

Seventy-five Years of Nuclear Criticality Safety Documents—A Bibliography

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The Bibliography Continues to Grow

- Our collection of nuclear criticality documents was begun in the 1970s.
- It now contains over **23,000** references to reports that contain information that can be helpful to nuclear criticality safety specialists or others that have an interest in the properties of fissile materials and systems.
- The first bibliographic collection, published in 1979, referenced reports that could provide specifications for relatively simple critical configurations necessary for validating nuclear constants and calculational techniques. It included **1143** reports.
- A *computer database* was created, but in order to share the information we prepared a *printed* publication (**UCRL-52769**).
- To make it useful, lookup tables were made and concordances were constructed that were based on keyterms and phrases in the titles and abstracts.

The Work Continues

- Besides critical experiment-related documents, the database now includes information on criticality safety evaluations, standards, evacuation alarms, emergency response, education, training, patents, and, packaging and transportation.
- Some documents may be of use to nuclear power installations, but the content of the compilation focuses on operations with fissile materials outside of nuclear reactors.
- We are scanning our archival hardcopy collection into digital format. This also helps to ensure that fragile reports are preserved, and other hard-to-find reports remain available for use.

Hardcopy Documents Were the Core of the Work--Collected Mostly in the 70s and 80s



Bibliographic Information was Obtained from Various Sources

- Our Technical Information Department searched for possibly relevant documents and gave us a large quantity of computer listings.
- A substantial number of bibliographic entries were found by examining the reference lists within reports, journal articles, and conference papers.
- We stopped ordering hard-copy documents and now rely on digital downloading to obtain full-text reports.
- There were several bibliographic collections that were helpful, especially ones from ORNL and LANL.
- We have also included the references contained within ICSBEP evaluations, assuming that if they were important for the evaluations they should be included in the bibliography.

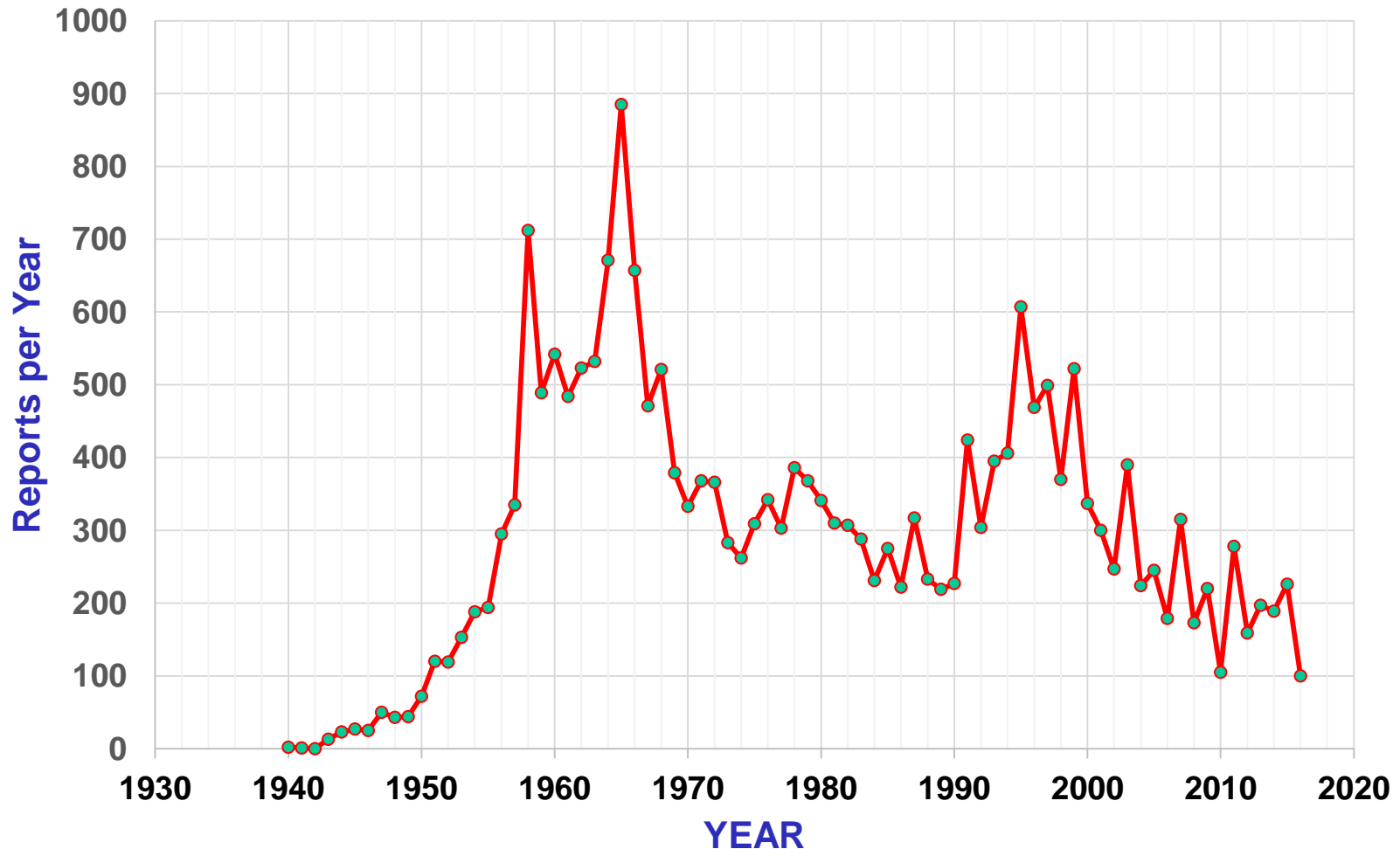
Much of the Content Has Been Obtained From

- *Critical Dimensions of Systems Containing ^{235}U , ^{239}Pu , and ^{233}U , (LA-10860), Nuclear Criticality Safety Guide (LA-12808), and A Review of Criticality Accidents (LA-13638).*
- Conference proceedings such as: United Nations International Conferences on the Peaceful Uses of Atomic Energy, American Nuclear Society meetings, and International Conferences on Nuclear Criticality Safety (ICNC).
- Technical journals such as American Nuclear Society publications, *Nuclear Science & Engineering* and *Nuclear Technology*.
- “Vintage reports” published in the 1940s and 1950s. Some of these reports had been retained at LLNL and some were provided by colleagues at other sites.
- Interim reports and memoranda from various sites.

In the 1980s We Published a Compilation of Paper Summaries Presented at American Nuclear Society Meetings

- This was done with the consent of ANS.
- We continued to use the tools developed for the 1979 bibliography.
- Complete images of the paper summaries were included.
- Lookup tables and concordances were provided.
- It was available in a document printed in 1982 (**UCRL-53369**).
- With the collaboration of ANS, we published an update to the 1982 compilation and discussed the work at the ICNC'99 conference in Versailles, France.

Publication Frequency Rose Rapidly in the Early Decades and then (Mostly) Declined



Some Important Publication Sources

Source	Number
ANS Annual and Winter Meeting	3841
Topical and Other ANS Meetings	413
<i>Nuclear Science and Engineering</i>	1191
<i>Nuclear Technology</i>	520
ANS Total	5965
ICNC Conferences	1197
USDOE Meetings and Workshops	105
United Nations & IAEA Conferences	267

Authors With Substantial Contributions

Author	Reports	Author	Reports
Mihalczo, J. T.	395	Handley, G. R.	67
Lloyd, R.	242	Newlon, C. E.	67
Clayton, E. D.	241	Hansen, G. E.	66
Bierman, S. R.	136	Johnson, E. B.	64
Thomas, J. T.	116	McLaughlin, T. P.	58
Hopper, C. M.	115	Toffer, H.	58
Valentine, T. E.	100	Ketzlach, N.	57
Schuske, C. L.	95	Koponen, B. L.	57
Paxton, H. C.	90	Whitesides, G. E.	52
Briggs, Blair	87	Fox, J. K.	51
Petrie, L. M.	73	Hollenbach, D.	51
Westfall, R. M.	73	Heinrichs, D. P.	50
Mosteller, R. D.	69	Clark, H. K.	49
Rothe, R.	68		

Some Major Topics

Reactor	4840	Storage	678
Criticality	4661	Monte Carlo	573
Experiment	2852	ZPR/ZPPR	484
Safety	2653	Validation	438
Assembly	1728	Array	340
Measurement	1593	SCALE	269
Accident	782	Standard	266
Failure	703	ICSBEP	196
Benchmark	694	Alarm	182

The Bibliography Is Available On the DOE/NCSP Website

- We no longer rely on using hardcopy reports to share the bibliographic information. Instead, the U.S. Department of Energy's Nuclear Criticality Safety Program (NCSP) includes the bibliographic database as part of its website.
- It is called "**LLNL Database.**"
- Links are provided to many full-text reports.
- Access to the NCSP website databases has recently been interrupted and we have been promised that restoration is in progress.

A Publication Has Recently Been Issued

- A publication has been prepared that contains a recent “snapshot” of the bibliography :
- *Seventy-Five Years of Nuclear Criticality Safety Documents – A Bibliography* (**UCRL-TR-60080**).
- The publication is too large for printing but is available in Adobe Acrobat (pdf) format. It can be downloaded from the NCSP website or found via standard publication retrieval methods.
- The document contains information for 23,136 reports.

A Sample Page From LLNL-TR-760080

1713.....ID Number.....1713

Author: Kumar, A. / Srinivasan, M.

Title: An Integral Version of the Los Alamos Density Exponent Formula for Critical Mass Variation

Date: 1/1/1978

Report: ATKE, 31, 249-251

Conference/Journal: Atomkernenergie (West Germany) Merged with Kerntechnik to form Atomkernenerg./Kerntech. Acta Radiol. Changed to Acta Radiol

Conference Session:

Abstract/Keyterms: This paper makes an attempt to extend the validity of the well-known Los Alamos Density Exponent Formula (LADEF) for the variation of critical mass of reflected spherical systems with core/reflector density changes to a wide range of density variations by appropriately integrating the original formula. The equation derived is $Y = X^{\alpha}/(\delta_0 + X^{\alpha})$ where X is the relative variation of core density with respect to that of reflector; α is a constant of system independent of density; Y denotes the ratio of reflected critical core radius to unreflected critical radius, $\delta_0 = (1-Y_0)/Y_0$ with Y_0 pertaining to a reference system where $X = X_0 = 1$. A detailed comparison with more exact calculations using a multigroup one-dimensional transport theory code is made over a five decade density variation range taking as example a Pu-Be system. The justification for integration, range of validity of the integral formula (ILADEF) and its physical interpretation are discussed. The possible applications and some of the limitations of ILADEF are also pointed out.

Search Example With Retrieval of Full-Text Documents

Search this site

Enter one or more keywords to search for using the Zoom Search Engine.
Note that '*' and '?' wildcards are supported.

Search for:

Search results for: fermi

17 results found.

2 pages of results.

Sorted by relevance / [Sort by date](#)

1. [ANL_7320.pdf](#)

... presented by Eldon L. Alexanderson, "Preliminary Report on Fuel Damage in the Fermi Reactor," have been included in this document. I wish to acknowledge ...

Terms matched: 1 - Score: 197 - 02 Jul 2015 - 91019k - URL: http://ncsp.llnl.gov/bibliography/file/ANL_7320.pdf

2. [ANL_EBS_NU_000008_REV_01.pdf](#)

... /Uranium-Molybdenum (U-Zr/U-Mo) Alloy DOE SNF; representative fuel type Enrico Fermi q DOE9 Low-Enriched Uranium Oxide (LEU Oxide) DOE SNF; representative fuel ...

Terms matched: 1 - Score: 85 - 07 Apr 2013 - 11646k - URL: http://ncsp.llnl.gov/bibliography/file/ANL_EBS_NU_000008_REV_01.pdf

3. [ANL_6629.pdf](#)

... 13 III. DESCRIPTION OF ZPR-III 16 IV. CRITICAL STUDIES PROGRAM FOR THE ENRICO FERMI REACTOR 19 V. CLEAN-CORE EXPERIMENTS ZI A. D e s c r ...

Terms matched: 1 - Score: 85 - 01 Jul 2015 - 10362k - URL: http://ncsp.llnl.gov/bibliography/file/ANL_6629.pdf

4. [ANL_5800_second_ed.pdf](#)

... reactor. Commonly-used kernels that describe the slowing down of neutrons are: Gaussian (Fermi) Kernel: $\exp[-rV4T(E)]$ Poo(r,E ...

Terms matched: 1 - Score: 77 - 09 Jul 2015 - 43663k - URL: http://ncsp.llnl.gov/bibliography/file/ANL_5800_second_ed.pdf

5. [ANL_6669.pdf](#)

... a s Avenue Argonne, Illinois CRITICAL STUDIES OF CORE B FOR THE ENRICO FERMI ATOMIC POWER PLANT (ZPR-III A s s e m b l y No ...

Terms matched: 1 - Score: 58 - 01 Jul 2015 - 9755k - URL: http://ncsp.llnl.gov/bibliography/file/ANL_6669.pdf

PATRAM Symposia Additions are in Progress

- We have recently acquired bibliographic information for the symposia papers.
- The symposia started in 1965 and in 1980 began to be held at international locations.
- The total number of papers is more than 3,700 since 1965.
- We will select papers from these files that are appropriate for inclusion in our nuclear criticality document database. This work is in progress.
- The next slide shows the symposia locations and the number of papers presented at each conference

PATRAM Symposia During Past Decades

YEAR	LOCATION	NUMBER of PAPERS
1965	Albuquerque, NM, U.S.A.	49
1968	Gatlinburg, TN, U.S.A.	59
1971	Richland, WA	93
1974	Miami Beach, FL	101
1978	Las Vegas, NV, U.S.A.	124
1980	Berlin (West) Germany	176
1983	New Orleans, LA, U.S.A.	157
1986	Davos, Switzerland	108
1989	Washington, DC, U.S.A.	233
1992	Yokohama, Japan,	213
1995	Las Vegas, NV, U.S.A.	247
1998	Paris, France	235
2001	Chicago, IL, U.S.A.	236
2004	Berlin, Germany	284
2007	Miami, FL,	281
2010	London, U.K.	257
2013	San Francisco, CA, U.S.A.	329
2016	Kobe, Japan	256
2019	New Orleans, LA, U.S.A.	325
TOTAL		3763



*Thank You For
Your Attention*