document these requirements for the author in Section 10. The author is responsible for incorporating these required changes into the release before the release is printed and distributed. The R&A Desk Coordinator returns the Review & Approval package to the point-of-contact indicated on the routing slip.

Preparing the Review & Approval Package

The Formal Review & Approval Process actually begins within each author's (or information provider's) organization when the author prepares a package for review (and any documentation for DOE or other agency/organization preapprovals) and then submits the package for internal reviews by peers, management, and an Authorized Derivative Classifier; these reviews are established by the author's organization.

- The package for documents (information releases) consists of a pocketed folder, with the draft document or overheads in the right-hand pocket and the Review & Approval Form in the left-hand pocket.

Even if the document is in its final form, route a **copy** of the document, *not* the original document.

Please include only one Review & Approval Form per folder.

Note: *If the product is a conference paper, include three copies of the conference paper in the folder. The Review & Approval Desk Coordinator will sign the Review & Approval Form and forward the copies to the Technical Library and OSTI.*

If the information release itself is in a format that will not fit in a pocketed folder, such as videos or displays, use the right-hand pocket to hold any document-sized representations of the release (Web tree, scripts, layouts, etc.) and route the release with the folder. If the release exists in a form that makes routing impractical, then arrangements can be made to have representatives from the Classification and Sensitive Information Department and the Patent and Licensing Department go where the information release can be reviewed.

- Mark the package with appropriate classification and access restrictions.
- Prepare a routing slip listing all the individuals or organizations that must sign the Review & Approval Form.

Please use the following routing sequence:

MS 0161	Patent & Licensing
MS 0175	Classification
MS 0619	Review & Approval Desk
Author's MS	Primary author's name —list this name last so the package will be returned to the author when R&A is completed.

- Staple the front and back of the folder together at the top and right side to secure the contents or use strong rubber bands around the folder in both directions. If the document is bulky, use an envelope.
- Place the package in the mail or hand-carry, as appropriate.

Reporting Requirements

If you are currently involved in a project, check the documentation authorizing the project to see if any reporting requirements were stated as to style and format (text, graphs, maps, or videos; loose-leaf, bound, or special covers) and timing (two progress reports and a final, for example). Also check to see if the sponsor requires pre-review before the work is released or if the sponsor explicitly requires distribution restrictions. Sponsors (other than DOE) of work at Sandia may require that the information be released only to the sponsor. In the absence of such a requirement, however, Sandia is obligated to report results of all work to DOE.

Changing Types of Approved Communications Products

Occasionally an author publishes a document in a format different from the originally approved format. For example, a conference paper that previously went through Review & Approval is now being presented to a different category of audience than originally approved. Or a conference paper is now being published (with no technical changes) as a full SAND Report or as a journal article.

When is a new Review & Approval Needed for Changed Types of Products?

Whether or not a new Formal Review & Approval is needed depends on the type of changes that occur:

- If no substantial technical changes have been made in the document and the new audience is consistent with any original distribution limitations, the document is essentially unchanged. Therefore, it does not have to be sent through the Formal Review & Approval Process again. However, if the new audience is not consistent with any previously approved distribution limitations, the document must go through the Formal R&A Process again before it is released.

If the new document contains no substantial technical changes, do not send it through R&A again. Instead, prepare a memo for the Review & Approval Desk Coordinator that includes the SAND number of the original document and explain the new circumstances. Attach a copy of the original Review & Approval Form. If the document is becoming a SAND Report, attach a copy of the R&A Form and a copy of the report title page and distribution list. (See Figures 1-2 and 1-3.)

The “new” SAND number will consist of the original SAND number, along with the appropriate suffix for the current form of the release. For example, if the release was previously a journal article numbered SAND97-2293J but will now be presented at a conference, its SAND number becomes SAND97-2293C.

- If substantial technical changes have been made in the document, it is essentially a new document. Therefore, the author must send the document through the Formal Review & Approval Process.

Example: *SAND95-1234* was approved in 1995 as an official SAND Report. It will now be presented—with substantial technical changes—at a conference, so it is essentially a new product.

The author may request a new SAND number; the title page would appear as follows:

SAND97-0127C
Unlimited Release
Printed July 1997

Or the author may use a new SAND number with a supersession statement:

SAND97-0127C
Unlimited Release
Printed July 1997

Supersedes SAND95-1234
dated April 1995

In both cases, the document would be submitted for Formal Review & Approval.

Note:

— In the preceding example, the new conference paper cannot use the technical report’s original SAND number and add the word “Revised”—*SAND95-1234 Revised*—because (1) the original technical report, called *SAND95-1234*, is not itself being republished, and (2) the new conference paper must have a “C” in its SAND number.

— Nor can the number “*SAND95-1234C Revised*” be used, because “*SAND95-1234C*” never existed so it cannot be revised.

— Nor can a “C” simply be added to the original report’s SAND number—*SAND95-1234C*. The new document isn’t simply the same material changed from a technical report into a conference paper. Significant technical changes were made. So to avoid confusion, an entirely new SAND number should be used.

A supersession statement can be used with the new number (as in the above example) to link the conference paper to the original technical report.

If you feel you have a situation not addressed in this discussion, contact the Creative Arts Department. Also refer to “SAND Numbers” in Section 1.

Changes and Revisions to Communications Products

The difference between “changes” and “revisions” to information releases is basically in the “eye of the author,” and it is the author’s decision as to whether a new SAND number should be requested or the current SAND number used with a notation of “Revised.”

- **Changes.** When a document is changed to become substantially different from the original, it is essentially a new document; to avoid confusion, a new SAND number is frequently assigned.
- **Revisions.** When a document is revised (updated or expanded with new information) but is not different in its purpose, authors usually choose to use the same SAND number with “Revised” as the suffix.

Should the SAND number be changed?

Factors to consider in deciding whether to change or revise the document:

- If the revisions were significant and the author considers the revised document to be a new document, then a new SAND number can be assigned. A supersession statement should be added to both the cover and title page below the print date. For example, a title page from an Unlimited Release document with a newly assigned (changed) SAND number might read:

SAND96-0021
 Unlimited Release
 Printed May 1996

Supersedes SAND93-2364
 dated October 1993

- If the substantially revised document has been referenced in a number of other information releases, changing the SAND number could cause confusion. In this case, keeping the old SAND number and indicating “Revised” in the SAND number suffix may be preferred. A supersession statement should be added to both the cover and title page below the print date. For example, a title page from an Unlimited Release document with a revised SAND number might read:

SAND93-2364 Revised
 Unlimited Release
 Printed May 1996

Supersedes SAND93-2364
 dated October 1993

For a change or revision, the document must go through a new, Formal Review & Approval Process.

SAND Report Reprints

A SAND Report that is to be republished becomes a reprint if no substantial changes have been made to the content or distribution limitation. Simple corrections to text, such as substituting a better word or correcting a typographical error, can (and should) be made.

Two types of reprints can be made: formal and informal.

- The **formal reprint** retains its original SAND number, but the cover, title page, and distribution page must be changed to show the reprint information. The reprint cover text is updated by the Creative Arts Department and the report is printed by the Sandia Print Shop (Printing & Duplicating Dept. 12630). Formal reprints require approval from the Review & Approval Desk Coordinator.
- The **informal reprint** keeps its original cover, title page, and distribution page. The author either copies the report on the departmental copier or has the report copied at the Print Shop. This type of reprint can be used when the author needs a small number of internal “working” copies. To take advantage of departmental copying, the job must be non-repetitive; that is, if copies are regularly needed, the job should be sent to the Print Shop.

We recommend that you use the most cost-effective way to produce your informal reprints. For example, if you will be copying more than 5,000 pages, we recommend that you consider using the Sandia Print Shop, where copying charges will be less.

A formal reprint is recommended in the following circumstances:

1. To maintain the quality of Sandia reports and to give them a “common look and feel,” reports distributed external to Sandia should be sent to Creative Arts Dept. 12620, where the cover text, title page, and distribution list are updated. Reports should then be printed and receive a new cover from the Sandia Print Shop (Printing & Duplicating Dept. 12630).

NOTE: In some cases, the author may need only a “working copy” to send outside of Sandia. In this case, the information from the original report can remain on the cover, title page, and distribution (as is done on informal reprints). But the author should send the report to the Print Shop to be copied (rather than using the departmental copier) because official Sandia cover stock will be used to produce a “quality” cover.

2. If value is added to the document by marking it as a reprint, then ordering a formal reprint is appropriate. For example, an author may prefer his or her readers see the following information printed on the document: “Second Printing January 1997.” Formally reprinting a report helps to track its history.
3. If the scope of the distribution or audience has grown beyond the originally approved release, but the content of the report has not changed, publish the report as a formal reprint after its distribution has been approved through the Formal R&A Process.

On the title page, one space below the “Second Printing” date, insert the following note. Adjust the wording to reflect your situation appropriately:

The only change to this SAND Report is the distribution limitation, which has changed from (old limitation) to (new limitation) .

Example:

SAND96-7054
Unlimited Release
Printed October 1996
Second Printing January 1997

The only change to this report is the distribution limitation, which has changed from Official Use Only to Unlimited Release.

4. If more than 10 reprinted copies are needed, we recommend a formal reprint. The distribution list will be updated, which will help track the history of the report.

The reprint information for the **cover** of a formal reprint might appear as follows:

SANDIA REPORT

SAND96-7054 • UC-700

Unlimited Release

Reprinted January 1997 *(The original publication date is replaced by the reprint date.)*

The **title page** for the same report would show this information:

SAND96-7054
Unlimited Release
Printed October 1996
Second Printing, January 1997

At the end of the original distribution, add the new **distribution** for the reprinted copies.

Example:

Second Printing, January 1997
30 MS 0159 John Wallace, 9313

If you have other questions, call the Service Coordinator in the Creative Arts Department at 845-8265.

Internal Communications Products

All of the previous information pertains to **external communications products** and to formal **Internal Distribution Only** reports.

Internal memorandums—official communication between colleagues within Sandia—are handled differently. They must be Reviewed and Approved by the author's

manager or project manager, the organization's Authorized Derivative Classifier, the Classification Department, and the Patent and Licensing Department, but *not* by the R&A Desk.

Call the R&A Desk (845-8220) for a SAND number for internal memorandums. Send five copies of the memorandum to the Technical Library, Dept. 4916, and maintain the original R&A Form in the originating organization.

To see examples of classified and unclassified internal memorandum covers, see Samples 3-1 and 3-2.

If the author wishes to release an internal memorandum outside of Sandia at a later date, the memorandum can be formatted into an official SAND Report and sent through the Formal Review & Approval Process before it is released.

SF 1006-PA (FRONT 3-97) DRAFT
Supersedes (1-96) Issue

Information Release REVIEW & APPROVAL FORM

Originating organization: Please complete Sections 1 - 6. Print or type all information. See attached instruction sheets for additional information.

This form is used to review and approve your information releases before they are released outside of Sandia. Most releases go through the Formal R&A Process, in which case this form must be completed through Section 10. For releases going through the Organizational R&A Process or the Individual R&A Process, organizational management is encouraged to complete this form through at least Section 6. For information on which R&A process to use, or for other R&A information, see:

- The Sandia Web page called "Review and Approval for Communication," located at <http://www.sandia.gov/SandiaOnly/RevApprov/RevApprov.html>
- The Information Management Manual (IMM) Web page called "The Review & Approval Process," located at <http://www-im.sandia.gov/corpdata/imm/s5c1.html>
- Contacts: Manny Oteveros (NM), (505) 844-8535 or Bob Tucker (CA), (510) 294-2388

* This R&A form can be used (through Section 6) to document organizational ADC approval of information for Sandia's Internal Restricted Network.
* The form can also be used (through Section 6 & Section 8) to document approvals when an information release changes release limitations (e.g., when Internal Distribution Only becomes Unlimited Release).

FOR R&A DESK USE ONLY

SECTION 1. Controlling information.
SAND No. 97-4127 Other Control No. _____ If other Control No., name of Agency: _____

Is this release the result of CRADA Work for Others Other partnership, agreement, or understanding OF ANY KIND
(Check all appropriate boxes)

No If No, go to Section 2. Yes If Yes, indicate Agreement Number _____ and answer the following question:
Has your partner or funding agency given approval for this release? Yes No

(You cannot release this information without partner or funding agency approval. Please provide written confirmation of such approval to Licensing and Agreements Processing Dept. 4212/MS 1380, Fax No. (505) 843-4175.)

SECTION 2. Document Title and Author Information:
Title of document (See document formats in Section 3.) Engineering Approach to Biomedical Decision Making

Author or contact (Sandian) Albert C. Brown Signature Albert C. Brown
Phone No. 845-3099 E-Mail Address acbrown@sandia.gov Org. No. 6112 Mail Stop No. 0312
 Contract Author to Sandia. (Contractor's name and contract no.)

SECTION 3. Document Format and Release Event Information. Indicate the format(s) of the information you plan to release, as well as information about the release event.

Document Format:	<input type="checkbox"/> Abstract	<input type="checkbox"/> Electronic Posting	<input type="checkbox"/> Publication (brochure, newsletter, fact sheet, etc.)	<input type="checkbox"/> Slides/Viewgraphs
	<input type="checkbox"/> Brief	<input type="checkbox"/> Internal Restricted Network		<input type="checkbox"/> Other _____
	<input type="checkbox"/> Extended	<input type="checkbox"/> External Open Network	<input checked="" type="checkbox"/> Report	
	<input type="checkbox"/> Audio/Video/Film	<input type="checkbox"/> Exhibit/Display/Poster	Case No. <u>0570.040</u>	
	<input type="checkbox"/> Conference Paper (3 copies)	<input type="checkbox"/> Internal Memorandum	DOE Distribution Category:	
	Case No. _____	<input type="checkbox"/> Journal Article	UC: <u>409</u> (Unclassified)	
	<input type="checkbox"/> Conference Presentation		C: _____ (Classified)	

Release Event: Indicate the name of the conference, meeting, or publication, the sponsoring organization, and the place and date of event. If this is an electronic posting, provide the current viewing address and intended posting location.

Name of Event: _____
Sponsoring Organization: _____
Place of Event: _____ Date: _____
Viewing Address and Posting Location: _____

SECTION 4. Classification and Sensitivity of Information. Contact Classification Dept. 7447 (8815) for questions. Indicate classification level and category of information release or whether information release is unclassified.

Classification of: Document Title: U Document Abstract: U The Document: U

Classified - Limited Release. Indicate additional distribution limitations.
 NWD Sigma _____ CNWDI NOFORN Other _____

Unclassified - Limited Release. Indicate all Unclassified Controlled Information (UCI) distribution limitations.

<input type="checkbox"/> Applied Technology	<input type="checkbox"/> Reactor Safeguards Information (RSI)
<input type="checkbox"/> Export Controlled Information (ECI) ITAR/EAR/ (Other) _____	<input type="checkbox"/> Sandia Commercially Valuable Information
<input type="checkbox"/> Internal Distribution Only (IDO)	<input type="checkbox"/> Small Business Innovation Research (SBIR)
<input type="checkbox"/> Non-Sandia Proprietary Information	<input type="checkbox"/> Specified Dissemination (Must attach letter of rationale)
<input type="checkbox"/> Official Use Only (OUO) Exemption No. _____	<input type="checkbox"/> Unclassified Computer Software (UCS)
<input type="checkbox"/> Patent Caution (2 of 5)	<input type="checkbox"/> Unclassified Controlled Nuclear Information (UCNI)
<input type="checkbox"/> Invention Disclosure	<input type="checkbox"/> Other (specify) _____
<input type="checkbox"/> Protected CRADA Information (Release date _____)	

Unclassified - Unlimited Release. Information is unclassified with no distribution limitations, i.e., distribution may be made worldwide. Authorized Derivative Classifier (ADC) who is knowledgeable of information sensitivity: Michael Post Michael Post 6112 6-10-97

1
(Continued on page 2)

Figure 1-4. Example of a Review & Approval Form (page 1) for an Unlimited Release document.

SECTION 5. Disclosure of Technical Advance

A Technical Advance is an original achievement or nonobvious progress in a scientific or engineering sense, including the creation of software. A Technical Advance may be protected by patent, copyright, or as Sandia Commercially Valuable Information. The Originators of a Technical Advance may be inventors or authors.

Does the subject of this Information Release represent a Technical Advance as defined above?

Yes No If No, skip to Section 6.

If Yes, has a Disclosure of Technical Advance (TA) Form SF 1155-G, been filed with the Sandia Patent and Licensing Center?

Yes SD No. _____ No If No, please follow up with a TA form obtainable from:

(1) Patent & Licensing Center: paper or PC or Mac diskette ((506) 845-9536 or e-mail: patents@sandia.gov); in California, paper or Mac diskette((510) 294-2787),

(2) Sandia's Internal Web (<http://www.patents.sandia.gov/patents/>), or

(3) Sandia Line ((506) 845-6789, Quick Dial Code 1067).

SECTION 6. Line/Project Signatures and Approvals. Print or type all author information; obtain appropriate signatures from next-level manager. Where concurrence is obtained in case of multiple authors, approval need only go through the principal author's line organization.

Authors' Names (print or type)	Org. No./MS	Phone No.	Next Level Manager's Name and Signature	Date
Albert C. Brown	6112/0312	845-3099	Laura M. Myers	6-11-97
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

Center Director's or Project Manager's Name and Signature (depends on Center policy)

THE FOLLOWING SECTIONS ARE NORMALLY TO BE USED FOR THE FORMAL REVIEW & APPROVAL PROCESS.

SECTION 7. Patent and Licensing Review (11500/MS 0161, 8842/MS 9141).

Copyright Interest? Yes No If Yes, copyright may be asserted, subject to DOE approval.

Patent Interest? Yes No If Yes, TA form has been or should be submitted.

Patent Caution? Yes No If Yes, TA form has been or should be submitted and distribution will be limited.

Patent Attorney's/Agent's Signature (signature) Date 6-12-97

SECTION 8. Classification and Sensitive Information Review (7447/MS 0175, 8815/MS 9021).

Signature (signature) Date 6-12-97

SECTION 9. Review of Public Communications/Review of Products Using Color Printing. Public communications must be reviewed for adherence to Corporate "Common Look & Feel" guidelines by PR & Communications Center 12600, MS 0619 (NM) or by Technical Communications Department 8815, MS 9021 (CA).

Also, all publications (including SAND Reports) distributed outside of Sandia that use color (ink) printing, as well as all internal products of two or more colors that use color printing, must go through the above review. NOTE: SAND Reports and internal release products that use color Xeroxing do not need the above review.

DOE approval received _____ Signature _____ Date _____
(date)

SECTION 10. Review & Approval Desk (12690, MS 0619 (NM)/Technical Communications (8815, MS 9021 (CA)).

Signature (signature) Date 6-13-97

Figure 1-5. Example of a Review & Approval Form (page 2) for an Unlimited Release document.

INSTRUCTIONS

Review & Approval Form (SF 1008-RA)

Instructions for Completing and Processing the R&A Form

INSTRUCTIONS FOR ORIGINATING ORGANIZATION

Regardless of format or media, before information is released outside of Sandia, it must have classification, patent, publication, and if applicable, technology partner review and approval. Please be as complete and legible as possible.

Section 1: Controlling information.

The Review & Approval Desk, Dept. 12690 (In CA, Technical Communications Dept. 8815) issues SAND numbers at the end of the Review & Approval process (after approval in Section 10). If this release is the result of a CRADA, Work for Others, or other partnership, indicate Agreement Number. The technology partner must approve the release, and a written confirmation of this approval must be sent to Licensing and Agreements Processing Dept. 4212.

Section 2: Document Title and Author Information.

This information is used when a reviewer has a question during the Review & Approval process. THE IDENTIFIED AUTHOR SHOULD BE A SANDIA EMPLOYEE. IF THE INFORMATION IS FROM A CONTRACTOR, THE NAME MUST BE A SANDIA CONTACT.

Section 3: Format and Release Event Information.

Important: include three copies of conference papers in the Review and Approval packet.

Abstract, Brief or Extended	<ul style="list-style-type: none"> Brief or extended abstracts of reports, journal articles, conference papers, and oral presentations. NOTE: Sandia's R&A sign-off of the abstract does not constitute R&A approval of an associated conference paper, presentation, journal article, etc.
Audio/Video/Film	<ul style="list-style-type: none"> Any format.
Conference Papers (3 copies)	<ul style="list-style-type: none"> Papers submitted for review or presentation at technical or non-technical professional conferences, domestic or foreign. Author must provide the Review & Approval Desk 12690 (8815) with 3 copies for distribution.
Conference Presentation	<ul style="list-style-type: none"> Document your oral presentation with notes or an outline, and get approval from your organizational or project ADC, or from the Classification Office. If documentation is not available, at least discuss the presentation with your ADC or with the Classification Office.
Electronic Posting	<ul style="list-style-type: none"> Unclassified, unlimited release information posted electronically on the Internet, World Wide Web, or external servers, with the intent of providing information about Sandia's technical strengths, current projects, technology interests, technology transfer contacts, etc. Indicate whether your information will be released on Sandia's Internal Restricted Network (which, except for new report releases, requires only organizational ADC approval) or on the External Open Network (which requires Formal Review & Approval). Refer to R&A requirements listed on top of page 1 of the form.
Exhibit, Display, Poster	<ul style="list-style-type: none"> Any format.
Internal Memorandum	<ul style="list-style-type: none"> This document is for communication between colleagues within Sandia. It needs R&A by your manager, the Classification Office and the Patents Office. Call the R&A Desk at (505) 845-8220 in NM or at (510) 234-2929 in CA, for a SAND Number and send 3 copies of the memorandum to the Technical Library.
Journal Article	<ul style="list-style-type: none"> Articles submitted for inclusion in technical or non-technical professional society journals, serials, magazines, and other publications containing separate articles and appearing at regular and frequent intervals.
Publication	<ul style="list-style-type: none"> Books, Booklets, Brochures, Fact Sheets, Chapters, Folders, Flyers, Pamphlets, Newsletters, etc.
Report	<ul style="list-style-type: none"> Topical: Comprehensive statements of the results of work performed on a specific task or phase of a contract, agreement, or financial assistance award. Detailed descriptions of scientific or technological advances, or administrative programs or processes. Progress: Summaries of the work performed during a specific reporting period, including results (positive or negative) of work performed under a contract, agreement, or financial assistance award, regardless of format. Final: Accounting of the total work performed under contract, agreement, or financial assistance award. Comprehensive descriptions of data, figures, photographs, and bibliographic citations in support of the investigations undertaken. May also include summaries of previous topical and progress communications. Official: Information prepared at the request of or in conjunction with a federal agency Headquarters or Field Office. <p>DOE Distribution Category Number For unclassified reports, refer to DOE/OSTI-4600-R73: <i>Program Distribution for Unclassified Scientific and Technical Reports</i>. For classified reports, refer to DOE/OSTI-3679-Rev. 75: <i>Standard Distribution for Classified Scientific and Technical Reports</i>. Most secretaries have copies of these distribution reports. Copies may also be obtained from the Review & Approval Desk 12690 (8815). In California, Department 8815 assigns the UC category at time of final approval.</p>
Slides, Viewgraphs	<ul style="list-style-type: none"> Overhead transparencies, 35-mm slides. Creative Arts needs a hard copy for the Library.

(continued on page 4)

Figure 1-6. Instructions for completing the Review & Approval Form.

Section 4: Classification and Sensitivity of Information

The author and the Authorized Derivative Classifier (ADC) assess the content of information for any appropriate distribution limitations, classified or unclassified. Unclassified information must not have a limitation placed on it solely to exclude it from Freedom of Information Act requests. **NOTE: For Protected CRADA Information, provide the release date (the date the information can be released to the public).** The ADC is usually the manager of the author's work, but the cognizant ADC for the project must concur with the determination or sign the release. Classification Department 7447 (8815) should be consulted so that an appropriate determination can be made, should any issues arise regarding the sensitivity of the information being considered for release. "The Document" represents "the report," "the briefing," "the conference paper," "the Web page," etc., but not the abstract.

It is possible to place multiple limitations on unclassified information. Example: "Export Controlled" and "Official Use Only" can be used together. If "Specified Dissemination" is chosen, be sure to include a letter addressed to the Review & Approval Desk (12690) explaining rationale for this selection, and indicate the program name that requires limitation on distribution.

Section 5: Disclosure of Technical Advance

Please answer all questions. These responses help the Patent and Licensing Center determine the patentability of the contents of the communication product. If you need help in answering the questions, please call the Patent and Licensing Center 11500 (8815). **Note: Sandia employees whose communication product represents a Technical Advance must file an invention disclosure with the Sandia Patent and Licensing Center before the invention is publicly revealed. Sandia employees file this disclosure by submitting a Disclosure of Technical Advance (TA) form. If the TA form is not filed, and the invention is publicly revealed in an enabling sense, DOE or Sandia will lose the right to file for a foreign patent after the date of such public announcement, and will lose the right to file for a patent in the United States one year following the date of public announcement.**

Section 6: Line Signatures and Approvals

The implication of the signatures in this section is that all technical, quality, and sensitivity reviews within the Department and/or the project have occurred as required by the programmatic or Center policy. The section must be signed by the Center Director or Project Manager (or both) as required by individual Center policy. If the author is a manager or higher, review signature must be by someone cognizant of the appropriate technical quality and sensitivity review requirements within the Division (VP). **A manager cannot approve his/her own document.**

This is the end of the Review & Approval process within the originating organization(s).

INFORMATION ABOUT REVIEWER RESPONSIBILITIES

Section 7: Patent and Licensing Review

The Patent and Licensing Center 11500 (Patent Agent in Center 11600, Chief Counsel, California Laboratory) will review the communications product, Section 5 of the R&A form, and how patent information is reflected in Section 4. If follow-up is necessary, the Patent and Licensing Center will assist the inventor or author with the paperwork.

Section 8: Classification and Sensitive Information Review

A member of 7447 (8815) will review the content of the information. If there are any questions or a difference of opinion, the 7447 (8815) reviewer will contact the author and/or the ADC and will resolve the issues. Allow about two days for Section 8 review. Comments relating to review or distribution may be added.

Section 9: Review of Public Communications. (DOE Directive 1340.1B)

Public Communications are products created to attract business, promote capabilities, convey general corporate information, or generate goodwill. These promotional products are created in any medium, such as videos, brochures, fact sheets, booklets, pamphlets, posters, exhibits, publications, multimedia, and Internet/World Wide Web postings. They are primarily intended for external audiences and are not used solely for the purpose of communicating scientific and technical information. For more information, see the *Guide to Preparing SAND Reports*, SAND97-0405, page 18, "Guidelines for Producing and Releasing Promotional Communication Media (Public Communication)."

If your information release (1) is a Public Communication, or (2) will use color printing and be distributed outside of Sandia, or (3) will use color printing for two or more colors and be distributed internally, hand-carry or mail it to the Review & Approval Desk Coordinator (NM), MS 0619, Bldg. 894, Rm 201, (505) 845-8220 or Technical Communications Dept. 8815 (CA), MS 9021, (510) 294-2388, who will arrange the following Section 9 approvals:

- Review by the PR & Communications Center 12600 (NM) or by the Technical Communications Department 8815 (CA) for adherence to Corporate "Common Look and Feel" guidelines. Refer to Web address: <http://www.sandia.gov/SandOnly/RevApprov/RevApprov.html>
- DOE approval, which takes considerable lead time. The procedure for getting DOE approval can be started at the beginning of the Review and Approval process, while other R&A steps are being initiated.

NOTE: Products reproduced by color Xeroxing (excluding Public Communications) do not need the Section 9 review.

Press releases are exempt from the Formal R&A process; preparation and distribution of releases are managed by the Employee Communications and Media Relations Department. As a minimum, press releases must have Organizational R&A and be coordinated with the Employee Communications and Media Relations Department.

Section 10: Review & Approval Desk (12690, MS 0619 (NM))/Technical Communications (8815, MS 9021 (CA)).

The Review & Approval Desk Coordinator performs a final review of the content of the Review & Approval Form for completeness and compliance with DOE reporting requirements. For this review, a copy of the report is also needed.

Figure 1-6. (concluded).

Final Processing of the Package

After the Formal Review & Approval (R&A) package has been received by the Review & Approval Desk Coordinator and the document has been approved, the following happens:

Type of Document	Retained by Creative Arts, to be sent to the Technical Library.	Sent to Author
SAND Report	Original R&A Form.	Copy of approved R&A Form. Final draft of report.
Abstract	Original R&A Form. The Abstract.	Copy of approved R&A Form.
Journal Article	Original R&A Form. The Journal Article.	Copy of approved R&A Form.
Conference Paper	Original R&A Form. Three copies of the conference paper. (One copy of the paper goes to the Technical Library and two go to DOE/ OSTI.)	Copy of approved R&A Form.

Notes:

- Be sure to check the copy of the approved R&A Form and final draft report for comments that may have been entered by any of the reviewers.
- The R&A Form will be kept on file at the Technical Library along with a copy of the document.

Submitting Your SAND Report for the Web

After your unclassified, Unlimited Release SAND Report has gone through Review & Approval and has been signed-off, Sandia's Technical Library requests that you send a copy to the Library so that they can load it onto the World Wide Web. The goal of the Library is to support Sandia's objective of providing Lab-wide electronic access to information resources. Putting your report on the Web gives you the opportunity to make your research available for viewing on the Internal Restricted Network (IRN) as well as on the External Open Network (EON).

Preferred Sand Report Format. The Technical Library would prefer that you send a copy of your SAND Report in electronic format, preferably in IBM compatible Postscript. You may also submit copies of your documents in formats supported by the Laboratories computer common operating environment. These standards are listed on the following Sandia Web site:

http://www-irn.sandia.gov/organization/div1/comp_std/Site_Lic.htm

You can send your file on a diskette (the Library cannot use a Bernoulli) or by anonymous FTP to the following sites:

- IRN: infoserve.library.sandia.gov/pub/sandreport, or
- EON: ftp.cs.sandia.gov/incoming/sandreport

Electronic files with hardcopy graphics. If some of your graphics are still in hardcopy form, send the hardcopy pages containing the graphics along with your electronic file, and the Library will scan the graphics and add them to your file.

Reports in hardcopy only. If only a hardcopy of your report exists, send a copy of it (preferably unbound) to the Library, and it will be scanned into the Library's electronic database of SAND Reports on the Web. Send the document to Reports Receival, Org. 4916, MS 0899.

NOTE: In addition to sending the Library your electronic file, please continue to provide five hardcopy copies of your SAND Reports to the Library by including the following in your report distribution list:

5 MS 0899 Technical Library, 4916

Abstracts, journal articles, and conference papers should be submitted in the same way as SAND Reports. They will be loaded into Sandia's Internal Restricted Network only.

SECTION 2

Writing the SAND Report:

- **SAND Report Terminology**
- **Elements of the Document**
- **Getting Started**
- **Peer Review**
- **Sample Report**

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SAND Report Terminology

contractor-authored – A document that has been authored by one or more contractors without a Sandia employee as a co-author. Contractor-authored SAND Reports are printed with a unique cover that sets them apart from Sandia-authored reports.

distribution limitation – This limitation is placed immediately under the SAND number on the cover and title pages. Its purpose is to indicate any limitations on the distribution of the document.

Examples: “Unlimited Release” and “Unclassified Controlled Nuclear Information.”

format – The physical arrangement and general appearance of text, for example, the margins, style of headings, spacing before and after headings, spacing between paragraphs, location of page number, indentation of text, and use of bullets.

levels of edit – The distinction made between the levels of effort to be applied in editing a document. Sandia’s system is based on three levels:

1 = low-level edit. The editor ensures that Sandia’s minimum report standards are met for format, spelling, punctuation, and grammar (limited to complete sentences and subject-verb agreement).

2 = medium-level edit. The editor performs a Level 1 edit, plus thoroughly reviews language and mechanical style (usage, consistency, and style).

3 = high-level edit. The editor performs a Level 2 edit, plus assists with the complete organization and content of the report. Editor writes or revises material for better flow, clarity, construction, and completeness.

markings – Control markings required by Sandia or the U.S. Department of Energy to indicate the level of protection required for a publication. Markings appear in large, bold print at the top and bottom of a page, or as otherwise specified. Examples of markings are UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION and SECRET.

physical protection legends – Legends (also called “notices” or “blurbs”) are placed on the title page and cover of documents to describe a limitation to access. Sometimes two or more legends may apply to one document.

SAND Report – An official Sandia document that bears a SAND number, such as SAND97-0045. The term most frequently refers to documents that report scientific or technical information, but it can also refer to documents that report administrative information.

Elements of the Document

The elements of a SAND Report follow a standard sequence (listed in the following pages). Deviations may be made when necessary, but we prefer that the standard sequence be adhered to whenever possible. Annotations in the Sample Report contain guidance for the author on what to include in each section.

Not all elements appear in every document, and for practicality a few reports may require a slightly different sequence. The frequency of such deviations should be limited as much as possible.

Covers for SAND Reports and Internal Memorandums

A SAND Report cover can be prepared by Creative Arts Dept. 12620 (Bldg. 894, Room 201) or by Technical Communications Dept. 8815 (CA). These departments base the master on your report title page, a copy of your completed and signed-off Review & Approval form, and your Service Order form (Figure 4-4). This requirement ensures that all information and markings mandated by the Department of Energy appear on the cover.

A sample cover is shown on page 71. Note the funding statement, which includes the current DOE contract number.

Creative Arts (NM) or Technical Communications (CA) also prepares the inside front cover, where the legal notice (disclaimer) and notice of copy availability (when applicable) are printed. The request for a cover is processed as a final step before the report is sent to our Print Shop. The process for having covers made is given in Figure 4-1, "Ordering covers from Creative Arts Dept. (NM) or Technical Communications Dept. (CA)."

The form for an internal memorandum cover is no longer available from JIT. The cover may be created on a PC or ordered from Creative Arts in the same manner as a SAND Report cover. See Samples 3-1 and 3-2.

Title Page—Unclassified

See Sample 3-3, which shows an unclassified title page; see Sample 3-6 for suggested treatment of authors' names on a title page, and Sample 3-7 for special markings and notices for the title page.

Elements of the Unclassified title page

An Unclassified title page includes the following elements:

- report number.
- distribution category number (UC-XXX).
- distribution limitation (Unlimited Release, Export Controlled Information, etc.).
- print date.
- supersession statement (if the report is a revision): skip a line below the print date and type "Supersedes SANDXX-XXXX, dated (month & year) ."
- title of report.
- author(s).
- contract or purchase order number if work was done with non-DOE funds or if report is authored by a non-Sandian on a contract.
- abstract (unless report is being done for an agency with different requirements, e.g., NRC).
- any required notices and markings that limit distribution (such as the Non-Sandia Proprietary Information notice).

Page numbering for Unclassified reports

Because Unclassified, Unlimited Release SAND Reports are being put on the Web (using Adobe Acrobat PDF format), we now recommend that you number your SAND Report pages with consecutive Arabic numbers. The cover is page 1 (with the page number not showing); the inside front cover (disclaimer page) is page 2 (with the page number visible); the title page is page 3, and so on. Using this numbering system, the SAND Report page numbers will correspond to the page numbers assigned by the Acrobat software, which means that authors' Contents pages will correspond with the Acrobat-assigned page numbers.

Unclassified reports can end on a right-hand **OR** left-hand page.

(In previous versions of this *Guide*, we recommended a different numbering system, using Roman numerals for the Front Matter and Arabic numbers for the rest of the report. Note the numbering system used for this *Guide to Preparing SAND Reports*, which was renumbered to be usable on the Web.)

Title Page—Classified

See Sample 3-4, which shows a Classified title page; see Sample 3-6 for suggested treatment of authors' names on a title page, and Sample 3-7 for special markings and notices for the title page.

Elements of Classified title page

A Classified title page includes the following elements:

- report number.
- distribution category (C-XX).
- any special limitation such as Nuclear Weapon Data and Sigma number.
- print date.
- supersession statement (if the report is a revision): skip a line below the print date and type “Supersedes SANDXX-XXXX, dated (month & year) .”
- title of report, with classification of title in parentheses, for example, (U) or (SRD), after the title.
- author(s).
- contract or purchase order number if work was done with non-DOE funds or if report was authored by a non-Sandian on a contract.
- abstract (with classification of abstract in parentheses after the word *Abstract*).
- classifier information (“Classified by . . .”).
- any required notices (such as the Restricted Data notice).

Page numbering for Classified reports

Classified reports are numbered the same way as Unclassified reports, except that the cover page number (“1”) is visible on the lower right of the cover.

If the Classified report ends on a right-hand page, follow it with a blank left-hand (even-numbered) page with the correct page number, the proper marking, and the words *Intentionally Left Blank* centered on it.

The following sections of a report are numbered the same for Unclassified and Classified reports.

Markings for Classified reports

Place the classification level (TOP SECRET, SECRET, or CONFIDENTIAL) at the top and bottom of the page, using bold print at least 1/8-inch high. Refer to Sample 3-4.

Sections of a SAND Report:

Front Matter (listed in the order it should appear)

- **Title Page**

The “Front Matter” of a SAND Report starts with the title page.

- **Acknowledgments** (optional)

The Acknowledgments statement usually appears on the back of the title page and is numbered page 4. If this (or any other) left-handed, even-numbered page stays blank, number that page as usual and center the words *Intentionally Left Blank* on the page. Right-hand pages should never be blank.

Acknowledgments credit substantial contributors to the work who are not authors. Contributions that are simply part of a person’s normal job responsibilities need not be acknowledged.

- **Contents**

The **Contents** page (or pages) appears next, and begins on a right-hand (odd-numbered) page, usually page 5.

The Contents (do not use “Table of Contents”) includes not only a list of headings in the text, but also a list of figures and a list of tables (see Sample 3-8). It should include headings through the third order. The Contents page(s) should be checked, and updated if necessary, after the report is complete. All listings in the Contents should agree exactly with the headings that appear in the text, and all page numbers listed should be accurate.

For figure captions and table titles in the Contents, do not include explanatory text, that is, (1) text that is enclosed in parentheses or (2) text that follows a period at the end of the caption/title. An exception would be to include any parenthetical text that is necessary to distinguish one figure from another. When the report includes only one or two figures and one or two tables, there is no requirement that they be included in the Contents. See the Sample Report at the end of this section for an example of a Contents page.

- **Preface or Foreword** (optional)

If a **Preface** or **Foreword** is included, it will appear on the next page of the front matter.

A **preface** is usually written by the author and includes information of interest to the audience but not essential to a clear understanding of the text.

A **foreword** (note the correct spelling) is usually written by a person other than the author after the document is finished, and that person's name appears at the end of the foreword. The foreword may consist of comments about the value, background, author's expertise, or other information that person thinks might contribute to the value of the report. An alternative placement of the foreword or preface is before the Contents.

- **Executive Summary** (optional)

Next comes the **Executive Summary** (or **Summary**), if needed, which starts on a right-hand (odd-numbered) page.

The executive summary is a self-contained, concise recapitulation of the major points in the body of the report. It includes information on the manner in which the work was done, the nature and purpose of the investigation, the equipment or processes used, a brief discussion of the results, and the primary conclusions or recommendations.

The executive summary is included in the front matter for expediency and it starts on a right-hand (odd-numbered) page. It is usually written after the body of the report is completed. However, the author has the option of including the executive summary in the body of the report, as the first section.

- **Acronyms and Abbreviations**

If an **Acronyms and Abbreviations list** is needed, include it next. If this list ends on a left-hand (even numbered) page, the body of the report begins on the facing right-hand page. If the acronyms list ends on a right-hand (odd-numbered) page, add an *Intentionally Left Blank* page after it, then begin the body of the report on the following right-hand page.

If a document is long and contains numerous acronyms, abbreviations, or special mathematical terms that require an explanation, include a list with the appropriate heading.

Capitalization of acronyms. We suggest that the expansion or definition in the list reflect capitalization as it appears in the text; that is, start the expansion or definition with a lower-case letter if that is the way it appears in the text. The fact that the first (or an internal) letter of a word is used in an acronym is not a reason to capitalize that letter in the expansion. Use the same rule you would in ordinary text: If a term is a proper noun, capitalize the first letter of each word; if a term is a title, follow the capitalization rule for titles.

Body of the Report

The first element in the body of the report is an *introduction* (or the executive summary if it is placed here rather than in the front matter). The introduction describes the purpose of the report, its scope (what is discussed, and sometimes what is *not discussed*), and background information that helps the audience understand the problem. For example, it might explain how this work relates to earlier work.

The introduction is followed by a logically organized development of the study that ends with a summary, conclusion, or recommendation section.

References and Bibliography

The references and bibliography immediately follow the body of the report. If the report has appendixes that include references and bibliography, the list of those references and the bibliography appear in the appendix, not in the body of the report. See Appendix C, References.

Back Matter

- **Glossary**

Including a glossary is optional. In very large, complex documents, a glossary might be valuable.

- **Appendixes**

Appendixes are included as supporting documents. They are not essential to the body of the report. Each appendix should be a self-contained section. For example, any references cited in an appendix must be numbered independently (such as A-1) and appear in the reference list for that appendix, not in the reference list for the body of the report. An appendix should in no way be dependent on the body of the report.

- **Index**

An index is included when more detail is needed than is provided by the contents listing, for example, as in a style guide or other reference document.

Distribution

The distribution list is headed by the word “Distribution” and is the last item in the report. External addresses are listed first (with any foreign addresses at the end), then internal addresses, then the “record” or “housekeeping” copies. Record copies are those required by Sandia and the Department of Energy for their records. See the Sample Report at the end of this section and Samples 3-9 and 3-10 for more information.

Getting Started

The following steps might save you time and stress when writing a technical report.

1. Define your purpose and pinpoint the audience.

Defining your purpose and pinpointing the audience for a report will help you determine the appropriate structure and level of detail needed in your writing. Why did you do the work (the purpose)? Are you directing your writing to the people who will be receiving your report (the audience)?

2. Outline the major points or sections.

Either in outline or sentence form, list the major topics you want to cover. This will help you organize your thoughts and the rough material, and later it will help you evaluate the draft.

3. Write the easiest sections first.

First, write the sections with which you are most familiar, or those for which you have all the information. Save the more troublesome sections for later. Always write the abstract, summary, introduction, and conclusion last. They must accurately reflect what you have said in the body of your report.

4. Organize the graphics.

Determine what figures and tables you will need. Prepare clear drafts of them.

5. Read the text draft and relate your graphics to the draft.

Check that the graphics are appropriately called out and consistent with the text. Are the graphics themselves clear and easily understood? Do they present information that is pertinent? Does the caption/title clearly reflect what the figure or table contains?

6. Order artwork as early as possible.

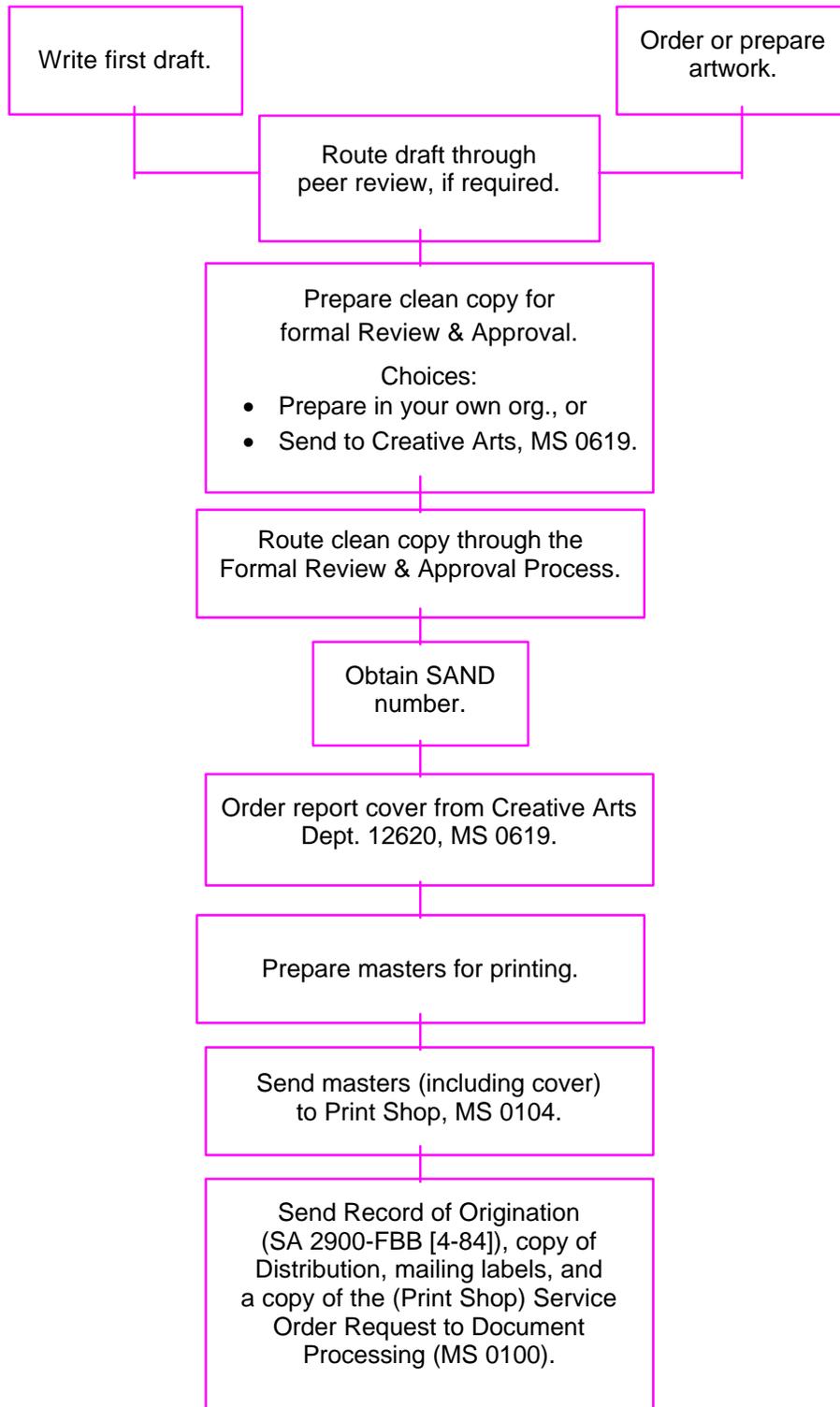
To avoid unnecessary delays in publishing your report, order artwork as early in the preparation stage as you feel secure about its accuracy. If you need photographic

services, arrange for those as soon as you know your requirements. If you know generally what you want but can't crystallize the concept, consulting with the staff in the technical art or photography groups would probably be helpful.

7. Ask others to review your work (see Peer Review later in this section).

Asking others to review your work isn't always easy, but it is crucial. Peer reviews can prevent technical errors and embarrassment and will help you present your material effectively.

Flowchart for Creating SAND Reports



Style Manuals

W. A. Sabin, *The Gregg Reference Manual*. McGraw-Hill, New York, 1994.

Completely covers punctuation, capitalization, treatment of numbers, abbreviations, plurals and possessives, compound words, grammar, and format. Highly recommended for anyone who needs to know the fine points of usage.

United States Government Printing Office, *Style Manual*. Government Printing Office, Washington, DC, 1984.

The standard for government publications. Contains capitalization, hyphenation (or not) of compound words, punctuation, standard abbreviations, and a wealth of miscellaneous information not easily found elsewhere—for example, plant and insect names, tables of geologic terms, etc.

University of Chicago Press, *The Chicago Manual of Style*. University of Chicago Press, Chicago, 1982.

The “Bible” of academic writing and for many publishers and journals. Has chapters on production and printing; majority of space is devoted to minutiae of rules concerning punctuation, tables, references, and bibliographic forms. Highly detailed and not easy to use, but is an undisputed authority, especially for references. Recommended for anyone publishing in academic presses and for those responsible for references/bibliographic forms.

Dictionary of Scientific and Technical Terms, fourth edition. McGraw-Hill, New York, 1989.

Includes scientific and technical words and phrases; omits most words already contained in other standard dictionaries. Field in which term is used is given in parentheses after the word. No pronunciation, verb tenses, or etymologies. Useful information in appendixes, for example, Greek alphabet, periodic table, mathematical signs and symbols, specialized abbreviations and acronyms. Highly recommended as resource for Sandia departments.

Peer Review

No Official Sandia Policy

Sandia has no official policy concerning peer reviews. Some organizations require it while others don't. The points in this section are excerpted from "Peer Review," a four-page leaflet prepared some years ago by Lee Garner of the Technical Writing Division. Unfortunately, no copies of the complete document are now available.

Value of a Peer Review

The value of a peer review is "to protect the author/s/, organization, and discipline from embarrassment created by omissions, flawed reasoning, unfortunate expressions, and oversell."

The Peer Review Process

The reviewer has certain standard obligations and should perform certain procedural obligations as listed in the following paragraphs.

Obligations of the reviewer

The peer reviewer should—

- Evaluate the significance of the work reported.
- Assess its accuracy and appropriateness for publication.
- Check adherence to standards of the organization and publisher.

Tact and sensitivity are important in the reviewing process. If the reviewer thinks important changes must be made, he or she should find a way to achieve these changes without arousing defensiveness or antagonism in the author. And the author must guard against developing a defensive attitude. The answer to both problems is objectivity.

Procedural steps of the review

The reviewer should read the entire manuscript twice, focus on specific areas, and check the mechanics of the document. Lists for each of these steps follow.

Peer reviewer should read the entire manuscript twice:

- The first time with an open mind and in a stream-of-consciousness mode, jotting down quick marginal notes to stimulate more detailed response in the second reading.
- The second time with more attention to detail, writing out reactions and suggesting specific improvements.

Focus on these details:

- A sentence or two in the introduction that expresses the author's specific purpose or intention.
- Statements of assumptions and definitions.
- Sufficient data and correct interpretation; equations expressed and dealt with accurately.
- Adherence to subject and avoidance of digressions, repetitions, and extraneous material; balanced treatment.
- Emphasis on significance of the work and applications.
- Language appropriate to the subject and the readers.
- Graphics that help visualize ideas or data.
- Appropriate title and abstract.

Check the mechanics. The following observations may be useful feedback to the author:

- Can a reader follow the numbering of equations, figures, references?
- Do the legends fully explain the central points of the illustrations? Are the scales of the ordinate and abscissa appropriate?
- Could some data and figures be combined or eliminated? Is metric notation appropriate?
- Are basic sentence problems eliminated? (Problems of expression could obscure exact technical meaning.)

Author's response to the review

The author should welcome feedback but carefully assess its validity. Further objective discussion may be needed between author and reviewer to resolve any dilemmas.

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Sample Report Annotated with Writing Instructions

The following sample was excerpted from an actual report and modified to present all sections that might appear. The boxes at the bottom of each page contain brief writing instructions about what to include in each section.

Information about other formats, graphics, and tables appears in Section 3, which has numerous samples at the end of the section.

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SAND97-2346 • UC-706

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Printed May 1997

**The Velocity Interferometer System
for Any Reflector**

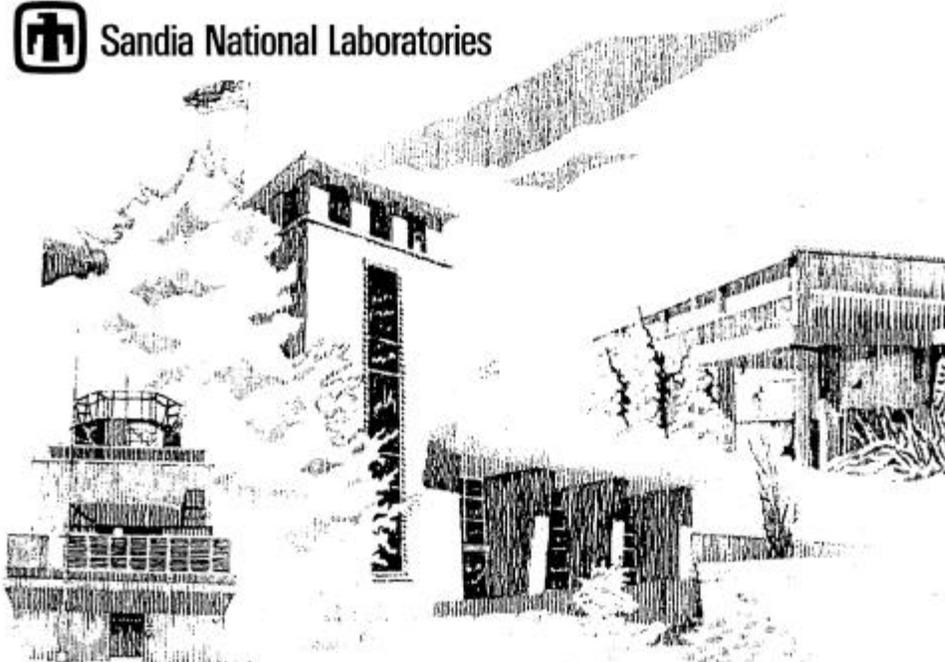
**Mod B, Push-Pull with Double-Delay-Leg
and Dual VISAR Modes**

O.B. Crump, Jr., P.L. Stanton

Prepared by
Sandia National Laboratories
Albuquerque, New Mexico 87185 and Livermore, California 94550

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Sample Report

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A15	326-350
A16	351-375
A17	376-400
A18	401-425
A19	426-450
A20	451-475
A21	476-500
A22	501-525
A23	526-550
A24	551-575
A25	576-600
A99	601 & UP

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The Velocity Interferometer System for Any Reflector

Mod B, the Push-Pull With Double-Delay-Leg and Dual VISAR Modes

O. B. Crump, Jr., and P. L. Stanton
Explosive Projects and Diagnostics Division
Sandia National Laboratories
Albuquerque, NM 87185

Abstract

The Velocity Interferometer System for Any Reflector (VISAR) is the modern standard for measurement of shock phenomena. This report describes the original VISAR and its evolution into the current Mod B version built for Sandia's Explosive Projects and Diagnostics Division 2514. The Mod B system incorporates the push-pull signal processing introduced in Mod A to reduce sensitivity to target self-light and simplify data reduction, and it introduces the use of two push-pull VISARs to obtain two modes of operation. In the Dual VISAR mode, each VISAR is used independently to track separate targets or separate points on a common target. In the Double-Delay-Leg mode, both delay legs are used to track the motion of a single point. The second delay leg gives a redundant measurement that is used to resolve the ambiguity in the velocity jump in shock-wave experiments.

Abstract:

- Sandia requires that all SAND Reports contain an abstract on the title page. Exceptions are rare.
- In a classified report, keep the abstract unclassified whenever possible.
- Use "key" words to support library searches (information retrieval).
- The purpose of an abstract is to explain the essence of your report to the reader.
- The abstract should be kept short—under 200 words whenever possible.
- It helps to have other people review your abstract.
- Abstracts are of two types: informative and descriptive. The informative abstract is preferred.

Continued in bottom box on next page . . .

Acknowledgment

The authors thank R. E. Hollenbach of the Thermomechanical and Physical Division for the very helpful conversation regarding his earlier work with circuit designs for photomultiplier tubes.

Acknowledgment:

Often an acknowledgment is the only recognition given someone who has made an important technological contribution to your work. For this reason it is an important part of the report. Give the contributor's name and tell briefly what the contribution was: "John Doe for his skill in fabricating the special testing equipment." Sandia's policy on acknowledgments was outlined by R. S. Claassen, 8000, in his memo "Publications—Title and Acknowledgments," December 18, 1984:

Acknowledgment of work by others, when appropriate, is an obligation of the author of a Sandia report or a journal paper. It is not necessary, however, to acknowledge work which was performed as a normal part of a work assignment. The important acknowledgment is for professional level contributions. Conceptual level inputs, such as innovative thoughts or original suggestions for an approach to the problem, rank first. Considerable effort at an advanced level, such as analysis of experimental data or refinement of experimental techniques, deserves credit. Recognition should be given to an assistant who has contributed to the work through skill and careful experimentation. Acknowledgments should be stated in a simple, declarative way. Flowery language and admissions of indentured servitude are inappropriate.

Abstract (continued from title page):

Informative abstract. In an informative abstract, you should—

- Explain the most important points of the report to give the reader a clear overview of the research, experiment, test, or other activity being reported. The well-written informative abstract may contain all the information certain readers need; other readers may find they want to explore the entire report.
- State the study's purpose, its objectives, or the subject treated. Classify the scope of your treatment as preliminary, brief, comprehensive or exhaustive, experimental, theoretical, or some other appropriate term.
- State the method of attack, parameters, and equipment involved, especially if they are new or unique.
- Report results (both expected and unexpected), their degree of accuracy, and their significance.
- Note if related or follow-up work is needed or planned.
- Insert no illustrations, charts, tables, references, or footnotes; refer to no specific figures or paragraphs.
- Write in full sentences, in the active voice whenever possible.

Descriptive abstract. In a descriptive abstract you outline the organization of your report but do not explain its major ideas. (It is essentially an extended table of contents and is best used for a manual, tutorial, or other reference material.)

Contents

Preface iv
 Summary v
 Nomenclature vi
 Introduction 1
 Background..... 1
 The Conventional (Original) VISAR 2
 The Mod A (Push-Pull) VISAR..... 5
 The Double-Delay-Leg VISAR..... 5
 The Mod B (Current) System 6
 Layout and Operation of the System 6
 Operating Modes 18
 Photomultiplier Design..... xx
 Optical Fiducial..... xx
 Data Acquisition Instrumentation xx
 Example Data..... xx
 Discussion of Technique..... xx
 Conclusion 19
 References..... 20
 APPENDIX — 21

These sections of the published report are omitted because they serve no illustrative purpose.

This report did not have an appendix. If it did have an appendix, the name of the appendix would appear here.

Figures

1 The Original VISAR Model..... 3
 2 Push-Pull VISAR 5
 3 Layout for Sandia's Mod B Push-Pull VISAR With Double-Delay-Leg and Dual VISAR Modes..... 7
 4 Schematic of Voltage Divider for High-Speed Photomultiplier..... xx
 5 Test Setup Used to Produce High-Frequency Optical Input..... xx
 6 Frequency Response for Photomultiplier Circuit From Test Setup of Figure 5 xx
 7 Response of Photomultiplier to a Narrow Optical-Plus Input..... xx

These figures were omitted because they serve no illustrative purpose.

(Continue listing all figures in the report)

Tables

This report does not have tables. If you have tables, list them here, using the format for figures.

Contents page:

- Include a Contents page if the report is longer than 15 pages; if the report is shorter, a Contents page is not required, although you may choose to include one.
- List major headings. Also include level two and three headings if necessary. Headings are the major road signs for the reader, so include the levels that serve the reader. List the headings exactly as they appear in the text (but omit parenthetical material).
- Include a list of figures and a list of tables unless you have fewer than three figures or three tables.

Preface

This report does not contain a preface.
If you have a preface or a foreword, place it here.

Preface and Foreword:

Most SAND Reports do not require a *preface* or a *foreword*. However, if you want to give the reader background information that is not appropriate to include in the text, or if someone else wants to write a prefacing statement, place it here.

The *foreword* is usually a prefacing statement made by someone other than the author. (Always check the spelling of *Foreword*; it is not "Forward," one of the most common oversights in writing.)

Sometimes acknowledging statements are included in the preface, making a separate acknowledgment section unnecessary.

Summary

This report does not contain an executive summary.
If you have a summary, place it here.

Executive summary:

- An executive summary is a complete but concise recapitulation of the major points of the entire report. The summary may provide some readers with all the information they need; it will brief others so that they will have a basic concept of the subject before they start reading the report.
- Often, especially in short reports, the abstract contains enough information to eliminate the need for an executive summary (as is the case in this report).
- The length varies according to the content and the audience. If you keep in mind the function of your summary—to briefly recapitulate the major points of the report—the length should be self-determining.
- Steps in developing a summary—
 1. Review your report and note major points, significant facts, important considerations, and major conclusions.
 2. List key phrases or sentences you want to include.
 3. Compress information from steps 1 and 2, and coherently connect the ideas.
 4. Have other people review your summary for accuracy, completeness, and proper emphasis.

Sample Report

Nomenclature

BS	beam splitter
PBSC	polarizing beam-splitting cube
PMT	photomultiplier
PZT	piezoelectric translator
VISAR	Velocity Interferometer System for Any Reflector

c	velocity of light
C	total of light velocity
H	total thickness of elements

Group terms according to functions and leave a space between the groups.

d	correction for refractive index with window
Dm/n	a correction term required when a window material with a stress-dependent refractive index is used

Acronyms, initialisms, and special terms:

When your report contains numerous acronyms, initialisms, or special terms, help your audience by listing them in a special section. Give the sections an appropriate title: nomenclature, acronyms, special terms, or other appropriate words. The audience will appreciate this courtesy. Even though you may think “everyone” will know what you mean, many people who are not thoroughly familiar with the terminology in your particular field will read the report. Also, the report is a permanent record, and by defining the acronyms you are ensuring that the terms will be clear to readers many years later.

When we use the initial letters of words within a phrase to form an abbreviation, we informally refer to that abbreviation (which is usually all caps) as an acronym ; however, technically speaking, it may be either an acronym or an initialism. The distinction between the two is that the acronym can be pronounced as a word but the initialism cannot. In practice, the only reason such a distinction must be made is to determine which indefinite article (a or an) to use. (See the last item on this page.)

Treatment of items in the listing:

- Capitalize the expanded terms as you would in text; use capitals only when they are required by the standard rules of grammar — NOT to indicate which letters make up the acronym.
- Group terms in the following order, with a blank line between the groups: acronyms, abbreviations, and general terms; mathematical English letters or terms; mathematical Greek terms.
- When a letter in the listing appears as both capital and lower case, list the lower case terms first.
- The generic title “nomenclature” includes acronyms and initialisms, symbols, and special terms.

Treatment of items in the text:

- At first use in text, enter the phrase as it usually appears (this is the “expanded” term) followed by the abbreviated form in parentheses. In a long report, you may want to refresh the reader’s memory in a later section by showing both the acronym and its expansion.
- For an isolated use of the phrase much later in the text, simply use the expanded term.

Pluralizing abbreviations:

Add “s” as in PMTs. Use the apostrophe only when not doing so might cause confusion, as in K_d ’s.

Using the correct indefinite article:

The choice of an indefinite article (a or an) is based on pronunciation—“a” before consonant sounds and long “u” sounds; “an” before vowel sounds. Examples: an ICBM, a FROG, an FFT, a FORTRAN program, an ADNET.

The Velocity Interferometer System for Any Reflector

Mod B, the Push-Pull With Double-Delay-Leg and Dual VISAR Modes

Introduction

The modern standard for measuring shock phenomena is the Velocity Interferometer System for Any Reflector (VISAR).¹ The VISAR uses coherent, single-frequency light from a laser source to measure the motion of a diffuse, reflective surface. The Doppler shift in the reflected light is detected in a modified Michelson interferometer. The inherent sensitivity, resolution, and frequency response of such a system are essentially limited only by the bandwidth of the optical detectors and recording equipment.

This report describes the development and operation of the VISAR Mod B Push-Pull with Double-Delay-Leg and Dual VISAR modes.

Background

The VISAR development started with the conventional version originated by L. M. Barker and R. E. Hollenbach of Division 1534 and progressed through the Push-Pull VISAR modification (Mod A) made by W. F. Hemsing of Los Alamos National Laboratories.^{1,2} The early 1970s experiments of J. E. Kennedy of Division 5131 and the author first used the double-delay-leg technique incorporated in the current Mod B.³ Each version resulted from a new need. To establish a background for understanding the current version, each of the earlier versions is discussed.

Introduction:

The function of an introduction is to inform the reader of the following:

- The exact subject of the report. Try to present a key idea in the first sentence or two.
- The exact purpose—why the report is being written; why the work is important.
- The scope—the “range” of the subject matter, that is, the detail in which it is discussed (and sometimes in what detail it is not discussed). The scope may require a section of its own.
- The plan of development—how you have organized your report. This information should appear near the end of your introduction. (This does not mean that you name each section. Rather it means that you explain the order in which you develop the report; be careful that your explanation is given in the same sequence in which you present the development in the text.)
- Identity of audience to whom you are directing the report and how the information will be used by this audience.
- A brief explanation of any outside sources you are using.
- Background information the readers need to understand the report better. The background sometimes may be long enough and important enough to require a section of its own, as in this example report.

The length of your introduction is determined by what is needed to set the stage for your readers to readily get a clear concept of your objective. It may be only a few sentences or it may be quite long; include only what is necessary.

The Conventional (Original) VISAR

Sample Report

The conventional VISAR was developed by Barker and Hollenbach primarily to measure free-surface velocities of materials in gun-impact experiments.¹ In this type of experiment, projectile velocities are very accurately measured (by other means), and well-defined experiments can be performed with results that are predictable in many respects. Uncertainties in the number of missed fringes at a shock jump may be resolved by using the known impact velocity and the impedances of the impactor and target materials.

The features of a conventional VISAR are shown in Figure 1. A diffused beam containing the target Doppler information is returned to the VISAR table, passing through a telescope to reduce the beam diameter. A small part of the light beam is split off to an intensity monitor, and the remainder is routed to the main beam splitter of the interferometer. Half of the signal is sent through a reference leg and half through the delay leg, whose medium is air and fused silica.

This beam is delayed by a time, t , caused by the difference in the index of refraction of the fused silica in the delay leg and the air in the reference leg. The beams are reflected and recombined at the main beam splitter, where interference is developed. A phase shift is produced in the recombined beam by a change in the target velocity. When the beam recombines, half of the recombined beam propagates in two directions away from the beam splitter, and interference phase information is present in each beam. One of the recombined beams is routed to the photo detectors, while the other beam is wasted. A polarizing beam-splitting cube splits the beam into two quadrature components: S and P polarized light beams.

Developing the text:

Decide before your first draft what your primary order of development will be. Making this decision at the very beginning will help you write a closely knit report. Here are suggested methods for organizing particular types of material.

<u>Method</u>	<u>Appropriate Use</u>
Sequential	to write a set of instructions or procedures.
Chronological	to emphasize the time element.
Comparison	to write about a new topic that is similar to others (as in this report).
Division and classification	to describe a device that can be broken into its component parts.
Spatial	to describe the physical appearance of a device, going from top to bottom, outside to inside, and so on.
General to specific	to write about, say, a software program, starting with the general function of the program, going to the larger routines and their functions, then the smaller routines and their functions.
Specific to general	to do the reverse of the previous method.
Decreasing order of importance	follows the same logic as general to specific.
Increasing order of importance	follows the same logic as specific to general.

Different methods in the same report:

Remember that different sections may require different types of development. For example, background may be chronological, and product description may be spatial. Use the same method for similar topics.



Figure 1. The Original VISAR Model (L. M. Barker and R. E. Hollenbach, Laser Interferometer for Measuring High Velocities of Any Reflecting Surface in J Appl Phys, Vol 43, No. 11, Nov 1972.).

Graphics, headings, and reference citations:

Because these topics occur throughout your report, they are combined here for convenience.

Figures and tables (graphics):

- Relate your graphics clearly to the text. Use consistent terminology in both. Use graphics only to serve a specific purpose—not as fillers.
- Use concise figure captions and table titles that clearly describe the content.
- Do not use duplicate captions or titles. If a figure or table is not different enough to deserve a different caption or title, maybe you do not need to include it.
- Call out all figures and tables in the text, and call them out sequentially.
- If a figure is taken from a published non-Sandia source, obtain written permission from the previous publisher. Then cite that source in your graphics caption, or above the caption, so that the original source will “travel” with the graphic if someone else decides to use your version of it. Use words such as “Reproduced with permission from (and give the source information, including the publisher).” See pages 102 and 223-226.

Headings:

- Use headings to flag the logical divisions of your text so the reader can (a) easily understand your method of developing the material and (b) locate a subject quickly.
- Make headings descriptive, brief, and parallel in structure.

Reference citations:

- Cite references by sequential numbering or the author-date system. Sequential-number citations should either be superscript numbers or on the line and bracketed: . . . was reliable.²; . . . was reliable [2]. Author-date citations should appear in parentheses on the line in the following form: (Smith 1992), (Jones et al. 1991), (Smith 1992, Kirkpatrick 1986a and 1986b). Kirkpatrick had two publications in one year, so to distinguish the citations they are labeled “a” and “b” and are listed that way in the reference list.
- If a superscript citation could be misinterpreted as a mathematical exponent, as in “a total of 36 ft²,” write “a total of 36 ft (Reference 2)” or “a total of 36 ft (Ref. 2).” If the reference itself forms part of the sentence, write (for example) “Reference 3 contains diagrams of the unit.”

The target velocity information is contained in the phase-time history of each of the S and P polarized light beams. These beams are monitored by photomultiplier tubes (PMTs). The P polarized light is Data 1, and the

Sample Report

S polarized light is Data 2. The recorded output of the PMTs is used to determine the target velocity, which is related to the instantaneous phase, ϕ , by the equation

$$u(t - \tau / 2) = \frac{I f(t)}{2\tau(1 + \Delta v / v)} \frac{1}{1 + d}$$

where

τ = delay time in the interferometer

λ = the source wavelength

Δn = a correction term required when a window material with a stress-dependent refractive index is used

δ = a correction for refractive index with wavelength⁴

The amplitude (envelope) of the phase information may change during an experiment because the target surface conditions may be altered by the shock wave. Thus, in conventional VISAR, measurement of instantaneous phase involves comparison of each data signal with the instantaneous overall amplitude or intensity.

Equation (1) may be solved for the velocity per fringe (VPF):

$$VPF = \frac{u(t - \tau / 2)}{f(t)} = \frac{I}{2\tau(1 + \Delta v / v)} \frac{1}{1 + d}.$$

Equations and mathematical English:

- If you handwrite your equations in the draft, use ink and form the characters carefully, especially Greek and other mathematical symbols. Circle any confusing term at first use and write in the margin what it is. Examples are ρ and p (rho and pee); η and n (eta and en); δ and ∂ (delta and partial derivative); χ and x (chi and ex). Write superscripts and subscripts so that the typist or others can easily distinguish them.
- Write any special instructions to the typist on a cover sheet or at the appropriate place in the draft. If you have a strong preference as to where the equations are to be broken at line endings, write instructions. Examples: after equals sign, before operators, no breaks immediately before dx , and so on. Because redoing equations is very time-consuming, any guidance you can give in your draft to help the typist get it right the first time is well worth the effort. The typist is not a mathematician and so must rely solely on the clarity of your draft.
- Punctuation of equations is a personal choice. The smoothest style is to punctuate them according to their function in the sentence. However, some authors prefer to use no punctuation (referred to as "open" style). Indicate your preference at the beginning of your draft, or at the beginning of the equations, so the typist will be certain about the style. Be consistent, whatever your choice. Indented paragraphs in a document with lots of equations allow you to distinguish when an equation occurs in the middle of a paragraph (no indent there).

The Mod A (Push-Pull) VISAR

VISAR Mod A, the Push-Pull VISAR, was developed by W. F. Hemsing.² The Push-Pull VISAR eliminates some of the problems in the reduction of data recorded from the original VISAR, caused by changes in light intensity in the return beam. The Push-Pull VISAR (Figure 2) makes use of the previously wasted light beam from the main beam splitter. This beam contains the same interference information as the first beam, but is opposite in phase. This light beam is routed to a second polarizing beam splitter, which produces $-S$ and $-P$ polarized light beams in the same manner as the first polarizing beam-splitting cube. These two beams are routed to two additional PMTs.



Figure 2. Push-Pull VISAR (uses the waste beam that contains the same Doppler information as the main beam).

The PMT output from the $-S$ polarized light PMT is inverted and added electronically to the output of the $+S$ polarized light PMT. In the resultant signal, the amplitude of the phase information is double the amplitude from one PMT. The P polarized light is likewise summed to provide a quadrature signal with the same phase-time history information. Furthermore, self-light, which contains no phase information, is an equal additive component in both PMTs. Since one of the PMT signals is inverted before summing, the self-light components cancel. Thus, the Push-Pull VISAR system is particularly suitable for use in experiments that produce self-light.

Since each of the electronically combined signals can oscillate symmetrically about zero, overall intensity envelope information is not required for data reduction. For this reason, monitoring of the overall beam intensity is not necessary, although some test diagnostic information is present in the intensity record. In some experiments, the self-light or reflected light may reach saturation levels for the PMTs. Under these conditions, the data records for the Push-Pull VISAR, like those for conventional VISAR, no longer provide reliable phase information. An intensity monitor would reveal the fact that the overall light level was too high in this case.

The Double-Delay-Leg VISAR

In experiments involving shock jumps in surface velocity, the recording equipment cannot track the change in phase. An uncertainty consisting of an integer number of fringes exists at such jumps in the record. The use of a VISAR with two delay legs set at different sensitivities can resolve the ambiguity in the data. The first experiments using the concept of a Double-Delay-Leg VISAR at Sandia Laboratories were performed by Kennedy and the author of this report in the early 1970s.⁵

The Mod B (Current) System

In the Mod B, a second VISAR was added to the Push-Pull VISAR system, giving it the additional capability to measure two separate points. When use of the second VISAR is blocked by adjusting certain beam splitters and mirrors, the system can be used in the Double-Delay-Leg mode to resolve shock jump ambiguity.

Layout and Operation of the System

The Mod B system is assembled on a horizontal breadboard optics table. The laser, a Spectra Physics Model 2000, 5-W, argon ion system, is mounted beneath the table, and the beam is routed up through a hole in the table to the optical train.

The optical layout for the Mod B system is shown in Figure 3. The laser output beam is routed by mirrors M2, M3, M4, and M6 to the target. BS1 is a 50/50 beam splitter, required when the system is used in the Dual VISAR mode. Finally, the outgoing beam passes through a short-focal-length, 5-cm-dia lens to the target. If the target is a diffuse reflector, a cone of the reflected light is collected by the short-focal-length lens, which serves as a collimating lens. The beam is then routed by steering mirrors M6, M5, and M7 into a telescope, which reduces the beam diameter by a factor of 10. The beam passes through a 0.30-nm bandpass filter, the center wavelength of which is 514.5 nm. This filter eliminates extraneous light signals and most of the self-light that may be generated by the target. Next, the beam enters a linear polarizer, which transforms circularly polarized light to linearly polarized light at 45° relative to the table.

When the VISAR is being used in the Double-Delay-Leg mode, part of the beam is sent to the second delay leg by beam splitter BS2. Part of the light is also reflected by BS3 (an 80/20 beam splitter), to be used to monitor beam intensity. The larger part goes to M8 and M9 and is incident on the main beam splitter, a 7.5-cm-dia, 50/50 beam splitter, mounted 11° of normal. From the main beam splitter, half of the beam traverses each of the two legs to mirrors and back to the main beam splitter, where they recombine. Fused silica optical delay bars and a 1/8 wave plate in one leg delay the light by some time, τ :

$$\tau = \frac{2h}{c} \frac{n}{n-1}$$

where

- h = the total thickness of the elements
- c = the velocity of light in free space
- n = the index of a refraction of the elements

The interference produced when the two beams recombine at the main beam splitter contains the velocity information. The information is present in both the transmitted and reflected beams, with a phase difference of 180°. The two beams are routed to beam-splitting cubes BSC1 and BSC2. Each cube splits its beam into S and P components, which have a phase difference of 90° introduced by the 1/8 wave plate at the end of the delay leg. The S and P polarized beams of light are then routed to the photomultipliers. The outputs of the two photomultipliers receiving the P polarized light are summed in a differential amplifier, one being

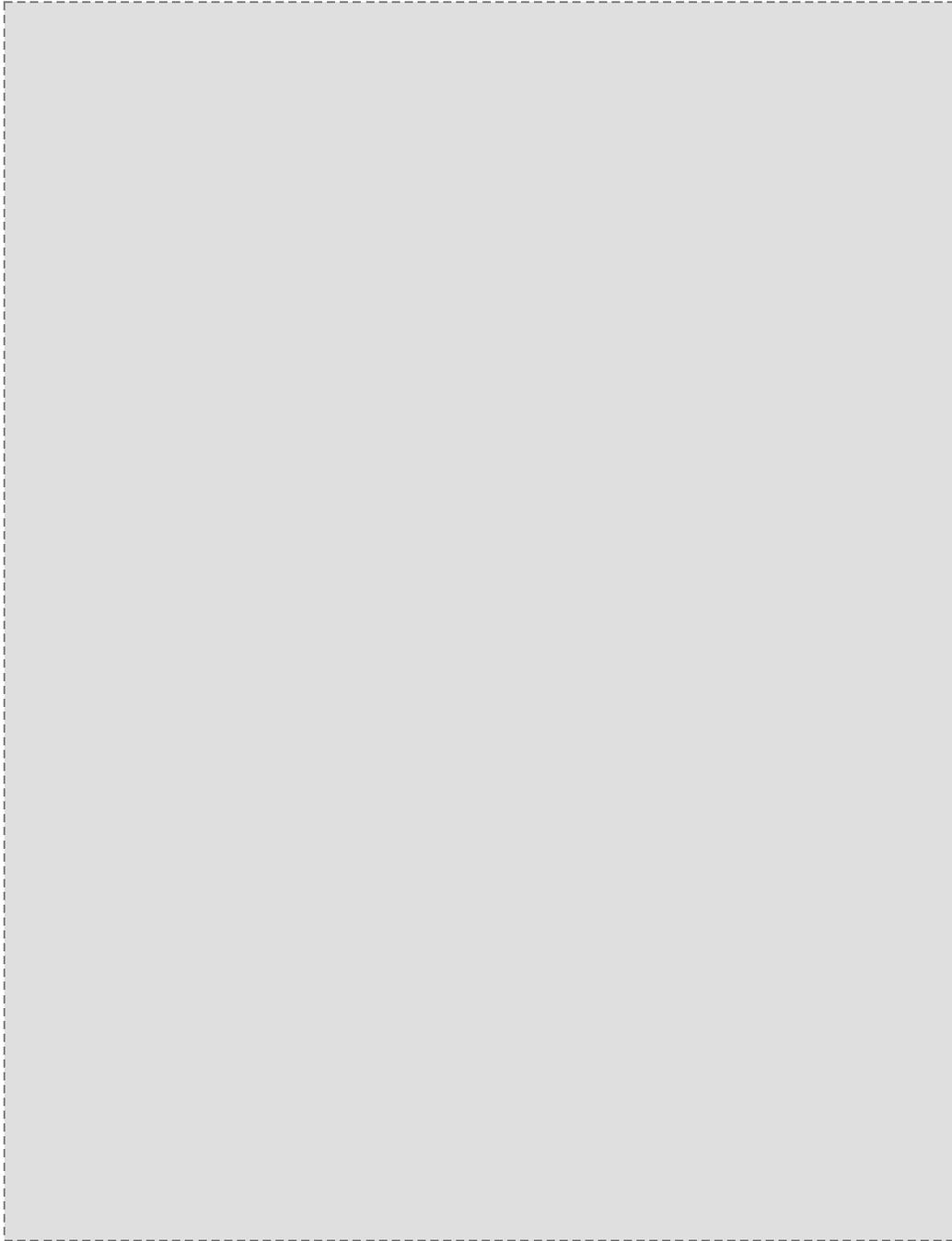


Figure 3. Layout for Sandia's Mod B Push-Pull VISAR with Double-Delay-Leg and Dual VISAR Modes.

Sample Report

inverted. The resulting signal is Data 1. The two outputs of the photomultipliers receiving the S polarized light are combined in the same manner, producing Data 2. Data 1 and Data 2 are quadrature signals containing the velocity information.

The piezoelectric translator (PZT) is used during setup to produce slowly varying phase interference.

Operating Modes

The addition of a second Push-Pull VISAR system on the same table enables the operator to use the system either in the Double-Delay-Leg mode to obtain a redundant measurement from the second system for comparison with the results from the primary system or in the Dual VISAR mode to use the second VISAR to measure a separate point.

Conversion between the Double-Delay-Leg mode and the Dual VISAR mode is simple. It involves three turning mirrors and slight readjustment of the back-off position of the delay-leg mirrors.

Flip mirror M1 must be in position for Dual VISAR experiments and out of position for Double-Delay-Leg experiments since it determines which information enters the second leg. BS1 is required for the double-target VISAR operation since it splits off half of the outgoing beam to be routed to the second target. It should be removed for single-target experiments to increase the available light to the photomultipliers.

BS2 is required for Double-Delay-Leg, single-target experiments since it sends half of the Doppler shifted return beam to the second leg. It should be removed for Dual VISAR experiments since it reduces the single level by a factor of 2.

Since BS2 has finite thickness and is mounted at an angle relative to the light axis, the beam passing through it is offset. Thus, repositioning BS2 required minor adjustment of

Pages 16 through 25 of the report have been omitted because they serve no illustrative purpose.

Conclusion

The Mod B Push-Pull VISAR with Double-Delay-Leg or Dual VISAR mode has proved to be a very useful tool in our diagnostic lab. With the 400-MHz data-recording capabilities, we have been able to characterize numerous flying foil configurations using both the Dual VISAR and Double-Delay-Leg modes without missing fringes caused by frequency response limitations. We have also been able to obtain very reproducible data from similar experiments.

Closure:

- End your report with a summary, a statement of the value of the report, a recommendation, or whatever concluding remarks are appropriate.
- Make some significant point, an indication of possible future use, or some other remarks that keep the readers from feeling they have simply been dropped.
- The current trend is to place the summary at the front of the report, where a busy person can quickly get a “thumbnail” concept. If your summary has been placed at the front of the report, use some other concluding paragraph to tie off the report.

Sample Report

References

- ¹L. M. Barker and R. E. Hollenback, Laser Interferometer for Measuring High Velocities of Any Reflecting Surface, *J. Appl. Phys.*, vol 43, no. 11, Nov. 1972.
- ²W. F. Hemsing, Velocity Sensing Interferometer (VISAR) Modification, *Rev. Sci, Instrum.*, vol 50, no. 1, Jan. 1979.
- ³J. E. Kennedy, Org. 5131, Sandia National Laboratories, private communication.
- ⁴J. R. Asay, Shock and Release Behavior in Porous 1100 Aluminum, *J. Appl. Phys.*, vol 46, no. 1, Jan. 1975).
- ⁵J. E. Kennedy and O. B. Crump, Jr., SNL, unpublished results.
- ⁶R. W. Barnard, DATACO - Digitizer Control and Data Acquisition Program, SAND87-2029. Sandia National Laboratories, in process, Albuquerque.

References:

A general guideline for references is that if an authorized reader of one document would not have access to a second document, we should not cite the second document in the original document. For example, in an Unlimited Release document, do not cite another document with any kind of limitation that would keep a reader from accessing it.

Unless it is necessary to do so, do not cite (1) an Export Controlled Information document in another document that would be available for foreign distribution, or (2) an UCNl document in another document with no limitation or a less strict limitation, or (3) a classified document in an unclassified document.

In a report going to a wide distribution, avoid referencing unpublished work or verbal communication that would be difficult or impossible for non-Sandia recipients of the report to access.

Format

See Appendix C for guidance on formatting references.

APPENDIX

(Place Title Here)

This sample report does not contain an appendix.
If you have an appendix, place it after the References.

Appendixes:

Use an appendix to include material that supplements the report but is not appropriate to include in the report. The report itself should not suffer if the appendix is removed. Examples of supplemental material appropriate for an appendix are equations, related correspondence, and related tests or experiments.

Note: Give credit to the person who authored an appendix if that person is not one of the authors of the main report.

- Do not use extra material in the appendix simply to “pad” the report (e.g., Product Specifications and other drawings that are not needed to understand the report and that are already in the SNL film banks).
- If you have only one appendix, do not use a letter suffix. Use only the word APPENDIX, followed by a descriptive title. Example: APPENDIX, Memorandum Outlining ABC Company’s Experience.
- If you have more than one appendix, use a letter suffix with each. Example: APPENDIX B, Computer Program XYZ.
- Call out each appendix in the text, in alphabetical order. Examples are “. . . described in the Appendix”; “. . .described in Appendix A.”
- Number tables and figures with the appendix letter followed by the sequential number of the figure or table. Examples: Table B-1; Figure C-6. If you have only one appendix, use “A” before the sequential number. Example: Figure A-1.
- Do not include appendix references in your reference list for the body of the report. Each appendix should be self-contained, as should the report itself. Compile a separate reference list for each and number the appendix references with the suffix for that appendix. Examples: A-1, A-2.
- Include each appendix and its title in the Contents, but do not include any headings of the appendix, or its figures and tables. If that amount of content detail is needed, include it at the beginning of the appropriate appendix as a Contents section. (Remember: Each appendix should be self-contained.)

Sample Report

1	R. E. Hollenback 5439 Charlotte Way Livermore, CA 94550	1	MS 0228	B. J. Wilson, 5556
		1	0310	A. M. Lamb, 6617
		1	0344	B. J. Roth, 9812
		1	0356	P. T. Webb, 2256
1	Los Alamos National Laboratory Attn: W. F. Hemsing, M-7 P.O. Box 1663 Los Alamos, NM 87545	1	0469	T. W. Hardy, 15103
		1	0555	P. E. Walker, 7876-1
		1	0578	F. E. Collins, 5331
		1	0588	W. R. Aragon, 2245
		1	0678	R. U. Asher, 1484
1	Monsanto Research Corp/ Mound Labs Attn: B. Nyer P.O. Box 32 Miamisburg, OH 45342	1	0679	M. N. Nash, 3357
		1	0723	D. A. Garcia, 1325-1
		1	0834	R. E. Foster, 2514
		1	0866	D. G. Cross, 2568
		20	0866	J. L. Russell, 2568
		1	0866	D. N. Valdez, 2568
5	KTech Corp Attn: L. Lee (3) R. Reinhart (2) 901 Pennsylvania Ave. Albuquerque, NM 87110-7491	10	0910	R. A. Sanchez, 9844
		1	1024	L. B. Cassidy, 12630
		1	1100	R. C. Bradley, 2544
		1	1289	E. R. Wilcox, 9926
		1	1345	R. V. Buckley, 10246
		1	1466	W. O. Rogers, 5896
1	MS 0113	1	1684	N. B. Rice, 10288
1	0124	1	9018	Central Technical Files, 8940-2
1	0126	5	0899	Technical Library, 4916
1	0223	2	0619	Review & Approval Desk, 12690
1	0225			For DOE/OSTI
1	0226			

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- Use discretion in compiling the distribution list. Keep the number of copies as low as possible and still inform interested people about your work.
- Arrange the list of internal recipients by increasing Mail Stop numbers.
- If you do not know which housekeeping copies to include at the end of the distribution list, see Samples 3-9 and 3-10, or call Creative Arts Department 12620.
- The format of this distribution is set up so that the number in the first column is the number of copies going to a single address. If one of the recipients in an "Attn:" list is to receive more than one copy, place the number for that recipient in parentheses following the name. Example: Attn: B. W. Reinhart (3). The advantage of this format is that the chore of totaling the copies to be printed is much easier.
- In unclassified reports, place all housekeeping copies at the end of the list. In classified reports, place 8940-2 (Sandia/California Library) at the end of the external recipients and all other housekeeping copies at the end of the list. (Classified mail to Sandia/California must go through an approved mail channel and is therefore considered external.)
- In reports dealing with sensitive information such as Export Controlled Information, check that all recipients are authorized to receive that level of information.

SECTION 3

Format, Layout, and Graphics

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Format

Sandia's Official Name and Addresses

Styles for referring to Sandia

Sandia's official corporate name, "Sandia Corporation," should be used in legal and official situations such as contracts, leases, and other formal documents.

In other cases, follow these guidelines:

Formal reference:

"Sandia National Laboratories"

"Sandia National Laboratories/New Mexico"

"Sandia National Laboratories/California"

Note: The city names "Livermore" and "Albuquerque" are no longer used to refer to the different sites.

Informal reference (for internal audiences and others familiar with Sandia):

"Sandia" where an informal reference is appropriate.

"Sandia/NM" and "Sandia/CA" to refer informally to the individual sites.

"SNL/NM" and "SNL/CA" when brevity is necessary or space is limited.

The facilities may also be referred to as "the California laboratory" and "the New Mexico laboratory."

Examples:

Sandia National Laboratories/New Mexico is the site of PBFA II.

The Combustion Research Facility at **Sandia/California** develops and applies new research tools to problems in combustion research.

Sandia National Laboratories is one of the nation's largest research and development engineering facilities.

Sandia has established programs in several areas of renewable energy and conservation.

SNL's lead role in photovoltaic conversion includes crystalline cell research and development. **SNL/CA** develops and applies new research tools to problems in combustion research.

The **California laboratory** is a leader in this effort. **SNL/California** is home to more than a thousand Sandia employees.

Sandia's addresses:

The US Postal Service requests that we follow the format below to receive mail from outside Sandia:

Sandia National Laboratories
Name (initials and last name or full name)
Mail Stop (MS #####)
P.O. Box 5800
Albuquerque, NM 87185-#### (Mail Stop number)

Sandia National Laboratories
Name (initials and last name or full name)
Mail Stop (MS #####)
P.O. Box 969
Livermore, CA 94550-0969

Sandia National Laboratories
Name (initials and last name or full name)
Mail Stop (MS #####)
P.O. Box 871
Tonopah, NV 89049-0871

Print Styles and Sizes

Body text

Print styles vary with the company producing the software, but usually a similarity in names means the appearance will probably be similar. Century Schoolbook with a 12-point size is a commonly used font and size combination that have stood the test of time. The font used for the body text of this document is Times New Roman at a size of 12 points. It has a larger x-height and is more compact, which means that more text can be put on a page. We suggest that you compare samples of the fonts on your system for readability.

Ease of reading should be the controlling factor in scientific and technical reports. The consensus is that serif fonts, such as Century Schoolbook and Times New Roman are the easiest to read. However, new software is being produced so rapidly that system users must develop their own sense of what is most readable. (See Sample 3-12 for the Creative Arts Department's recommended text fonts and text sizes in standard SAND Reports.)

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability—and readability is the goal. Another factor to consider is that most SAND Reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible.

Compare the readability of the following examples of the same paragraph, set in different fonts and sizes:

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability—and readability is the goal. Another factor to consider is that most SAND Reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible.
—*Century Schoolbook, 11 point*

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability—and readability is the goal. Another factor to consider is that most SAND Reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible.
—*Times New Roman, 11 point*

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability—and readability is the goal. Another factor to consider is that most SAND Reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible. —*Times New Roman, 10 point*

We discourage the trend to use *very* small print. That practice may produce a neat, attractive page, but it reduces readability—and readability is the goal. Another factor to consider is that most SAND Reports will be reduced to 75% when they are microfiched, and the small print then becomes illegible.
—*Times New Roman, 9 point*

In choosing a print style, look at the spacing between thin letters. If they are too close together in a particular face, the text will be hard to read, so you would want to avoid that face for text. For example, Arial Narrow has little space before and after the i and l: responsibility, RESPONSIBILITY.

Other factors to consider when choosing a style are legibility of superscripts and subscripts and compatibility of text and equation symbols. Symbols in the text should closely resemble those in displayed equations. If a document contains numerous displayed equations, address this problem before starting the document.

Headings and titles

A bold “sans serif” font such as Helvetica, Arial, or Geneva works effectively for headings and titles. It produces a clean, compact line that is easy to read and contrasts well with the text. Bold Arial in Microsoft Word for Windows was used for the headings in this report.

All-Cap vs. Lowercase Headings and Titles. All-cap headings have long been discouraged because long lines of all-caps are difficult to read. And readability is of prime importance in SAND Reports. Compare these styles of headings for readability:

ADDRESSOGRAPH REQUIREMENTS FOR MASS MAILINGS TO PLAN PARTICIPANTS IN THE ALBUQUERQUE AREA

Addressograph Requirements for Mass Mailings to Plan Participants in the Albuquerque Area

Addressograph requirements for mass mailings to plan participants in the Albuquerque Area

The lowercase headings can be read at a glance, whereas one must almost study the all-cap version. On the other hand, short all-cap headings (up to three short words) do not present much of a readability problem and can sometimes make heading levels more evident.

MASS MAILINGS

Mass Mailings

Mass mailings

Obviously, the use of all-caps for headings is a judgmental matter. Just consider readability when selecting headings.

Page Margins and Placing Page Numbers

Use at least a 1-inch margin on the page top, bottom, and sides. Place the page number 1/2 inch from the bottom of the page, either centered or flush with the outside margin (see Sample 3-13). Be consistent in placement of the page number because the printer frequently uses it as a guide in aligning the master during the photographing process—and because the report will look better.

Ragged Right Margin vs. Justified Right Margin

The consensus among those who have conducted studies on the subject is that text with a ragged right margin is easier and therefore faster to read than text with a justified right margin. Although justified text may produce a more aesthetic page, it may also create uneven spacing between words that can be distracting. If justified text is chosen, the text should be checked for this problem.

Line Length

For a double-column format, each column should be about 3-1/4 inch wide, with a “gutter” of about 1/4 to 1/3 inch between columns. Total text width should not exceed 7 inches (see Samples 3-12 and 3-14).

For a single-column format, a line of 6-1/4 or 6-1/2 inches is the easiest to read in most standard type sizes and styles (10 to 12 points). Never exceed 7 inches for line length. If you must use a 7-inch line, for readability you should use 11- or 12-point type (see Sample 3-15).

Keep in mind that artwork must be sized to fit within whatever line length you choose.

Line Spacing

As a general rule, use single-line spacing. In reports that contain equations, one-and-a-half- or double-line spacing may be used. Keep in mind that more than 2 or 3 points of white space between lines make reading of the text slower because the eye has to jump from line to line rather than flowing over the text.

Paragraph Spacing

Double-space between paragraphs. Use either block or indent style, but be consistent throughout the report. (If text contains equations, indented paragraphs allow the author to indicate whether text following a displayed equation is a new paragraph.)

Spacing for Headings and Titles

In large reports, dropping the major section titles down two or three spaces from the top of the text area and using larger type help the reader locate new sections quickly. This treatment is called a “drop head.”

Keep headings and titles brief and descriptive of the text they are heading.

Paragraph Numbering

Paragraph numbering is not required in SAND Reports. In reports that have no internal cross referencing, paragraph numbering can even be distracting. However, when it helps the reader locate information in the document, it can be invaluable.

When paragraph numbering is appropriate, try to limit the numbering to two decimal places, for example, 1.2.16. Beyond that, use Arabic numbers and letter designators, such as 1.2.16, subparagraphs a, b, etc.

For information on Page Numbering and the Order of Sections for Unclassified and Classified reports, see Section 2, under “Elements of the Document” (pages 56-61).

Headers and Footers

In a report that is broken into major sections, using a header with the appropriate section number (if there is one) and the title at the outside margin of each page, is a help to the reader. This is a nicety, not a requirement. In scientific and technical documents, the header is most appropriately used to provide information that helps the reader rather than to embellish the appearance.

The style of a header or footer should be in keeping with the tone of the document. That usually means simple and functional.

Do not use header or footer capabilities to include the Sandia logo, departmental logos, or the words “Sandia National Laboratories” on internal pages of a report, as part of the document design. Using the Sandia logo on internal pages violates Laboratory Communications policy.

Dashes

Each dash has a special meaning. Use the proper dash for the proper meaning. On a typewriter, two hyphens (--) were used as an *em* dash, and typewriters did not have an *en* dash. Most computer software has the capability to produce these symbols, and that capability should be used. The uses for each are described in the following paragraphs.

The hyphen (-) is strictly for hyphenating words.

The en dash (–), so called because it is the approximate width of an *n*, is used primarily with numbers either as a minus sign (when the system being used does not have a special key for the minus sign) or to indicate continuing or inclusive numbers:

An *en* dash (–) makes an acceptable minus sign. A *hyphen* (-) is not a minus sign. Compare the columns below. The alignment on the one using hyphens is ragged; the alignment on the other is correct. In text, -35 mm should be –35 mm, and 525⁻¹⁰ should be 525⁻¹⁰. If this last example were sized at 9-point, as is often used in figure captions and references, see the difference: 525⁻¹⁰ should be 525⁻¹⁰. In the version using the hyphen, one wonders whether there is a speck on the paper or a minus sign. After reduction to 75%, the hyphen may not even be visible.

The en dash as a minus sign:

<u>No</u>	<u>Yes</u>
-634	–634
+523	+523
+125	+125
-100	–100

The en dash representing continuing or inclusive numbers
(to replace the word “to,” indicating continuing or inclusive numbers — note that no space is used with the *en* dash):

Examples:

... on pages 18–21
... during the week of May 15–21
... in Articles I–IV.

Note: Never use the words “from” or “between” with an *en* dash. For example, avoid writing: “from 1967–1972” or “between 1967–1972.”

“From” requires the word “to” (as in “from 1967 to 1972”) and “between” requires the word “and” (as in “between 1967 and 1972”).

Another use for the *en* dash is in a compound modifier where one of the elements is two words or is already hyphenated:

New York–San Francisco flight
quasi-public–quasi-judicial branch

The *em* dash (—), so called because it is the approximate width of the *m*, is used to indicate an abrupt or more emphatic break than the colon or parentheses. Two little hyphens or an *en* dash with space on each side do not convey this emphasis as effectively. If an *en* dash were not available, the hyphens would have to do, but an *em* dash *is* available.

Proper use of the dashes adds to the professional appearance of a document.

Consistency

Strive for consistent format. An inconsistent and careless-appearing report may make the reader wonder whether the work was also careless. In your final check, look for the following:

- Page numbers are correctly located (the same distance from bottom edge and outside edge of the page in all cases). The Print Shop sometimes uses the page number to line up the masters.
- Margins are consistent.
- If different margins have been used for right-hand pages and left-hand pages, the widest margin is at the binding edge.
- If dropped section heads have been used, all section heads are dropped consistently.
- All other headings, figure captions, and table titles are formatted consistently.

For a more detailed checklist for report masters, refer to Figures 4-2 and 4-3.

Layout

Placement of Figures and Tables

Display figures and tables as soon as possible after they are called out in the text. We recommend placing them either at the top or the bottom of the text area (not in the middle). Such placement presents an unbroken flow of text and usually a more pleasing appearance.

Obvious Relationship

Readers should be able to easily determine the relationship of graphics to the text and of headings to their text.

Pleasing Appearance

A pleasing overall appearance invites readers to be interested in what you have to say. Squeezed-looking pages, especially, discourage readers.

Graphics

Introduction

Purpose

A graphic should convey the essence of information that cannot easily be made clear with words. It should be a functional part of your report, not a filler or an ornament. If a particular graphic does not substantially contribute to the readers' understanding, consider not using it.

Orientation of graphics on page

The two types of orientation of text or graphics on a page are portrait and landscape (also called broadside). **Portrait** refers to orientation in the normal vertical reading position. **Landscape** requires that the page be turned 90 degrees (clockwise) to view the contents of the page. See Sample 3-16.

Because repeated turning of the document is inconvenient for the reader, place graphics in the same orientation as the text, provided that they remain legible at this size.

Citing non-Sandia source of graphic

If a graphic is taken from another work, that information must be included with the graphic. If a graphic is taken from a published non-Sandia source, obtain written permission from the previous publisher. Cite the source in your graphics caption, or above the caption, so that the original source will "travel" with the graphic if someone else decides to use your version of it.

Examples:

"Reprinted with permission from . . ." if the artwork is used as originally presented.

"Adapted with permission from . . ." if redrawn with minor modifications.

"Redrawn with permission after . . ." if redrawn in substantially the same manner.

Note: Changing the graphic slightly does **not** relieve the author of the obligation to use a source line. See Appendix D, Copyrights and Permissions, for a full discussion about using the work of others.

Numbers, captions, and titles

Each graphic must have a number and a caption (for figures) or title (for tables). Number graphics sequentially, using Arabic numbers (for example, 1, 2, 3 or, if in section-number style, 1-1, 1-2, etc.). Arabic numbers are quick to read and easy to format, especially in the Contents. In contrast, capital Roman numerals (for example, XVIII or XXVII) are very unwieldy to align in the Contents and slow down the reader when they are referenced in the text.

Use a clear, unique caption or title. If necessary, add parenthetical information to distinguish otherwise identical captions or titles. The caption or title should be short, descriptive, and followed by a period. This will be the entry in the Contents listing. Descriptive text (which will not be included in the Contents) may be entered after the period.

For figures, place the caption 1 to 1-1/2 lines under the illustration. Gaps of three or more lines between the figure and caption are distracting. The figure and the caption should appear as a single unit even when nothing else appears on a page. Enter the figure caption in a font different from the text (a small, bold font, but not smaller than 9 or 10 points). If the caption is a small bold font, enter descriptive matter after the caption in the same font, but not bold. Block the caption under the figure unless the figure is very narrow, in which case the caption can be somewhat wider (but do not run it all the way across the page).

For tables, place the title 1 to 1-1/2 lines above the column headings. Enter the table title in the same font used for figure captions (bold, and not larger than about 11 or 12 points). If desirable, descriptive matter can be added after the title in the same font, but not bold.

Line Drawings

Line drawings include maps, charts, schematic diagrams, and line representations of components or other objects. Some line drawings also contain shaded areas.

Reproducibility

Be sure that graphics are of good, reproducible quality.

- All lines in drawings are solid (no broken or dim lines).
- If computer-generated line drawings with colored lines are to be reproduced in black and white, each line is identified by a unique symbol or otherwise clearly labeled. (**Note:** Certain colors do not translate well into shades of gray. Green, blue, and yellow—in that order—are the least distinguishable from one another in black and white translations.)

Drawing services

Creative Arts Dept. 12620 can help with all drawing needs. To obtain their services, prepare Form SA 1820-A, Service Order form (Sample 3-17), attach your draft, and send or hand-carry the request to Customer Service or the SCIS clerk. If your instructions are complex, hand-carrying would be the better choice. Most Creative Arts jobs are picked up from the artist (rather than being sent through the mail)—this gives the requester the opportunity to proof the work.

Classified artwork. Hand-carry all classified artwork. Be sure to include all available classifying information. On the Service Order, fill in the section called “Complete for Classified Work.”

Value of a good draft and of good communication with artist

A well-executed draft and good communication with the Creative Arts Department contribute immeasurably to the quality of the finished graphic. A few minutes spent in clear communication in the early stages saves time and redrawing later.

Here are some guidelines for creating good graphics and checking the effectiveness of a completed one:

- Give the artist a good, easily read draft. Explain, either by note or in person, areas that might be confusing.
- Tell the artist, or note on the Service Order form, the end use of the artwork and whether it will be greatly reduced later. Such information helps the artist determine print size, line weight, etc.
- Make the drawing as simple as possible. Do not clutter it with detail that adds nothing to the reader’s understanding.
- Keep information brief and simple, but include all elements needed to convey an accurate picture. Use simple wording; delete unnecessary words and detail.
- Use terminology that is consistent with the text. If you call a thing a “widget” in the text, then call it a widget in the figure. If you use “cm³” in the text, use the same form in the figure—not “cu cm.”
- Use white space effectively to separate callouts; be sure the reader can quickly relate each callout to its respective area.

- Be careful that the callouts do not overpower the drawing; on the other hand, be sure the print is large enough to remain legible after your planned reductions. See Sample 3-18 to compare print sizes after reduction.

If you take your artwork to Creative Arts, the artist can guide you.

- Include a simple key or legend to explain all symbols.
- Be sure tick marks appear wherever they are needed.
- Label both axes of plots correctly and consistently, and use terms and abbreviations that are consistent with those used in text.

In summary, keep your drawing simple, informative, and easily interpreted. Proof the completed drawing carefully.

Graphs

The most commonly used graphs are line graphs, followed by bar graphs and pie charts.

Because line graphs are by far the most commonly used in scientific and technical documents, some basic guidelines are listed here:

- Render curves with a uniform line that presents a smooth flow without angular change in direction unless the angular change is required to present the information accurately.
- Draw ordinary curves and chart lines through the center of data points. If the curve line would make identification of the data point difficult, a white outline should be left around the point. Curves should not be drawn through open data points.
- Use different line thicknesses for different parts of the graph: thickest for the curve, medium for the abscissa, ordinate, and major division lines, lightest for callout arrows, grid lines (if used), dimension lines, and ticks.
- When data points are not required on curves, use callouts or a simple line system (solid, dotted, dashed, etc.) that is explained in a legend.
- If labels directly on a curve create congestion, use a light-weight indicator arrow to a callout in a less congested location.
- Avoid showing grid lines unless they are required.

- Place legends inside a graph if space allows without overcrowding; otherwise place the legend in an appropriate location outside the graph.
- Use vertical labeling for the y-axis of a graph.

Oversize Figures

Some figures (usually engineering releases and strip charts) are too large for a standard page and must be handled as foldouts. Because foldouts are more expensive to print and collate than standard sheets, use them only when absolutely necessary.

Foldout masters. Standard foldout masters come in three sizes, described below, and can be obtained by hand pickup from the Creative Arts Department.

Term used for the master	Size of available mounting area	Size of printed page	Form No.
1 to 1 foldout	9×15-1/2 in.	11×17 in.	SA 1820-GC
1/8 oversize foldout	10-1/8×17-11/16 in.	11×17 in.	SA 1820-GUC
1/4 oversize foldout	12×20-5/8 in.	11×17 in.	SA 1820-GJC

Oversize masters. Material that is larger than the standard 7×9-in. text size can sometimes be mounted on oversize masters that will be reduced to standard size by the printer. An example is a computer printout that will not fit on the standard page. The oversize masters, unlike the foldout masters, can be ordered from JIT.

The following table lists available oversize masters:

Term used for the master	Size of available mounting area	Size of printed page
1/8 oversize	8×10-3/4 in.	8-1/2×11 in.
1/4 oversize	9-15/16×12 in.	8-1/2×11 in.

Computer Art Generated by Line Organizations

Many organizations now create figures, frequently in color, on their own PCs and use the printout as original art masters or to be electronically integrated into the final document and printed out on the Print Shop masters. If you computer-generate your own artwork, consider the points made in the previous paragraph. Also pay special attention to the following items.

- If you create your own artwork on the computer, you must make the decisions about print size. The current trend to use very small print for callouts causes problems when DOE/OSTI or our library make copies that are reduced to 75%. Information you consider vital may become lost at that point. Even if the information is not vital, the reader will not know that and will be disturbed about what is illegible. Ten points is the preferred minimum for callouts on the artwork masters, although 9-point type may be legible, especially if it is bold.
- Lines clearly differentiated by color in the original may require some additional identification to be distinguishable in black and white reproduction.
- Representations should be made in black and white if possible. Color should be used for the final report only when it adds information to the graphic. Reproduction by color copier is still tedious.
- Two-sided printing of color is now permitted (either a color page backed to a text page or a color page backed to another color page). Until recently it was not permitted because it quickly gummed up the copying equipment.
- Large blocks of color may be indistinguishable from one another when the illustration is printed in black and white. Unless you are sure that the colors will translate into distinguishable shades of gray, use additional identification, e.g., crosshatch, texture, line styles.

Photographs

Among its services, Creative Arts Department 12620 provides traditional and digital photography for authors who would like to have professional photographs taken for their reports.

Callouts on photographs should be easy to read, and arrows going from callouts to the point of interest should be clear. Using white arrows or black arrows edged with white is often effective.

If you are using existing photographs, the best reproductions are made from black and white glossy photographs with good contrast. Frequently, however, the only available photographs are in color. If you plan to use halftones made from color prints, check that the black and white rendition shows the detail you require. Certain colors do not translate well to shades of gray. Green, blue, and yellow—in that order—are the least distinguishable from one another in black and white translations.

Cropping extraneous material from photographs can focus attention on the area of interest and allow more detail in the same amount of space. A well-handled photograph is as important as well-written text.

Tables

Purpose of a table

Use a table to—

- present a large amount of data in a small space.
- compare different treatments of a single subject.
- list variable information about a single subject.

Limited subject

Limit a table to one main subject. Comparing too many things in one table is self-defeating. It is better to break the information into separate tables so that the information can be presented in a straightforward manner with a title that clearly describes what the table contains.

Format

Good formatting produces a functional table and often reduces the amount of table text required. Follow these guidelines:

- Number tables sequentially; give them clear and unique titles.
- Label each column with a descriptive heading.
- Express measurements consistently, preferably in SI units.
- Be sure terminology in the table matches that in the text.
- Use footnotes to explain complex circumstances or ideas or to cite data sources.

See Sample 3-19 for helpful information on presenting data in a table.

Lists

SPECIAL NOTE. A simple listing (no columns and no headings) should not be called a table. A table lists or compares *at least two different things*. A list may be boxed and called a figure; however, if no number is required for referencing the list elsewhere in the report, it may simply be included in the text immediately after the sentence introducing it.

Intentionally Left Blank

Samples

The following samples are provided for a quick visual reference. Whenever possible, explanations (enclosed in boxes) are placed on the samples to save the user from searching the text.

Samples

SECRET (UNCLASSIFIED SAMPLE)

SANDXX-XXXX
Internal Distribution Only
(Use Patent Caution, if applicable)

This document contains ___ pages.

Concepts for (title)

John J. Doe and John H. Smith
(authors)

Printed January 1997

Note:

You may reconstruct this form on your PC or have Org. 12620 (845-8261) make the cover for you.

Another alternative is to copy the "internal memorandum" block from this form and mount it on your cover.

internal memorandum • not to be distributed outside Sandia National Laboratories

This format is to be used for informal working papers as distinguished from official Sandia National Laboratories reports. Review is required for classification and patent approval. Five copies must be sent to the Technical Library, 4916.

Formal scientific and technical reports must be produced in the official Sandia National Laboratories report format and require full review and Manager or Director approval.

RESTRICTED DATA

This document contains Restricted Data as defined in the Atomic Energy Act of 1954. Unauthorized disclosure subject to Administrative and Criminal Sanction.

Classified by _____ (name), _____ (title), _____ (org. number),
_____ (month and year).

SECRET (UNCLASSIFIED SAMPLE)

Sample 3-1. Classified internal memorandum cover.

Secret Internal Memorandum:

This is an example of the cover format for a secret internal memorandum. A title page is not required.

SAND numbers are used to list and track internal memorandums (reference symbols are no longer used). The line organization obtains the SAND number from Org. 12620, 845-8220, and prepares the memorandum.

NOTE: Even though SAND numbers are no longer given out until documents go through the entire Review & Approval process, SAND numbers can be given out to the author of the internal memorandum when the author calls for it. This is because the memorandum only goes through the Review & Approval process through Section 9, but never comes to the R&A Desk. After the Review & Approval Form is completed through Section 9, the author needs to distribute the memorandum and keep the Review & Approval Form on file.

No copies of the internal memorandum may be sent outside SNL, nor may the memorandum be cited as a reference in externally distributed papers and reports.

The line organization is encouraged to send one copy of the internal memorandum to Central Technical Files, 8940-2; and five copies must be sent to the Technical Library, Org. 4916; but no copies should be sent to the R&A Desk Coordinator or to DOE/OSTI.

Sample 3-1. (concluded).

Samples

SANDXX-XXXX

Internal Distribution Only

(Use Patent Caution, if applicable)

Concepts for *(title)*

John J. Doe and John H. Smith

(authors)

Printed January 1997

Note:

You may reconstruct this form on your PC or have Org. 12620 (845-8261) make the cover for you.

Another alternative is to copy the "internal memorandum" block from this form and mount it on your cover.

internal memorandum •

**not to be distributed outside
Sandia National Laboratories**

This format is to be used for informal working papers as distinguished from official Sandia National Laboratories reports. Review is required for classification and patent approval. Five copies must be sent to the Technical Library, 4916.

Formal scientific and technical reports must be produced in the official Sandia National Laboratories report format and require full review and Manager or Director approval.

Sample 3-2. Unclassified internal memorandum cover.

Unclassified Internal Memorandum:

This is an example of the cover format for an unclassified internal memorandum. This page is not required.

DOE requires this information. Get the number from DOE/TIC 4500 or call 845-8220 (Org. 12690) for help.

SAND numbers are used to list and track internal memoranda (SAND numbers are no longer used). The line organization obtains the SAND number from DOE/TIC 4500 (Org. 845-8220), and prepares the memorandum.

NOTE: Even though SAND numbers are no longer given out until documents go through the entire Review & Approval process, SAND numbers can be given out to the author of the internal memorandum when the author calls for it. This is because the memorandum only goes through the Review & Approval process through Section 9, but never comes to the R&A Desk. After the Review & Approval Form is completed through Section 9, the author needs to distribute the memorandum and keep the Review & Approval Form on file.

No copies of the internal memorandum may be sent outside SNL, nor may the memorandum be cited as a reference in externally distributed papers and reports.

The line organization is encouraged to send one copy of the internal memorandum to Central Technical Files, 8940-2; and five copies must be sent to the Technical Library, Org. 4916; but no copies should be sent to the R&A Desk Coordinator or to DOE/OSTI.

Sample 3-2 (concluded).

SAND number comes from Org. 12690 at final stage of Review & Approval process.
Distribution limitation: see sample

SAND97-1674
Unlimited Release
Printed May 1997

Distribution
Category UC-706

Replace "Unlimited Release" with "Patent Caution" if applicable to your report.

Samples

called "Markings and legends for cover and title page" for official wording for all distribution limitations.

Use the current month for print date unless you have a compelling reason to use another date.

The Velocity Interferometer System for any Reflector

Mod B, the Push-Pull With Double-Delay-Leg and Dual VISAR Modes

Include the organization title but not the org. number.

O. B. Crump, Jr., and P. L. Stanton
Explosive Projects and Diagnostics Division
Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185-0619

See sample called "Treatment of multiple authors' names on title page."

Preferably, spell out authors' first or middle name.

Sandia requires official reports to have an abstract (exceptions are rare).

Abstract

Zip + main author's Mail Stop

The Velocity Interferometer System for Any Reflector (VISAR) is the modern standard for measurement of shock phenomena. This report describes the original VISAR and its evolution into the current Mod B version built for Sandia's Explosive Projects and Diagnostics Division 2514. The Mod B system incorporates the push-pull signal processing introduced in Mod A to reduce sensitivity to target self-light and simplify data reduction, and it introduces the use of two push-pull VISARs to obtain two modes of operation.

Use this legend only if your report needs a Patent Caution.

See sample called "Markings and legends for cover and title page," third column.

(Not all release statements require a legend.)

PATENT CAUTION

This document may reveal patentable subject matter. The information must not be divulged outside Sandia National Laboratories without the approval of the Patent and Licensing Office. Approved external recipients must not divulge the information to others.

Distribution authorized to U.S. Government agencies only; other requests shall be approved by the cognizant DOE Departmental Element.

Be sure classification level is at the top and bottom of each page in bold print, at least 1/8-inch high.

Sample 3-3. Unclassified title page
SECRET

Get information from R&A form. See sample called "Markings and legends for cover and title page," second column, for NWD and Sigma guidance.

SAND number comes from Org. 12690 at final stage of R&A process. Use the current month for print date unless you have a compelling reason to use another date.

SAND97-XXXX
Nuclear Weapon Data • Sigma 1
Printed October 1997

Distribution
Category C-XX

DOE requires this information. Get the number from DOE/TIC M-3679 or call 997 845-8220 (Org. 12690) for help.

Final Weapon Development Report for the BXX-X and BXX-X Bombs (U)

See sample called "Treatment of multiple authors' names on title page."
Preferably, spell out author's first or middle name.
Include the organization title, but not the org. number.

**UNCLASSIFIED
Illustration Purposes Only**

Enter classification of title and abstract as indicated on R&A form.

Michael C. Doe
Universal Applications Department
Sandia National Laboratories
P.O. Box 5800
Albuquerque, NM 87185-0619

Zip + author's
Mail Stop

Abstract (U)

This report describes the status of the BXX-X and BXX-X bombs of first production unit. These bombs each incorporate a Category F permissive action link, a nonviolent command disable system. The importance of knowing and stabilizing the ambient working temperature of thermocouple tubes is stressed. Other observations regarding time constants versus pressure changes are also noted.

Insert appropriate notices as indicated on the R&A form. For wording, see sample called "Markings and legends for cover and title page."
Use margins that are different from those of the Abstract.

Classified by B. D. Zzzzzz, Manager, ABC Department 2345, Month, Day, 19XX.

CRITICAL NUCLEAR WEAPON DESIGN INFORMATION
DoD DIRECTIVE 5210.2 APPLIES

RESTRICTED DATA This document contains Restricted Data as defined in the Atomic Energy Act of 1954. Unauthorized disclosure subject to Administrative and Criminal Sanctions.

NATIONAL SECURITY INFORMATION Unauthorized disclosure subject to Administrative and Criminal Sanctions.

Derivatively Classified based upon _____
(enter appropriate information).

Declassify on _____ *(enter appropriate information).*

These always appear together.

SECRET

Sample 3-4. Classified title page.
SANDXX-XXXX
Unlimited Release
Printed October 19XX

Distribution
Category UC-XXX

Field Examination of Shale and Argillite in Northern Nye County, Nevada*

James R. Connolly
Lee A. Woodward

Department of Geology
and
Institute of Meteorites
University of New Mexico
Albuquerque, NM 87131

Sandia Contract No. XX-XXXX

Include Sandia contract
(purchase order) number.
Example: AB-7294

Either center it under the
contracting company's
name or footnote it to the
title.

Abstract

Thirty-two locales underlain by clay-rich strata ranging from Cambrian Pioche Shale to Mississippian Chainman Shale and equivalents were examined in northern Nye County, Nevada. The text of the report summarizes data for each stratigraphic unit examined. Checklists for tabulating field data at each locale are included in an appendix. Working guidelines used to evaluate the locales include a minimum thickness of 150 m (500 ft) of relatively pure clay-rich bedrock, subsurface depth between 150 m (500 ft) and 900 m (3000 ft), low topographic relief, low seismic and tectonic activity, and avoidance of areas with mineral resource production or potential. Field studies indicate that only the Chainman Shale, specifically in the central and northern parts of the Pancake Range, appears to contain sites that meet these guidelines.

*The work described in this report was performed for Sandia National Laboratories under Contract No. XX-XXXX.

Sample 3-5. Title page for contractor report.

<p>Multiple authors:</p>	<p>Frank Biggs, Marion P. Apodaca, and Clarence R. Mehl Test Planning and Diagnostics Department Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185-3415</p>
<p>Two or more departments:</p>	<p>J. William Rogers, Jr., and Stephen J. Ward Initiating and Pyrotechnic Components Department</p> <p>Ronald A. Guidotti Exploratory Batteries Department</p> <p>Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185-2356</p>
<p>Sandia and an outside company:</p>	<p>Randall R. Nason and August E. Binder Project Engineering Department Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185-0156</p> <p>John L. Darby Science and Engineering Associates, Inc. Albuquerque, NM 87190</p>
<p>Editor:</p>	<p>Randall R. Nason, Editor Project Engineering Department Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185-9824</p>
<p>Authors and editor:</p>	<p>Frank Biggs and Marion P. Apodaca Test Planning and Diagnostics Department</p> <p>Edited by</p> <p>Stephen J. Ward Initiating and Pyrotechnic Components Department Sandia National Laboratories P.O. Box 5800 Albuquerque, NM 87185</p>

**Sample 3-6. Treatment of multiple authors' names on title page.
Markings and Legends for Cover and Title Page**

Samples

**and
Physical Protection of
Limited Access SAND Documents**

All SAND documents require a special marking or legend, or both. This table lists the markings and legends to be used with various types of reports. To ensure proper physical protection, the markings and legends appropriate for a particular report should be placed on the draft copy as soon as possible. Just before a SAND Report is printed, the line organization requests a cover master from the Creative Arts Department. At that time a comparison is made of the author's title page and the completed Review & Approval Form, and any discrepancies are resolved.

Legend for different print styles in this table:

- **Bold text**, Initial Caps, ALL CAPS: Place in SAND Report as indicated.
- *Italicized text*: explanatory matter.

Name of Notice	Cover and Title Page Distribution Limitation <i>(place in top block under the SAND No.)</i> and Required Markings <i>(shown in all caps; place as indicated).</i>	Legend to be Placed on <u>Cover</u> and <u>Title Page</u>; deviations are noted.
-----------------------	--	---

<u>UNCLASSIFIED UNLIMITED RELEASE DOCUMENTS</u> (DOE G 1430.1D-1,II,2.1) Physical Protection: None required.		
Unlimited Release	<i>On cover only→</i>	Approved for public release; distribution is unlimited.

Sample 3-7. Markings and legends for cover and title page.

Name of	Cover and Title Page Distribution Limitation <i>(place in top block under the SAND No.)</i>	Legend to be Placed on <u>Cover</u> and
----------------	--	--

Notice	and Required Markings <i>(shown in all caps; place as indicated).</i>	<u>Title Page</u>; deviations are noted.
---------------	--	---

<u>UNCLASSIFIED CONTROLLED INFORMATION (UCI)</u>		
Physical Protection: See notes at end of table. (DOE G 1430.1D-1,II,4.1.13.2)		
	(DOCUMENTS GOING TO FOREIGN COUNTRIES. Such instances are rare. If the need for instructions should arise, see order 1430.2B,VII for guidance.)	
Applied Technology	Applied Technology (DOE G 1430.1D-1,II,4.1.13.2,1,i)	<p>APPLIED TECHNOLOGY</p> <p>Any further distribution by a holder of this product or data therein to third parties representing foreign interests, foreign governments, foreign companies, and foreign subsidiaries or foreign divisions of U.S. companies shall be approved by the <i>(insert appropriate NE Program Office official from list below)</i>, * U.S. Department of Energy. Further, foreign party release may require DOE approval pursuant to 10 CFR 810, and/or may be subject to Section 127 of the Atomic Energy Act.</p> <hr/> <p>* (a) Associate Deputy Assistant Secretary for Reactor Systems, Development, and Technology</p> <p>(b) Associate Deputy Assistant Secretary for Reactor Deployment</p> <p>(c) Deputy Assistant Secretary for Space and Defense Power Systems</p> <p>(d) Deputy Assistant Secretary for Naval Reactors</p>

UNCLASSIFIED CONTROLLED INFORMATION (Continued) →

Sample 3-7 (continued).

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UNCLASSIFIED CONTROLLED INFORMATION, Continued

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Sample 3-7 (continued).

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Sample 3-7 (concluded).

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CLASSIFIED Documents:^{1,2}

(List at the end of **external** recipients)

1	M0800	Central Technical Files, 8940-2
---	-------	---------------------------------

For SNL/CA *classified* reports use Mail Channel and Org. number — not Mail Stop.

(List at the end of **internal** recipients):

5	MS 0899	Technical Library, 4916
2 (micro-fiche)	0899	Technical Library, 4916 ³
1	0619	Review & Approval Desk, 12690

This copy is for DOE/OSTI, after Org. 12690 processes it.

¹ If the document has a “Patent Caution” or “Patent Interest,” always include one copy for Org. 11500 (Patent and Licensing Office). The format for an Org. 11500 entry is as follows:
At the END of the housekeeping copies, add —

1 **0161 Patent and Licensing Office, 11500**

² For CRADA documents, add the following to the END of the housekeeping copies:

1 **1380 Technology Transfer, 4212**

³ The Print Shop is now creating two microfiche copies of each technical report for the Technical Library. Security procedures require that these microfiche copies be identified in the distribution lists of classified documents; the microfiche copies do *not* have to be identified in the distribution lists of unclassified documents.

Sample 3-9. Sandia/NM’s distribution list “housekeeping” copies.

Example of an UNCLASSIFIED distribution:

DISTRIBUTION:

- 2 Los Alamos National Laboratory
Attn: J. C. Stevenson, WDP-WD
M. George, M4
P.O. Box 1663
Los Alamos, NM 87545
- 3 Lawrence Livermore National Laboratory
Attn: R. F. Chatham, L125 (2)
A. B. Palmen, L394
P.O. Box 808
Livermore, CA 94550
- 1 University of Waterloo
Dept. of Stat. and Actuarial Sciences
Attn: B. D. Johnson
Waterloo, Ontario N2L 3G1
CANADA
- 5 MS 0314 L. G. Grant, 9811
- 1 0574 D. R. Jones, 5941
- 8 0827 J. R. Dallas, 1502
Attn: R. Collier
- 1 0832 A. T. Walker, 6503
- 1 0841 E. R. Farmer, 3340
Attn: D. G. Anderson, 3341
- 12 9106 J. S. Kendall, 8417
- * 1 9018 Central Technical Files, 8940-2
- * 5 0899 Technical Library, 4916
- * 2 0619 Review & Approval Desk, 12690
For DOE/OSTI
- * 3 0161 Patent and Licensing Office, 11500

Distribution List order:

- 1. Non-Sandians (external recipients).
Author decides how entries are grouped: alphabetically, geographically, by type of organization, etc.
- 2. Foreign recipients.
Foreign addresses can be listed in alphabetical order by country.
- 3. Sandia/CA and Sandia/NM recipients.
In unclassified reports, Sandia/CA and Sandia/NM entries are intermingled and listed by increasing Mail Stop numbers.

Mail Stop numbers

For foreign recipients:

Place name of country (in all caps) on the last line of the address.

Use both Mail Stops and Org. numbers.

Mail sent without Mail Stops will be delayed.

Sandia/CA entry, intermixed with Sandia/NM entries. (Note location of this entry in the classified example, next page.)

If report has a Patent Caution or Patent Interest, add this entry.

Example of a heading for a continued (to next page) unclassified distribution:

DISTRIBUTION (continued):

* Include "housekeeping" copies in all unclassified reports as indicated (see Sample 3-9 on previous page for complete list).

**Sample 3-10. Sandia / NM's distribution list pages, Unclassified and Classified.
Example of a CLASSIFIED distribution:**

DISTRIBUTION:

For classified reports, check that all Mail Channels are authorized and current.

Distribution List order:

- 1. Non-Sandians (external recipients).
Author decides how entries are grouped: alphabetically, geographically, by type of organization, etc.
- 2. Sandia/CA recipients.

Samples

- 2 M3669 Los Alamos National Laboratory
Attn: J. C. Stevenson, WDP-WD
M. George, M4
P.O. Box 1663
Los Alamos, NM 87545

- 3 M0830 Lawrence Livermore National Laboratory
Attn: R. F. Chatham, L125 (2)
A. B. Palmen, L394
P.O. Box 808
Livermore, CA 94550

- 6 M0701 US Department of Energy
Attn: Maj. Gen. W. W. Hoover
Washington, DC 20545

- 1 M0800 J. S. Kendall, 8417 ←
- 1 M0800 P. R. Walker, 8417
- * 1 M0800 Central Technical Files, 8940-2 ←

- 5 MS 0314 L. G. Grant, 9811
- 1 0574 D. R. Jones, 5941
- 8 0827 J. R. Dallas, 1502
Attn: R. Collier
- 1 0832 A T. Walker, 6503 ←
- 1 0841 E. R. Farmer, 3340
Attn: D. G. Anderson, 3341
- * 5 0899 Technical Library, 4916
- * 2 (micro- 0899 Technical Library, 4916 ←
fiche)
- * 1 0619 Review & Approval Desk, 12690 ←
- * 3 0161 Patent and Licensing Office, 11500 ←

Note location of this Sandia/CA entry in the unclassified sample, previous page.

Use Mail Channel and Org. numbers, not Mail Stops, for Sandia/CA and external classified mail.

For SNL/NM, use both Mail Stops and Org. numbers. Mail sent without Mail Stops will be delayed.

See footnote ³ in Sample 3-9.

This copy is for DOE/OSTI, after Org. 12690 processes it.

If report has a Patent Caution or Patent Interest, add this entry.

Example of a heading for a continued (to next page) *classified* distribution:

DISTRIBUTION (continued):

* Include "housekeeping" copies in all classified reports as indicated.

Sample 3-10 (concluded).

Sandia / CA: The following "housekeeping" copies should appear at the end of each SAND Report distribution list:

UNCLASSIFIED Unlimited Release Documents: ^{1,2}

- 3 MS 9018 Central Technical Files, 8940-2
- 4 0899 Technical Library, 4916

For *unclassified* reports, use both Mail Stops and Org. numbers. Mail sent without Mail Stops will be delayed.

Samples

(List at the end of **external** recipients)

1 M0800 Central Technical Files, 8940-2

For SNL/CA *classified* reports use Mail Channel and Org. number — not Mail Stop.

(List at the end of **internal** recipients):

5 MS 0899 Technical Library, 4916

2 (micro-fiche) 0899 Technical Library, 4916³

This copy is for DOE/OSTI, after it is processed.

1 9021 Technical Communications Department, 8815

¹ If the document has a "Patent Caution" or "Patent Interest," always include one copy for Org. 11500 (Patent and Licensing Office). The format for an Org. 11500 entry is as follows:
At the END of the housekeeping copies, add —

1 0161 Patent and Licensing Office, 11500

² For CRADA documents, add the following to the END of the housekeeping copies:

1 1380 Technology Transfer, 4212

³ The Print Shop is now creating two microfiche copies of each technical report for the Technical Library. Security procedures require that these microfiche copies be identified in the distribution lists of classified documents; the microfiche copies do *not* have to be identified in the distribution lists of unclassified documents.

Sample 3-11. (Concluded).

Document Title, 24 point (22 point, if title is long) Helvetica Bold

Chapter Title, 20-point Helvetica Bold

Level 1 Sidehead, 18-point Helvetica Bold

This is an example of 12-point Times New Roman text. Creative Arts uses 12-point Times New Roman (or Century Schoolbook) for standard SAND Reports.

These first two paragraphs illustrate a ragged right margin.

Level 2 Sidehead, 14-point Helvetica Bold

This is an example of 12-point Times New Roman text. Creative Arts uses 12-point Times New Roman (or Century Schoolbook) for standard SAND Reports.

These second two paragraphs illustrate a justified margin.

Level 3 Sidehead, 12-point Helvetica Bold Italic

This is an example of 12-point Times New Roman text. Creative Arts uses 12-point Times New Roman (or Century Schoolbook) for standard SAND Reports.

Level 4 Sidehead, 11-point Helvetica Bold

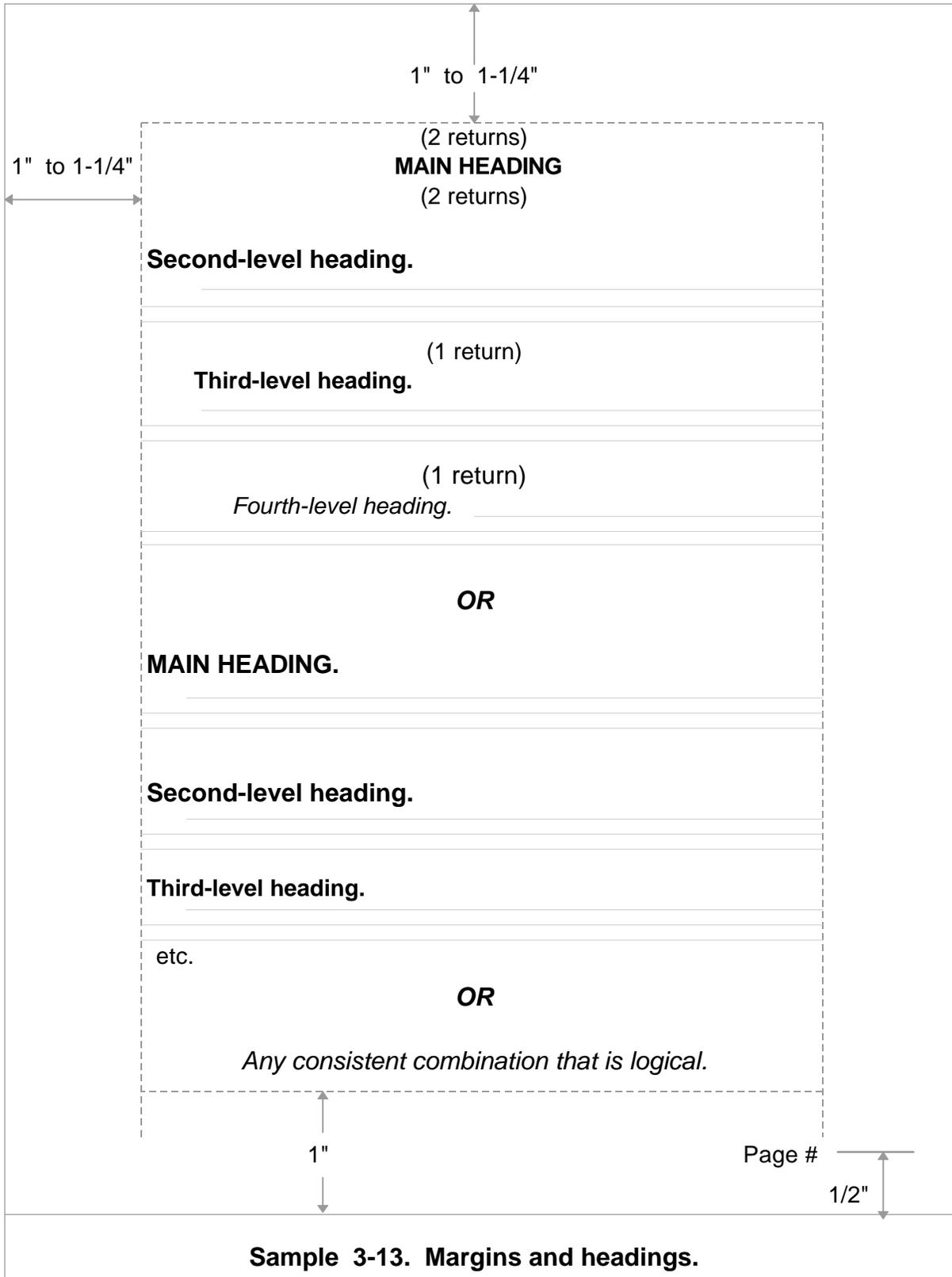
This is an example of 12-point Times New Roman text. Creative Arts uses 12-point Times New Roman (or Century Schoolbook) for standard SAND Reports.

**Level 5 run-in heading, 10-point
Helvetica Bold.** This is an example of 12-point Times New Roman text. Creative Arts uses 12-point Times New Roman (or Century Schoolbook) for standard SAND Reports.

*Level 6 run-in heading, 11-point New
Century Schoolbook, Italic.* This is an example of 12-point Times New Roman text. Creative Arts uses 12-point Times New Roman (or Century Schoolbook) for standard SAND Reports.

Sample 3-12. Text fonts and text sizes for standard SAND Reports prepared in the Creative Arts Department.

Samples



Document title,
24-pt. Helvetica

Design Guidelines for Human-Computer Dialogues

Chapter title, 20-pt. Helvetica

Introduction

Purpose

Level 1, 18-pt. Helvetica

The growing role of computers in Sandia systems such as the Command and Control Systems and the Safeguard Systems places increasing importance on the design of effective human-computer dialogues. Critical concerns for the software designer are the anguish and frustration of users, the degraded user productivity, the potential for human errors, the increased training costs, and the need to redesign and reimplement the user interface. These problems can be avoided, or at least minimized, through knowledge of their causes and remedies. This report provides guidelines for designing effective interactive dialogues.

Emphasis is limited to the human-computer dialogue as it is related to software design. Issues related to the design of computer hardware, keyboard layout, display quality assessment, workstation arrangement, etc., are explicitly excluded. However, assumptions concerning the hardware, such as use of electronic visual displays as the medium for human-computer interaction, the use of such words as ENTER, CANCEL, and NEXT PAGE, and the use of a keyboard are implied for simplicity in discussion.

Principles of Human-Computer Dialogue Design

“User friendly” is a term used frequently in describing human-computer dialogues. User friendly dialogue is easy to use, simple to learn, not likely to produce errors, and intrinsically

satisfactory to the user. To achieve these qualities, the software designer should consider the following principles in user psychology: compatibility, consistency, flexibility and control, brevity, feedback, and operator workload (Williges and Williges, 1984).

Compatibility

Level 2, 14-pt. Helvetica

The presentation of information and input requirements should be compatible with the user's expectations. For example, word processor operators should not be required to understand system messages meant for programmers in troubleshooting problem areas. When a user is required to process the information in any fashion, errors are likely to occur. The designer's goal should be to avoid the need to translate, transpose, or interpret information displayed on the screen.

Consistency

Display formats, language, labels, and operation of the computer system should be consistent throughout the course of the dialogue. This permits the user to develop a concept of the system and thus operate the system in a predictable manner.

Flexibility and Control

The reaction of many novice users to computer systems is fear and frustration. Such behavior often results from inability to decide what to do, when to do it, or how to do it. If the system is flexible, the intended users should be able to operate it effectively.

Sample 3-14. Example of a double-column format.

Design Guidelines for Human-Computer Dialogues

*Document title,
24-pt. Helvetica*

Introduction

Chapter title, 20-pt. Helvetica

Purpose

Level 1, 18-pt. Helvetica

The growing role of computers in Sandia systems such as the Command and Control Systems and the Safeguard Systems places increasing importance on the design of effective human-computer dialogues. Critical concerns for the software designer are the anguish and frustration of users, the degraded user productivity, the potential for human errors, the increased training costs, and the need to redesign and reimplement the user interface. These problems can be avoided, or at least minimized, through knowledge of their causes and remedies. This report provides guidelines for designing effective interactive dialogues.

Emphasis is limited to the human-computer dialogue as it is related to software design. Issues related to the design of computer hardware, keyboard layout, display quality assessment, workstation arrangement, etc., are explicitly excluded. However, assumptions concerning the hardware, such as use of electronic visual displays as the medium for human-computer interaction, the use of such words as ENTER, CANCEL, and NEXT PAGE, and the use of a keyboard are implied for simplicity in discussion.

Principles of Human-Computer Dialogue Design

“User friendly” is a term used frequently in describing human-computer dialogues. User friendly dialogue is easy to use, simple to learn, not likely to produce errors, and intrinsically satisfactory to the user. To achieve these qualities, the software designer should consider the following principles in user psychology: compatibility, consistency, flexibility and control, brevity, feedback, and operator workload (Williges and Williges, 1984).

Compatibility

Level 2, 14-pt. Helvetica

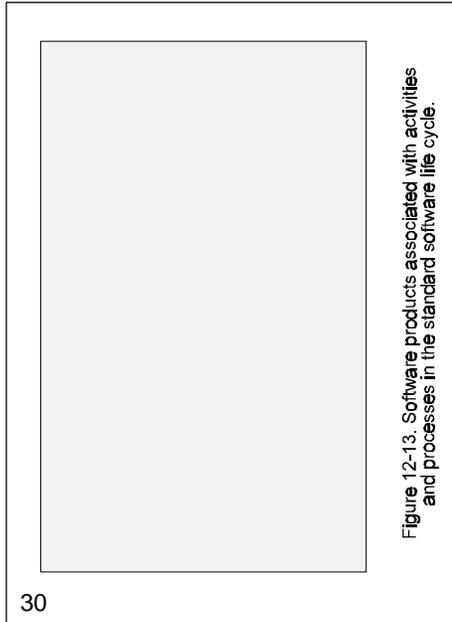
The presentation of information and input requirements should be compatible with the user’s expectations. For example, word processor operators should not be required to understand system messages meant for programmers in troubleshooting problem areas. When a user is required to process the information in any fashion, errors are likely to occur. The designer’s goal should be to avoid the need to translate, transpose, or interpret information displayed on the screen.

Consistency

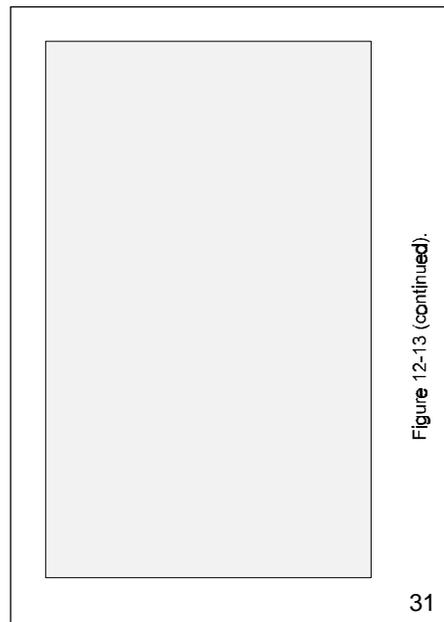
Display formats, language, labels, and operation of the computer system should be consistent throughout the course of the dialogue. This permits the user to develop a concept of the system.

Sample 3-15. Example of a single-column format.

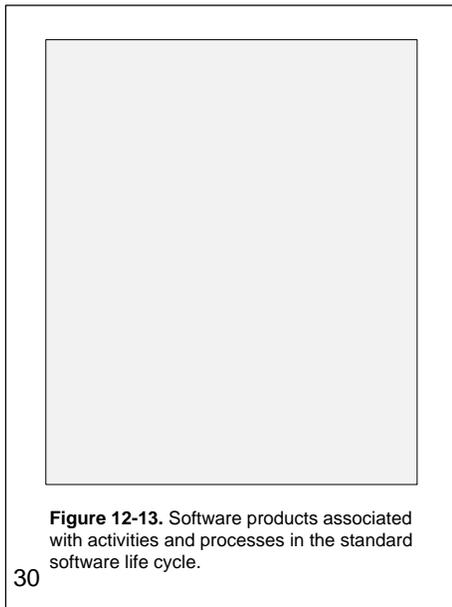
Landscape Orientation,
Left-hand page



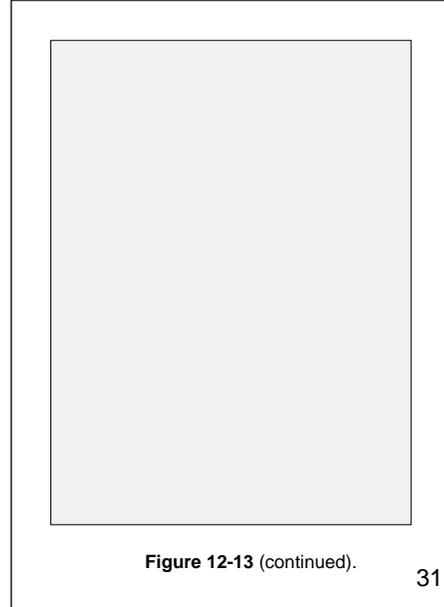
Landscape Orientation,
Right-hand page



Portrait Orientation,
Left-hand page



Portrait Orientation,
Right-hand page



Sample 3-16. Figure orientations (landscape and portrait).

Samples

SA 1820-A (12-96)
Supersedes (9-93) issue

LABORATORY COMMUNICATIONS

Service Order

Order No. **DF0134**

<input type="checkbox"/> Video Services Bldg. 892, Rm. 101 MS 0650 - 844-7167 - Video Production - Scriptwriting - Videotaping/Field & Studio - Editing/Digital Video - Tape duplicating - Multimedia support - Audiovisual support - Quicktime VR (Virtual Reality)	<input type="checkbox"/> Printing & Duplicating Bldg. 802, Rm. 850 MS 0104 - 845-8328 - Multicolor Printing - High contrast camera services - Color & rapid copying services - Digital duplicating from electronic files - Micrographic shooting & processing - Photo processing and printing	<input checked="" type="checkbox"/> Creative Arts Bldg. 894, Rm. 201 MS 0619 - 845-8265 - Interactive multimedia presentations - World Wide Web development - Photography - Brochures - Graphic design, logos & layout - Technical writing & editing - Electronic presentations - Slides, viewgraphs, image setting, CD-ROM mastering - Computer-generated 2-D & 3-D images - Exhibits design & fabrication - Conference & events planning
Requester Name: MARY WALTERS	Date: 6-10-97	Social Security No.: 334-21-0871
Org.: 1425 Mail Stop: 0124 Phone: 845-1221 Fax: 844-2138	Required Completion Date: 6-17-97	
Case Number Information: Case No. 0645.200 Charging Org. 1425 Est. \$ Amount _____		Approval (Required) Signature: Mary Walters Social Security No.: 334-21-0871
Product Wanted: LASER COPY, ITEK, 3 figs in Photoshop	SAND No. 97-2190	CLASSIFIED? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Project Title: Two-Dimensional Transit Program	No. of Pages _____	
Deliver To: <input checked="" type="checkbox"/> Call for pickup <input type="checkbox"/> Send to <input type="checkbox"/> Send to Mail Services, MS 0100 for Disc <input type="checkbox"/> Store Negatives (Still Photo) (Customer must submit an Imaging Cataloging Form (SA 1400-ICF) for Unclassified only.)		
Name (if different from requester)	SSN	MS Bldg./Room
Item No.	No. of Originals	Qty.
Work Instructions		
1		Draw attached Figure 1 from draft provided. Generate one laser proofing copy, then one ITEK print.
2		Create Figures 2, 3, and 4 on enclosed (MAC) diskette in Photoshop. Drafts attached.
COMPLETE FOR CLASSIFIED WORK		
Security Class.	Classified by	Classifier's Job Title
		Date of Classification
		Org. MS
RECEIPT FOR CLASSIFIED: I hereby assume responsibility for receipt of classified material identified herein and will handle, store, and transmit it in accordance with existing regulations.		
Name	Org.	MS
		Signature
		Date
INFORMATION BELOW TO BE FILLED IN BY SERVICE CENTER PERSONNEL		
Estimate Of Job By Service Center Personnel		Hours/Units
		Item No.
		Desk Ref. No.
		Totals
Assigned to	Desk Ref. No.	
Completed Job Picked Up By:		
Name	Signature	Date

Send Service Orders involving forms to Dept. 15102, MS 0612, for approval.

Sample 3-17. Service Order form for graphics.

When ordering artwork, think about the size you would like the text to be in your final report, and be sure the callouts are large enough to bear the reduction you have in mind.

The following table will help you visualize various reductions.

Point Size	Original Size	Reduction	
		To 75% (Most microfiche)	To 50%
22	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE
20	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE
18	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE (smallest legible size)
16	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE
14	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE
12	ORIGINAL SIZE (Normal type)	REDUCED SIZE (smallest legible size)	REDUCED SIZE
10	ORIGINAL SIZE	REDUCED SIZE	REDUCED SIZE

Sample 3-18. Print sizes and typical reductions.

Table 1. Example Table

Samples

Major Sources of Funding	(Operating BA in \$M)		
	FY85*	FY86 [†]	FY87 [‡]
Department of Defense	159.0	181.5	147.0
Other Federal Agencies [§]	16.2	16.3	25.0
Nuclear Regulatory Commission	32.1	38.4	38.0
All Other**	0.7	0.6	1.0
Total Work for Others Than DOE	208.0	236.8	211.0
Percent of Total Operating Funding	22	25	19

A spanner line should be used over subheads that have a common heading.

* The first year . . .
[†] Increased costs affected the amount . . .
[‡] The most recent figures . . .
[§] Other federal agencies included . . .
 ** *Start doubling up on the symbols at this point.*

Standard order for footnotes. Number or letter footnotes are also acceptable. Whatever is used should clearly stand out as a footnote.

Table 4-2. Enhanced-Field Switching vs. Uniform-Field Switching

Enhanced-Field Switching	Uniform-Field Switching	Second Enhanced-Field Switching
Arc is generated <i>early</i> in the charge cycle. Because the field stress is <i>low</i> , initial arc velocity is low. The pulse-forming line (PFL) charges as the arc propagates across the gap. Arc <i>generation</i> time is small, minimizing variations in arc <i>generation</i> time. Pins 0.6 cm in diameter are placed . . .	Arc is generated <i>late</i> in the charge cycle. Because the field stress is <i>high</i> , initial arc velocity is high. The PFL charges very little as the arc propagates across the gap. Pins 5 cm in diameter are placed . . .	Arc is generated <i>early</i> in the charge cycle. Because the field stress is <i>low</i> , initial arc velocity is low. The pulse-forming line (PFL) charges as the arc propagates across the gap. Pins 0.6 cm in diameter are placed . . .

Sample 3-19. Example tables from published reports.

Table 4. Computed flow at the center of elements illustrated in Figure 8

Flow Rates (10^{-5} m ³ /day) for	Ratio of Vector Magnitudes for Various Cases
---	--

Samples

Center of Element	(1) Case 1*		(2) Case 2		(3) Case 3		(4) Case 4		(5) Case 2/ Case 1	(6) Case 1/ Case 3	(7) Case 1/ Case 4
	H [†]	V	H	V	H	V	H	V			
43	0.0	0.46	0.0	0.45	0.0	0.57	0.029	0.62	0.99	0.80	0.74
44	0.0	0.42	0.0	0.41	0.0	0.52	0.017	0.64	0.99	0.81	0.65
45	0.0	0.37	0.0	0.36	0.0	0.48	0.027	0.66	0.98	0.77	0.56
46	0.0	0.29	0.0	0.27	0.0	0.42	0.049	0.69	0.96	0.69	0.41
74	0.037	1.3	0.038	1.3	0.047	1.5	0.058	1.7	0.99	0.85	0.74
75	0.051	1.2	0.054	1.2	0.040	1.4	0.053	1.8	0.99	0.83	0.68
76	0.083	1.1	0.087	1.1	0.066	1.3	0.075	1.8	0.98	0.81	0.61
77	0.13	0.91	0.14	0.88	0.13	1.2	0.12	1.8	0.97	0.77	0.50
105	0.12	0.99	0.12	0.99	0.11	1.1	0.055	1.2	1.00	0.91	0.82
106	0.16	0.97	0.17	0.97	0.13	1.1	0.052	1.2	1.00	0.93	0.82
107	0.26	0.97	0.27	0.96	0.22	1.0	0.063	1.2	1.00	0.95	0.83
108	0.43	0.99	0.45	0.99	0.45	1.0	0.069	1.2	1.01	0.98	0.90

* Cases are described in Table 2.

[†]—"H" connotes horizontal component of flow; "V" connotes vertical component of flow.

Table 5. Volumes of water entering a drift for the drift analysis

Case	Description	Flow Through Drift (m ³ /day)	Ratio of the Flow Entering Drift to the Influx* for the Modeled Area (%)
1	Vertical emplacement of waste packages—drift located in welded tuff (Sample 19) and backfilled with clay.	9.2×10^{-7}	0.55
2	Vertical emplacement of waste packages—drift located in welded tuff (Sample 19) and backfilled with sand.	8.2×10^{-20}	0.0
3	Vertical emplacement of waste packages—drift located in welded tuff (Sample 19, k_s increased) and backfilled with clay.	4.3×10^{-7}	0.26
4	Vertical emplacement of waste packages—drift located in welded tuff (Sample 19, k_s decreased) and backfilled with clay.	2.8×10^{-5}	17

*Influx = 1.671×10^{-4} m³/day

Sample 3-19 (concluded).

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SECTION 4

Reproduction and Distribution of SAND Reports

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Reproduction of SAND Reports

The final processing of a SAND Report consists of (1) preparing the masters to be sent to the Print Shop, (2) sending the master pages, cover, and Service Order to the Print Shop, and (3) preparing and submitting the Record of Origination & Distribution of Publication form, a copy of the Distribution list, a copy of the Service Order used to order Print Shop services, and the mailing labels that Document Processing will need to process the report for distribution.

Using Creative Arts' "Report Prep Service"

Authors can either prepare their own SAND Reports to be printed and distributed (a summary of instructions follows) or use the "Report Prep Service" offered by Creative Arts Dept. 12620 (MS 0619, Bldg. 894, Room 201). Creative Arts normally charges authors about four hours to complete the work, but costs vary depending on which parts of the service are used.

Report Prep Service:

- After the Review & Approval Form is signed off through Section 10, the R&A Desk verifies that the report is ready for printing—that all Sandia and DOE report requirements were met and all required report changes and corrections were made. (These changes and corrections were described by a Creative Arts reviewer in Section 10 of your Review & Approval Form.)
- Creative Arts completes the necessary paperwork, including a Service Order form (after getting requirements from the author) to request the Report Prep Service (which includes the report cover) and Print Shop services. The Record of Origination is completed. Copies are made of all the paperwork and distributed to the appropriate offices.
- The author's secretary is provided with the information needed to prepare labels for the report.
- The report cover is prepared, then proofed by the author.
- The report, cover, and Service Order are delivered to the Print Shop.

For more information on the Report Prep Service, call Irene Silva at 845-8261.

Authors who want to prepare their own reports for printing and distribution should use the following instructions.

Preparing Report Masters for Printing

Steps for preparing the master package for printing are as follows:

1. Incorporate comments from the Review & Approval Form (Section 10), if any were specified.
2. Order report covers and legal notice masters from Creative Arts Dept. 12620 (NM) or from Technical Communications Dept. 8815 (CA) (Figure 4-1). These masters must be included in the package going to the Print Shop. (Be sure to remove any temporary cover and legal notice pages you have been using on draft copies.)
3. Check masters carefully for the following:
 - Sequential page numbering.
 - Appropriate page numbering. For example, for two-sided printing, check that all right-hand pages have odd numbers and all left-hand pages have even numbers.
 - No blank pages except those falling at the end of a section or at the end of the document.
 - Report title page and Distribution page(s) are included.

(More comprehensive checklists for a final check of the masters for unclassified and classified reports are shown in Figures 4-2 and 4-3.
4. Carefully proof the cover; if corrections are needed, return cover to Creative Arts Dept. 12620.
5. Put the cover and legal notice masters with the other masters.

You are now ready to send the report, along with a Service Order form (Figure 4-4), to the Print Shop, Dept. 12630, Bldg. 802, Room B50 (NM) or to Technical Communications Dept. 8815, MS 9021.

Note: Submit SAND Reports to the Print Shop with a copy of your completed Review & Approval Form (SF 1008-RA), signed off through Section 10.

Make your request on a Service Order form (Form SA 1820-A)(3-97, sample below. Attach to the Service Order:

- (1) A copy of your title page, carefully checked for completeness and accuracy (see Figure 4-2 or 4-3 for title page requirements), and
- (2) A copy of your Review & Approval Form (SF 1008-RA), signed off through Section 10.

On the Service Order, show the total number of pages in the document.

Mail or hand-carry the request to Creative Arts Dept. 12620, Bldg. 894, Room 201 (NM) or to the Technical Communications Department (CA). If a classified title page has a classified title or abstract, be sure to use a red and white striped envelope.

Proof your cover after you receive it; you are responsible for its correctness.

Covers are processed within 24 hours .

CREATIVE ARTS
assigns #

LABORATORY COMMUNICATIONS
Service Order

Order No. **DF1248**

<input type="checkbox"/> Video Services <small>Req. 802, Rm. 201 MS 963 - 644-7187</small> Video Production Remounting Videography/Facilities Studio Editing/Digital Titles Tape Duplication Multimedia equipment Audiovisual support Customized VR (Virtual Reality)		<input type="checkbox"/> Printing & Duplicating <small>Req. 802, Rm. 201 MS 964 - 644-6328</small> Multicolor Printing High contrast labels services Color & rapid moving services Digital duplicating from electronic file Micrographic shooting & processing Photo processing and printing		<input checked="" type="checkbox"/> Creative Arts <small>Req. 894, Rm. 201 MS 965 - 645-4205</small> Interactive multimedia presentations World Wide Web development Photography Graphics design, layout & format Technical writing & editing Electronic presentations Maps, diagrams, image printing, CD-ROM installation Computer-generated 2-D & 3-D images Limited design & fabrication Conference & events planning		
Requester Name: PAUL B. MILLER Date: 6-11-97 Social Security No.: 278-59-7281 Org.: 6352 Mail Stop: 0124 Phone: 845-9904 Fax: 844-2195 Required Completion Date: 6-12-97		Case Number Information: Case No.: 0344.900 Charging Org.: 6352 Est. # Amount: _____ Approval (Required): Paul B. Miller Social Security No.: 278-59-7281				
Product Wanted: SAND Report COVER Project Title: Hydraulic Testing of XX Formation SAND No.: 97-2237 CLASSIFIED? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No No. of Pages: _____		Deliver To: <input type="checkbox"/> Call for pickup <input checked="" type="checkbox"/> Send to <input type="checkbox"/> Send to MIL Services, MS 0100 for <input type="checkbox"/> Store Negatives (CD ROM Photos) <input type="checkbox"/> Customer must submit an image Cataloging Form (SA 1800/21 for Unclassified only /				
Name (if different from requester): _____ SSN: _____ MS: _____ Bldg./Room: _____		Work Instructions: Prepare COVER for SAND97-2237 (76 pages + COVER). Copies of the report title page and signed-off Review & Approval Form are included.				
COMPLETE FOR CLASSIFIED WORK						
Security Class.	Classified by	Classifier's Job Title	Date of Classification	Org.	MS	
RECEIPT FOR CLASSIFIED: I hereby assume responsibility for receipt of classified material covered herein and will handle, store, and transmit it in accordance with existing regulations.						
Name	Org.	MS	Signature	Date		
INFORMATION BELOW TO BE FILLED IN BY SERVICE CENTER PERSONNEL						
Estimate Of Job By Service Center Personnel			Hours/Units	Item No.	Dept. Ref. No.	Total
Assigned to _____ Desk Ref. No. _____						
Completed Job Picked Up By: _____						
Name _____ Signature _____						Date _____

Send Service Orders involving forms to Dept. 15102, MS 9612, for approval.

Figure 4-1. Ordering covers from Creative Arts (NM) or Technical Communications (CA)

___ Does Review & Approval (R&A) Form include all approvals?

Cover

___ Is all information on the cover prepared by Department 12620 correct?

Check that the following cover items agree with the title page:

___ Report number(s) and DOE Distribution Category (UC) number (except for Internal Distribution Only and Work for Others reports that do not have housekeeping copies)

___ Release information and print date

___ Report title

___ Author(s), preferably first name, initial, and last name of each; check spelling carefully

___ Legends

___ Does cover include additional legends indicated on R&A form, but not required on title page (e.g., Patent Caution and ECI)?

___ Does cover have "Prepared by . . ." statement?

Legal Notice (Disclaimer)

___ Does legal notice appear on page 2?

___ If Unlimited Release, is the price information included below the legal notice: "Available at . . ."?

___ Is the price code number correct?

Title Page

Does title page have the following information?

___ Report number

___ Distribution limitation (Unlimited Release, Patent Caution, or other statement as indicated on R&A form)

___ Print date (month and year without comma)

___ Is the DOE/OSTI distribution category (UC-XXX) in the upper right-hand corner? (Internal Distribution Only and some Work for Others do not require a distribution category)

___ Full title of report

___ Author(s), preferably first name, initial, and last name of each; check spelling carefully

___ Name of author(s)' organization(s) —but not the organization number

___ Company name and address, including zip code (87185 for Sandia/NM)

Body of Report

___ Is page numbering correct? Check for the following:

___ Page numbers in proper location

___ No skips in sequence

___ Are the title page and the first page of body of report (the page with Introduction, Background, or similar headings) right-hand pages?

___ Do Contents listings (including figures and tables) agree with the text, and are page numbers listed correctly?

___ Are graphics of good, reproducible quality?

Distribution

___ Are names, organizations, and mail stops up to date?

___ Are housekeeping copies correct?

Revisions

___ The word *Revised* appears after SAND# on cover and title page *unless* a new SAND# is used.

___ The supersession statement, with a blank line above it, appears below the Printed (date) line on cover and title page. The statement reads the same whether it is for SANDxx-xxxx Revised or a new SAND#. It is:

"Supersedes SANDxx-xxxx dated (month & year)."

Reprints

___ On cover, the reprint date replaces the previous print date.

___ On title page, *the previous print date is retained* and the reprint date is added below it.

___ On distribution page, the original distribution is retained, followed by a blank line or two, then "Second (etc.) Printing, (date):" which is followed by another blank line and the new distribution. No housekeeping copies required.

Figure 4-2. Checklist for Unclassified report masters.

___ Does Review & Approval (R&A) Form include all approvals?

Cover

___ Is all information on the cover prepared by Department 12620 correct?

___ Is the cover numbered page 1?

Check that the following cover items agree with the title page:

- ___ Report number(s)
- ___ Nuclear Weapon Data & Sigma # or other limitations; no DOE/OSTI Distribution Category Number (C#)
- ___ Print date
- ___ Report title with classification in parentheses
- ___ Author(s), preferably first name, initial, and last name of each; check spelling carefully
- ___ Legends

___ Does cover include additional legends indicated on R&A form, but not required on title page (e.g., Patent Caution and ECI)?

___ If report is going to outside recipients, does the notice "Reproduction of this document . . ." appear as last item on cover?

___ Does cover have "Prepared by . . ." statement?

___ Does documentation block appear on cover? Is the total number of pages correct?

Legal Notice (Disclaimer)

___ Does legal notice appear on page number 2?

___ No price blurb appears

Title Page

Does title page have the following information?

- ___ Report number
- ___ Limitation statement(s) as marked on the R&A form (such as Nuclear Weapon Data - Sigma)

___ Print date (month and year without comma)

___ Distribution Category (C-#)

___ Full title of report followed by classification [e.g., (U) or (SRD)]

___ Author(s), preferably first name, initial, and last name of each; check spelling carefully

___ Name of author(s)' organization(s)—but not the organization number

___ Company name and address, including zip code (87185 for Sandia/NM)

___ Does classification [e.g., (U) or (SRD)] follow the word *Abstract*?

___ Are all classification markings and legends included?

Body of Report

___ Is page numbering correct? Check for the following:

___ Page numbers in proper location

___ No skips in sequence

___ If Secret or Confidential, all blank pages state *Intentionally Left Blank*

___ Is the last page of report (which should be a blank left-hand page) numbered and does it say *Intentionally Left Blank*

___ Are the title page and the first page of body of report (the page with Introduction, Background, or similar headings) right-hand pages?

___ Do Contents listings (including figures and tables) agree with the text, and are page numbers listed correctly?

___ Are graphics of good, reproducible quality?

Distribution

___ Are names, organizations, and mail stops up to date?

___ Are housekeeping copies correct?

Figure 4-3. Checklist for Classified report masters.

Revisions	Reprints
<p>___The word <i>Revised</i> appears after SAND# on cover and title page <i>unless</i> a new SAND# is used.</p>	<p>___On cover, the reprint date replaces the previous print date.</p>
<p>___The supersession statement, with a blank line above it, appears below the Printed (date) line on cover and title page. The statement reads the same whether it is for SANDxx-xxxx Revised or a new SAND#. It is:</p>	<p>___On title page, <i>the previous print date is retained</i> and the reprint date is added below it.</p>
<p>“Supersedes SANDxx-xxxx dated (month & year).”</p>	<p>___On Distribution page, the original distribution is retained, followed by a blank line or two, then “Second (etc.) Printing, (date):” which is followed by another blank line and the new distribution. No housekeeping copies required.</p>

Figure 4-3 (concluded).

Sending Masters to the Print Shop (Bldg. 802)

DOE regulations state that all printing of camera-ready SAND Report masters must be done through the Sandia Print Shop (Sandia/NM Dept. 12630, MS 0104).

1. Prepare a Service Order, Form SA 1820-A (Figure 4-4).
Note: Retain a copy of the Service Order. You will need to send it to Document Processing (MS 0100) later, along with the Record of Origination and mailing labels.
2. Mail or hand-carry the report masters and the Service Order form to Print Shop Dept. 12630 (MS 0104). If you hand-carry the masters to the Print Shop, your Service Order will be date-stamped, and you can request a copy. If you mail the masters to the Print Shop, make a copy of the Service Order form and retain it for your records.

Note: Submit SAND Reports to the Print Shop with a copy of your completed Review & Approval form (SF 1008-RA), signed-off through Section 10.

If you have indicated on the Service Order that the printed copies are to go to Mail Services, Document Processing will intercept the reports in the mail room and process them for distribution. See the following section for Document Processing procedures.

DA 1620-A (12-95)
Supersedes (9-85) issue

LABORATORY COMMUNICATIONS

Service Order

Order No. **DF2764**

<input type="checkbox"/> Video Services Bldg. 802, Rm. 101 MS 0650 - 844-7167 - Video Production - Scriptwriting - Videotaping/Field & Studio - Editing/Digital Video - Tape duplicating - Multimedia support - Audiovisual support - Outtime VR (Virtual Reality)	<input checked="" type="checkbox"/> Printing & Duplicating Bldg. 802, Rm. 850 MS 0104 - 845-8328 - Multicolor Printing - High contrast camera services - Color & rapid copying services - Digital duplicating from electronic files - Micrographic shooting & processing - Photo processing and printing	<input checked="" type="checkbox"/> Creative Arts Bldg. 894, Rm. 201 MS 0619 - 845-8268 - Interactive multimedia presentations - World Wide Web development - Photography - Brochures - Graphic design, logos & layout - Technical writing & editing	<input type="checkbox"/> Electronic presentations - Slides, micrographs, image setting, CD-ROM mastering - Computer-generated 2-D & 3-D images - Exhibits design & fabrication - Conference & events planning
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Requester	Name HAROLD MARTIN	Date 4-16-97	Social Security No. 215-78-0532
	Org. 12313 Mail Stop 0512 Phone 845-3214 Fax 844-9876		Required Completion Date 4-25-97

Case Number Information:	Approval (Required)
Case No. 0589.200 Charging Org. 12313 Est. \$ Amount _____	Signature Harold Martin
	Social Security No. 215-78-0532

Product Wanted COVERS, Color Xerox, Printing	SAND No. 97-4301	CLASSIFIED?
Project Title Animation of Robotic Structures	No. of Pages 46	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

Deliver To: Call for pickup Send to **MASTERS** Send to Mail Services, MS 0100 for Dist. Store Negatives (Still Photo) (Customer must submit an Imaging Catalog Form (ISA 1400-ICF) for Unclassified only.)

Name (if different from requester)	SSN	MS	Bldg./Room
------------------------------------	-----	----	------------

Item No.	No. of Originals	Qty.	Work Instructions
1			CREATIVE ARTS - Prepare COVERS for SAND 97-4301 and return to Harold Martin (46 pages + cover).
2	23		PRINT SHOP - Print standard SAND Report covers PRINT 23 copies of attached masters, page back-to-back.
3			RAPID SERVICE - Color Xerox pgs. 3, 7, 13, 15 with backing pages marked "Intentionally Left Blank." Hand-insert color copies into printed pgs. of document.
4			Staple at left margin. # of copies: (23) # of originals: (46)

COMPLETE FOR CLASSIFIED WORK

Security Class.	Classified by	Classifier's Job Title	Date of Classification	Org.	MS
-----------------	---------------	------------------------	------------------------	------	----

RECEIPT FOR CLASSIFIED: I hereby assume responsibility for receipt of classified material identified herein and will handle, store, and transmit it in accordance with existing regulations.

Name	Org.	MS	Signature	Date
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INFORMATION BELOW TO BE FILLED IN BY SERVICE CENTER PERSONNEL

Estimate Of Job By Service Center Personnel	Hours/Units	Item No.	Desk Ref. No.	Totals
Assigned to _____ Desk Ref. No. _____				
Completed Job Picked Up By: Name _____ Signature _____ Date _____				

Send Service Orders involving forms to Dept. 15102, MS 0612, for approval.

Figure 4-4. Service Order form for report cover and Print Shop services.

Distribution of SAND Reports

If you indicated on the Service Order form that the SAND Report copies are to be sent to Mail Services for distribution, Document Processing Dept. 7613-2 will intercept the copies there and prepare them for distribution. To do so, they need several items from the line organization.

Submitting Required Items to Document Processing

Immediately after the masters go to the Print Shop, take the following action to give Document Processing the information needed to process the reports for final distribution.

1. Prepare Record of Origination & Distribution of Publication Form (SA 2900-FBB) (see Figure 4-5).

Instead of listing addressees as requested on the form, simply type "SEE ATTACHED" and go to step 2.

2. Attach a copy of the Distribution list from your report.
3. Attach a copy of the Service Order form that was used to order Creative Arts (cover) and Print Shop services.
4. **Make self-adhesive address labels (1) for all internal and external addressees who are to receive unclassified reports, and (2) for all internal addressees who are to receive Confidential or Secret reports. The Mail Services Team will supply labels for external addressees who are to receive Confidential or Secret reports. If your report is Secret, also prepare RCIs (for *all* Secret reports) and RITs (if the Secret report is going outside of Tech Area I).**
5. Enclose items 1 through 4 in an envelope addressed to Document Processing, Dept. 7613-2 (MS 0100).

Distributing the Reports

Mail Services distributes the reports after Document Processing has prepared them.

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SECTION 5

Presentations and Conference Papers, Journal Articles, Book Chapters, and Brochures

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Presentations and Conference Papers

Presentations

Oral presentations made at conferences or at public meetings need to be approved before they are presented. Document your oral presentation with notes or an outline, and get approval from your organizational or project Authorized Derivative Classifier (ADC) or from the Classification Department. If documentation is not available, at least discuss the presentation with your ADC or with the Classification Department, and document the authorization in Sections 1-6 of the Review & Approval Form.

When the full conference paper is developed, it must go through the Formal Review & Approval process (see Section 1).

Conference Papers

Definition

Conference papers are presented to professional societies. A professional society such as IEEE NSREC requires that all presentations be accompanied by reproducible masters to be included in a “proceedings” document. Some conferences require an abstract; an extended abstract or summary, usually 2 to 4 pages; and the full paper.

Conference papers must have a SAND number (see *SAND Numbers* in Section 1). The SAND number is used to track the paper and does not appear on the paper when the masters are submitted to the conference.

Approvals

Each form of the conference paper (abstract, extended abstract, or the full paper) must be formally reviewed at Sandia (see Section 1). *The Review & Approval Form must be accompanied by three copies of the conference paper when the R&A package is sent to Creative Arts.*

Draft copy

Many professional societies require that drafts of papers be submitted for consideration by the society review committee. Such a draft must go through the R&A process. If the draft is accepted, then the author is usually required to furnish camera-ready masters so that the paper can be included in the “proceedings” of the conference.

Masters

The sponsoring society usually furnishes guidelines for preparation of the masters (how to prepare them and when they must be submitted). Sample pages of a typical conference paper are shown in Figure 5-1.

The SAND number for a conference paper will not appear on the masters, but it will be used for tracking the paper during the review process and for other recordkeeping purposes. The SAND number suffix for a conference paper is "C." Example: SAND97-1132C.

DOE (or other) funding statement on conference papers

All conference papers must include a funding statement (also referred to as a "support statement," or "sponsorship statement"). This can appear on the title page, footnoted to "Sandia National Laboratories" below the name(s) of the author(s) or to the title of the document, as appropriate (see Figure 5-1). It can also appear on the last page of the document.

If all the work was funded by the DOE, the DOE-Sandia funding statement must appear on the first page of a conference paper and credit the current contract number. If some other government agency or company contributed all or part of the funding, appropriately indicate that information as well. The DOE-Sandia funding statement is as follows:

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

Distribution limitations

When the R&A form shows a distribution limitation, such as Export Controlled Information, include the appropriate legend in the conference paper, immediately after the abstract (see legends for distribution limitations in Sample 3-7). Also, be sure that the proceedings in which the paper will appear have a limitation as stringent as the limitation of your paper.

Copyright transfer

If the conference asks for a copyright transfer, see Appendix D, page 224.

R&A and how to submit your conference paper for the Web

For information on

- the Review & Approval Process for conference paper, and
- submitting your conference paper for the Web,

see pages 32-33 and page 52.

The ASSESS Outsider Analysis Module

Alfred Winblad, Mark Snell, Sabina Erteza Jordan
Sandia National Laboratories,* Albuquerque, New Mexico, U.S.A.

Brad Key, Bryan Bingham, Scott Walker
Science & Engineering Associates, Inc., Albuquerque, New Mexico, U.S.A.

ABSTRACT

The Outsider Analysis (Outsider) module is part of the Analytic System and Software for Evaluating Safeguards and Security (ASSESS). Outsider and the ASSESS Facility Descriptor (Facility) module together supersede the Systematic Analysis of Vulnerability to Intrusion (SAVI) software package. Outsider calculates P(I), the probability that outsiders are interrupted during an attack by security forces at the facility, and P(W), the probability of security system win, and has other features not found in SAVI. Analysts can select intruders from a set of ten reference threats, ranging from well-equipped terrorists to intruders with no equipment at all. New analysis algorithms run 60 to more than 100 times faster. New reports detail how safeguards are defeated at each element in a path and give other data critical to effective upgrade decisions. Outsider takes as input a facility security system defined in Facility and produces intermediate results for the ASSESS Collusion module.

INTRODUCTION

The Outsider Analysis (Outsider) module is part of the Analytic System and Software for Evaluating Safeguards and Security (ASSESS) developed under contract to the U.S. Department of Energy [1].

Outsider calculates the vulnerability of facilities defined in the ASSESS Facility Descriptor (Facility) module to intrusion by outsiders [2]. Other ASSESS modules analyze facility security against other kinds of threats [3,4]. All ASSESS modules run on IBM-PC compatible computers within Microsoft Windows™, a graphical user interface.

Outsider and Facility together supersede the Systematic Analysis of Vulnerability to Intrusion (SAVI) software, developed in 1987 by Sandia National Laboratories and Science & Engineering Associates, Inc. [5,6]. Along with an improved user interface based on Microsoft Windows, Outsider has new modeling and reporting capabilities

* Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

that make it faster and easier to set up and run intrusion analyses, to determine specific areas of vulnerability, and to identify and test potential upgrades.

THE OUTSIDER ANALYSIS MODULE

Outsider analyses are based on the SAVI model of timely detection, with major improvements in threat definition, algorithm performance, and deceitful intrusion modeling [7]. SAVI and Outsider both calculate the probability of interruption, P(I). P(I) is the probability that the security force at a facility can respond to an alarm and interrupt intruders before they complete their mission. Outsider also calculates P(W), the probability of system win. P(W) is defined as the product of P(I) and P(N), where P(N) is the probability the response force can neutralize the intruders once interruption occurs. Outsider can get P(N) from the ASSESS Neutralization Analysis module [8] or directly from the analyst. For more about how Outsider calculates P(I) see Reference 7.

The value of P(I) for a given path is determined by locating the last point in the path, called the Critical Detection Point (CDP), where an alarm can cause the response force to deploy with enough time left to stop the intruders. Protection elements before the CDP provide detection; those after the CDP provide delay. Thus, in calculating P(I) for each path, delay safeguards in protection elements before the CDP and detection safeguards after the CDP are not effective. Outsider can find the ten most vulnerable (lowest P(I)) paths for a range of ten response force times (RFT).

Outsider is a Microsoft Windows application. As such, it looks and works like other Windows applications, such as Facility and Microsoft Excel. Figure 1 shows the Outsider application as it might look after an analysis has been completed. A Control Panel displays and sets threat and analysis settings, and three support windows, Diagram, Results, and Graphs, display analysis information. Each support window can be moved and sized independently inside the main window. Outsider provides both mouse and keyboard control.

Figure 5-1. Sample of a conference paper.



Figure 1. The main Outsider Analysis screen

After starting Outsider, an analyst can load a physical protection system description created in Facility or a previously saved analysis. The protection system, in the form of an Adversary Sequence Diagram (ASD), appears in the Diagram window. The analyst can then choose threat and response force settings using the Control Panel, and run the chosen analysis. After the analysis is finished, the Control Panel is used to select any path and see it highlighted on the Diagram. A detailed textual description of the path including intrusion methods and individual safeguard performance values is shown in the Results window. The Graphs window displays user-selectable information about sets of paths, including a graph of the protection system's sensitivity to response force deployment time. After reviewing the analysis results, the analyst can save them to a file, print reports, create a collusion analysis support file, or modify settings and reanalyze.

Control Panel

The Control Panel shown in Figure 2 displays all of the settings that control an Outsider vulnerability analysis.

When an Outsider analysis is completed, the most vulnerable intrusion paths through the facility protection system are accessed through the Control Panel's Path Matrix. Outsider can display up to 100 of the most vulnerable paths based on the number of requested paths and response force times. The Path Matrix columns represent the most vulnerable intrusion paths. The analyst may request that up to 10 of the most vulnerable paths be identified. Each row of the matrix represents a single response force time from the specified range, which may also have as many as 10 RFTs. Therefore, the Path Matrix can be as large as 10 by 10. The Path Matrix controls indicate the number of requested paths and RFTs as well as the current highlighted path in the matrix. All data associated with the highlighted path is displayed automatically in the Diagram, Results, and Graphs windows. Using these controls, the analyst can efficiently review the vulnerability of all paths in the matrix.



Figure 2. The Outsider Analysis control panel

Journal Articles

Definition

Journal articles are manuscripts submitted to professional journals, either in draft form (following the journal's specifications for the draft) or on camera-ready masters.

Journal articles must have a SAND number (see Section 1). The SAND number is used to track the article at Sandia and DOE; it does not appear on the journal article that is submitted to the publisher.

Approvals

Each form of a journal article (abstract or final draft) must be formally reviewed before it leaves Sandia. See Section 1 for R&A instructions. The R&A must be accompanied by one copy of the journal article when the R&A package is sent to Creative Arts.

Draft copy

A draft copy, usually double-spaced and in near-final form, is sent to the journal. If the article is accepted, the journal will send instructions for preparation of the final manuscript and submission of artwork. A SAND number is needed for a journal article but is not put on the document. The SAND number suffix for a journal article is "J."
Example: SAND97-2334J.

DOE (or other) funding statement on journal articles

The funding organization must be given credit in the article. This is usually done in the **acknowledgment** section near the end of the article.

If all the work was funded by the DOE, the DOE-Sandia funding statement (also referred to as a "support statement" or "sponsorship statement") should appear in the acknowledgment section of the journal article and credit the current contract number. If some other government agency or company contributed all or part of the funding, appropriately indicate that information as well. The DOE-Sandia funding statement is as follows:

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

Distribution limitations

When the R&A form shows a distribution limitation, such as Export Controlled Information, include the appropriate legend on a cover sheet. Also, be sure that the journal in which the article will appear has a limitation as stringent as the limitation of your article.

Copyright transfer

If the publisher asks for a copyright transfer, see Appendix D.

R&A and how to submit your journal article for the Web

For information on

- the Review & Approval Process for journal article, and
- submitting your journal article for the Web,

see pages 34-36 and 52.

Book Chapters

Book chapters must have a SAND number (see Section 1). The SAND number is used to track the chapter at Sandia and DOE and does not appear on the chapter that is submitted to the publisher.

Approvals

The manuscript for a book chapter must go through the Formal Review & Approval Process.

Draft copy

Instructions for preparation of the chapter are supplied by the publisher.

Distribution limitations

When the R&A form shows a distribution limitation, such as Export Controlled Information, include the appropriate legend on a cover sheet or insert it in the chapter as directed by the publisher. Also, be sure that the book in which the chapter will appear has a limitation as stringent as the limitation of your chapter.

Copyright transfer

If the publisher asks for a copyright transfer, see Appendix D.

Brochures

Definition

Brochures are leaflets or booklets that have special formats and frequently contain color photographs and special displays. If they are prepared for distribution within the federal government or for marketing purposes, they usually are “slick” publications that fall into the category of Public Communications. A sample of a master for a simple brochure appears in Figure 5-2.

Brochures must have a SAND number (see Section 1). The SAND number is used to track the brochure at Sandia and it should appear on the brochure.

Approvals

Brochures that are “Public Communications,” or that use color printing and will be distributed outside Sandia, or that use color printing for two or more colors and will be distributed internally, must be approved by DOE. To initiate the procedure for DOE approval: As soon as a complete draft copy is available, contact the R&A Desk Coordinator, (505) 845-8220 in NM, or the Technical Communications Department, (510) 294-2388 in CA.

Masters

For assistance in the design and layout of masters for brochures, contact one of the graphic design specialists in Creative Arts Department 12620.

Distribution limitations

All appropriate distribution limitations (as shown on the R&A Form) must be reflected in the brochure in some appropriate manner.

Funding credit

If all the work was funded by the DOE, the DOE-Sandia funding statement (also referred to as a “support statement” or “sponsorship statement”) should appear on the brochure and credit the current contract number. If some other government agency or company contributed all or part of the funding, appropriately indicate that information as well.

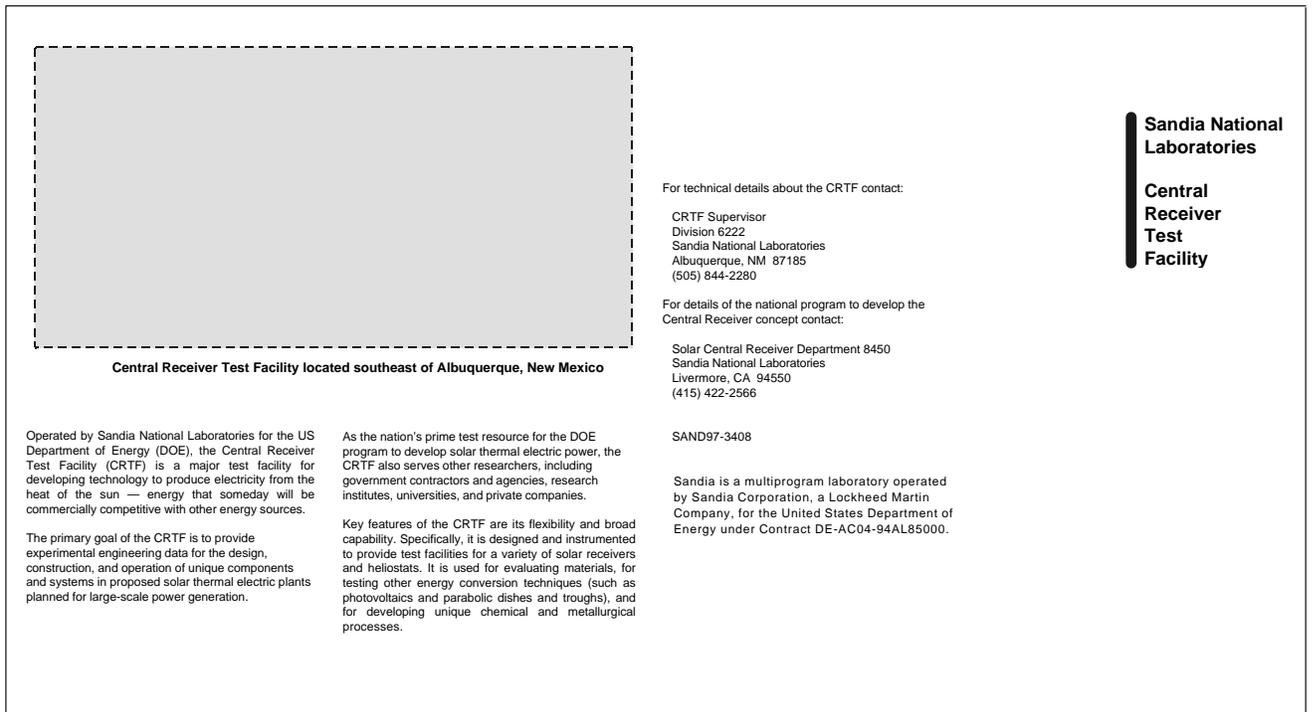
The DOE-Sandia funding statement is as follows:

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy under Contract DE-AC04-94AL85000.

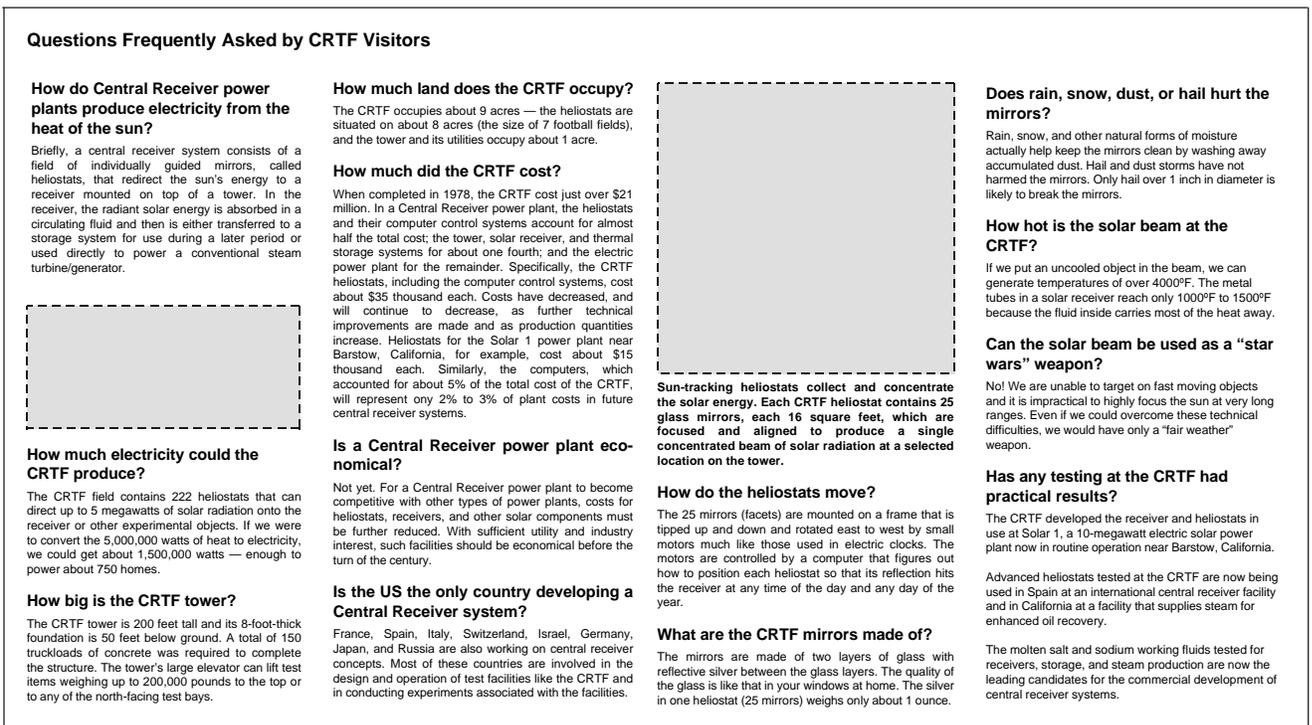
If you need to separate the funding statement to put it into two locations on the brochure, divide it as follows:

This work was supported by the United States Department of Energy under Contract DE-AC04-94AL85000.

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy.

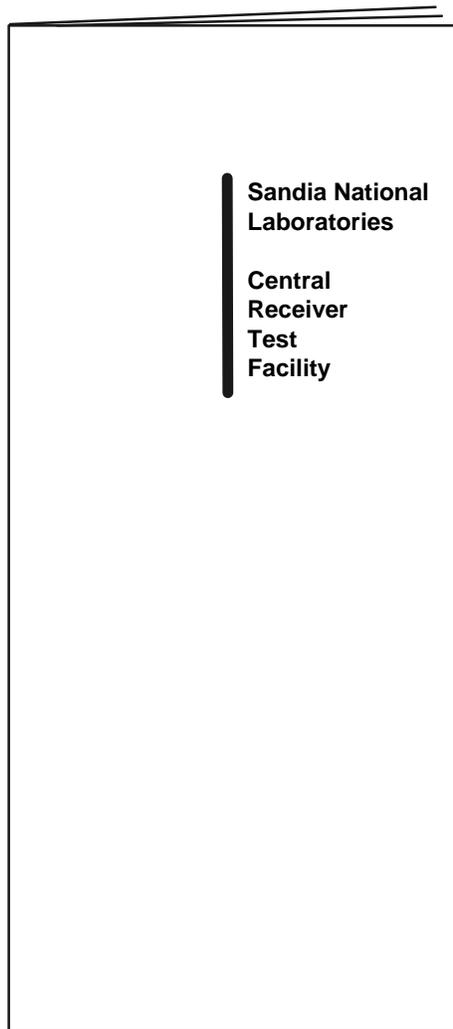


(a) First (front) sheet of brochure



(b) Second (back) sheet of brochure

Figure 5-2. Master for a simple brochure.



(c) The folded brochure

Figure 5-2 (concluded).

APPENDIX A

Sandia's Preferred Style, Usage, and Grammar

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Style, Usage, and Grammar

Introduction

As stated in the introduction to this document, we make no attempt to present an exhaustive guide to style, usage, and grammar. Because excellent references are available to cover these subjects, we limit our treatment to topics that seem to cause the most trouble and to Sandia's preference when two or more choices are offered by standard references.

Definitions

Style

Style is a personal thing. It is the way a writer or author phrases things. It might be highly idiosyncratic, such as very formal and erudite; it might be very clipped, with short sentences and abrupt transitions—yet correct and acceptable for some audiences; or it might be affected. The list is endless.

The style that should be used for SAND Reports is a more neutral style that communicates the author's information without distracting idiosyncrasies. That also allows the work of several authors to be included in one report without heavy rewriting.

Usage and Grammar

Usage and grammar are closely related. Usage describes the choices we make among the various words and constructions available in our language—between formal and informal expression and standard and nonstandard expression: “Am I not invited?” or “Ain't I invited?” This example is extreme, but it makes the distinction clearly. Grammatically, *ain't* works well as a verb, but usage has determined that it is nonstandard. On the other hand, “Aren't I invited?” has become an acceptable phrase in speech, but not in writing. It combines a singular subject and a plural verb, which is certainly not grammatically correct. Three dictionaries agree on this usage of *ain't*: *The American Heritage Dictionary*, *Random House*, and *Webster*. *Webster* tends to be more lenient than the other two in accepting *ain't* in literary writing for its shock value, especially when used in common spoken phrases such as “Ain't that something!”

Another example, common in the technical world, is the current trend to use *that* to introduce a restrictive (essential) clause and *which* (with the clause bracketed by commas) to introduce a nonrestrictive (nonessential) clause. Either of these words is grammatically correct, but technical usage dictates a separation of the uses as described in the previous sentence.

APPENDIX A

Grammar is what is structurally correct; it is fairly static. Usage has to do with the appropriateness of the choices we make based on current acceptance.

Preferences

In the following pages we include, mostly in tabular form (for quick reference), some information about grammar and currently preferred usage (or Sandia's choices). They appear in the following order:

- Clauses — Use and punctuation (“as well as” is not a conjunction and therefore does not use a plural verb when teamed up with a simple, one-element subject).
- Verbs (the substitution of simple, direct verbs for weak and wordy ones).
- Substitutions for formal and incorrect terms (such as “consensus” for “consensus of opinion”).
- Terms most frequently used as one word (“aboveground” as an adjective, for example).
- Prepositions—which to use.
- Prefixes (which are written solid), suffixes (which are hyphenated), and some confusing singulars and plurals.

CLAUSES—Their types, the words that introduce or connect them, and how they are punctuated

A clause is a group of words that has a subject and a verb.

Independent clauses

An *independent clause* expresses a complete thought. Two independent clauses in the same sentence are connected by a coordinating conjunction or a conjunctive adverb. (See these headings for a list.)

Note: Frequently ideas are expressed in two independent clauses, implying that they are of equal importance, when ideally one of them should be expressed in a dependent clause to represent the information correctly.

Punctuation of independent clauses.

If the independent clauses are joined by a coordinating conjunction, a comma is used before the coordinating conjunction.

Example: “I just received the job from Al Smith, and I hope to have his estimate ready soon.”

If the independent clauses are joined by a conjunctive adverb such as *however*, a semicolon is used before the conjunctive adverb and a comma after it. *Example:* “The tests must be finished by Friday; however, the results won’t be available for another month.”

Exception: No comma is needed after *then*, *thus*, or *hence*, unless a strong pause is wanted at that point. *Example:* “Then they decided to start over.”

Dependent clauses

A *dependent* (or *subordinate*) *clause* contains a subject and a verb, but it does not express a complete thought. It merely adds information to the independent clause of which it is a part.

A dependent clause may be *essential* or *nonessential* to the thought expressed in the independent clause of which it is a part. An *essential (restrictive) clause* adds information that is essential to the meaning of the independent clause.

A *nonessential (nonrestrictive) clause* adds interesting but nonessential information to the independent clause.

Adjective dependent clauses.

An adjective dependent clause modifies a noun or pronoun in the independent clause. Words that introduce adjective dependent clauses (and link the dependent clauses to independent clauses) are either relative pronouns (such as *that*, *which*, *who*, *whose*, and *whom*) or adverbs (such as *when* and *because*).

That vs. which

In technical writing, a distinction is made between the use of *that* and *which* to introduce adjective dependent clauses.

- *That* introduces essential clauses.

Example of an *essential clause*:
“The component *that* was damaged was returned to the manufacturer.”

(Since there were several components, the adjective clause is essential to explain which one was returned to the manufacturer. Notice that essential clauses are not set off by commas because they are essential to the complete meaning of the sentence.)

- *Which* introduces nonessential clauses.

Example of a *nonessential clause*:
“The component, *which* was damaged, was returned to the manufacturer.”

(Since there was only one component, the adjective clause is not essential to explain which component was returned to the manufacturer. Notice that nonessential clauses are set off by commas because they are parenthetical information. The basic meaning of the sentence would be complete without them.)

Conjunctions

Conjunctions connect words, phrases, and clauses. Their use in this function is discussed in the following paragraphs.

Coordinating conjunctions

Coordinating conjunctions connect things of equal value. The most common coordinating conjunctions:

and but
or nor

and sometimes —

so yet

A subset of coordinating conjunctions is **correlative conjunctions**, which are coordinating conjunctions that come in pairs, such as:

either . . . or,
neither . . . nor,
not only . . . but also,
both . . . and,
whether . . . or.

Coordinating conjunctions can connect words, phrases, independent clauses, or subordinate clauses.

Examples:

Words: Scientists *and* engineers attended the conference.

Phrases: The author's story revealed a childhood of great hardship *and* of intense disappointments.

Independent clauses: The results of the test were inconclusive, *but* they provided valuable background.

Subordinate clauses: The test results showed that the experiment was well conducted *and* that it provided valuable information.

Conjunctive adverbs

A conjunctive adverb is an adverb that is part of the independent clause that it introduces. It is a conjunction because it connects that independent clause to the independent clause preceding it.

The most common are:

<i>accordingly</i>	<i>moreover</i>
<i>also</i>	<i>so</i>
<i>besides</i>	<i>therefore</i>
<i>consequently</i>	<i>then</i>
<i>however</i>	<i>thus</i>

Examples:

“The test results showed that the experiment was well conducted and that it provided valuable information; *however*, it was not conclusive.”

“The test provided valuable but inconclusive information; *consequently*, the project leaders were forced to conduct further tests to get a conclusive result.”

Subordinating conjunctions

Subordinating conjunctions connect a dependent clause to the main clause. They are used to present information that is secondary to the main clause. It may be essential to the meaning of the main clause (called an *essential* or *restrictive* clause), or it may be merely additional information that is not essential to the meaning (called a *nonessential* or *nonrestrictive* clause). See punctuation of these clauses on the following page. The most common subordinating conjunctions are:

<i>although</i>	<i>that</i>
<i>after</i>	<i>then</i>
<i>as</i>	<i>through</i>
<i>because</i>	<i>unless</i>
<i>before</i>	<i>when</i>
<i>if</i>	<i>where</i>
<i>since</i>	<i>whereas</i>

Examples:

“The test results showed that the experiment done on May 12 was inconclusive *because* the equipment was faulty.”

“*Unless* the faulty equipment is repaired, no tests can be conclusive.”

VERBS

The following list suggests simple, direct verbs that can be substituted for the more wordy versions in the first column. Applying some of the suggestions listed will help you be brief and concise.

Weak and Wordy Phrase	The Simple, Direct Verb
achieve purification	purify
analyses were made	analyzed
are found to be in agreement	agree
are known to be	are (except in rare cases)
are of the opinion that	think that, believe that
arrive at a decision	decide
bring to a conclusion	conclude, complete, end, finish
carry on the work of developing	continue developing
connection is made	connects
carry out, has been carried out	<i>(avoid unless something is physically carried)</i>
carry out experiments	experiment
carry out mixing	mix
carry out purification	purify
failed to find	did not find
give an indication of	indicate
give proof of	prove
give a weakness to	weaken
institute an improvement in	improve
is applicable	applies
is characterized by,	be, have
has the character of	resembles, looks like
is found to be	is
is indicative of	indicates
is suggestive of	suggests
make:	
a study of	study
adjustments to	adjust
an approximation of	approximate
an exception of	except
mention of	mention

*(Continued)***Weak and Wordy Phrase****The Simple, Direct Verb**

obtain an increase or decrease in temp.	raise or lower the temperature
perform an examination of	examine
proceed to separate	separate
present a report	report
present a summary	summarize
put out a list	list
succeed in doing, making, etc.	do, make, etc.
take cognizance of	note, notice, heed
take into consideration	consider
was seen, was noted	<i>(these phrases are sometimes unnecessary)</i>
undertake a study of	study

SUBSTITUTIONS FOR FORMAL AND INCORRECT TERMS

The following list contains common offenders that are formal, ungrammatical, or redundant.

Instead of using:

Consider using:

aforesaid		stated previously
at this point in time		now, at present, at this time
attendee	participant	
center around		center on, in, or at; revolve around
consensus of opinion		consensus
due to		because of
equivalent as far as acceptability is concerned	equally acceptable	
firstly, secondly, etc.		first, second, etc.
idea		intention, impression (<i>if that is what you mean</i>)
in the case of		in
irregardless		regardless
it would be reasonable to suggest		it may be
orientate		orient
pertaining to		on, about
preventative		preventive
prior to		before
recent		in the past year (<i>usually</i>)
share (something) in common		share, or have (<i>these things</i>) in common

TERMS USED MOST FREQUENTLY AS ONE WORD

aboveground (*adj.*)

antimissile

boiloff (*adj., noun*)

burnout (*adj., noun*)

cutoff (*adj., noun*)

database

deenergize

downhole

electronvolt

flowchart

flyby (*adj., noun*)

indepth (*adj.*)

offload

phaseout (*adj., noun*)

pulldown (*adj., noun*)

railcar

servomotor

setup (*adj., noun*)

startup (*adj., noun*)

walkthrough (*adj., noun*)

workplace

PREPOSITIONS—WHICH TO USE

abhorrence <i>of</i> a thing	consist of (make up of); <i>comprised of</i> is incorrect when used in this sense
abhorrent (disgusting) <i>to</i> a person	credit <i>for</i>
abide <i>by</i> a decision	
abide (dwell) <i>with</i> a person	deal <i>in</i> goods or services
abounds <i>in</i> or <i>with</i>	deal <i>with</i> someone
absolve <i>from</i> responsibility	depend or dependent <i>on</i> , but independent <i>of</i>
absolve <i>of</i> crime	despite (takes no preposition)
accede <i>to</i>	differ <i>from</i> (of two things)
accountable <i>for</i> actions	differ <i>with</i> another person
accountable <i>to</i> a person	differ <i>about</i> , <i>over</i> an issue
accused <i>by</i> a person	differ <i>on</i> amounts, terms
accused <i>of</i> a deed	different <i>from</i> (not <i>than</i> or <i>to</i>)
acquaint <i>with</i>	disagree <i>on</i> an issue
adapt <i>to</i> a situation	disagree <i>with</i> a person
adapt <i>for</i> a purpose or need	discrepancy <i>between</i> two things
adapt <i>from</i> the original form	discrepancy <i>in</i> one thing
adept <i>in</i>	dispense <i>with</i>
affinity <i>between</i>	
agree <i>to</i> a proposal	employ <i>for</i> a purpose
agree <i>with</i> someone	expect <i>from</i> things
agreeable <i>to</i> (<i>with</i> is permissible)	expect <i>of</i> people
angry <i>at</i> a thing or condition	expert <i>in</i>
angry <i>with</i> a person	
approve <i>of</i> actions	familiarize <i>with</i>
argue <i>for</i> or <i>against</i> a policy	foreign <i>to</i>
argue <i>with</i> a person	
	identical <i>with</i>
based <i>on</i> or <i>upon</i> (<i>on</i> is preferred)	in spite <i>of</i>
beneficial <i>to</i>	independent <i>of</i> (not <i>from</i>)
	infer <i>from</i>
compare <i>to</i> the mirror image (assert a likeness)	
compare <i>with</i> the reverse side (analyze for similarities or differences)	necessary <i>for</i> an action
comply/compliance <i>with</i>	necessary <i>to</i> a state of being
concur <i>in</i> (to indicate consensus)	
concur <i>with</i> a person	occupied <i>by</i> things, people
confer <i>on</i> or <i>upon</i> (give to)	occupied <i>with</i> actions
confer <i>with</i> (talk to)	opposite <i>of</i> qualities
conform <i>to</i> (in conformity to or with)	opposite <i>to</i> positions
consist <i>in</i> (exists in)	plan or planning <i>to</i> (not <i>on</i>)
	proceed <i>with</i> a project

APPENDIX A

proceed *to* do something (begin)
profit *by* things
profit *from* actions

qualify *as* a person
qualify *by* experience, actions
qualify *for* a position, award

responsibility *for, of*
retroactive *to* (not *from*)

speak *to* (tell something *to* a person)
speak *with* (discuss something *with* a
person)
surrounded *by* people
surrounded *with* things

talk *to* a group
talk *with* a person (discuss)

PREFIXES

Prefixes seldom require a hyphen. Unless you have a specific reason to use a hyphen after a prefix (see exceptions below), write the word solid.

Exceptions:

- The prefixes *ex-* (when it means former), *quasi-*, and *self-* always require a hyphen: *ex-champion*, *quasi-professional*, and *self-starter*.
- Prefixes before proper names require hyphens: *anti-Communist*.
- Prefixes that end with an *a* or *i* and the base word begins with the same letter:
- *ultra-active*, *anti-inflammatory*. (Note: Prefixes ending in *e* or *o* followed by a base word starting with the same letter are *not* hyphenated: *electrooptic*, *coordinate*.)
- A hyphen may be needed to retain the clarity of a word, as in *re-cover* (to cover again), *multi-ply* (more than one ply), and *un-ionized* (not ionized).

Examples of prefixes written without a hyphen:

electro:	electromagnetic	post:	posttest, postdate
multi:	multidimensional	pre:	pretest, predate
non:	nonnuclear	pro:	pronuclear
out:	outperformed, outsized, outpatient	prot:	protagonist
over:	overrated, overloaded	proto:	prototype
		psych:	psychasthenia
		psycho:	psychometrics
		under:	undercut, underpaid

SUFFIXES

Suffixes seldom require a hyphen.

Exceptions:

- Always use a hyphen before the suffix *-elect* : President-*elect*.
- Use a hyphen to avoid tripling a consonant: bell-*like*.

SOME CONFUSING SINGULARS AND PLURALS

Sandia National Laboratories (SNL) *is* . . .

Sandia National Laboratories, New Mexico (SNL/NM) *is* . . .

Sandia National Laboratories, California (SNL/CA) *is* . . .

. . . the Laboratories *is* . . . (when referring to SNL)

. . . the laboratories *are* . . . (when referring to two or more other laboratories)

data *are* . . .

appendixes (indexes, etc.) *are* . . . (**Note:** use the English plurals for words of Latin origin when such plurals exist.)

a number *are* . . . ; the number *is* . . .

APPENDIX B

Equations

Intentionally Left Blank

EQUATIONS

The rules presented here are based on the American Institute of Physics *Style Manual* and the American Mathematical Society *Mathematics into Type*. Equation styles vary with different disciplines. If your organization already has an established format, follow it.

Accuracy and Consistency

Accuracy is extremely important in equation typing. Resolve uncertainties in the draft, input accurately, and check your work carefully—typos can easily slip through.

Use the same style and format consistently throughout a single report. Consistency of format and usage is one mark of a professional-looking product.

Explanatory Charts

The following charts appear at the end of this section:

- Definitions of Parts of Speech (knowing how symbols function as parts of speech will help you understand spacing).
- Abbreviations of Functions.
- Signs and Symbols.
- Greek Alphabet.

Procedures for Inputting from Handwritten Copy

Read all the draft *before you start typing* to spot problem areas.

As you read through the draft, mark problem areas. Pay special attention to

- superscripts and subscripts.
- look-alike characters:

a, α , ∞ ; b, β ; w, ω (omega, not script w); Γ , T; h, n; k, κ ; g, l; μ , u;
 ŋ, u, v; i, \imath ; r, p; x, z; t, τ ; c, x.

- continuity of equation numbers—not all equations require numbers, but the ones that are numbered must be in unbroken sequence.

Formatting Equations

Line spacing

The spacing of lines in equation typing depends on the type of equipment you have:

- Use single-spaced text if your equipment prints subscripts and superscripts within the 1-line space.
- Use 1-1/2-line spacing if it does not.
- Use double-spaced text only if nothing else works.

The final product should be easy to read, but not spaced out excessively.

Centered, indented, or flush left

Whether you center, indent, or flush-left equations on the page depends on several factors: your equipment, the column width (line length), and certain specified formatting requirements.

Centered equations are slightly preferred by many organizations. However, on some equipment, centering is so time consuming that you might consider indenting all displayed expressions by a standard paragraph indent or even starting them flush with the left margin. Any of these practices is quite acceptable.

Special formatting requirements may be specified by your organization or by a particular professional society.

Equation number

Enclose the equation number in parentheses and place it flush with the right margin, either even with the last line of the equation (the fastest method) or even with the center line of the equation.

Punctuation

Two styles of punctuation are acceptable: *text* style and *open* style.

Text Style: To punctuate in the *text* style, read the displayed equation as if it were text and punctuate it accordingly. A displayed mathematical expression is often the continuation or completion of the text that introduces it, as in the following example.

...This solution resulted in

$$L = \log \left| \frac{TT_o - 1 + pp_o}{TT_o - 1 - pp_o} \right|$$

$$= T_o - p_o \cos \theta$$

$$= \log \left| \frac{T + p}{T - p} \right|$$

where

T = time
 p_o = perpendicular, and
 pp_o = perpendicular pitch.

Open Style: To punctuate in the *open style*, use no comma or periods at the end of any equation line (although you may use them *within the line*).

Spacing within the equation

Refer to Definitions of Parts of Speech (page 203) if you are not familiar with the grammatical function of expressions in equations (that is, nouns, verbs, collectives, etc.).

Use no space in the following instances:

- Between a number and the symbol it multiplies or between two or more symbols that multiply each other: 3b; 5aB; 3 δ xy
- Before or after superscripts and fences:

$$3x_{y-2}d; \exp[(y-1)/(z+n)]$$

APPENDIX B

- Within subscript or superscript expressions: $b^{n-1} \lim_{a \rightarrow 0}$

Use one space as follows (indicated by $_$):

- Before and after verbs: $a = b$; $y \geq 8z$
- Before and after conjunctions: $a + b$; $(b^{n-1} + 2bx)$
- Before but not after $+$, $-$, or \pm when they are used as adjectives:

$$-x(a + b) = -3; x = \pm 3$$

- After commas: y_1, y_2, \dots, y_n
- Before and after sigma-class symbols:

$$a \int x dy \quad \lim_{c \rightarrow p} \inf \sum_{n=p}^{\infty} f^{(n)}(c) \quad \text{II} \quad \text{ah}$$

- Before and after the following functions:

$$\begin{array}{lll} \sin: a \sin x; & \lim: \lim_{c \rightarrow p} \inf p; & \tanh: 2 \tanh q \\ \log: \log x; & \exp: \exp a^n; & \log \log: \log \log x \end{array}$$

Exception: If any of the above functions is preceded or followed by a superscript or subscript, parenthesis, brace, or bar, then the space between them is eliminated: $[(x - y)\log x]$ $(a_2 \sin x)$ $\sin(a - x)$

- Before and after a vertical rule that appears singly or a colon that is used as a mathematical symbol: $a | b$ as $a \in A$ $A = (x | P)$
- Before a back inferior (a subscript placed *before* a term), as the $2x$ in this example: $a _2 x b$ $b _1 x _2 a h$.
- Before and after ds , dp , dx , and similar combinations of d and another symbol following: $\int f(x) dx$ $\iiint dr dq dr$

Superscripts and Subscripts in the Same Expression

When superscripts and subscripts are used together, align them consistently (either stacked or staggered). If the terms have several characters, you can change the form as in the third column below.

Superscripts and subscripts

Staggered

Changed form

$$x_m^n$$

$$x_m^n$$

$$x_c^{a-b}$$

$$x_m^{a-b}$$

$$(x_c)^{a-b}$$

$$x_{ay}^{mn}$$

$$x_{ay}^{mn}$$

$$(x_{ay})^{mn}$$

Fractions

Use slashed fractions in text and in superscripts and subscripts; in display, use barred fractions (or a combination if that adds clarity—see **In Display**).

Slashed Fractions in Text

Use *slashed fractions* in text to avoid unattractive, spread-out lines.

Slashed Fractions in Superscripts and Subscripts

Use slashed fractions (1/8, 1/4) in superscripts and subscripts. The single-key fraction ($\frac{1}{8}$, $\frac{1}{4}$) may be too small to read, and the barred, or stacked, fraction is too awkward.

This

$$x^{1/8}$$

Not this:

$$x^{\frac{1}{8}}$$

Note use of parentheses to retain clarity $\frac{3}{4} >$

$$y^{(a+b)/(x-y)}$$

$$y^{\frac{a+b}{x-y}}$$

APPENDIX B

Because authors usually focus on the information rather than the format when they write, they often use stacked fractions within the text. To change stacked fractions to slashed fractions, follow the guidelines below:

<u>Stacked</u>	<u>Replace with this:</u>	<u>Or this:</u>	<u>Not with:</u>
$\frac{a + 1}{b}$	$(a + 1)/b$	$(a + 1)b^{-1}$	$a + 1/b$
$\frac{a}{(x + 1)^3}$	$a/(x + 1)^3$	$a(x + 1)^{-3}$	
$\sin \frac{a}{x}$	$\sin(a/x)$	$\sin a/x$	

In Display

Use *stacked*, or *barred*, fractions in display.

Exception: The appearance of multilevel stacked fractions can often be improved by changing the stacked portion in the numerator to a slashed fraction, and the same in the denominator. See the following example:

<u>Stacked</u>	<u>Replace with one of these:</u>	
$\frac{\sin a}{x}$	$(\sin a)/x$	$\sin a/x$
$\frac{a}{x^3}$	a/x^3	ax^{-3}
$\frac{a}{(b - c)^2}$	$a/(b - c)^2$	$a(b - c)^{-2}$
$\frac{\partial}{\partial u} F(u, k, q)$	$\partial F(u, k, q) / \partial u$	$(\partial / \partial u) F(u, k, q)$

The Exponential Function

The terms e [as in e^x] and exp [as in $exp(x^2 - 1)$] mean the same thing and can be interchanged as necessary to accommodate space. Consistency in the form used is not necessary; both forms can be used within the same sentence or display.

	<u>Instead of:</u>	<u>Use:</u>
To avoid double superscript:	e^{x^2-1}	$exp(x^2 - 1)$
To avoid fractions in the superscript:	$e^{\frac{a-b}{c+d}}$	$exp\left(\frac{a-b}{c+d}\right)$ or $exp((a - b)/(c + d))$

Matrices and Determinants

Always set matrices and determinants in display. Set them in columns and rows and enclose them with brackets, parentheses, or lines:

$$\begin{bmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ 1 & 2 & 3 \end{bmatrix} \quad \begin{vmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ 1 & 2 & 3 \end{vmatrix}$$

Line Breaks

When an equation is too long for one line, break it according to the following rules:

- Break before a verb that does not occur within fences (see page 203 for definitions).
- Break at any other space (see “spacing”), except
 - after a collective sign, do not break until there is an operator outside of fences
 - after an integral sign (\int), do not break until a d occurs; then break after the next punctuation, or before a verb.

APPENDIX B

- When a set of fences is followed directly by another set of fences, break between them and insert a sign of multiplication (\cdot or \times) before the carried-over set of fences.

Exception: This rule does not apply if the fences are preceded by a sigma-class symbol or if they have a slash between them.

Alignment of Line Breaks

If a single expression contains a series of equal signs, break at the equal sign and align the expressions vertically on the equal signs. See example on page 197, “Punctuation, Text Style.”

When breaking at a point other than an equal sign, align subsequent lines of the equation with the first character following the equal sign:

$$\frac{dS}{dE_k d\Omega} = \frac{7.95 \times 10^{-26}}{8\pi^{137}} \frac{1}{E_k} \frac{p}{p_o} \left| \frac{8\sin^2 \alpha (2T_o^2 + 1)}{p_o^2 \Delta_o^4} - \frac{2(5T^2 + 2TT_o + 3)}{p_o^2 \Delta_o^2} \right.$$
$$\left. - \frac{2|p_o^2 - E_k^2|}{Q^2 \Delta_o^2} + \frac{4T}{p_o^p \Delta_o} + \frac{L}{pp_o} \right| \frac{4T_o \sin^2 \alpha |3E_k - p_o^2 T|}{p_o^2 \Delta_o^4}$$

“Copying” Equations

A common practice in word processing is to copy similar equations and change the variables within the new equation. This practice is a great time-saver. However, when you “copy,” carefully proof *each character* and *each symbol* in the new version. Common errors are failing to change signs (+ to $-$) or incorrectly modifying one character within a term: $3n_p[M - 1]$ to $3np[M - 1]$.

Proofing Equations

When you proof your own output, *check each character*. Pay special attention to:

- symbols such as $<$ and $>$
- superscripts and subscripts

- fences (Does each opening fence have a closing fence?)

Definitions of Parts of Speech

Operators:

Verbs: = < > ≤ ≥ < > ⊂ ⊃ ∈ ∋ ≠ ≡ ≈ → ← ⇒ ⇐ ⇔ ∉

Conjunctions: + − × ± ∪ ∩ ∨ ∧ · ° ⊕ ⊗

Fences:

{ [< (| | }] >) ||

Nouns: italic, Greek, German, and Hebrew letters; numerals —

a; ab; 3; 3αβ

Sigma-class symbols:

Collective signs: Σ Π ∪ ∩ ∨ ⊕ ⊗

Abbreviations of Functions

The most commonly used abbreviations for functions and operators are defined below:

ad	adjoint	lim sup	limit superior
arg	argument	ln <i>or</i> log	logarithm
Coker	Cokernel	lub	least upper bound
cos	cosine	max	maximum
cosh	hyperbolic cosine	min	minimum
cot <i>or</i> ctg	cotangent	mod	modulus
coth	hyperbolic cotangent	P	Property
det	determinant	PL	Piecewise Linear
dim	dimension	Re	Real
exp	exponential	sin	sine
GL	General Linear	sinh	hyperbolic sine
hom	homology	SL	Special Linear
Im	imaginary	tan	tangent
inf	inferior	tanh	hyperbolic tangent
ker	kernel	tr	trace
lim	limit	wr	wreath
lim inf	limit inferior		

Signs and Symbols

+	Plus	•	Multiplied by
−	Minus	:	Ratio
×	Multiplied by	√	Square root
÷	Divided by	$\sqrt[3]{}$	Cube root
=	Equal to	Σ	Summation of
±	Plus or minus	Π	Product sign
∓	Minus or plus	π	Pi (3.1416)
≡	Identical with, congruent	∪	Union sign
≠	Not equal to	∩	Intersection sign
≈	Nearly equal to	!	Factorial sign
≐	Equals approximately	∈	Is an element of
<	Less than	∉	Is not an element of
>	Greater than	Δ	Delta
≤	Less than or equal to	∇	Nabla; del
≥	Greater than or equal to	∞	Variation
⊂	Included in	∞	Infinity
⊃	Excluded from	ħ	$h/2\pi$
⊥	Perpendicular to	∂	Partial differential
	Parallel to	∫	Integral
∠	Angle	∮	Contour integral
∴	Hence, therefore		

Greek Alphabet

<u>Identity</u>	<u>Lower Case</u>	<u>Capital</u>
alpha (a)	α	A
beta (b)	β	B
gamma (g)	γ	Γ
delta (d)	δ	Δ
epsilon (e)	ϵ	E
zeta (z)	ζ	Z
eta (e)	η	H
theta (th)	θ	Θ
iota (i)	ι	I
kappa (k)	κ	K
lambda (l)	λ	Λ
mu (m)	μ	M
nu (n)	ν	N
xi (x)	ξ	Ξ
omicron (o)	\omicron	O
pi (p)	π	Π
rho (r)	ρ	P
sigma (s)	σ	Σ
tau (t)	τ	T
upsilon (u)	υ	Y
phi (ph)	ϕ	Φ
chi (ch)	χ	X
psi (psi)	ψ	Ψ
omega (o)	ω	Ω

APPENDIX C

References

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References

Any reference style that adheres to an *established* form is acceptable because SAND Reports fall into so many different disciplines and because often each discipline has its own reference style. The major criteria are that

- the style used must be *consistent* within a report
- the reference must contain *complete publication data* (publisher, city, date)

The following examples show a simplified reference style that you may want to use. For examples of a more abbreviated form that can be used when readership is limited to a small group who are extremely familiar with the sources cited, see page 220.

Ways to Cite References

The two ways to cite references are

- by **sequential numbers**, the most standard way until recent years.
- by **author-date**, becoming widely used in technical fields because it has no sequence problem and gives the reader more information in the text.

Sequentially Numbered References

Citing in the text

Cite numbered references in text by using sequential Arabic numbers, either superscripted or on the line in brackets.

Example: . . . *theory*.¹ or . . . *theory* [1].

When the citation is an integral part of the sentence, use the following form: *Reference 1 contains . . .* or *. . . contained in Reference 1.*

When a reference in the superior-numbered style could be confused with a mathematical exponent (13 cm²), put the reference on the line as follows: . . . *at 13 cm (Ref. 2).*

Citing multiple references

Use one of the following forms to cite multiple references.

Examples:

Two in sequence:	<i>theory</i> . ^{1,2}	or	[1,2]
More than two in sequence:	<i>model</i> ¹⁻⁶	or	[1-6]
Nonsequential:	<i>Laboratory</i> . ^{1,4,8}	or	[1,4,8]
A combination:	<i>Laboratory</i> . ^{1,4,8-12}	or	[1,4,8-12]

Citing a reference the second time

To cite a reference the second time, repeat the number originally assigned to it.

Placing references relative to punctuation marks

Place *superior-numbered* citations after all marks of punctuation except the dash.

Place citations that are enclosed by brackets or parentheses before all marks of punctuation except quotation marks.

Listing in the Reference section

Numerical references are entered in numerical sequence in the Reference list. Examples of Reference lists appear on pages 218 through 220.

Author-Date References

Advantages

An advantage of the author-date style is that an author can add or delete a reference at any time without affecting other citations since no sequence is involved.

Another advantage is that in multiple-author reports, each author can work independently without affecting the citations of other authors.

Citing in the text

Cite in text by author and date:

Examples:

one author:	. . . <i>Dickson apparatus (Seyfried 1979)</i>
one work with two authors:	. . . <i>had been determined (Seyfried and Thornton 1980)</i>
one work with more than two authors:	. . . <i>in the sediment (Seyfried et al. 1980)</i> (Note: In the reference list, show all authors.)
more than one work cited:	. . . <i>in the sediment (Seyfried 1979; Krumhansl 1982; Bischoff and Seyfried 1982).</i>
a citation that is part of the sentence:	. . . <i>and as Seyfried (1979) maintains, . . .</i>
specific parts of a cited work indicated:	. . . <i>(Seyfried 1979, vol. 2)</i>
more than one work by the same author in the same year:	. . . <i>(Seyfried 1979a, 1979b)</i>

APPENDIX C

Author-Date References *(continued)*

Placing references relative to punctuation marks

Place references before all marks of punctuation. Example:

. . . A series of experiments with a titanium-lined thermal gradient apparatus was begun in FY81 (Seyfried and Thornton 1981).

Listing in the Reference section

In the Reference section, list author-date style references in alphabetical order. Hang indent is preferred (see pages 219 and 220).

Listings in the Reference Section—Sequential Style

- Book, multiple authors** R. L. Smith, R. M. Thompson, J. D. Doe, and T. J. Jones, *Computer Modeling of Gas Lasers*. Plenum Press, New York, 1978.
- Book, multiple editors** F. A. Hopf, Amplifier Theory, in *Physics of Quantum Electronics*, S. F. Jacobs, M. Sargent III, and M. O. Scully, ed., vol. I, pp. 77-176. Addison-Wesley, Reading, MA, 1974.
- Book, general editorship** *Blasters Handbook*, 17th ed. E. I. duPont de Nemours and Co., Wilmington, DE, 1977.
- Book chapter** Manuscript Preparation and Copyediting, in *The Chicago Manual of Style*. The University of Chicago Press, Chicago, IL, 1982.
- Multiple-volume works:**
- general title** A. B. El-Kareh and J. C. J. El-Kareh, *Electron Beams, Lasers, and Optics*, vol. I and II. Academic Press, NY, 1970.
- individual title for each volume** Conrad O. Jones, *Operation Plowshare*, vol. III of *Studies in Peaceful Uses of the Atom*. The Isolation Press, Los Alamos, NM, 1978.
- Journal article:**
- submitted** D. B. Haidvogel, A. R. Robinson, and E. E. Schulman, The Accuracy, Efficiency, and Stability of Three Numerical Models With Application to Open Ocean Problems. Sandia National Laboratories report SAND86-1052J (submitted to *Journal of Computational Physics*).
- accepted but not published** G. L. Weatherly and P. J. Martin, On the Structure and Dynamics of the Oceanic Bottom Boundary Layer, Sandia National Laboratories report SAND87-2213J (to be published in *Journal of Computational Physics*).

Listings in the Reference Section—Sequential Style *(continued)***Journal article:***(continued)****published***

F. Schreiner, S. Fried, and A. M. Friedman, Measurement of Radio-nuclide Diffusion in Ocean Floor Sediment and Clay, in *Nuclear Technology*, vol. 59, pp. 429-38, 1982.

Conference paper:***unpublished***

G. L. Weatherly and P. J. Martin, On the Structure and Dynamics of the Oceanic Bottom Boundary Layer. Sandia National Laboratories report SAND87-2213C. Fifth Annual NEA-Seabed Working Group Meeting, Bristol, England, March 3-5, 1987.

published in proceedings

G. L. Weatherly and P. J. Martin, On the Structure and Dynamics of the Oceanic Bottom Boundary Layer, in *Fifth Annual NEA-Seabed Working Group Meeting*, held in Bristol, England, March 3-5, 1987. Sandia National Laboratories, Albuquerque, NM, 1988. (**Note:** The name of the company or society publishing the proceedings is listed as the publisher. In this case it was Sandia.)

**Report,
unclassified**

Seabed Programs Division 6334, *The Subseabed Disposal Program: 1983 Status Report*, SAND83-1387. Sandia National Laboratories, Albuquerque, NM, October 1983.

**Report,
classified**

Author, *Report Title (U)*, SANDxx-xxxx. Sandia National Laboratories, Albuquerque, NM (SRD), August 1988.

Thesis

C. W. Young, Depth Prediction for Earth-Penetrating Projectiles. PhD thesis, University of New Mexico, 1980.

Foreign title

Ch'en Shich-ch'i, *Ming-tai shou-kung-yet ti yen-chiu*. (Studies on government-operated handicrafts during the Ming dynasty). The Mandarin Press, Hong-Kong, 1978.

Translation

V. L. Bouch-Bruevich, *Electronic Theory of Heavily Doped Semiconductors*. American Elsevier Publishing Co., NY, 1966, translation.

Listings in the Reference Section—Sequential Style (*continued*)

- Corporate author** American National Standards Institute, *Scientific and Technical Reports: Organization, Preparation, and Production*. ANSI Z39.18-198-X. American National Standards Institute, Inc., 1430 Broadway, NY, 1989.
- Unpublished data:**
- memorandum, unclassified** D. G. True, Penetration of Projectiles Into Seafloor Soils, Sandia National Laboratories memorandum to D. R. Anderson, December 10, 1982.
- memorandum, classified** D. G. True, Penetration of Projectiles Into Seafloor Soils (title classification), Sandia National Laboratories memorandum (RSxxxx-xx-xxx) (memorandum classification) to D. R. Anderson, December 10, 1982.
- interview** Statement by C. J. Osgoode, solar energy engineer, in personal interview at Barstow, CA, November 13, 1979.
- speech** Opinion expressed by Conrad O. Jones, engineer, in an address “Is solar power cost effective?” at the University of New Mexico, Albuquerque, NM, December 31, 1978 (tape on file at the Sandia National Laboratories Reference Library).
- letter** Letter from Conrad O. Jones, Division Supervisor, Engineering Division 0001 of Sandia National Laboratories, December 31, 1978.
- Professional paper** W. H. Bradley, Origin and Microfossils of the Oil Shale of the Green River Formation of Colorado and Utah. U.S. Geological Survey Professional Paper 168, 1931.
- Standard** Calibration Techniques for the Calorimeter Assay of Plutonium-Bearing Solids Applied to Nuclear Materials Control, ANSI N15.22-1975. American National Standards Institute, Inc., New York, 1975.
- Newspaper article** Study Labels Alcohol Fuel As Threat to Food Supply, *Dallas Times Herald*, March 16, 1980, Sec. A, p. 14.

APPENDIX C

Listings in Reference Section—Sequential Style *(continued)*

Legal document 43 CFR 192.14. ← (Code of Federal Regulations)

 21 F.R. 623. ← (Federal Register)

 New Mexico Revised Statutes, Title 24, Article 7.

 U.S. Congress, Uranium Mill Tailings Radiation Control Act of
1978. Public Law 95-604, 95th Congress, November 8, 1978.

Listings in the Reference Section—Author-Date Style

Author-date style The author-date style in the Reference section differs from the sequential-number style in only three respects:

- The order of listing is alphabetical.
- Hang indent is used if that format is available.
- The date is placed immediately after the authors' names:

Example: S. D. Maksimovic and J. R. Lipscomb, 1982, *Sealing Openings in Abandoned Mines by Pneumatic Stowing*, RI8730. U.S. Bureau of Mines, Pittsburgh, PA.

**Examples: Listings in the Reference Section—
Sequential-Numbering Style**

1. F. L. Oetting, M. H. Rand, and R. J. Ackerman, in *The Chemical Thermodynamics of Actinide Elements and Compounds, Part I: The Actinide Elements*. International Atomic Energy Agency, Vienna, Austria, 1976.
2. M. Hansen, *Constitution of Binary Alloys*. New Book Co., 1958.
3. F. A. Shunk, *Constitution of Binary Alloys, Second Supplement*. McGraw-Hill Book Co., New York, 1969.
4. A. N. Vol'skii and Y. M. Sterlin, *The Metallurgy of Plutonium*, Translated From Russian. Jerusalem, Israel, Program for Scientific Translations; available from the U.S. Dept. of Commerce, Clearinghouse for Federal Scientific and Technical Information, Springfield, VA, 1970.
5. W. G. Moffatt, *The Index to Binary Phase Collections*. General Electric Co., Schenectady, NY, 1979.
6. J. G. Parr and A. Hanson, *An Introduction to Stainless Steel*. American Society for Metals, Akron, OH, 1965.
7. D. F. Bowersox and J. A. Leary, The Solubilities of Selected Elements in Liquid Pu. II. Titanium, Vanadium, Chromium, Manganese, Airconium, Niobium, Molybdenum and Thulium, in *J Nuc Mat* Vol. 27, No. 2, pp. 181-86, February 1968.

**Examples: Listings in the Reference Section of Report—
Author-Date Style**

M. Hansen, 1958, *Constitution of Binary Alloys*. New Book Co.

W. G. Moffatt, 1979, *The Index to Binary Phase Collections*.
General Electric Co., Schenectady, NY.

Nevada Department of Conservation and Mineral Resources,
1979a, *Regulations for Drilling Water Wells*. Carson City,
NV, 36 p.

Nevada Department of Conservation and Mineral Resources,
1979b, *Regulations and Rules of Practice for Drilling Oil and
Gas Wells*. Carson City, NV, 26 p.

F. L. Oetting, M. H. Rand, and R. J. Ackermann, 1976, *The
Chemical Thermodynamics of Actinide Elements and
Compounds, Part I: The Actinide Elements*. International
Atomic Energy Agency, Vienna, Austria.

J. G. Parr and A. Hanson, 1965, *An Introduction to Stainless
Steel*. American Society for Metals, Akron, OH.

F. A. Shunk, 1969, *Constitution of Binary Alloys, Second
Supplement*. McGraw-Hill Book Co., New York.

A. N. Vol'skii and Y. M. Sterlin, 1970, *The Metallurgy of
Plutonium, Translated From Russian*. Jerusalem, Israel,
Program for Scientific Translations; available from the U.S.
Dept of Commerce, Clearing-house for Federal Scientific and
Technical Information, Springfield, VA.

Listings in the Reference Section of Report— Abbreviated Style

The Reference list in a publication that will be distributed only to a select group of readers, all of whom are familiar with the subject of the report and the references listed, may be done in abbreviated style, that is,

- do not italicize title or enclose it in quotation marks
- initial-cap first word only of a single-volume publication (such as a book or report)
- initial cap all major words of a journal
- use abbreviated style for journal volume and page (*22:131-39*)

Examples:

J. H. Adlam and J. N. Burcham, 1964, *in* J Sci Instrum, 43:93.

or if you are using sequential-number style:

(vol.:pp.)

J. H. Adlam and J. N. Burcham, *in* J Sci Instrum, 43:93–96
(1988).

M. Hansen, 1958, Constitution of binary alloys. New Book Co.

W. G. Moffatt, 1979, The index to binary phase collections.
General Electric Co., Schenectady, NY.

Nevada Department of Conservation and Mineral Resources,
1979a, Regulations for drilling water wells. Carson City, NV,
36 p.

Nevada Department of Conservation and Mineral Resources,
1979b, Regulations and rules of practice for drilling oil and gas
wells. Carson City, NV, 26 p.

APPENDIX D

Trademarks, Copyrights, and Permission to Use Another's Work

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Trademarks, Copyrights, and Permission to Use Another's Work

Trademarks

A trademark is a symbol, word(s), or name that identifies a company's specific product. Authors are responsible for verifying whether products they mention in their SAND Reports have been trademarked. If so, these products need to be identified.

If a non-Sandia product is *registered* with the United States Patent and Trademark Office and is mentioned in a Sandia SAND Report, the author should acknowledge the trademark by using the ® symbol following the trademarked product's symbol, word(s), or name. The author should also identify the owner of the trademark in a footnote or within the text of the report. An example footnote might be "Macintosh® is a registered trademark of Apple Computer, Inc."

A trademark can also be established by use alone, without registration. If a trademark has been *claimed* but has not been registered, use the ™ superscript. As with the registered trademark, the author should identify the owner of the unregistered trademark in a footnote or within the text of the report. An example footnote might be "ProductZ™ is a trademark of ABC, Inc."

With few exceptions, the names of products generated within Sandia should not be followed by the ® or the ™ symbols because Sandians usually do not apply for trademarks. If you want to describe a Sandia product as a trademarked product, Sandia's Legal Department (in Patent and Licensing Center 11500) asks that you clear your wording with them. Legal's hotline number is 845-9536. One of the attorneys will be happy to perform a prompt search of a database to see if the word you want to trademark is available for use by Sandia.

It is important to use trademarks correctly in your reports. According to Judith A. Tarutz, in *Technical Editing, The Practical Guide for Editors and Writers*, keep in mind the following two suggestions when writing about products with trademarks:

1. A trademark modifies a product category (for example, Macintosh computer, Crayola crayons). The product category should be in lowercase, so that it does not compete with the trademark for prominence.
2. Spell a trademark according to how it is registered. For example, if the product's official name is in all caps, spell it in all caps *all the time*. If the trademark is registered in a particular typeface or style (such as italics), take care to display it accordingly.

Copyrights

Copyright instructions in DOE Order 1430.2B,VIII,2b(2) for open literature publications state, “. . . In submitting the manuscript to the publisher, the author must include the following statement (the same language shall be used on the copyright transfer form if the publisher sends the author a transfer form):

“The submitted manuscript has been authored by a contractor of the U.S. Government under contract No. (*insert the contract number*). Accordingly, the U.S. Government retains a nonexclusive, royalty-free license to publish or reproduce the published form of this contribution, or allow others to do so, for U.S. Government purposes.”

Should a journal or other publisher insist on a transfer of copyright, discuss the situation with Sandia’s Legal Department.

Permission to Use Another’s Work

To use work from a copyrighted source, obtain written permission of the copy-righting publisher. If the work is not copyrighted, obtain written permission from the author. If you have other questions, call your Information Specialist at the Library or the Legal Department (Center 11500).

The following summarizes information furnished by various members of the Library staff and the Legal Department.

- Anytime you are reproducing another person’s work—even if it is only a sentence, an illustration, or that person’s idea—you should obtain the author’s permission, if possible. You also must give credit to the author, cite the source, or both. Use words such as “Reproduced with permission from (*and give the source information, including the publisher*).” See “Figures and tables (graphics)” on page 81, and “Citing non-Sandian source of graphic” on page 102.
- If you are planning to reproduce material protected by copyright, you may need permission from the publisher, even if the author is a Sandian. If in doubt, write for permission.
- Government reports and publications prepared by U.S. government employees are considered “public domain” materials and are not subject to copyright laws. Therefore, they can be reproduced—but be sure to cite the author and source.

- Copyright duration for work done for a corporation such as Sandia (called “work made for hire”) is 75 years from the date of first publication, or 100 years from the date the work was first created.

Permission to reproduce material protected by copyright must be obtained in writing. A letter to the publisher should contain the following information:

- Title, author and/or editor, and edition of materials to be duplicated.
- Exact material to be used, giving amount, page numbers, chapters and, if possible, a photocopy of the material.
- Number of copies to be made.
- Use to be made of duplicated material.
- Form of distribution (newsletter, SAND report, classroom materials, etc.).
- Whether the material is to be sold.
- Type of reprint (photography, offset, typeset, etc.).

Send the request, along with a self-addressed return envelope, to the permissions department of the publisher in question (Figure D-1).

The Technical Library, Org. 4916, will assist you in getting the publisher’s address if you do not have it.

The process of granting permission may require time for the publisher to check the status of the copyright and to evaluate the nature of the request, so it is advisable to allow sufficient lead time—six weeks at least. Some publishers may charge a fee for granting this permission. In other cases, permission may be given, provided that proper credit is given in the reproduced material.

Sandia National Laboratories
Albuquerque, NM 87185-XXXX
March 14, 1997

(Note: Text in italics indicates information that will vary.)

*Permissions Department
Scientific American
415 Madison Avenue
New York, NY 10017*

Permissions Department:

On behalf of Sandia Corporation, this is a request for permission to reproduce the following:

Unnumbered figure "Four offshore oil platforms are compared schematically with two onshore structures of comparable height" on pages 40-41 of Eilers, Fred S., Advanced Offshore Oil Platforms, Scientific American, V. 246, no. 4, 1982.

A copy of the figure is attached.

The figure will be used in a Sandia report entitled _____, SAND97-_____. This is *an internal report that will be available to the public through NTIS after its initial distribution to approximately _____ individuals.*

Full credit will be given to *Scientific American.*

Sandia Corporation is a subsidiary of Lockheed Martin. Sandia Corporation operates Sandia National Laboratories on a no-profit, no-fee basis for the U.S. Department of Energy.

Your prompt consideration of this request will be greatly appreciated.

Sincerely,

*John J. Doe
Title (if appropriate)
Org. Name and Number
MS #####*

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