

PAPER PREPARATION INSTRUCTIONS FOR WASTE MANAGEMENT

Papers are required for both Oral and Poster sessions at the annual WM Symposia (WMS) Conference, except for the Wednesday afternoon Non-Paper Poster session and the Student Poster session. Papers for Panel sessions are discretionary, as decided by the session organizers.

To facilitate production of the conference proceedings and to improve the quality of papers and presentations a review of each draft and final paper is required. Your reviewer will critically review and comment on your paper based on these instructions.

We must receive your final paper by January 13, 2012 in the specified format to be included in the final program, conference and proceedings. Your paper must be presented at the symposium to be included in the published proceedings as well as a signed copyright authorization must be submitted for each author and is part of the online uploading procedure.

Papers lacking any of the aforementioned documents, not timely received by the WMS, not approved by the designated paper reviewer, or not presented at WMS will not be published in the conference proceedings. Although you can wait until you are ready to submit your final paper before you send in the required submittal form, speaker biography, and signed copyright forms, please be aware that WMS recommends submitting all these forms as early as possible.

Provided below are paper submittal instructions, as well as instructions for the preparation of papers to be submitted to WMS for consideration, presentation, and publication. The format of the subsequent instructions follows the required WMS paper format, except in cases where particularly important Paper Preparation Instructions have been emphasized in bold letters.

SUBMITTING PAPERS

To submit your draft and final paper, go to the WMS website, www.wmsym.org, and log-in. If you have forgotten your User Name or Password, enter your email address in the section labeled ***"I have a previously affiliation with WM Symposia"***. The website will send you an automated response with your log-in information.

Once you have logged in, you will be able to select the button that reads ***"Submit Paper"*** and follow the instructions as listed.

Please note that the WMS website only accepts one file per abstract number. If you make changes to your file and upload a new version, the old version is discarded.

The paper submittal schedule for this year's conference is as follows:

- Draft Papers are due on or before November 11, 2011.
- Final Paper are due on or before January 13, 2012.

Final papers not received by the mandated due date may not be included in the Final Program, or presented. For additional clarifications and/or information, please contact the WMS Technical Program Coordinator, LeighAnn Spadola by email at: papers@wmarizona.org or by phone at +1 480-557-0263

PAPER LENGTH

Each author is required to submit a paper of no less than six (6) and preferably no more than 15 pages, including figures and tables. Please use low-resolution graphics to reduce the byte-size of the document.

Papers exceeding 15 pages require pre-approval of the Program Advisory Committee (PAC) Chair, Gary Benda who may be reached at gbenda@wmarizona.org.

PAPER FORMAT

General

- Microsoft Office Word™ 2007 is the preferred software.
- US Letter format (8-1/2 inches wide and 11 inches high) is the page format to be used for all WMS papers. **Do not use A4 paper size.**
- When naming your file, please use your assigned abstract number and the correct file extension in order to alert WMS to the type of software being used as illustrated in the following example:
 - File name 12101a.doc - where “12101” is the abstract number, “a” is the revision number and “.doc” denotes an MSWord file.
- **Please note that the file name should NOT be included in the page header.** The page headers should read as follows and should appear on each page:
 - WM2012 Conference, February 26 – March 1, 2012, Phoenix, Arizona, USA
- The paper should **NOT** include a cover page.
- It is recommended that the paper organization be structured as follows:
 - Abstract
 - Introduction
 - Method
 - Results
 - Discussion
 - References
- The paper should have page numbers, centered, in the footer of each page.
- The paper title shall only be shown on the first page. It shall be in Title Case, centered immediately below the top margin and followed by the abstract number. The title and abstract number shall be separated by a hyphen (-).
- The name(s) of the author(s) and the related affiliation(s) should also only be shown on the first page. They shall be in Title Case and centered on two separate lines, respectively, beginning with the author name(s) **two** spaces/lines below the paper title, i.e., leaving one open/empty vertical space between the title and the author name(s).
- All papers shall have an introductory Abstract following the listing of the affiliation(s) of the author(s) summarizing the main content of the paper. The Abstract heading should be in capital letters, flush with the left margin **two** lines below the authors’ affiliations.
- As described further below, **ALL** subsequent headings, sub-heading, text, and table and figure titles/captions shall have **only one** open vertical space between it and any text, Table, or Figure.
- All sentences shall be separated by at least one but not more than two open horizontal spaces from a previous or subsequent sentence in the same paragraph.
- Only acronyms approved by WMS may be used. A listing of approved acronyms is posted on the WMS website on the last page of the Topic Listing.

- It is recommended that a paper avoid the use of personal pronouns where possible (i.e., you, I, me, we, etc).
- It is also recommended that a paper avoid using terminology that starts or includes the term “this paper”; such as “this paper will demonstrate”, or “in this paper we’ll discuss”, or “this paper will describe”. A reader should be able to determine and understand the general contents and purpose of the paper (i.e., what the paper is about) via the paper’s title and abstract and by reading the actual paper contents.

Abstract

1. The Abstract shall not refer to or direct the reader to the main paper text as the abstract should be a one (1) paragraph, less than three-quarters (3/4) of a page, self-contained summary of the most important elements of the paper.
2. Upon approval of the final paper and after receipt of all required forms WMS will publish the first 1,200 characters of the final paper abstract on the WMS website. **WMS will not use the original abstract submitted.** Only the Abstract submitted as part of the final paper will be used in the online Technical Program.

Headings and Sub-headings

1. All main headings shall be in bold, all **CAPITAL** letters, and be flush with the left margin.
2. Sub-headings, if used, shall be in bold **letters** with the first letter in upper-case and the remaining letters in lower-case and be flush with the left margin.
3. There should be no further subdivision beyond main headings and sub-headings.
4. Do not number or letter any heading or sub-heading because it can cause conversion problems.
5. Text preceding and following headings and sub-headings should be flush with the left margin and begin two lines below the heading.

Main Body or Text

1. Use one-inch^a margins on all four sides of the page.
2. Arial is the preferred font.
3. Do not use fonts smaller than 11 point, or larger than 12 point, except for footnotes to a table (*see Tables section below for further guidance on how to do table footnotes*).
4. Define all acronyms on its respective first use in the body of the paper and use it consistently after that. *Exceptions to this rule may be taken if the acronym is listed in the table of pre-approved acronyms.*
5. Refer to isotopes as C-14, H-3, Co-60, Pu-239, etc.
6. Itemized, lettered and/or bulleted items can be either flush with the left margin or indented 1/4 - 1/2 inch. However, the related text as well as any related sub-item, letter and bullet shall be indented another 1/4 - 1/2 inch, respectively.

^a Notwithstanding that British units are used above, International Standard (SI) units are to be used as “base-units” in the paper text.

Tables

1. Whenever possible, tables shall be embedded in the text and placed as close as possible after they are first cited in the text.
2. Tables shall be numbered using Roman numerals and have a title.
3. The Table title and number shall be in Title Case two lines above the table and either flush left, or centered with the margin of the table or the page, contingent upon the width of the table.
4. Tables should be formatted with a single-line box around the outside border and single ruling lines between rows and columns.
5. The column headings in the table shall be centered, whereas the related text/information in the table can be either centered or flush left or right at the discretion of the author. The format shall, however, be consistent in each table.
6. Footnotes to tables shall use lower-case letter superscripts (e.g., ^a) when referenced in the table itself.
7. Footnotes must be placed one vertical space under the table in which they are referenced and indented 1/4 inch from the left box line, border, of the table. Footnotes should be 9 point font size.
8. Indent all text in the footnote(s) themselves another 1/8 – 1/4 inch.

Figures (Charts, Graphs, Diagrams, Photographs, etc.)

1. Because of disk space limitations, only four (4) figures per paper are allowed without additional approval from the PAC Chair.
2. Figures shall be no larger than 6-1/2 x 9 inches.
3. Figures should be saved in Graphics Interchange Format (GIF); pictures should be in Joint Photographic Experts Group (JPEG) format.
4. Digitized figures in JPEG or GIF format should be a maximum of 600 pixels (width) by 480 pixels (height) and not exceed 1MB in size. Color images are acceptable.
5. Figures should be numbered (Fig. 1.) and captioned as illustrated below. Captions serve as a brief, but complete, explanation and as a title.
6. Figures that are graphs, charts or diagrams should, as needed, include a legend that explains the symbols, abbreviations and terminology used in the figure. These terms must be consistent with those used in the text and in other figures. The lettering in the legend should be of the same type and size as that used in the figure.
7. Figure caption and number should be typed below the figure using sentence format and be flush left for large figures and centered below the figure for small figures.
8. Figures should be embedded in the text and placed after they are cited.

Equations

1. Indent all equations at least 1/2 inch from the left margin; center if possible and assign each of them a unique consecutive identification number within parenthesis, e.g., (Eq. 1) throughout the paper as illustrated below. Whenever possible, the equation and its identification number, e.g., (Eq. 1), should be separated by at least one inch.

$$\frac{\partial \alpha_c \rho_c}{\partial t} + \nabla \cdot (\alpha_c \rho_c \mathbf{v}_c) = \Gamma_c, \quad (\text{Eq. 1})$$

2. Equations may be numbered as follows:

$$\frac{\partial \alpha_d \rho_d}{\partial t} + \nabla \cdot (\alpha_d \rho_d \mathbf{v}_d) = \Gamma_d. \quad (\text{Eq. 2})$$

Footnotes

1. Footnotes in the text, if used, must be chronologically numbered/lettered in superscript, and explained at the bottom of the page on which they occur.
2. As described above in the Tables format guidance, footnotes in tables are to be in a different format than footnotes in the text.

Units

International Standards (SI) units are to be used in the paper. Please reference <http://physics.nist.gov/cuu/Units/units.html> for guidance. At the discretion of the author(s), British units may be inserted within parenthesis after the SI units, as appropriate.

References

1. List all references in full under a “REFERENCES” heading, which should follow the main text of the paper.
2. References should be flush with the left margin in the paper.
3. References should be cited/listed in numerical sequence, as they were cited in the text of the paper (before Footnotes, if included). Each reference should be cited/identified in the text by a unique number in brackets, in chronological order, i.e., [1], [2] etc. **Do not superscript the numbers.**
4. Only one number should be used for the same reference citation throughout the text, and it should correlate to the order in which the references are listed in the actual references section of the paper.
5. References should be cited in the references section using any technical journal style desired, so long as that style remains consistent and contains, at minimum, the following information: Author(s), Title, Year, Publication information.

SPECIAL NOTES

1. WMS does not provide copies of papers as handouts at the conference; however, if a presenter wants to provide handouts of either their paper or presentation notes, they are allowed to, but must provide them.
2. Please refrain from commercialism; thus no company symbols or logos should be present in the paper or presentation.
3. Please refrain from acknowledgements (to people or funding sources) unless necessary. If required, an “ACKNOWLEDGEMENTS” heading should be created and located at the end of the paper after the References section.
4. **Adherence to the WMS paper format is mandatory as it is essential to the quality of the proceedings and reflects on all authors.** Note the paper organization can be structured by headings to appropriately reflect the type of topic, but must include an Abstract, Introduction and Reference section at the end if there are references in the text.

Excerpts from papers submitted for presentation to previous WMS conferences are provided below as examples/illustrations of the desired format. Some of the example paragraphs have been truncated for these instructions.

Further Development of Modified Monosodium Titanate, an Improved Sorbent for Pretreatment of High Level Nuclear Waste at the Savannah River Site - 11215

Kathryn M. L. Taylor-Pashow*, Fernando F. Fondeur*, Samuel D. Fink**, and David T. Hobbs*

*Savannah River National Laboratory, Aiken, South Carolina 29808

**Savannah River Nuclear Solutions, Aiken, South Carolina 29808

ABSTRACT

High-level nuclear waste produced from fuel reprocessing operations at the Savannah River Site (SRS) requires pretreatment to remove Cs-137, Sr-90, and alpha-emitting radionuclides (i.e., actinides) prior to disposal onsite as low level waste. Separation processes planned at SRS include caustic side solvent extraction, for Cs-137 removal, and sorption of Sr-90 and alpha-emitting radionuclides onto monosodium titanate (MST). The predominant alpha-emitting radionuclides in the highly alkaline waste solutions include plutonium isotopes Pu-238, Pu-239, and Pu-240. Recent results from the development of an improved titanate material that exhibits increased removal kinetics and effective capacity for Sr-90 and alpha-emitting radionuclides was compared to the baseline MST material.

INTRODUCTION

Approximately 140 million liters of high-level nuclear waste (HLW) are presently stored in 49 underground carbon steel tanks at the Savannah River Site (SRS). Approximately 9 vol % of the waste consists of precipitated metal oxides and hydroxides...

Cost effective disposal of the large quantities of high-level radioactive waste solutions requires reducing the radioactive material to the smallest possible volume for incorporation into durable long-term waste forms such as borosilicate glass...

The improved performance for strontium and plutonium removal will allow pretreatment facilities to use markedly less sorbent ...

EXPERIMENTAL METHOD

Materials

The baseline MST used in these studies was prepared using a sol-gel process developed at the Savannah River National Laboratory (SRNL) and ...

Effect of Radiation on MST Performance

To determine if irradiation of the MST or modified MST (mMST) would have an effect on the sorption of strontium and actinides, the materials were irradiated in a gamma source and the ...

Performance tests were carried out using a simulated waste solution (SWS-5-2009), having the composition shown in Table I. The experiments were carried out in a waterbath-shaker at 25 °C, with an agitation speed of 175 rpm. All MST experiments were performed with a sorbent loading of 0.4 g/L, and the mMST experiments were performed at a loading of 0.2 g/L. Samples

were removed and filtered after 6, 12, and 24 hours of contact, and were analyzed for Sr, U, Np, and Pu content.

Table I. Composition of Simulated Waste Solutions.

Component	Measured Concentrations		
	SWS-5-2009	SWS-9-2009	SWS-10-2007
NaNO ₃	2.13 ± 0.21 M	2.35 ± 0.18 M	2.42 ± 0.24 M
NaOH	1.37 ± 0.14 M	1.27 ± 0.13 M	1.36 ± 0.14 M
Na ₂ SO ₄	0.483 ± 0.048 M	0.531 ± 0.040 M	0.562 ± 0.056 M
NaAl(OH) ₄	0.484 ± 0.048 M	0.389 ± 0.039 M	0.419 ± 0.042 M
NaNO ₂	0.133 ± 0.013 M	0.127 ± 0.010 M	0.141 ± 0.014 M
NaCO ₃	0.0298 ± 0.0030	0.0302 ± 0.0030	0.0266 ± 0.0027
Total Na	5.05 ± 0.01 M	5.05 ± 0.01 M	5.52 ± 0.72 M
Total Sr	0.521 ± 0.052 mg/L	0.676 ± 0.026 mg/L	0.318 ± 0.106 mg/L
Sr-85	189,000 dpm/mL	12,000 dpm/mL	189,000 dpm/mL
Total Pu	0.216 ± 0.019 mg/L	0.17 ± 0.033 mg/L	0.235 ± 0.007 mg/L
Np-237	0.392 ± 0.92 mg/L	0.463 ± 0.026 mg/L	0.450 ± 0.098 mg/L
Total U	10.7 ± 0.13 mg/L	10.1 ± 0.36 mg/L	11.3 ± 0.38 mg/L
Cs-137	102,000 ± 1910 dpm/mL	123,000 ± 6130 dpm/mL	86,900 ± 577 dpm/mL

Effect of Age on mMST Performance

Iodometric titration analyses indicated that the peroxide content of mMST samples decreases linearly with age. Strontium and actinide sorption tests were performed with several lab prepared batches of mMST of varying age (see Table II)...

Table II. Age of mMST Samples.

Sample	Age at Time of Testing
LS-2	4.70 y
LS-7	0.30 y
LS-8 ^a	0.19 y
LS-9	0.09 y

^a Sample LS-8 was exposed to elevated temperature (49 °C) causing accelerated aging.

Desorption of Sr, Pu, and Np from mMST

A series of desorption experiments were performed to determine if any of the strontium or actinides that are loaded onto the mMST solids during the contact period will desorb during the washing sequence ...

RESULTS AND DISCUSSION

Effect of Radiation on MST Performance

Similar removal kinetics was seen for the irradiated samples when compared to the unirradiated controls. The decontamination factors are summarized ...

Results from the initial set of desorption experiments showed ...

Gas Release from mMST

The mMST material releases oxygen during the synthesis, and continues to offgas after the synthesis at a rapidly diminishing rate until below a measurable rate after 4 months...

Figure 1 compares the gas release rate of five batches of mMST. Samples LS-5 and LS-9 were synthesized using the standard procedures...

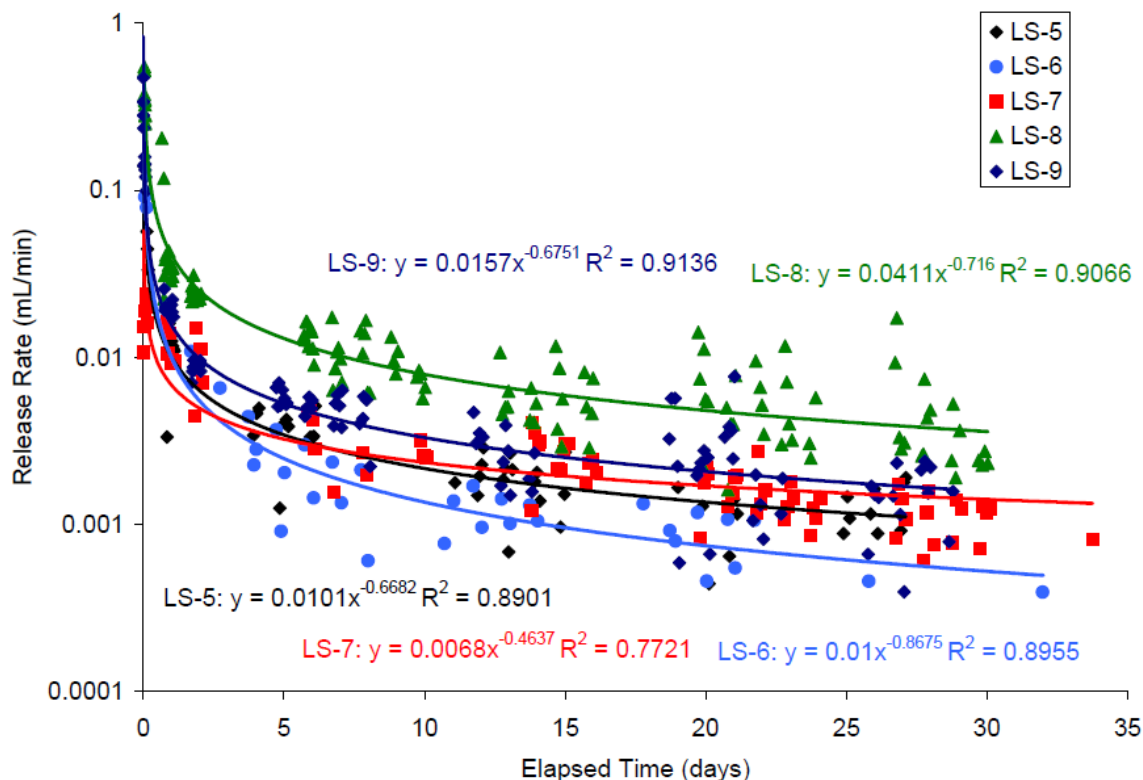


Fig 1. Comparison of gas release rates from LS-5, LS-6, LS-7, LS-8, and LS-9.

Solids Settling Characteristics

Results from the gravity settling tests ...

CONCLUSION

Recent testing of mMST focused on further characterization of the material including determination of peroxide content, evaluation of the post-synthesis gas release under different conditions, and evaluation of the performance of the material under varying conditions. Studies also focused on how the material changes with age...

REFERENCES

1. Lynch, R.W., Dosch, R.G., Kenna, B.T., Johnstone, J.K., and Nowak, E.J. (1976). The

Sandia Solidification Process – a Broad Range Aqueous Solidification Method. IAEA Symposium on the Management of Radioactive Waste, Vienna, Austria, March 22, 1976, 360-372.

2. Lynch, R.W. (Ed.). (1976). Sandia Solidification Process Cumulative Report. Technical Report SAND-76-0105, Sandia Laboratories, Albuquerque, NM
3. Dosch, R.G. (1978). The Use of Titanates in Decontamination of Defense Wastes. Technical Report SAND-78-0710, Sandia Laboratories, Albuquerque, NM
4. Hobbs, D.T., Barnes, M.J., Pulmano, R.L., Marshall, K.M., Edwards, T.B., Bronikowski, M.G., and Fink, S.D. (2005). Strontium and Actinide Separations from High Level Nuclear Waste Solutions Using Monosodium Titanate 1. Simulant Testing. *Separation Science and Technology*, 40, 3093-3111.
5. Peters, T.B., Barnes, M.J., Hobbs, D.T., Walker, D.D., Fondeur, F.F., Norato, M.A., and Fink, S.D. (2006). Strontium and Actinide Separations from High Level Nuclear Waste Solutions Using Monosodium Titanate 2. Actual Waste Testing. *Separation Science and Technology*, 41, 2409-2427.

ACKNOWLEDGEMENTS

This work was funded by the ...