

ABSTRACT FOR PANEL DISCUSSION OF THE REVISED NUCLEAR AIR CLEANING HANDBOOK

A revision to the Nuclear Air Cleaning Handbook (ERDA 76-21) was completed by DOE/NNSA. This revision, Nuclear Air Cleaning Handbook HDBK-1169-2003, was released in December of 2003. One of the major revisions to the Handbook incorporates significant references to the ASME AG-1 Code on Nuclear Air and Gas Treatment. The ASME AG-1 Code is a component and structural code that did not exist at the time ERDA 76-21 was written. Incorporation of the AG-1 Code brought the Handbook up to date with the latest nuclear air cleaning industry requirements. The handbook revision drew on subject matter experts from DOE, ASME, manufacturers and consultants. This is a panel discussion on the handbook and its application.

The panel lead will be Ray Weidler. Participating on the panel are Maynor Dykes, Jan Fretthold, Harry Frisby, Jim Kriskovich, Rich Porco, Craig Ricketts, Jim Slawski, and Roger Zavadoski.

The following information and documents describe the intent of the handbook/standard, the project history, the DOE response/direction to the handbook, the DNFSB expectation for the use of the handbook, and how/were to find the handbook "on the internet".

PROJECT TO UPDATE THE DOE NUCLEAR AIR CLEANING HANDBOOK HARRY FRISBY, SAIC PROJECT MANAGER

Introduction:

Beginning in 1995, the Defense Nuclear Facility Safety Board (DNFSB) urged the Department of Energy (DOE) to update the Nuclear Air Cleaning Handbook (ERDA 76-21). The Board felt that the handbook, last revised in 1976, provided important guidance on the design and maintenance of confinement ventilation systems for defense nuclear facilities. In the DOE Implementation Plan for DNFSB Recommendation 2000-2, the DOE committed to place a draft revision of the Handbook into the directives system for DOE-wide review by December 2001. DOE further committed to issue the revised Handbook by November 2002.

In December of 2000, Science Applications International Corporation (SAIC) received a Task Order from the DOE that included in the Statement of Work a provision to assist in the revision of ERDA 76-21, which would be issued as a DOE Technical Standard. The revised handbook was to maintain the general format and content of ERDA 76-21, with two additional chapters on fire protection and occupational safety and health. SAIC was to use recognized subject matter experts (SMEs) in the field of nuclear air and gas treatment and

the DOE technical project manager was to provide a list of suggested writers and approve each writer or reviewer. SAIC was to coordinate the review and comment resolution process per the DOE Technical Standards Program procedures.

SAIC began work on the project in March of 2001 and the final document was delivered to DOE on December 15, 2003. The SAIC cost for this 33 - month period was \$814,000. This included all SAIC employee, subcontractor, consultant, production, and travel costs. It does not include DOE labor or travel costs.

The Update Process:

With limited and sporadic funding, work began on the project to update the Handbook in March 2001. The first tasks were to work with the DOE technical project manager to identify potential writers and to develop a Project Management Plan (PMP). SAIC and DOE identified Lead Writers for each chapter. To make the chapter information credible, it was necessary to locate and contract with recognized SMEs in the chapter subject matter. The people who agreed to update the handbook chapters were a mixture of volunteers from DOE and the filter manufacturers, SAIC employees, and subcontractors to SAIC. Chapters and their lead authors are shown in the table below. It was up to the lead author to determine additional assistance needed, if any, and secure that assistance either using their resources or through SAIC.

CHAPTER	TITLE	LEAD AUTHOR
Chapter 1	Introduction	Humphrey Gilbert
Chapter 2	System Considerations	Richard Porco
Chapter 3	Internal Components	Maynor Dykes
Chapter 4	Housing Design and Layout	Jan Fretthold
Chapter 5	External Components	Richard Porco
Chapter 6	Small Air Cleaning Units	Glen Moore
Chapter 7	Glove Box Filtration	Russ Krainiak
Chapter 8	Testing	Julie Davis
Chapter 9	Special Application Requirements	Jerome Roberts
Chapter 10	Fire Protection	Matt Cole
Chapter 11	Occupational Safety and Health	Dave Anglen

The PMP was developed to outline the actions required by DOE and SAIC to meet DOE Commitment 23 to DNFSB Recommendation 2000-2. The Plan addressed coordination and facilitation of research and the writing activities of identified SMEs, drafting of chapters, coordination of the peer review process, editorial review, and production support. The plan was a living document and

was updated several times as more definitive information became available or the schedule changed.

The PMP established that the DOE National Nuclear Security Administration (NNSA) Office of ES&H Operations Support (NA-53) would manage the revision project, assisted by SAIC as the project integrator. A writing team, headed by a Lead Writer was identified for each chapter of the Handbook and documented in the PMP. The PMP required the Lead Writers to be responsible for managing their chapter team to prepare the chapter draft and resolve any comments. They were also responsible for procuring photographs to support their chapters and for providing current references.

As part of the PMP, a style guide was provided to the Lead Writers for drafting each chapter. The guide identified the minimum subjects to be addressed in each chapter and discussed format and style to follow, per the DOE Style Guide for preparation of Technical Standards. The PMP required the writers to use the content of the original ERDA 76-21 as a starting point and guide for the update. Other resources to be used by the writers included the 1997 draft revision of ERDA 76-21, ASME AG-1 Code on Nuclear Air and Gas Treatment, NRC regulatory guides, and various published papers, as appropriate. The PMP identified the contract vehicle to be used by SAIC to secure the services, as necessary, of the Lead and Support Writers and identified three subcontracts that would have to be let by SAIC to secure the services of certain Lead Writers.

The PMP also identified the five-member peer review panel. The plan called for the peer review panel to provide comments on the draft chapters to the lead writers. The plan also included a project schedule and a cost estimate, a list of assumptions that were made in developing the plan, and deliverables. Risks associated with the project were identified as well as a mitigation plan for those risks, and progress reporting requirements were defined.

Progress was reported monthly to DOE. In each report, a writing assignment status table showed by chapter when it was assigned, when the draft was due, date the draft was received, date the technical editing was completed, when the peer review was completed, and completion dates for editing and final document QA. A comments column provided space to record issues or problems and up-coming events. Monthly cost reports and a written monthly activity report were also provided to DOE. Periodic cost to completion estimates were done and compared against funding so that DOE was given advanced notice when additional funding was needed. DOE met periodically with the DNFSB and provided current project status.

During the period from March 2001 to August 2001, the writing teams were identified, subcontracts were let by SAIC, and the PMP was published. No electronic copies of ERDA 76-21 existed so also during this time, SAIC converted

a hard copy to electronic by scanning and editing the scanned document. This electronic copy of ERDA 76-21 was provided to the lead writers with instructions to begin their update by reviewing the old version and keeping as much of that document as appropriate for use in the updated version. Additional funding for the project was received by SAIC in August and drafting of chapters began with a teleconference on August 23, 2001. The first deliverable, due in two weeks, was a chapter outline showing the topics to be discussed and who was going to write about the topic. The outline had to be approved by the DOE technical Project Manager (PM) before the chapter could be written. The purpose of the outline was to prevent duplication, ensure continuity between chapters, and ensure that all appropriate topics were discussed.

The first drafts of the chapters were due in December 2001 but were not all completed until the end of January 2002, due mostly to time and priority conflicts with the lead authors. SAIC had contractual authority, and thus more control over work priorities, on only three lead writers. The other writers were volunteers from within DOE, at several locations around the country, or from the filter manufacturing industry. It became a problem throughout the life of the project for volunteer lead writers to find time to work on the handbook when faced with the activities and pressures of their normal jobs. These conflicts led to frequent delays and missed deadlines.

After the first drafts were received by SAIC, a Technical Editor worked on each chapter to standardize formats and to identify missing information such as current references or pictures. The edited drafts and lists of missing information were provided to the lead writers for their approval and action. After the writers approved the edits and provided as much needed information as they could in the time allowed, the drafts were delivered to DOE as scheduled in April 2002. Through out the writing and review process, there were twice monthly teleconferences to discuss progress and resolve issues.

The drafts were then sent to the peer review team identified in the PMP as well as other SMEs selected by the DOE PM. This was an unofficial peer review intended to validate the chapter content before the document was formally placed in the DOE standards review process for comments. SAIC compiled the comments from the reviewers and worked with the lead writers to make the suggested changes. The draft Nuclear Air Cleaning Handbook (NACH) was then delivered to DOE at the end of June 2002 and entered into the DOE standards review process known as REVCOM.

The REVCOM process within DOE is a formal process that requires all comments to be categorized as routine or essential, and comments, especially essential ones must be resolved before a document can be finalized. DOE received over 2000 comments from the REVCOM review, of which over 70% were technical in nature. SAIC compiled the comments and began a process to resolve the issues and track the comments through the resolution process. The

SAIC Technical Editors resolved comments that were editorial in nature but many of the technical comments needed to be referred to the lead writers. A compilation of all the comments was delivered by SAIC to DOE in November 2002 in the form of a table that indicated which comments had been resolved by SAIC and which needed to be resolved by the lead writer.

As DOE was under pressure from the DNFSB to complete the update and the project had fallen behind schedule due to the unexpected number of review comments, DOE felt that it would take too long to send the comments back to the lead writers for resolution and that the consistency of the resolutions would not be good since they would be written by different people. A second review panel was thus established to resolve comments. The six-member panel included SMEs from DOE (Jan Fretthold & Jim Slawski), the DNFSB (Roger Zavadoski), SAIC (Harry Frisby & Robin Phillips/Steven Mixon), and the air cleaning industry (Matt Hargan). The panel met in two one-week sessions, with the first session being in January 2003, and lead writers were invited to attend when the panel was discussing comments on their chapter. Comment resolutions were documented, the chapter modified accordingly, and the comment resolutions and the revised text were returned to the commenter for approval. If the commenter did not agree with the resolution, the DOE PM negotiated a settlement among the commenter, the review panel, and lead writer.

After all comments were resolved, the document went through another review by the DOE PM and an abbreviated review panel, and then a final consistency review was completed by the SAIC editors and the review panel member from the DNFSB. These reviews revealed, among other things, that the footnote references in many cases were missing, incomplete, or not the most current reference. Many of the pictures in the document were also judged to be of poor quality or inappropriate for the discussion. Lead writers were asked to provide the information and SAIC assigned a person specifically to research references and pictures through the Internet, DOE facility libraries, and other sources. In many cases, newer, better pictures could not be obtained and the SAIC production staff had to improve the existing pictures and tables through electronic editing. At the same time, DOE classifiers completed a review of the document to ensure that no classified information had been included, and SAIC completed a final review to ensure that no copyright laws had been violated.

After all of the above reviews were complete, final preparation for publication of the NACH began in August 2003. DOE determined that the NACH would not be published in hardcopy form and would instead be made available through the DOE Web. This decision required changes to the document format and picture resolution. Unfortunately, SAIC had expended all available funds for the work in September, which resulted in a work stoppage and a delay in completion of the electronic format copy until November 2003. The document was formally delivered to DOE in December 2003. The DOE Project Manager made some minor changes to the SAIC document and the Air Cleaning

Handbook was given a DOE number and published electronically in 2004, marking the completion of the NACH upgrade project.

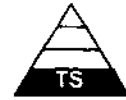
Key Project Facts:

1. A detailed Project Management Plan was developed and used for the project.
2. Updating a large, controversial, technical document such as the NACH is a long, labor-intensive process and more time needed to be allowed in the schedule for comment resolution.
3. Some comments were not resolved to everyone's satisfaction.
4. The use of volunteer writers lengthened the update process.
5. Frequent dialog among writers, such as biweekly teleconferences, was necessary to resolve issues and prevent duplication of effort.
6. The DOE Project Manager was actively engaged in the update process, especially during comment resolution. DOE upper management must be kept informed of issues and be willing to support the Project Manager.
7. A better incremental funding process needed to be in place to avoid delays due to lack of funds.

DOE MEMO - HANDBOOK COMPLETION

On January 14, 2004 a memo was sent to the Honorable John T. Conway Chairman of the Defense Nuclear Facilities Safety Board from Edward B. Blackwood, Director Office of Regulatory Liaison

"The National Nuclear Security Administration and the Office of Environmental Management have issued the attached memoranda to their site offices requesting **review** and **implementation** of the recently revised Nuclear Air Cleaning Handbook (DOE-HDBK-1169-2003). These memoranda are a deliverable as part of the Department's Implementation Plan in response to Board Recommendation 2000-2, *Configuration Management, Vital Safety Systems*. This completes the Department's actions to fulfill commitment 25 of the 2000-2 Implementation Plan.



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DOE-HDBK-1169-2003

DOE HANDBOOK

NUCLEAR AIR CLEANING HANDBOOK



U.S. Department of Energy
Washington, DC 20585

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

INTRODUCTION

The 4th edition of the Nuclear Air Cleaning Handbook succeeds three previous editions: ERDA 76-21, *Nuclear Air Cleaning Handbook* (1976); ORNL/NSIC-65, *Design, Construction and Testing of High-Efficiency Air Filtration Systems for Nuclear Applications* (1970); and NSIC-13, *Filters, Sorbents, and Air Cleaning Systems as Engineered Safeguards in Nuclear Installations* (1966). It benefits from over 25 years of industry experience since the previous edition was published.

Along with U.S. Nuclear Regulatory Commission documents and consensus standards such as the American Society of Mechanical Engineers (ASME) *Code On Nuclear Air and Gas Treatment* (ASME AG-1), this handbook addresses systems and equipment used in nuclear facilities to capture and control radioactive aerosols and gases. It differs from other documents in that it is intended to be specific for U.S. Department of Energy (DOE) and National Nuclear Security Administration (NNSA) nuclear applications. This handbook is not intended for application to commercial systems other than for general historical information and discussions of basic air cleaning theory. DOE handbooks are nonmandatory documents unless invoked by DOE policy or Order, DOE-approved contractor document, or by contract.

This revision updates the information provided in ERDA 76-21 and incorporates current thinking as provided by manufacturers, subject matter experts from the DOE complex and members of the ASME Committee on Nuclear Air and Gas Treatment (ASME AG-1 Committee). Chapters have been added on History, Fire Protection, and Occupational Safety and Health.

This handbook draws from many special technical areas, each of which requires years of education and practice to master. The authors do not intend to make the reader an "instant expert" in the overall subject or in any of the disciplines of the contributors. For example, reading the chapter on fire protection will not make the reader a fire protection engineer, nor will reading the chapter on gloveboxes make one a glovebox expert. This handbook is intended to provide a very brief overview of the subjects discussed and identify potential issues. Qualified subject matter experts should be contacted for the areas discussed in this handbook.

While this handbook is written for nuclear applications, it is recognized that these systems have shared engineering characteristics that may, with professional discretion exercised by trained engineering and public health professionals, be applicable to nonradiological toxic materials. Such materials include, but are not limited to, asbestos and other particulate carcinogens, beryllium, and biological agents.

We would like to acknowledge the contributions of Humphrey Gilbert, who from the days of the Manhattan Project, was responsible for the initial development of the technology discussed in this handbook. He played a significant role in the development, writing, and technical review of this and previous editions. We wish to express our appreciation to Melvin First, Harvard School of Public Health, who provided a draft that was used in the development of this document; and to Richard C. Crowe, Department Manager for Environment, Safety, and Health (NNSA Service Center), without whose continued support this handbook would not have been possible.

James W. Slawski, NNSA
Project Manager

DEFENSE NUCLEAR FACILITY SAFETY BOARD EXPECTATION

The Defense Nuclear Facility Safety Board (DNFSB) strategic performance goal for nuclear facilities design and infrastructure is to ensure that new DOE defense nuclear facilities and major modifications to existing facilities are designed and constructed in a manner providing adequate protection of health and safety of the workers and the public. The Nuclear Air Cleaning Handbook addressing ventilation design underwent a major revision in response to DNFSB Recommendation 2000-2. It is the DNFSB expectation that the Nuclear Air Cleaning Handbook, HDBK-1169-2003 be implemented at all DOE Sites.

DOE MEMOS ON ISSUANCE OF REVISED NUCLEAR AIR CLEANING HANDBOOK

The Deputy Administrator for Defense Programs (NNSA) and the Chief Operating Officer Office of Environmental Management (EM) issued memos to field managers at the following: (NNSA sites) Kansas City, Livermore, Los Alamos, Nevada, Pantex, Sandia, Savannah River, Y-12 and (EM sites) Ohio, Richland Operations, River Protection, Rocky Flats, Savannah River, Carlsbad, Portsmouth/Paducah.

The memos addressed the subject "Assess potential for un-reviewed safety questions due to issuance of revised DOE-HDBK-1169-2003, Nuclear Air Cleaning Handbook"

The following is a quote from the memos:

"In December 2003, the Department of Energy released DOE-1169-2003, Nuclear Air cleaning Handbook. The changes in this revision over its predecessor, ERDA76-21, are evolutionary and represent current thinking regarding confinement ventilation systems used in nuclear facilities. It also reflects the current American Society of Mechanical Engineer Code on Nuclear Air and Gas Treatment, AG-1.

Please pay particular attention to chapter 8, Testing and also the appendices. These contain discussions on the different types of testing regimens, care and handling of HEPA filters, receiving inspection, and filter service life.

An Un-reviewed Safety Question could exist by an identification of Potential Inadequacy of Safety Analysis (PSIA) as a result of relying on the old handbook. Please review your authorization basis documents for any PISA resulting from changes in the new handbook over its predecessor. By April 30, 2004, inform me of any corrective actions and enter them into your local Corrective Actions Tracking System. This

requirement satisfies a commitment to the Defense Nuclear Facilities Safety Board.”

This memo assumes that the site has reviewed and evaluated their current practices and applications compared to the recommendations and directions of the DOE-HDBK-1169-2003, Nuclear Air Cleaning Handbook.

DOE MEMO ON IMPLEMENTATION OF REVISED AIR CLEANING HANDBOOK

The Deputy Administrator for Defense Programs (NNSA) has directed the issuing of a memo to field managers at the following: (NNSA sites) Kansas City, Livermore, Los Alamos, Nevada, Pantex, Sandia, Savannah River, Y-12 and (EM sites) Ohio, Richland Operations, River Protection, Rocky Flats, Savannah River, Carlsbad, Portsmouth/Paducah.

The memo is to address the subject --- **“Include in your contractor's required standards list Nuclear Air Cleaning Handbook, DOE-HDBK-1169-2003” ----**

One of the commitments in the Defense Nuclear Facilities Safety Board Recommendation 2000-2; Configuration Management, Vital Safety Systems; was the revision of the Nuclear Air Cleaning Handbook. After an extensive process of peer review and the Department of Energy comment and resolution process in which over 2,000 comments were reconciled, the revised handbook, DOE-HDBK-1169-2003 was issued. This new Nuclear Air Cleaning Handbook replaces the predecessor handbook, ERDA 76-21 that was published in 1976. “It reflects current thinking of subject matter experts in the disciplines that deal with confinement ventilation systems used in nuclear facilities, and is compatible with the ASME Code on Nuclear Air and Gas Treatment, ASME AG-1. It also addresses the conditions and operations that are unique to DOE / NNSA nuclear facilities.”

“You are directed to have the Nuclear Air Cleaning Handbook, DOE-HDBK-1169-2003 included in your contractor's required standards list.”

TO OBTAIN A COPY OF THE “NUCLEAR AIR CLEANING HANDBOOK, DOE-HDBK-1169-2003”

The Nuclear Air Cleaning Handbook, DOE-HDBK-1169-2003” may be downloaded at the DOE Technical Standards website:
<http://www.eh.doe.gov/techstds/standard/hdbk1169/>

The Nuclear Air Cleaning Handbook, DOE-HDBK-1169-2003” may be downloaded on “Google” by entering the following into search “DOE-HDBK-1169”.

A bound copy of the handbook is currently not available.