

**From:** Tom Lakosh [mailto:lakosh@gci.net]  
**Sent:** Wednesday, February 04, 2009 7:37 AM  
**To:** 'PDR Resource'  
**Cc:** 'Fred Lyon'; 'Scott Burnell'; 'Tanya Mensah'  
**Subject:** RE: questions about your NRC document request

Adam;

These references are all associated with volcanic dispersal of Yucca Mt. wastes as opposed to the probability and mitigation protocols for reactor/fuel cooling when volcanic ash contaminates primary and/or emergency cooling water. I've copied some correspondence with USGS Yellowstone Volcano Observatory below to give you a better idea regarding the probability issue and as information to Fred regarding the consensus that "...it is worth having plans for major facilities (such as nuclear power plants) to assess how they could deal with the effects of a major eruption" and that "...it would be a real problem being ready for a super-eruption if it went from "0 to 60" in less than a week. I doubt that would happen, but if it did, we'd be screwed". Tom

-----Original Message-----

From: Jacob B. Lowenstern [mailto:jlwnstrn@usgs.gov]  
Sent: Tuesday, February 03, 2009 4:14 PM  
To: Tom Lakosh  
Subject: Re: probability of eruption report?

Tom,

Yes, these numbers are purely probabilistic. You would prefer a time-dependent model that includes recent monitoring data and a re-assessment of probabilities. This is a laudable goal. We are approaching this capability for stratocones such as Redoubt. Scientists are working on decision trees that will provide probabilities based on what has happened in the past. That is, if a volcano has had swarms of X size for Y days, associated with Z gas discharge and W deformation, how often did these volcanoes erupt and what was the size of the eruption. There is no peer-reviewed, best-practices method for doing this, and so scientists are still a bit queasy about using them during crises. More typically, we provide a range of scenarios and let people know our consensus on which is most likely. This has been formalized in some situations as "expert solicitation", where people's opinions become the "data" whereby decisions are made.

Please note that NONE of the above actually is a mechanistic, deterministic sort of approach where we are calculating rock strength, induced stress, and a host of other rapidly changing parameters in some grand calculation of eruptive potential. Most of us would have negligible confidence in any mechanistic model of volcanic eruption. There are too many variables with unknown values. The state of the art is still probabilistic, even if it involves a detailed historic assessment of past activity.

When it comes to Yellowstone, or any other large caldera, we have

very little experience with precursors to actual eruptions versus failed eruptions or "background" unrest, so any sort of decision tree based on past events is without much basis. So we are left with the analysis based on "strictly statistical" means based on previous eruptions.

I understand your criticism and I agree that it would be a real problem being ready for a super-eruption if it went from "0 to 60" in less than a week. I doubt that would happen, but if it did, we'd be screwed. At this point in time, we could spend a billion dollars in research and I'm pretty sure things wouldn't change on that one point. I agree that it is worth having plans for major facilities (such as nuclear power plants) to assess how they could deal with the effects of a major eruption. Fortunately, the lifetime of a nuclear power plant is geologically very short relative to the average recurrence interval of any caldera within harm's reach.

You've been a busy man lately. Don't forget to smell the coffee (assuming you like coffee).

Best wishes,

Jake Lowenstern, USGS

On Feb 3, 2009, at 9:28 AM, Tom Lakosh wrote:

> Jake;  
>  
> I've read those reports and found them to be lacking in any reliable  
> correlation between ongoing geologic activity and probability of  
> eruption  
> and little firm predictive capability. The problem we're faced with  
> is that  
> much of the necessary mitigation actions that would be needed are  
> based on  
> probability of occurrence and that should reflect changes in known  
> geologic  
> factors that create eruptions rather than a strictly statistical  
> average  
> time between eruptions. For example, even if all of the known eruption  
> predictors were experienced at Yellowstone or Long Valley, the  
> strictly  
> statistical probability would not change. The most important  
> mitigation  
> efforts take considerable time to implement and current predictive  
> capability is so nebulous both in terms of time frame and certainty  
> that  
> there would never be enough reliable advance warning to undertake  
> mitigation  
> efforts.

>  
> How would you propose assessing risk for triggering mitigation  
> efforts such  
> as securing the heat sink for nuclear reactors that would have  
> cooling water  
> contaminated by ash fall? This is a limited and quantifiable  
> technical risk  
> but wide scale impacts to transportation and food production would  
> also  
> affect stuff like securing consumable parts and insuring continued  
> availability of plant operating personnel. Planning for these  
> measures, let  
> alone implementing them, takes a lot of time, more time than would  
> have been  
> available given the two day time frame it took for Redoubt to go  
> from green  
> to orange. Tom  
>  
> -----Original Message-----  
> From: Jacob B. Lowenstern [mailto:jlwnstrn@usgs.gov]  
> Sent: Tuesday, February 03, 2009 7:25 AM  
> To: Tom Lakosh  
> Subject: Re: probability of eruption report?  
>  
> I was referring to such an eruption any where on Earth. They happen  
> around every 100,000 years. Yellowstone would be less often. It is  
> discussed in the following articles:  
>  
> Sparks, R. S. J., Self, S., Grattan, J., Oppenheimer, C., Pyle, D. &  
> Rymer, H. 2005 Super-  
> eruptions: global effects and future threats. Report of a Geological  
> Society of London Working  
> Group, 25 pp.  
>  
> Mason, B., Pyle, D. M. & Oppenheimer, C. 2004 The size and frequency  
> of the largest explosive  
> eruptions on Earth. Bull. Volcanol. 66, 735-748. (doi:10.1007/  
> s00445-004-0355-9)  
>  
>  
> There is a bit of discussion on this in the Yellowstone Hazards  
> Assessment on our website.  
> <http://pubs.usgs.gov/of/2007/1071/>  
>  
> Jake  
>  
>  
> On Feb 3, 2009, at 8:14 AM, Tom Lakosh wrote:  
>  
>> Jake;  
>>  
>> Would you please supply a reference to the study that determined

>> the probability of eruption of Yellowstone that was reported in the  
>> Idaho Press-Tribune article yesterday? Just in case you forgot the  
>> quote: "The chances of another super eruption occurring in any  
>> given year are one in 100,000, according to geologist Jacob  
>> Lowenstern, the U.S. Geological Survey scientist in charge of the  
>> Yellowstone Volcano Observatory, which monitors volcanic and  
>> earthquake unrest in the Yellowstone region". Tom (907) 563-7380

**From:** PDR Resource [mailto:PDR.Resource@nrc.gov]  
**Sent:** Wednesday, February 04, 2009 6:56 AM  
**To:** lakosh@gci.net  
**Cc:** Fred Lyon; Scott Burnell; Tanya Mensah  
**Subject:** RE: questions about your NRC document request

Tom Lakosh,

I am responding to your inquiry, which was recently received by the Nuclear Regulatory Commission's Public Document Room (NRC/PDR).

I searched ADAMS, NRC's Agencywide Documents Access and Management System, using "volcanism" and "ashplume" as keywords. The following citations are my search results; you can pull up any one of these documents in Web-based ADAMS <http://www.nrc.gov/reading-rm/adams/web-based.html> with their accession numbers:

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Accession Number: ML030430473  
Estimated Page Count: 3  
Document Date: 2/12/2003  
Document Type: Memoranda  
Availability: Publicly Available  
Title: Presentation of Paper at the 2003 International High-Level Radioactive Waste Management Conference.  
Author Name: Greeves J T  
Author Affiliation: NRC/NMSS/DWM  
Addressee Name: Craig J W  
Addressee Affiliation: NRC/EDO/AO  
Docket Number: WM-00011  
License Number:  
Case/Reference Number: HLWR  
Document/Report Number:  
Keyword: AGC, dml1, source term, TSPA Model, Volcanism, Yucca Mountain  
Package Number:  
Document Date Received:  
Date Docketed:  
Related Date:  
Comment:

Vital Records Category: No  
Document Status: final  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: No  
Date to be Released: 2/21/2003  
Distribution List Codes:  
Contact Person: Richard Codell (301) 415-8167  
Text Source Flag: Native Application  
Document Sensitivity: Non-Sensitive  
File Name: ML030430473.pdf  
File Size: 6853

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Accession Number: ML003730003  
Estimated Page Count: 22  
Document Date: 6/6/2000  
Document Type: Meeting Briefing Package/Handouts, Slides and Viewgraphs  
Availability: Publicly Available  
Title: TSPA-SR Models: Disruptive Events.  
Author Name: Sauer M  
Author Affiliation: Sandia National Labs (SNL), US Dept of Energy, Office of Civilian Radioactive Waste Mgmt (OCRWM)  
Addressee Name:  
Addressee Affiliation: NRC/NMSS  
Docket Number: WM-00011  
License Number: PRE  
Case/Reference Number:  
Document/Report Number:  
Keyword: airborne transport of radionuclides, ASHPLUME, disruptive events, dml1, features, events, and processes, FEPs, Igneous Intrusion, mac4, oarc20020710dnw, oarc20021114dnw, OARC20071003MAB8, performance assessment, seismic activity, Site Recommendation, TSPA-SR, Volcanism, Yucca Mountain  
Package Number:  
Document Date Received: 6/6/2000  
Date Docketed:  
Related Date: 6/6/2000  
Comment:  
Vital Records Category: No  
Document Status: final  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: No  
Date to be Released: 8/1/2003  
Distribution List Codes:  
Contact Person:  
Text Source Flag: OCR'd from scanned image - no corrections made  
Document Sensitivity: Non-Sensitive  
File Name: ML003730003.pdf  
File Size: 2485280

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Accession Number: ML003729535  
Estimated Page Count: 5

Document Date: 6/6/2000  
Document Type: Highlights, Letter, Meeting Minutes, Meeting Summary  
Availability: Publicly Available  
Title: U.S. Nuclear Regulatory Commission/U.S. Department of Energy Technical Exchange Meeting on Total System Performance Assessments (June 6-7, 2000)  
Author Name: Gil A V, Stablein N K  
Author Affiliation: US Dept of Energy, Office of Repository Development  
Addressee Name:  
Addressee Affiliation: NRC/NMSS  
Docket Number: WM-00011  
License Number: PRE  
Case/Reference Number: A10214  
Document/Report Number:  
Keyword: engineered barriers, Gap Analysis, GoldSim, Issue Resolution, KTI Issues, Model Abstraction, Multiple Barriers, npx, OARC20000831bac4, oarc20021007dnw, oarc20021114dnw, oarc20030429mmn, Overall Performance Objective, performance assessment, Quality Assurance, Scenario Analysis, Site Recommendation, Site Recommendation Considerations Report, SRCR, Sufficiency Review, Technical Exchange, TSPA, TSPAI, Volcanism  
Package Number:  
Document Date Received:  
Date Docketed:  
Related Date: 6/6/2000  
Comment: Rose Conn-Holden  
Vital Records Category: No  
Document Status: Draft  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: No  
Date to be Released: 8/19/2003  
Distribution List Codes:  
Contact Person: Firth J R  
Text Source Flag: OCR'd from scanned image - no corrections made  
Document Sensitivity: Non-Sensitive  
File Name: S107263.pdf  
File Size: 345841

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Accession Number: ML061600242  
Estimated Page Count: 4  
Document Date: 6/8/2006  
Document Type: Committee Letter Report  
Availability: Publicly Available  
Title: Future Volcanism at Yucca Mountain - Comments on the Igneous Intrusion Scenario  
Author Name: Ryan M T  
Author Affiliation: NRC/ACNW  
Addressee Name: Diaz N J  
Addressee Affiliation: NRC  
Docket Number: WM-00011  
License Number:  
Case/Reference Number: WH 137J  
Document/Report Number: R-0240  
Keyword: 170th ACNW Meeting, Future Volcanism, igneous intrusion scenario, SUNSI Review Complete, Yucca Mountain

Package Number:  
Document Date Received:  
Date Docketed:  
Related Date:  
Comment:  
Vital Records Category: No  
Document Status:  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: ACNW  
Date to be Released: 6/22/2006  
Distribution List Codes:  
Contact Person: Coleman N M, 301-415-7656  
Text Source Flag: Native Application  
Document Sensitivity: Non-Sensitive  
File Name: ML061600242.pdf  
File Size: 180735

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Accession Number: ML061640308  
Estimated Page Count: 3  
Document Date: 6/9/2006  
Document Type: Committee Letter Report  
Availability: Publicly Available  
Title: Future Volcanism at Yucca Mountain - Comments on the NRC Staff Model for the Fluvial Redistribution of Volcanic Tephra  
Author Name: Ryan M T  
Author Affiliation: NRC/ACNW  
Addressee Name: Diaz N J  
Addressee Affiliation: NRC  
Docket Number: WM-00011  
License Number:  
Case/Reference Number: WH 137J  
Document/Report Number: R-0243  
Keyword: 170th ACNW Meeting, Fluvial Redistribution of Volcanic Tephra, Future Volcanism, NRC Staff Model, SUNSI Review Complete, Yucca Mountain  
Package Number:  
Document Date Received:  
Date Docketed:  
Related Date:  
Comment:  
Vital Records Category: No  
Document Status:  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: ACNW  
Date to be Released: 6/22/2006  
Distribution List Codes:  
Contact Person: Coleman N 415-7656  
Text Source Flag: Native Application  
Document Sensitivity: Non-Sensitive  
File Name: ML061640308.pdf  
File Size: 473115

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Accession Number: ML063250235  
Estimated Page Count: 12  
Document Date: 11/13/2006  
Document Type: Memoranda, Trip Report  
Availability: Publicly Available  
Title: Attendance at US Nuclear Waste Technical Review Board (US NWTRB) Workshop on Localized Corrosion of Alloy 22 in Yucca Mountain Environments, and Workshop 3 of the Probabilistic Volcanic Hazard Analysis Update (PVHA-U) for Yucca Mountain.  
Author Name: Snodderly M R  
Author Affiliation: NRC/ACNW, NRC/ACRS  
Addressee Name: Larkins J T  
Addressee Affiliation: NRC/ACNW, NRC/ACRS  
Docket Number: WM-00011  
License Number: PRE  
Case/Reference Number: -nr, WH 112, WH 133  
Document/Report Number:  
Keyword: ACRS/ACNW-003, jef1, laf1, oarc20070112dam=Added -nr to case/reference, SUNSI Review Complete, Yucca Mountain, NWTRB, Volcanism, Corrosion  
Package Number:  
Document Date Received:  
Date Docketed:  
Related Date: 9/25/2006  
Comment:  
Vital Records Category: No  
Document Status:  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: No  
Date to be Released: 11/30/2006  
Distribution List Codes:  
Contact Person: Coleman NM, ACRS, 301-415-7656  
Text Source Flag: Native Application  
Document Sensitivity: Non-Sensitive  
File Name: ML063250235.pdf  
File Size: 1056940

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Accession Number: ML063530748  
Estimated Page Count: 165  
Document Date: 12/19/2006  
Document Type: Report, Technical  
Availability: Publicly Available  
Title: DRAFT Report - Volcanism White Paper  
Author Name: Coleman N  
Author Affiliation: NRC/ACNW  
Addressee Name:  
Addressee Affiliation:  
Docket Number:  
License Number:  
Case/Reference Number: Yucca Mountain  
Document/Report Number:



Keyword: SUNSI Review Complete, Yucca Mountain, Volcanism, probability, consequences  
Package Number:  
Document Date Received:  
Date Docketed:  
Related Date:  
Comment:  
Vital Records Category: No  
Document Status:  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: ACNW  
Date to be Released: 12/20/2006  
Distribution List Codes:  
Contact Person: Coleman, N. 301-415-7656  
Text Source Flag: Native Application  
Document Sensitivity: Non-Sensitive  
File Name: ACNW Draft White Paper Igneous Activity at Yucca Mtn Dec 19 2006.pdf  
File Size: 12986368

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Accession Number: ML070110594  
Estimated Page Count: 3  
Document Date: 12/29/2006  
Document Type: Letter  
Availability: Publicly Available  
Title: Letter to Stakeholders (E-mail) - Transmittal of Draft White Paper on Igneous Activity at Yucca Mountain, and Invitation to ACNW's Working Group Meeting on the "State of Knowledge Regarding Potential Igneous Activity at Yucca Mountain."  
Author Name: Larkins J T  
Author Affiliation: NRC/ACNW  
Addressee Name:  
Addressee Affiliation:  
Docket Number: WM-00011  
License Number: PRE  
Case/Reference Number: -nr, WH 133  
Document/Report Number:  
Keyword: ACRS/ACNW-003, laf1, nxp, oarc20070627rbs=Added -nr to case/reference, SUNSI Review Complete, Volcanism Yucca Mountain White Paper  
Package Number: ML070110520  
Document Date Received:  
Date Docketed:  
Related Date:  
Comment:  
Vital Records Category: No  
Document Status:  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: ACNW  
Date to be Released: 3/30/2007  
Distribution List Codes:  
Contact Person: Coleman NM, ACNW, 301-415-7656  
Text Source Flag: Native Application  
Document Sensitivity: Non-Sensitive

File Name: ML070110594.pdf  
File Size: 74584

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Accession Number: ML070120262  
Estimated Page Count: 3  
Document Date: 12/29/2006  
Document Type: Letter  
Availability: Publicly Available  
Title: Letter to Mr. R. Loux: Transmittal of Draft White Paper on Igneous Activity at Yucca Mountain, and Invitation to ACNW's Working Group Meeting on the "State of Knowledge Regarding Potential Igneous Activity at Yucca Mountain."  
Author Name: Larkins J T  
Author Affiliation: NRC/ACNW  
Addressee Name: Loux R R  
Addressee Affiliation: State of NV, Agency for Nuclear Projects, State of NV, Office of the Governor  
Docket Number: WM-00011  
License Number: PRE  
Case/Reference Number: WH 133  
Document/Report Number:  
Keyword: ACRS/ACNW-003, laf1, nxp, SUNSI Review Complete, Volcanism Yucca Mountain White Paper  
Package Number: ML070110520  
Document Date Received:  
Date Docketed:  
Related Date:  
Comment:  
Vital Records Category: No  
Document Status:  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: ACNW  
Date to be Released: 3/30/2007  
Distribution List Codes:  
Contact Person:  
Text Source Flag: Native Application  
Document Sensitivity: Non-Sensitive  
File Name: ML070120262.pdf  
File Size: 73587

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Accession Number: ML070170245  
Estimated Page Count: 3  
Document Date: 12/29/2006  
Document Type: Letter  
Availability: Publicly Available  
Title: Letter to Mr. Sproat: Transmittal of Draft White Paper on Igneous Activity at Yucca Mountain, and Invitation to ACNW's Working Group Meeting on the "State of Knowledge Regarding Potential Igneous Activity at Yucca Mountain."  
Author Name: Larkins J T  
Author Affiliation: NRC/ACNW  
Addressee Name: Sproat E F  
Addressee Affiliation: US Dept of Energy, Office of Civilian Radioactive Waste Mgmt (OCRWM)  
Docket Number: WM-00011

License Number: PRE  
Case/Reference Number: -nr, WH 133  
Document/Report Number:  
Keyword: ACRS/ACNW-003, laf1, nxp, oarc20070627rbs=Added -nr to case/reference, SUNSI Review Complete, Volcanism Yucca Mountain White Paper  
Package Number: ML070110520  
Document Date Received:  
Date Docketed:  
Related Date:  
Comment:  
Vital Records Category: No  
Document Status:  
Media Type: Electronic  
Physical File Location: ADAMS  
FACA Document: No  
Date to be Released: 3/30/2007  
Distribution List Codes:  
Contact Person: Coleman NM, ACNW, 301-415-7656  
Text Source Flag: Native Application  
Document Sensitivity: Non-Sensitive  
File Name: ML070170245.pdf  
File Size: 58508

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I hope you will find this information to be useful.

Adam  
Technical Librarian  
Public Document Room  
Nuclear Regulatory Commission  
(301) 415-4737  
(800) 397-4209  
(301) 415-3548 (FAX)  
PDR.Resource@nrc.gov  
<http://www.nrc.gov/reading-rm/pdr.html>  
[8:00am - 4:00pm, Eastern Time, Monday - Friday]

**From:** lakosh@gci.net [mailto:lakosh@gci.net]  
**Sent:** Wednesday, February 04, 2009 10:29 AM  
**To:** PDR Resource  
**Subject:** RE: questions about your NRC document request

Karen;

With assistance of Adam, I finally replicated the search you suggested below for Long Valley but the documents have nothing to do with the Long Valley super volcano in California and are instead referencing the long term disposition of the West Valley reprocessing plant in New York. Adam said he

would continue to work on the document search and send me some relevant results. Would you please coordinate with him regarding the search for relevant documents? Tom (907) 563-7380

**From:** PDR Resource [mailto:PDR.Resource@nrc.gov]  
**Sent:** Friday, January 30, 2009 11:56 AM  
**To:** lakosh@gci.net  
**Subject:** RE: questions about your NRC document request

Tom,

I have only come up with a few things, but I wanted to get back to you before we leave for the day.

I have also forwarded your e-mail to the NRC Office of Public Affairs ([opa.resource@nrc.gov](mailto:opa.resource@nrc.gov) ; 301-415-8200), asking for an expert on this topic. OPA has a list of technical experts in the agency. So I will let you know if I hear back from them.

There are 23 publicly available documents in ADAMS with Long Valley in the Title. Nothing came up when I searched Yellowstone. Here is how I searched the documents with Long Valley in Title - some may be helpful in your search.

Begin at Web-based ADAMS, <http://www.nrc.gov/reading-rm/adams/web-based.html> .  
Click on "Begin ADAMS Search", and then on "Advanced Search".  
In the Title field, enter Long Valley (with no quotes).  
Click Search.  
You should see a list of 23 document titles.

To view the official agency record, you will need to click on the PDF Image File, not the linked title.

There may also be documents on this topic in the Energy Citations Database from the Department of Energy, at <http://www.osti.gov/energycitations/index.jsp> .

Search in their Fielded Search at <http://www.osti.gov/energycitations/advancedsearch.jsp> .  
Example searches I did was the term Yellowstone and Long Valley (as separate searches) in the Title field.

I will let you know what I find out from the Office of Public Affairs staff, and please let me know if you have any questions on searching ADAMS or need more information. So far, I also could not locate any documents in the microfiche.

Thanks.

Sincerely,  
Karen  
USNRC/PDR  
301-415-4737  
[pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov)

**From:** lakosh@gci.net [mailto:lakosh@gci.net]  
**Sent:** Friday, January 30, 2009 12:31 PM  
**To:** PDR Resource  
**Subject:** RE: questions about your NRC document request

Karen;

That sounds like a reasonable process as if there were documents generated in the ADAMS time frame they would be most relevant. I've already done multiple searches using "volcanic ash", modified by reactor and similar searches but could only find reference to dispersion of waste from the volcano below Yucca Mt. I may have missed some documents but I suspect that if any relevant studies were done, they pre-dated the commissioning of most of our existing reactors. Please call ASAP anytime, 24/7, if you find a relevant publication as Fred is waiting on me to proceed with a 2.206 and/or a 2.802 review of the need for additional mitigation efforts. Tom (907) 563-7380

**From:** PDR Resource [mailto:PDR.Resource@nrc.gov]  
**Sent:** Friday, January 30, 2009 5:48 AM  
**To:** lakosh@gci.net  
**Subject:** questions about your NRC document request

Tom,

I have read the e-mails below, and am working on answering your request for documents regarding the risk/probability of catastrophic eruptions from Yellowstone and Long Valley and their potential effect on reactor operations.

Are you interested in recent documents? Do you have a specific time-frame in mind? Please let me know if there are specific years, so I can narrow down my search.

The reason I ask is because our microfiche collection pre-dates ADAMS, the Agencywide Documents Access and Management System at <http://www.nrc.gov/reading-rm/adams.html>, which came online on November 1, 1999. However, some documents dated before this date have been scanned into ADAMS.

The easiest way to search ADAMS is via the Web-based search, at <http://www.nrc.gov/reading-rm/adams/web-based.html>.

There is a different database we search for documents in our microfiche collection. Our copy service contractor copies our microfiche, and other documents, for the public. Information about our copy service is at <http://www.nrc.gov/reading-rm/pdr/copy-service.html> and at <http://www.nrc.gov/reading-rm/pdr/fee-schedule.html>.

I will begin by searching ADAMS for electronic documents on your topic. If you would like me to search our microfiche collection as well (that goes back to at least 1975), please also me know.

Thanks, and sorry about the delay in getting back to you.

Sincerely,  
Karen  
Librarian

USNRC Public Document Room  
301-415-4737; 1-800-397-4209  
(8 am - 4 pm, Eastern Time, Mon-Fri)  
[pdr.resource@nrc.gov](mailto:pdr.resource@nrc.gov)

**From:** lakosh@gci.net [mailto:lakosh@gci.net]  
**Sent:** Tuesday, January 27, 2009 11:53 AM  
**To:** PDR Resource  
**Subject:** ATTN: Karen FW: Rulemaking

Dear Karen;

You'll find discussion of the pertinent issue below. Mr. Lyon contended that the NRC concluded that the probability of a super eruption was too low to require planning for such events but later said he was unaware of any probability/risk analysis done on this topic. I would like to review any documents considered by the NRC regarding the risk/probability of catastrophic eruptions from Yellowstone and Long Valley and their potential effect on reactor operations. Tom (907) 563-7380

**From:** Tom Lakosh [mailto:lakosh@gci.net]  
**Sent:** Friday, January 23, 2009 7:39 AM  
**To:** 'Fred Lyon'  
**Subject:** RE: Rulemaking

Mr. Lyon;

My decision on which process to pursue, 2.206 and/or 2.802, will depend largely on the pertinent information requested in our conversation regarding the risk assessment of super eruptions from Yellowstone or Long Valley and the mitigation measures appropriate to such events. I am still unsure of the extent of effects on reactor operations and the applicable regulations and guidelines that control such operations. While the potential impact to the ultimate heat sink regulations is clear, the other potential impacts, (e.g. availability of plant consumables and retention/accommodation of personnel, etc.), could be far reaching both in terms of geographic and mitigation requirements given such a catastrophic event. I could envision proceeding with both administrative procedures where both immediate orders to resolve the probability issue is warranted and new regulations to address design issues would be applicable as well. I hope we can discuss the ramifications to a greater extent and assess the reliability of the risk assessment that have been performed to date and any need to update those assessments given subsequent dynamic events that may have altered the prior assessment scope and/or parameters. Tom (907) 563-7380

**From:** Fred Lyon [mailto:Fred.Lyon@nrc.gov]  
**Sent:** Friday, January 23, 2009 6:53 AM  
**To:** lakosh@gci.net  
**Subject:** Rulemaking

Mr. Lakosh, based on your telephone call to me this morning, I recommend you refer to the NRC webpage <http://www.nrc.gov/about-nrc/regulatory/rulemaking.html> for links that discuss the rulemaking process. I will call you back to discuss your decision as to whether to proceed with the 2.206 process. Thanks, Fred Lyon

**From:** Tom Lakosh [mailto:lakosh@gci.net]  
**Sent:** Wednesday, December 31, 2008 7:32 PM  
**To:** 'allegation@nrc.gov'  
**Cc:** 'ucs@ucsusa.org'  
**Subject:** Reserve water for extended blow down

Dear NRC;

The earthquakes at Yellowstone Lake continue in a pattern suggesting that a highly pressurized chimney has developed between the surface and a depth of 7.2 km. If the worst case scenario ensues, dozens of plants will have to cease utilization of surface water within hours and clean reserve cooling water to replace steam lost in blow downs and evaporation at spent fuel storage ponds extending for months on end will be very hard to come by. I might suggest an order by the NRC to all operating US reactors detailing the threat and requiring immediate acquisition of sufficient temporary water storage, water filtration systems and pumps with spare parts to accommodate the loss of direct access to surface water for a period of no less than three months. Arrangements should be made in advance with local pumping and firefighting assets to fill the acquired water storage in a timely manner should notice of eruption be issued. If the dreaded event happens in short order, it will be necessary for the NRC to obtain cooperation of the USCG to seize all available tank vessels for diversion to nuclear facilities to provide the required clean water storage. I've supplied some links to storage bladders below but full reserve capacity may not be needed where the use of several large bladders may permit sufficient settling time for stored ash-contaminated water augmented by a filtration process between two of the bladders. If time allows, the bedding for all pillow tanks should be established for all plants West of the Mississippi and pre-positioning of some of the tanks with emergency contracts with construction equipment for additional bed preparation should be maintained elsewhere. If towable/floating tanks are acquired, no bedding is required but anchor systems should be pre-positioned to allow for timely deployment/filling of the bladders.

Sincerely, Tom Lakosh (907) 563-7380

[http://www.canflexinc.com/ocean\\_towable\\_bladders\\_en.cfm](http://www.canflexinc.com/ocean_towable_bladders_en.cfm)  
<http://www.mpccontainment.com/military-applications.shtml?gclid=CKvu4vy17JcCFSAUagod5FUnEA>  
[http://www.bergco.com/integrated\\_systems/products/khcms\\_tanksdivision\\_largecapacitybladder.aspx](http://www.bergco.com/integrated_systems/products/khcms_tanksdivision_largecapacitybladder.aspx)  
[http://www.interstateproducts.com/fuel\\_storage\\_bladders.htm](http://www.interstateproducts.com/fuel_storage_bladders.htm)  
<http://www.musthane.com/english/products/tanks-muststore.htm>  
[http://store.interstateproducts.com/water\\_bladders.htm?gclid=CNTd46O57JcCFQ8Qagodlw8UEA](http://store.interstateproducts.com/water_bladders.htm?gclid=CNTd46O57JcCFQ8Qagodlw8UEA)

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**From:** Tom Lakosh [mailto:lakosh@gci.net]  
**Sent:** Tuesday, December 30, 2008 7:47 AM  
**To:** 'allegation@nrc.gov'  
**Cc:** 'ucs@ucsusa.org'  
**Subject:** Shutdown after Yellowstone eruption

Dear NRC;

Would please quickly devise a plan for immediate systematic shutdown and cooling of all reactors that may be downwind of a major Yellowstone caldera eruption? I am concerned that water pumps will not survive for long with significant ash contamination in feed water and there should be a plan to dissipate latent heat in reactor cores and spent fuel storage given a fairly short pump lifetime after ash fall. While the quakes listed below may not be anything more than hydrothermal indigestion, the long term and wide spread radioactive contamination from a failure to properly plan for multiple ash-induced water pump failures is too catastrophic to evade a modicum of preparatory planning.

Sincerely, Tom Lakosh (907) 563-7380

**Update time = Tue Dec 30 16:18:40 UTC 2008**

Here are the earthquakes in the [Map Centered at 44°N, 110°W area](#), most recent at the top.

(Some early events may be obscured by later ones.)

Click on the underlined portion of an earthquake record in the list below for more information.

<u>MAG</u>	<u>UTC DATE-TIME</u> <u>y/m/d h:m:s</u>	<u>LAT</u> <u>deg</u>	<u>LON</u> <u>deg</u>	<u>DEPTH</u> <u>km</u>	<u>LOCATION</u>
<a href="#">MAP</a> 2.4	<a href="#">2008/12/30 11:59:07</a>	<a href="#">44.523</a>	<a href="#">-110.401</a>	<a href="#">10.3</a>	58 km ( 36 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.7	<a href="#">2008/12/30 01:35:08</a>	<a href="#">44.530</a>	<a href="#">-110.361</a>	<a href="#">2.1</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.5	<a href="#">2008/12/30 01:15:37</a>	<a href="#">44.522</a>	<a href="#">-110.360</a>	<a href="#">2.1</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 2.1	<a href="#">2008/12/30 00:51:20</a>	<a href="#">44.505</a>	<a href="#">-110.373</a>	<a href="#">0.2</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.0	<a href="#">2008/12/30 00:41:35</a>	<a href="#">44.522</a>	<a href="#">-110.361</a>	<a href="#">1.8</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 2.8	<a href="#">2008/12/30 00:36:39</a>	<a href="#">44.525</a>	<a href="#">-110.362</a>	<a href="#">1.2</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 2.4	<a href="#">2008/12/29 21:25:15</a>	<a href="#">44.525</a>	<a href="#">-110.360</a>	<a href="#">2.0</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.6	<a href="#">2008/12/29 21:18:51</a>	<a href="#">44.521</a>	<a href="#">-110.362</a>	<a href="#">2.2</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.8	<a href="#">2008/12/29 21:18:36</a>	<a href="#">44.522</a>	<a href="#">-110.359</a>	<a href="#">2.1</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 2.9	<a href="#">2008/12/29 20:38:25</a>	<a href="#">44.514</a>	<a href="#">-110.381</a>	<a href="#">2.1</a>	60 km ( 37 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 2.3	<a href="#">2008/12/29 20:38:04</a>	<a href="#">44.511</a>	<a href="#">-110.385</a>	<a href="#">2.3</a>	60 km ( 37 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.0	<a href="#">2008/12/29 20:26:29</a>	<a href="#">44.520</a>	<a href="#">-110.355</a>	<a href="#">2.2</a>	62 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.9	<a href="#">2008/12/29 20:14:26</a>	<a href="#">44.498</a>	<a href="#">-110.364</a>	<a href="#">2.3</a>	62 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.4	<a href="#">2008/12/29 20:13:31</a>	<a href="#">44.508</a>	<a href="#">-110.359</a>	<a href="#">2.2</a>	62 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 2.2	<a href="#">2008/12/29 19:56:46</a>	<a href="#">44.522</a>	<a href="#">-110.365</a>	<a href="#">1.2</a>	61 km ( 38 mi) ESE of West Yellowstone, MT
<a href="#">MAP</a> 1.2	<a href="#">2008/12/29 19:53:50</a>	<a href="#">44.511</a>	<a href="#">-110.377</a>	<a href="#">2.2</a>	60 km ( 37 mi) ESE of West



[MAP1.1](#) [2008/12/29 19:46:1344.515-110.3862.4](#)

[MAP1.7](#) [2008/12/29 19:44:5044.525-110.3730.0](#)

[MAP1.7](#) [2008/12/29 19:40:2744.511-110.3792.5](#)

[MAP2.4](#) [2008/12/29 19:37:0744.502-110.3661.8](#)

[MAP1.2](#) [2008/12/29 19:36:0844.521-110.3852.0](#)

[MAP1.7](#) [2008/12/29 19:35:2744.511-110.3852.4](#)

[MAP2.9](#) [2008/12/29 19:29:3844.513-110.3810.5](#)

[MAP2.5](#) [2008/12/29 19:28:5544.515-110.3810.0](#)

[MAP1.8](#) [2008/12/29 19:26:2144.519-110.3702.0](#)

[MAP1.5](#) [2008/12/29 19:24:4344.520-110.3422.3](#)

[MAP3.3](#) [2008/12/29 19:14:4944.521-110.3691.8](#)

[MAP1.2](#) [2008/12/29 18:47:4544.523-110.3712.1](#)

[MAP1.4](#) [2008/12/29 18:40:0044.533-110.3594.8](#)

[MAP1.1](#) [2008/12/29 16:32:1244.494-110.3602.4](#)

[MAP1.6](#) [2008/12/29 16:31:5544.491-110.3602.3](#)

[MAP1.2](#) [2008/12/29 16:15:2844.480-110.3632.3](#)

[MAP1.5](#) [2008/12/29 14:58:3744.486-110.3541.3](#)

[MAP1.7](#) [2008/12/29 10:25:1844.523-110.3712.4](#)

[MAP1.8](#) [2008/12/29 09:14:0444.527-110.3760.3](#)

[MAP2.4](#) [2008/12/29 08:57:5544.527-110.3780.5](#)

[MAP2.4](#) [2008/12/29 08:28:2444.527-110.3820.4](#)

[MAP2.0](#) [2008/12/29 05:30:3544.517-110.3721.0](#)

[MAP2.3](#) [2008/12/29 05:30:0444.477-110.3496.5](#)

[MAP1.7](#) [2008/12/29 05:29:2344.489-110.3544.2](#)

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[MAP2.4](#) [2008/12/29 05:23:3644.516-110.3616.4](#)

[MAP1.9](#) [2008/12/29 04:29:1844.522-110.3851.0](#)

[MAP2.8](#) [2008/12/29 04:25:5344.514-110.3700.1](#)

[MAP2.6](#) [2008/12/28 23:57:5644.521-110.3711.4](#)

[MAP2.0](#) [2008/12/28 23:08:2544.491-110.3901.7](#)

[MAP3.1](#) [2008/12/28 19:55:1744.511-110.3530.7](#)

[MAP3.0](#) [2008/12/28 19:32:1544.511-110.3562.7](#)

[MAP2.8](#) [2008/12/28 15:37:4044.514-110.3590.0](#)

[MAP2.2](#) [2008/12/28 09:25:1444.508-110.3641.9](#)

[MAP3.2](#) [2008/12/28 09:23:5744.511-110.3610.4](#)

[MAP1.5](#) [2008/12/28 08:41:3344.509-110.3592.5](#)

[MAP2.2](#) [2008/12/28 08:23:4144.506-110.3690.1](#)

[MAP1.1](#) [2008/12/28 08:22:4644.499-110.3622.5](#)

[MAP1.3](#) [2008/12/28 08:22:2444.499-110.3612.3](#)

[MAP1.7](#) [2008/12/28 08:15:3344.499-110.3642.1](#)

[MAP1.0](#) [2008/12/28 08:14:5844.501-110.3805.3](#)

[MAP1.9](#) [2008/12/28 07:16:1344.513-110.3742.0](#)

[MAP2.5](#) [2008/12/28 07:15:1844.495-110.3590.0](#)

[MAP2.5](#) [2008/12/28 06:37:4144.492-110.3562.6](#)

[MAP2.0](#) [2008/12/28 06:37:2044.497-110.3792.1](#)

[MAP1.9](#) [2008/12/28 05:28:4944.498-110.3832.3](#)

[MAP1.9](#) [2008/12/28 05:28:0544.485-110.3712.5](#)

[MAP1.8](#) [2008/12/28 05:26:1444.484-110.3592.0](#)

[MAP1.2](#) [2008/12/28 05:26:0344.470-110.3555.2](#)

[MAP1.3](#) [2008/12/28 05:24:3944.489-110.3594.1](#)

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[MAP2.8](#) [2008/12/28 05:23:5444.489-110.3542.5](#)

[MAP1.9](#) [2008/12/28 05:21:1644.480-110.3444.0](#)

[MAP1.7](#) [2008/12/28 05:20:1044.494-110.3792.4](#)

[MAP1.6](#) [2008/12/28 05:19:1144.492-110.3722.2](#)

[MAP3.9](#) [2008/12/28 05:15:5644.502-110.3660.3](#)

[MAP2.6](#) [2008/12/28 00:08:5044.493-110.3540.4](#)

[MAP3.3](#) [2008/12/27 22:30:0344.498-110.3584.3](#)

[MAP1.5](#) [2008/12/27 22:28:5344.500-110.3682.1](#)

[MAP1.8](#) [2008/12/27 22:27:3644.499-110.3672.5](#)

[MAP1.0](#) [2008/12/27 21:28:0644.500-110.3623.5](#)

[MAP1.6](#) [2008/12/27 21:22:0844.495-110.3722.6](#)

[MAP2.1](#) [2008/12/27 21:08:4944.496-110.3702.0](#)

[MAP3.2](#) [2008/12/27 20:26:2744.505-110.3642.4](#)

[MAP3.5](#) [2008/12/27 20:17:3344.488-110.3574.1](#)

[MAP2.3](#) [2008/12/27 18:56:3544.484-110.3670.5](#)

[MAP3.0](#) [2008/12/27 18:23:0744.495-110.3642.8](#)

[MAP2.0](#) [2008/12/27 18:21:3644.493-110.3627.2](#)

[MAP1.2](#) [2008/12/27 17:01:4644.484-110.3732.4](#)

[MAP2.7](#) [2008/12/27 17:01:0744.490-110.3661.2](#)

[MAP2.6](#) [2008/12/27 16:30:5444.498-110.3622.5](#)

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