



UNITED STATES  
NUCLEAR REGULATORY COMMISSION

WASHINGTON, D.C. 20555-0001

November 2, 1999

Mr. Stephen D. Page, Director  
Office of Radiation and Indoor Air  
U.S. Environmental Protection Agency  
Washington, DC 20460

Dear Mr. Page:

This letter provides the comments of the U.S. Nuclear Regulatory Commission (NRC) staff on the Notice of Proposed Rulemaking, "Environmental Radiation Protection Standards for Yucca Mountain, Nevada" (64 FR 46976) at proposed 40 CFR Part 197. As the Agency responsible for licensing a possible repository at Yucca Mountain, Nevada, the NRC is concerned that the standards exhibit a sound scientific and technical basis and that the need for the standards adopted be fully justified on health and safety grounds. The NRC staff disagrees with the need for, and health and safety basis of, some of the requirements in the proposed standards. In addition, the NRC staff is concerned that EPA has not provided any analysis of the costs and benefits of its approach to regulating radioactive waste disposed at Yucca Mountain. The staff's objections to the proposed standards are given below and in the enclosure to this letter.

**1. The NRC staff objects to the inclusion of separate ground-water protection requirements for the proposed repository at Yucca Mountain because these requirements would result in non-uniform risk levels, they misapply the Maximum Contaminant Levels for radionuclides, and they far exceed what is needed for protection of public health and safety.**

Although Maximum Contaminant Levels (MCLs) may have been considered reasonable standards during their development in 1975, current understanding of the risk posed to individual organs by radiation exposure demonstrates that the MCLs for individual radionuclides provide a level of protection that varies significantly. For example, consider the annual risk of developing a fatal cancer from drinking water that contains Neptunium-237 (Np-237) and Iodine-129 (I-129) at their respective MCL. The risk of developing a fatal cancer from ingestion of Np-237 at its MCL is 30 chances in 1,000,000 ( $3 \times 10^{-5}$ ), while the risk from ingestion of I-129 at its MCL is 0.07 chance in 1,000,000 ( $7 \times 10^{-8}$ ). More than a four-hundred fold difference exists between the risk levels prescribed for these two radionuclides. Therefore, this simple comparison shows an application of MCLs that results in non-uniform risk levels which are likely to lead to greater confusion about the level of risk which is acceptable and attainable, rather than confidence that the health and safety of the public are being protected. It is our understanding that there are no EPA efforts currently underway to modify the MCLs to ensure a uniform risk level.

The EPA does not demonstrate a need for such an overly conservative, separate groundwater limit to protect public health and safety. The all-pathway dose limit, by definition, ensures that risks from all radionuclides and all exposure pathways, including the groundwater pathway, are acceptable and protective. All radionuclides and all exposure pathways will have to be acceptably evaluated at Yucca Mountain, and will have to meet an individual protection standard that is fully protective of public health and

safety and the environment. Therefore, the proposed standard should not contain separate ground-water protection requirements because they are unnecessary for protection of public health and safety and because they lead to inconsistent and unreconcilable results as described above, which we believe will cause confusion and diminish rather than enhance public confidence that adequately protective limits have been established.

Certain MCLs maintain a risk level so small that the individual, all-pathway dose limit is meaningless. EPA has proposed an annual, individual dose limit of 0.15 mSv (15 mrem) which is equivalent to an annual risk of developing a fatal cancer of 9 chances in 1,000,000 ( $9 \times 10^{-6}$ ).<sup>1</sup> The MCL for I-129 (annual risk of 0.07 chance in 1,000,000) is more than 100 times below the risk of the individual dose limit. Consequently, the groundwater protection criteria become the de facto standards instead of the individual protection limit called for by the Energy Policy Act of 1992 (EnPA - Public Law 102-486).

The EPA's current proposal is a continuation of EPA's practice of using the MCLs without appropriate justification. Specifically, EPA would have NRC require that groundwater in the vicinity of Yucca Mountain meet EPA's MCL, originally established to implement the Safe Drinking Water Act (SDWA). The MCLs were based on an analysis of treating contaminated water in public drinking water systems subject to the SDWA and not on an analysis of technology and costs of remediating groundwater at actual sites. In this rule, EPA proposes to apply the same MCLs to groundwater supplies before treatment rather than "at the tap" after treatment. Therefore, in the absence of an appropriate and comprehensive cost-benefit analysis, EPA should not require the expenditure of potentially significant amounts of taxpayer money to prevent potential contamination of groundwater that may require treatment prior to use anyway. Instead, EPA's standards should permit a decision to spend much smaller sums for water treatment in the event that such contamination should occur. Finally, EPA's application of MCLs at DOE's Waste Isolation Pilot Plant (WIPP) site in New Mexico should not be considered a precedent for the Yucca Mountain site since the WIPP site is located in a salt formation and lacks potable groundwater making the application of MCLs irrelevant.

Furthermore, the NRC staff is troubled by the discussion of ground-water protection that suggests additional options that are not representative of ground-water conditions at Yucca Mountain and further increase the conservatism in applying these unnecessary separate requirements. The preamble to the standard requests comment on alternative dilution volumes that are extremely small (e.g. 10 and 120 acre-feet). These dilution volumes are not reflective of the resource to be protected (the EPA states the representative volumetric flow is 4000 acre-ft/year for the sub-basin in which the proposed repository is located). The standard also requests comment on alternative locations for determining compliance (e.g., 5 kilometers) that are similarly not reflective of the resource. As explained in connection with the compliance location for the individual protection (e.g., 20 kilometers), cautious and reasonable assumptions for

---

<sup>1</sup> This value was calculated by EPA's use of NCRP Report No. 126 risk value of  $6 \times 10^{-2}$  health effects per Sievert (Sv) [ $6 \times 10^{-4}$  health effects per rem] and the NAS recommendations for an annual risk limit.

lifestyles and the practicality of obtaining water provide no basis for identifying the 5 kilometer location for protection of ground water.

Is there a better approach? Yes. An individual, all-pathway dose limit of 0.25 mSv (25 mrem) total effective dose equivalent (TEDE) properly accounts for the radiation sensitivity of individual organs, and ensures the risks from all radionuclides and all exposure pathways are acceptable and protective.

**2. The NRC staff objects to those portions of the proposed standard that address technical matters of compliance determination and implementation - matters which Congress has assigned to the NRC, not to the EPA.**

In the proposed rule, there are many requirements where the EPA has inappropriately assumed the Commission's responsibility. For example, the EPA introduces a new term, "reasonable expectation," in place of the Commission's term, "reasonable assurance." Confidence that the U.S. Department of Energy (DOE) has or has not demonstrated compliance with the EPA's standards is the essence of NRC's licensing process, and is the Commission's responsibility. The NRC has effectively used "reasonable assurance" in licensing a variety of atomic energy activities. The reasonable assurance standard is derived from the finding the Commission is required to make under the Atomic Energy Act that the licensed activity provides "adequate protection" to the health and safety of the public; the standard has been approved by the Supreme Court. Power Reactor Development Co. v. Electrical Union, 367 U.S. 396, 407 (1961). This standard, in addition to being commonly used and accepted in the Commission's licensing activities, allows the flexibility necessary for the Commission to make judgmental distinctions with respect to quantitative data which may have large uncertainties. The NRC staff has incorporated this concept of reasonable assurance in its development of implementing regulations for Yucca Mountain (Proposed 10 CFR Part 63).

A second example is the EPA's requirement that the dose should be calculated to the "reasonably maximally exposed individual" (RMEI). The RMEI is the EPA's proposal of a technical criterion for determining whether the standard will achieve its purpose of protecting the individuals most likely to receive doses from any releases from the repository. The RMEI is untested in NRC's licensing process, and involves a matter of implementation within the NRC's statutory responsibilities. The NRC staff, consistent with the National Academy of Science (NAS) recommendations and international practice, intends to use the "average member of the critical group" approach to determine the population that should be the focus in implementation of the individual protection standard. The EPA should conform to the recommendations of the NAS and international practice by adopting the use of the "average member of the critical group." [Comments on other examples of the EPA's intrusion into implementation matters are provided in the Enclosure to this letter.]

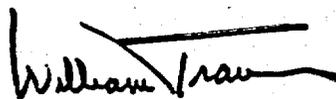
**3. The NRC staff objects to the imposition of a 0.15 mSv (15 mrem) per year individual dose limit from all pathways, because this lower dose limit will unnecessarily increase the conservatism of the dose assessment.**

An annual all-pathways individual dose limit of 0.25 mSv (25 mrem) is fully protective of public health and safety and is a suitable standard for a potential repository at Yucca Mountain. The 0.25 mSv/year (25 mrem/year) limit represents a small fraction of the national and international public dose limit of 1 mSv/year (100 mrem/year) and provides a level of radiation protection that is consistent with our and EPA's regulations for related activities (e.g., low-level, high-level, and transuranic waste management, storage, and disposal; spent fuel storage and disposal). Although the EPA rule proposes a lower limit of 0.15 mSv (15 mrem), and the difference between 0.15 and 0.25 mSv (15 and 25 mrem) is small, the lower value is not necessary for protection of public health and safety and would provide little, if any, reduction in health risk when compared with 0.25 mSv (25 mrem). It is also important to consider that the average American receives approximately 3 mSv/yr (300 mrem/yr) from natural background radiation. In addition to the lack of public health and safety benefit, there are regulatory concerns associated with lowering the dose limit to 0.15 mSv (15 mrem). Specifically, as the dose limit becomes smaller, limitations in the DOE's models used for estimating performance, and the associated uncertainties in supporting analyses, become more pronounced. Further, a 0.15 mSv (15 mrem) dose limit is likely to cause unnecessary confusion for the public and cause the NRC to expend resources without a commensurate increase in public health and safety.

In addition to the above objections to provisions proposed in 40 CFR Part 197, the NRC staff also provides responses to the EPA's solicitation for input on specific questions annotated in Section IV of the "Supplementary Information" text. These responses are provided in the enclosure to this letter.

In summary, the NRC staff believes there are fundamental flaws in the proposed rule which EPA should reconsider before finalizing the rule. Moreover, many of the requirements in the proposed rule will, if included in the final rule, add significant cost and burden to the DOE license application process and significantly increase the complexity of the NRC's licensing process without a commensurate, if any, increase in the protection of public health and safety and the environment. The NRC staff will attend the EPA-sponsored public meetings on the proposed Yucca Mountain Standard and may provide further comments, if warranted.

Sincerely,



William D. Travers  
Executive Director  
for Operations

Enclosure: Additional Comments

cc: See attached list

Letter to S. Page from W. Travers dated: November 2, 1999

cc: R. Loux, State of Nevada  
S. Frishman, State of Nevada  
L. Barrett, DOE/Wash, DC  
A. Brownstein, DOE/Wash, DC  
S. Hanauer, DOE/Wash, DC  
C. Einberg, DOE/Wash, DC  
D. Shelor, DOE/Wash, DC  
N. Slater, DOE/Wash, DC  
R. Dyer, YMPO  
S. Brocoun, YMPO  
R. Clark, YMPO  
A. Gil, YMPO  
G. Dials, M&O  
J. Bailey, M&O  
D. Wilkins, M&O  
M. Voegele, M&O  
S. Echols, M&O  
B. Price, Nevada Legislative Committee  
J. Meder, Nevada Legislative Counsel Bureau  
D. Bechtel, Clark County, NV  
E. von Tiesenhausen, Clark County, NV  
J. Regan, Churchill County, NV  
T. Cain, Esmeralda County, NV  
L. Fiorenzi, Eureka County, NV  
A. Remus, Inyo County, CA  
T. Manzini, Lander County, NV  
E. Culverwell, Lincoln County, NV  
J. Wallis, Mineral County, NV  
L. Bradshaw, Nye County, NV  
M. Murphy, Nye County, NV  
J. McKnight, Nye County, NV  
N. Stellavato, Nye County, NV  
D. Kolkman, White Pine County, NV  
D. Weigel, GAO  
W. Barnard, NWTRB  
R. Holden, NCAI  
A. Mitre, NIEC  
R. Arnold, Pahrump County, NV  
J. Lyznicky, AMA  
R. Clark, EPA  
F. Marcinowski, EPA  
R. Anderson, NEI  
R. McCullum, NEI  
S. Kraft, NEI  
J. Kessler, EPRI  
G. McKnight, Pahrump, NV  
R. Wallace, USGS  
R. Craig, USGS  
W. Booth, Engineering Svcs, LTD  
S. Trubatch, Winston & Strawn

**COMMENTS ON PROPOSED U.S. ENVIRONMENTAL PROTECTION AGENCY  
STANDARDS FOR YUCCA MOUNTAIN (40 CFR PART 197)**

**Unwarranted Specification of Implementation Criteria:**

The U.S. Nuclear Regulatory Commission (NRC) staff objects to those portions of the proposed standard that address technical matters of compliance determination and implementation -- matters assigned to NRC's jurisdiction and responsibility. The NRC staff offers the following comments on specific portions of the standard that prescribe implementation and/or solicit comment on implementation:

**A) Use of Reasonable Expectation**

The U.S. Environmental Protection Agency (EPA) proposes to "establish minimum requirements for implementation" by requiring the NRC to use reasonable expectation as a basis for determining compliance. The NRC staff objects to the EPA's intrusion into an area of implementation related to making a license determination. The NRC has the sole licensing responsibility to determine compliance of the U.S. Department of Energy's (DOE's) license application with pertinent regulations and standards. The EPA has no authority to define how the NRC should make its licensing decision and should remove language that presumes to prescribe matters of NRC implementation.

Furthermore, the EPA incorrectly portrays how the NRC makes its licensing decisions. The EPA wrongly asserts that use of "reasonable assurance" as a basis for judging compliance would force the NRC to focus on extreme values (i.e., "tails of distributions") for representing the performance of a Yucca Mountain repository. This is not correct for the proposed repository at Yucca Mountain. Over the last several years, the Commission has clearly articulated how performance analyses are to be conducted to assist the NRC's goal of protecting health and safety. The Commission's Final Policy Statement on the "Use of Probabilistic Risk Assessment Methods in Nuclear Regulatory Activities" (FRN Volume 60, Number 158, August 16, 1995) stated that use of probabilistic risk assessment (PRA), which includes performance assessment for waste management systems, should: 1) reduce unnecessary conservatism; and 2) be as realistic as practicable when supporting regulatory decisions. In particular, the NRC's proposed implementing regulation for disposal of high-level waste at Yucca Mountain (10 CFR Part 63) propounds a comparison of the average or mean dose with the individual dose limit to determine compliance. The NRC's draft Branch Technical Position on Performance Assessment for Low-Level Waste Disposal Facilities (FRN May 29, 1997, Volume 62, Number 103) also uses an average dose as the basis for comparison with the dose limit. The NRC has made it clear that it does not focus on extreme values but rather is evaluating expected doses. The EPA should remove language that incorrectly portrays the NRC's use of reasonable assurance.

**B) Specification of the Reasonably Maximally Exposed Individual (RMEI)**

The EPA proposes that the RMEI be used for making dose estimates and also prescribes the approach to be used for determining the diet, and specifies the water intake volume of the

Enclosure

RMEI. The EPA should not require use of the RMEI, but instead endorse use of the more widely-accepted critical group (CG) concept, consistent with the National Academy of Sciences (NAS) recommendations (see also the NRC staff response to the EPA's question #3). Specification of attributes or characteristics of the RMEI or how these attributes or characteristics are to be determined should not be prescribed in the standards, but left to the NRC's implementing regulation (see also NRC staff responses to EPA's questions #4, 5, and 6).

**C) Specification of the Stylized Calculation for Human Intrusion**

Prescription of the stylized calculation for evaluating human intrusion should not be part of the EPA standards. Specification of the stylized calculation more appropriately belongs in the NRC's implementing regulations (see also the NRC staff response to the EPA's question #10). Additionally, the standards include an alternative for evaluating human intrusion beyond 10,000 years in the event an intrusion is not likely in the initial 10,000 years. The EPA should prescribe only the standard that is to be met and should not stipulate implementation details for what constitutes compliance with the standard.

**D) Request for Comment on Inclusion of Assurance Requirements**

It is unnecessary for the EPA to establish additional qualitative "assurance requirements" to "add confidence that the Yucca Mountain disposal system will achieve the level of protection proposed in the quantitative standards." The degree of confidence that the NRC must have, in assessing whether the DOE's compliance demonstration satisfies applicable requirements, including the EPA disposal standards, is inherently an implementation matter for the NRC licensing requirements and licensing process to determine. Further NRC staff response to this specific request is provided later in this document.

**E) Request for Comment on Inclusion of Requirements for Use of Expert Opinion**

It is unnecessary for the EPA to set guidelines for the use of expert opinion in its standards for Yucca Mountain. The NRC's licensing requirements and licensing process will govern the DOE's use of expert opinion in the development of its licensing case for a repository at Yucca Mountain. Further NRC staff response to this specific request is provided later in this document.

The NRC requests that those portions of the proposed standards that address the foregoing technical matters of compliance determination and implementation be removed or, at a minimum, that they acknowledge that the NRC, as the implementing authority, is not bound by implementation details that are contained in the standards. Additionally, the section entitled, "Who Will Be Regulated by These Standards?" should: 1) properly define the EPA role in standard development; 2) accurately describe the NRC's authority to establish technical requirements that are consistent with the EPA standards; and 3) acknowledge the time constraints established by the U.S. Congress that require the NRC to promulgate its rule within one year after the EPA issues its final standards.

## Responses to Specific Questions for Comment in the Proposed Standards:

Question 1: The NAS recommended that we base the individual-protection standard upon risk. Consistent with this recommendation and the statutory language of the Energy Policy Act of 1992, we are proposing a standard in terms of annual committed effective dose equivalent (CEDE) incurred by individuals. Is our rationale for this aspect of our proposal reasonable?

Answer: Yes. The individual-protection standard should be specified in terms of an annual CEDE limit. The use of an "effective" dose limit correctly accounts for the variation in risk levels associated with different organs. Not using an effective dose provides widely varying degrees of protection depending on the organ and radionuclides used in the exposure scenario.

Question 2: We are proposing an annual limit of 150  $\mu$ Sv [equivalent to 0.15 mSv (15 mrem)] CEDE to protect the reasonably, maximally exposed individual (RMEI) and the general public from releases from waste disposed of in the Yucca Mountain disposal system. Is our proposed standard reasonable to protect both individuals and the general public?

Answer: No. An annual all-pathways individual dose limit of 0.25 mSv (25 mrem) is fully protective of public health and safety and is a more appropriate standard for a potential repository at Yucca Mountain. The 0.25 mSv/yr (25 mrem/yr) limit represents a small fraction of the national and international public dose limit of 1.0 mSv (100 mrem/yr) and provides a level of radiation protection that is consistent with our and EPA's regulations for related activities (e.g., low-level, high-level, and transuranic waste management, storage, and disposal; spent fuel storage and disposal). Although the EPA rule proposes a lower limit of 0.15 mSv (15 mrem), and the difference between 0.15 and 0.25 mSv (15 and 25 mrem) is small, the lower value is not necessary for protection of public health and safety and would provide little, if any, reduction in health risk when compared to 0.25 mSv (25 mrem). It is also important to consider that the average American receives approximately 3 mSv/year (300 mrem/yr) from natural background radiation. In addition to the lack of public health and safety benefit, there are regulatory concerns associated with lowering the dose limit to 0.15 mSv (15 mrem). Specifically, as the dose limit becomes smaller, limitations in the DOE's models used for estimating performance, and the associated uncertainties in supporting analyses, become more pronounced. Further, a 0.15 mSv (15 mrem) dose limit is likely to cause unnecessary confusion for the public and cause the NRC to expend resources without a commensurate increase in public health and safety.

A single, all-pathway standard is protective of both individuals and the general public health when the standard is applied to a CG (i.e., those individuals in the population expected to receive the highest dose equivalent using cautious but reasonable assumptions). An annual limit of 0.25 mSv (25 mrem) applied to the average member of the CG is protective of individuals in the CG. The general

public is comprised of the individuals within the CG group as well as all other individuals residing in the Yucca Mountain area who are not part of the CG (e.g., the DOE has considered individuals living within 80 km (50 miles) of the Yucca Mountain site for evaluating population doses in the Draft Environmental Impact Statement). Individuals within the CG will have estimated doses higher (i.e., at least 3-5 times higher) than individuals outside the CG. The dose limit is protective of individuals in the CG and is also protective of individuals outside the CG for whom doses will be lower.

Question 3: To define who should be protected by the proposed individual-standard, we are proposing to use a RMEI as the representative of the rural-residential CG. Is our approach reasonable? Would it be more useful to have the DOE calculate the average dose occurring within the rural-residential CG rather than the RMEI dose?

Answer: The NRC staff endorses the NAS recommendation for use of the average member of the CG as a basis for comparison with the risk limit.

The NRC staff disagrees with the EPA's use of "a RMEI as the representative of the rural-residential CG" because: 1) it unnecessarily confuses the CG concept, recommended by the NAS, by advancing a second, less widely-used, concept (i.e., RMEI); 2) the CG concept has been accepted both internationally and nationally and thus has meaning to a wider audience than the RMEI; and 3) specification of a particular group (i.e., rural-residential RMEI) is a matter of implementation to be determined in the NRC's implementing regulation. NRC routinely employs the CG approach in its licensing actions and for other regulatory applications (e.g., as part of our LLW and Decommissioning programs). We are also aware of documented applications of the CG approach by state regulatory authorities and by regulatory authorities in the United Kingdom, Sweden, Switzerland, and Canada. The EPA should replace the "RMEI" with the "average member of the CG" and remove any reference to the particular characteristics of the CG.

Question 4: Is it reasonable to use the RMEI parameter values based upon characteristics of the population currently located in proximity to Yucca Mountain? Should we promulgate specific parameter values in addition to specifying the exposure scenarios?

Answer: The NRC staff agrees with the NAS recommendation that specification of the CG is to be based on cautious but reasonable assumptions. In doing so, it is appropriate to use present day knowledge of the habits and characteristics of the local population in the vicinity of Yucca Mountain to inform the specification of the CG.

That being said, however, the NRC staff objects to specification of parameters of the exposure scenario because they are matters of implementation that are to be determined in the NRC's implementing regulation. Additionally, detailed specification of exposure parameters at this time unnecessarily pre-judges

ongoing efforts by the DOE to collect information in the Yucca Mountain vicinity relevant to exposure scenarios.

**Question 5:** Is it reasonable to consider, select, and hold constant today's known and assumed attributes of the biosphere for use in projecting radiation-related effects upon the public of releases from the Yucca Mountain disposal system?

**Answer:** Yes. As explained in the NRC's proposed 10 CFR Part 63, it is appropriate to hold constant today's known and assumed attributes of the biosphere. Specification of assumed attributes of the biosphere is a matter of implementation that should be accomplished in the NRC's implementing regulations.

The NAS recognized the difficulties in forecasting the characteristics of future society, especially those influencing exposure, and recommended specification of exposure scenario assumptions. The NAS indicated the purpose for making the exposure scenario assumptions was to provide a framework for evaluation of repository performance and not to identify or predict possible futures.

**Question 6:** In determining the location of the RMEI, we considered three geographic subareas and their associated characteristics. Are there other reasonable methods or factors which we could use to change the conclusion we reached regarding the location of the RMEI? For example, should we require an assumption that for thousands of years into the future people will live only in the same locations that people do today? Please include the rationale for your suggestions.

**Answer:** The NAS recommended that cautious and reasonable assumptions be used in defining an assumed exposure scenario, including the compliance location. The EPA should not go beyond considerations that are cautious and reasonable. Specification of additional assumptions for determining the compliance location are unnecessary. The NRC staff recognizes that the EPA has a need to discuss who is being protected by their standard. However, specification of the exposure scenario is a matter of implementation, and specification of the compliance location should be determined in the NRC's implementing regulation.

**Question 7:** The NAS suggested using a negligible incremental risk level to dismiss from consideration extremely low, incremental levels of dose to individuals when considering protection of the general public. For somewhat different reasons, we are proposing to rely upon the individual-protection standard to address protection of the general population. Is this approach reasonable in the case of Yucca Mountain? If not, what is an alternative, implementable method to address collective dose and the protection of the general population?

**Answer:** Yes, it is reasonable to rely on an all-pathway, individual protection standard. We agree with the NAS that "a health-based individual standard will provide a reasonable standard for protection of the general public" (p. 65 of NAS report).

By definition, it will ensure that every member of the general public will not receive more than the individual dose limit and is therefore protected. Additional regulatory criteria limiting collective dose are unnecessary for the protection of public health and safety and should not be included in the final EPA standards for Yucca Mountain.

**Question 8:** Is our rationale for the period of compliance reasonable in light of the NAS recommendations?

**Answer:** Yes. A 10,000-year compliance period is reasonable for the reasons identified in the NRC's proposed criteria at 10 CFR Part 63. The fact that it is feasible to calculate performance of the engineered and geologic barriers making up the repository system, for periods much longer than 10,000 years, does not mean that it is possible to make realistic or meaningful projections of human exposure and risk, attributable to releases from the repository over comparable time frames. NAS acknowledged that projecting the behavior of human society over long periods is beyond the limits of scientific analysis and recommended that "cautious, but reasonable" assumptions, based upon current knowledge, be made with regard to the selection of biosphere and CG parameters for Yucca Mountain. Determining just how far into the future current knowledge can no longer support "reasonable" assumptions about pathways affecting human exposure is clearly a subjective, policy judgment. The NRC staff believes that, for periods approaching 1,000,000 years, as suggested by NAS, during which significant climatic and even human evolution would almost certainly occur, it is all but impossible to make useful and informed assumptions about human behaviors and exposure pathways. The NAS explicitly acknowledged that selection of a time period over which compliance should be evaluated necessarily involves both technical and policy considerations (p. 56 of NAS report). We believe sound reasons—technical, policy, and practical— support the designation of a 10,000-year compliance period for evaluating compliance with an all-pathway, individual protection standard.

**Question 9:** Does our requirement that the DOE and the NRC determine compliance with §197.20, based upon the mean of the distribution of the highest doses resulting from the performance assessment, adequately address uncertainties associated with performance assessments?

**Answer:** Although the NRC staff agrees with the use of the mean of the distribution, we object to the EPA prescription of a specific statistical parameter that the NRC must use to evaluate compliance with the standard. Specification of approaches for determining compliance, given the uncertainties associated with performance assessment, is strictly a matter of implementation that is properly addressed in the NRC's regulation.

**Question 10:** Is the single-borehole scenario a reasonable approach to judge the resilience of the Yucca Mountain disposal system following human intrusion? Are there other reasonable scenarios which we should consider, for example, using the

probability of drilling through a waste package based upon the area of the package versus the area of the repository footprint or drilling through an emplacement drift but not through a waste package? Why would your suggested scenario(s) be a better measure of the resilience of the Yucca Mountain disposal system than the proposed scenario?

**Answer:** Specification of a calculation for the NRC to use to evaluate the consequences of human intrusion on repository performance is a matter of implementation to be determined by the NRC. The NRC has proposed implementing regulations at 10 CFR Part 63, that include a proposal for evaluating the consequences of an assumed intrusion scenario, on which we have received significant comment. We will fully consider these comments prior to finalizing the rule. The EPA should eliminate the separate provisions for evaluating human intrusion by deleting §§197.25 and 197.26.

**Question 11:** Is it reasonable to expect that the risks to future generations be no greater than the risks judged acceptable today?

**Answer:** Yes. The NRC staff agrees with the basic principle that individuals in the future should be afforded a level of protection from actions taken today that is comparable to that found acceptable for the current generation. The primary objective of geologic disposal of high-level radioactive wastes is the protection of current and future generations from the radiological hazards posed by the wastes produced by the current generation. The NRC has long supported the national strategy to pursue deep geologic disposal in the belief that the current generation's responsibilities to provide comparable protection to future generations are better fulfilled by pursuit of long-term disposal than by indefinite reliance on temporary storage strategies. That being said, however, the NRC acknowledges that permanent, complete isolation is unlikely to be achieved by any repository at any site, including Yucca Mountain, and that some fraction of the waste inventory can be expected to migrate to the biosphere, giving rise to potential exposures thousands, or even hundreds of thousands of years in the future. Doses and risks to individuals over these very long time frames can only be estimated, and the reliability of such estimates diminishes, the further into the future they are calculated. Because doses and risks cannot be forecast with any certainty into the indefinite future and must instead rely on cautious, but reasonable assumptions, as noted by the NAS, it is only appropriate to use such estimates to evaluate whether a proposed repository system is adequate, over a compliance period within which those assumptions continue to be reasonable. For the reasons cited or referenced in the response to Question 8, the NRC staff believes 10,000 years is an appropriate compliance period.

**Question 12:** What approach is appropriate for modeling the groundwater flow system down-gradient from Yucca Mountain at the scale (many kilometers to tens of kilometers) necessary for dose assessments, given the inherent limitations of characterizing the area? Is it reasonable to assume that there will be some degree of mixing with uncontaminated groundwater along the radionuclides travel paths from the repository?

**Answer:** Determination of the appropriate model for groundwater flow will be an important part of the NRC's review of a possible DOE license application. It is inappropriate for the EPA to prescribe any degree of belief in potential modeling approaches that could be part of the DOE's license application.

**Question 13:** Which approach for protecting ground water in the vicinity of Yucca Mountain is the most reasonable? Is there another approach which would be preferable and reasonably implementable? If so, please explain the approach, why it is preferable, and how it could be implemented.

**Answer:** Although Maximum Contaminant Levels (MCLs) may have been considered reasonable standards during their development in 1975, current understanding of the risk posed to individual organs by radiation exposure demonstrates that the MCLs for individual radionuclides provide a level of protection that varies significantly. For example, consider the annual risk of developing a fatal cancer<sup>2</sup> from drinking water that contains Neptunium-237 (Np-237) and Iodine-129 (I-129) at their respective MCL. The risk of developing a fatal cancer from ingestion of Np-237 at its MCL is 30 chances in 1,000,000 ( $3 \times 10^{-5}$ )<sup>3</sup>, while the risk from ingestion of I-129 at its MCL is 0.07 chance in 1,000,000 ( $7 \times 10^{-8}$ )<sup>4</sup>. More than a four-hundred fold difference exists between the risk levels prescribed for these two radionuclides. Therefore, this simple comparison shows an application of MCLs that results in non-uniform risk levels which are likely to lead to greater confusion about the level of risk which is acceptable and attainable, rather than confidence that the health and safety of the public are being protected.

Certain MCLs maintain a risk level so small that the individual, all-pathway dose limit is meaningless. EPA has proposed an annual, individual dose limit of 0.15 mSv (15 mrem) which is equivalent to an annual risk of developing a fatal cancer of 9 chances in 1,000,000 ( $9 \times 10^{-6}$ ). The MCL for I-129 (annual risk of 0.07 chance in 1,000,000) is more than 100 times below the risk of the individual dose limit. Consequently, the ground-water protection criteria become the de facto standards instead of the individual protection limit called for by the EnPA.

The EPA's current proposal is a continuation of EPA's practice of using the MCLs without appropriate justification. Specifically, EPA would have NRC require that groundwater in the vicinity of Yucca Mountain meet EPA's MCL, originally established to implement the Safe Drinking Water Act (SDWA). The MCLs were based on an analysis of treating contaminated water in public drinking water systems subject to the SDWA and not on an analysis of technology and costs of remediating groundwater at actual sites. In this rule,

---

<sup>2</sup> The annual risk of developing a fatal cancer is 60 chances in 1,000,000 ( $6 \times 10^{-5}$ ) per mSv of exposure

<sup>3</sup> Based on a concentration of 15 picocuries per liter.

<sup>4</sup> Based on a 0.04 mSv (4 mrem) exposure to the thyroid.

EPA proposes to apply the same MCLs to groundwater supplies before treatment rather than "at the tap" after treatment. Therefore, in the absence of an appropriate and comprehensive cost-benefit analysis, EPA should not require the expenditure of potentially significant amounts of taxpayer money to prevent potential contamination of groundwater that may require treatment prior to use anyway. Instead, EPA's standards should permit a decision to spend much smaller sums for water treatment in the event that such contamination should occur. Finally, EPA's application of MCLs at DOE's Waste Isolation Pilot Plant (WIPP) site in New Mexico should not be considered a precedent for the Yucca Mountain site since the WIPP site is located in a salt formation and lacks potable groundwater making the application of MCLs irrelevant.

The EPA does not demonstrate a need for such overly conservative, separate ground-water limit to protect public health and safety. The all-pathway dose limit, by definition, ensures that risks from all radionuclides and all exposure pathways, including the groundwater pathway, are acceptable and protective. All radionuclides and all exposure pathways will have to be acceptably evaluated at Yucca Mountain, and will have to meet an individual protection standard that is fully protective of public health and safety and the environment. Therefore, the proposed standard should not contain separate ground-water protection requirements because they are unnecessary for protection of public health and safety and because they lead to inconsistent and unreconcilable results as described above, which we believe will cause confusion and diminish rather than enhance public confidence that adequately protective limits have been established.

Furthermore, the NRC staff is troubled by the discussion of ground-water protection that suggests additional options that are not representative of ground-water conditions at Yucca Mountain and further increase the conservatism in applying these unnecessary separate requirements. The preamble to the standard requests comment on alternative dilution volumes that are extremely small (e.g. 10 and 120 acre-feet). These dilution volumes are not reflective of the resource to be protected (the EPA states the representative volumetric flow is 4000 acre-ft/year for the sub-basin in which the proposed repository is located). The standard also requests comment on alternative locations for determining compliance (e.g., 5 kilometers) that are similarly not reflective of the resource. As explained in connection with the compliance location for the individual protection (e.g., 20 kilometers), cautious and reasonable assumptions for lifestyles and the practicality of obtaining water provide no basis for identifying the 5 kilometer location for protection of ground water.

Is there a better approach? Yes. An individual, all-pathway dose limit of 0.25 mSv (25 mrem) total effective dose equivalent (TEDE) properly accounts for the radiation sensitivity of individual organs, and ensures the risks from all radionuclides and all exposure pathways are acceptable and protective.

**Question 14:** Is the 10,000-year compliance period for protecting the RMEI and groundwater reasonable or should we extend the period to the time of peak dose? If we extend it, how could the NRC reasonably implement the standards while

recognizing the nature of the uncertainties involved in projecting the performance of the disposal system over potentially extremely long periods?

**Answer:** Yes, 10,000 years is a reasonable time period for evaluating compliance with an all-pathway individual protection standard for the reasons stated in the answer to Question 8 (above). For reasons stated in response to Question 3, we disagree with the EPA's use of the RMEI construct. For reasons given at Question 13, inclusion of separate groundwater protection criteria is unnecessary regardless of the compliance period applied.

**Question 15:** As noted by the NAS, some countries have individual-protection limits higher than we have proposed. In addition, other Federal authorities have suggested individual-dose limits with no separate protection of groundwater. Therefore, we request comment upon the use of an annual CEDE of 0.25 mSv (25 mrem) with no separate groundwater protection, including the consistency of such a limit with our groundwater protection policy.

**Answer:** The NRC staff believes that the application of a single, all-pathway standard is fully protective of public health and safety, and obviates the need for separate, single pathway limits. The purpose of a post-closure performance objective for a repository at Yucca Mountain is to ensure that members of the public will not receive doses, from all possible sources, exclusive of background radiation, in excess of 1 milliSievert (mSv) or 100 millirem (mrem) per year. 1 mSv (100 mrem) per year is the public dose limit established by the Commission at 10 CFR Part 20 and is the radiation protection basis upon which the Commission licenses all operating nuclear facilities. A limit of 0.25 mSv (25 mrem) to the TEDE, received in a year by the average member of the CG would limit the dose received from all possible pathways to the CG at Yucca Mountain, including direct exposure, drinking of contaminated water, eating food that was irrigated with contaminated groundwater or grown in contaminated soil, exposure to airborne releases, etc. The Commission established the 0.25 mSv (25 mrem) annual dose limit as the overall safety objective for both decommissioning of nuclear facilities (at 10 CFR Part 20.1402) and for low-level radioactive waste disposal facilities (at 10 CFR Part 61.41). It is within the range of international constraints that allocate doses from high-level waste disposal to between 0.1 and 0.3 mSv (10 and 30 mrem) per year, and is sufficiently below the public dose limit that no members of the public near Yucca Mountain would be expected to receive doses from all sources, excluding background radiation, in excess of 1 mSv (100 mrem) per year.

We believe that recent Congressional direction and NAS guidance, provided pursuant to that direction, are germane to the setting of acceptable risk levels for radionuclides received through the ground-water pathway — the primary pathway of concern at Yucca Mountain. The 1996 Amendments to the Safe Drinking Water Act directed the EPA to withdraw drinking water standards proposed for radon in 1991, that would have established an acceptable risk level for radon (a naturally-occurring isotope, not generally regulated by the NRC) comparable to current MCLs for other radionuclides. The same amendments called for the EPA to arrange for the NAS to conduct an individual risk

assessment for radon in drinking water. Based on the results of that assessment, the EPA was further directed to develop an alternative MCL that would represent a risk comparable to that incurred from naturally-occurring radon in outdoor air. By our calculations, such an alternative MCL for a single radionuclide would correspond to an annual risk of  $3.8 \times 10^{-5}$  or more than twice that arising from exposure to an all-pathway, all-nuclide limit of 0.25 mSv (25 mrem) for Yucca Mountain. In view of this, and for the reason cited above and in the NRC's notice of proposed rulemaking for Part 63, we continue to believe that an all-pathway limit of 0.25 mSv (25 mrem) per year is an appropriate level of protection for a repository, a level that is consistent with national and international radiation protection practice.

**Question 16:** We are proposing to require, in the individual-protection standard, that the DOE must project the disposal system's performance after 10,000 years. Are the specified uses of the projections appropriate and adequate?

**Answer:** We agree that the NRC should not be required to use the results of the DOE's analyses of repository performance after 10,000 years. However, should the DOE elect to use results of these calculations to further support its safety case, to demonstrate the capability of individual barriers, or to justify uncertainty estimates for data supporting its compliance demonstration, the Commission should not be constrained from considering such information. For this reason we object to the wording on p. 46993, that states that "...NRC is not to use the additional analysis in determining compliance with proposed §197.20." We recommend that the EPA modify this statement to read "...NRC is not required to use the additional analysis in determining compliance with proposed §197.20."

## Responses to Further Requests for Comment in the Proposed Standard

### Question (p. 46997)

Is it appropriate for the EPA to set guidelines for the use of expert opinion in this standard and, if so, what should those guidelines be?

### Answer

It is inappropriate for the EPA to set guidelines for the use of expert opinion in its standards for Yucca Mountain. The NRC's licensing requirements and licensing process will govern the DOE's use of expert opinion in the development of its licensing case for a repository at Yucca Mountain. Furthermore, the NRC has already issued guidance on this matter (see Kotra, J.P. *et al.*, NUREG-1563, "Branch Technical Position on the Use of Expert Elicitation in the High-Level Radioactive Waste Program," 1996).

### Question (p.46998)

Is it appropriate for the EPA to establish assurance requirements...and, if so, what should those requirements be?

### Answer

It is inappropriate for the EPA to establish additional qualitative "assurance requirements" to "add confidence that the Yucca Mountain disposal system will achieve the level of protection proposed in the quantitative standards." The degree of confidence that the NRC must have, in assessing whether DOE's compliance demonstration satisfies the EPA disposal standards, is inherently an implementation matter for the NRC licensing requirements and licensing process to determine. As a practical matter, the NRC has already included criteria, in its proposed Part 63 regulations, that address the issues cited by the EPA as potential "assurance requirements." Two of these are matters explicitly assigned to the NRC by statute [*i.e.* Section 121(b)(1)(B) of the Nuclear Waste Policy Act specifies that the NRC criteria "shall provide for the use of a system of multiple barriers in the design of the repository and shall include such restrictions on the retrievability of the solidified high-level radioactive waste and spent fuel emplaced in the repository as *the Commission deems appropriate* (emphasis added)].

**REQUEST FOR PRINTING AND COPYING SERVICES**

NOTE: DO NOT USE THIS FORM FOR ADMINISTRATIVE SERVICES (USE NRC FORM 30), FOR AUDIOVISUAL AND PHOTOGRAPHIC SERVICES (USE NRC FORM 459), OR FOR GRAPHIC SERVICES (USE NRC FORM 460).

REQUESTER <b>Manny Comar</b>	OFFICE <b>NMSS</b>	TELEPHONE <b>301-415-6074</b>	MAIL STOP <b>T-7F3</b>	E-MAIL I.D.	DATE OF REQUEST <b>10/12/1999</b>
---------------------------------	-----------------------	----------------------------------	---------------------------	-------------	--------------------------------------

TITLE OF DOCUMENT <b>BIBLIOGRAPHY OF YUCCA MTN PROJECT PUBLICATIONS AT LANL</b>	NUREG NO./FORM NO.	<input type="checkbox"/> CALL FOR PICKUP <input checked="" type="checkbox"/> RETURN BY MAIL <input type="checkbox"/> DELIVER TO DISTRIBUTION	DATE AND TIME REQUIRED (not ASAP) <b>10/15</b>
--	--------------------	--	---

**6. SENSITIVITY**

CLASSIFIED  
 SENSITIVE UNCLASSIFIED  
 COPYRIGHT MATERIAL  
 PROPRIETARY

For copyrighted material, sign below to indicate that you have received permission from the copyright owner to use the material.

SIGNATURE - ADMINISTRATIVE OFFICER

**REPRODUCTION SPECIFICATIONS**

NUMBER OF PAGES		SIZE OF REPRODUCED COPY(IES)		REPRODUCE COPY(IES)	PAPER COLOR	INK
<b>91</b>	<b>4</b>	<input type="checkbox"/> 11 X 17"	<input type="checkbox"/> 8 1/2 X 14"	<input checked="" type="checkbox"/> SAME AS ORIGINAL	COVER (CARD STOCK)	
		<input type="checkbox"/> 8 1/2 X 11"	<input type="checkbox"/> OTHER (Specify)	<input type="checkbox"/> ONE SIDE		
		<input type="checkbox"/> ENGINEERING		<input type="checkbox"/> HEAD-TO-HEAD	TEXT (PAPER)	
		<input type="checkbox"/> PRINT ON DEMAND		<input type="checkbox"/> HEAD-TO-FOOT		

**BINDERY SPECIFICATIONS**

FOLD TO:	<input type="checkbox"/> ASSEMBLE (As original) <input type="checkbox"/> TAPE BIND <input type="checkbox"/> GBC BIND <input type="checkbox"/> PERFECT BIND <input type="checkbox"/> LOOSE-LEAF	<input checked="" type="checkbox"/> STAPLE <input checked="" type="checkbox"/> 1 - TOP LEFT <input type="checkbox"/> 2 - LEFT SIDE <input type="checkbox"/> LANDSCAPE <input type="checkbox"/> SADDLESTITCH	<b>PAD</b> NUMBER OF PADS: _____ SHEETS PER PAD: _____	<b>HOLE PUNCH</b> <input type="checkbox"/> 2 HOLES <input type="checkbox"/> 1/4" <input type="checkbox"/> 3 HOLES <input type="checkbox"/> 3/8"
----------	--	---	--	---

**DISTRIBUTION CODES (Check and complete all applicable data)**

<input type="checkbox"/> DIVISION DIRECTOR & ABOVE <input type="checkbox"/> BRANCH CHIEF & ABOVE <input type="checkbox"/> TECH ONLY <input type="checkbox"/> SUPT. DOC. AVAILABILITY <input type="checkbox"/> NTIS AVAILABILITY <input type="checkbox"/> YES <input type="checkbox"/> NO <input type="checkbox"/> AN	<input type="checkbox"/> AGENCY REPORTS A <input type="checkbox"/> RULES AND REGS B <input type="checkbox"/> STATE C <input type="checkbox"/> COMM. ACTION F	<input type="checkbox"/> MGMT/ADM M <input type="checkbox"/> MGMT/ADM N <input type="checkbox"/> RESEARCH R <input type="checkbox"/> REG GUIDES S <input type="checkbox"/> EXTERNAL 1	<input type="checkbox"/> WASTE MGMT W <input type="checkbox"/> SPECIALTY X <input type="checkbox"/> OTHER CODES
---	---	--	---

**ADDITIONAL INSTRUCTIONS**

*Done & Distributed  
Vivian  
10/26/99*

DOCUMENT SUBMITTED BY <b>Karen Vandervort</b>	DATE <b>10/12/1999</b>	REQUEST FOR EXPEDITED SERVICE (Branch Chief or above)	DATE
--	---------------------------	---	------

**BIBLIOGRAPHY OF**  
**YUCCA MOUNTAIN PROJECT (YMP)**  
**PUBLICATIONS AT**  
**LAWRENCE LIVERMORE NATIONAL LABORATORY**  
**(SEPTEMBER 1977 THROUGH AUGUST 1999)**

**AUGUST 1999**

This version of the LLNL-YMP bibliography includes all Spent Fuel Test-Climax (SFT-C) reports. The SFT-C project was a test in which a limited number of actual spent reactor fuel assemblies were safely packaged, transported, stored, and retrieved. The project was conducted by LLNL from 1978 to 1983 at the Nevada Test Site. The SFT-C reports are marked by an asterisk (\*) next to the report number.

Copies of reports published by Lawrence Livermore National Laboratory are available at nominal cost from:

National Technical Information Services  
U.S. Department of Commerce  
5385 Port Royal Road  
Springfield, VA 22161

Copies are available to DOE and DOE Contractors from:

Office of Scientific and Technical Information (OSTI)  
P.O. Box 62  
Oak Ridge, TN 37831  
Prices available from (615) 576-8401

Inquiries about the availability of other material should be addressed to:

Jeanne Palmer  
Lawrence Livermore National Laboratory  
P. O. Box 808, L-631  
Livermore, CA 94550  
(925) 422-0777

YUCCA MOUNTAIN PROJECT  
BIBLIOGRAPHY

AUGUST 1999

- 1.\* Effect of Pressure and Stress on Water Transport in Intact and Fractured Gabbro and Granite, D. Trimmer, B. Bonner, H.C. Heard, and A. Duba, published in "Journal of Geophysical Research", Vol. 85, pp 7059-7071, 1980, also available as Lawrence Livermore National Laboratory Report UCRL-83932, September 1977.
2. Waste Isolation Projects--FY 1977, L. D. Ramspott - Editor, Lawrence Livermore Laboratory Report UCRL-50050-77, January 18, 1978.
- 2a. A Preliminary Evaluation of 30 Potential Granitic Rock Sites for a Radioactive Waste Storage Facility in Southern Nevada, C. R. Boardman and C. F. Knutson, GeoEnergy Corporation, submitted to Lawrence Livermore National Laboratory under subcontract, Contractor Report not numbered and not published, Lawrence Livermore National Laboratory Report UCRL-12933, February 15, 1978.
- 3.\* Underground Heater Test--Climax Granitic Stock, L. B. Ballou, published in Proceedings of the National Terminal Storage Program Progress Report for Period October 1, 1976, to September 30, 1977, Union Carbide Corp., Office of Waste Isolation Report Y/OWI-9, pp. 218-223, April 1978.
- 4.\* Laboratory Measured Material Properties of Granodiorite, Climax Stock, Nevada Test Site, R. Lingle and H. R. Pratt, Terra Tek, Inc., Report TR78-47, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15811, August 1978.
- 5.\* Instrumentation Program for Rock Mechanics and Spent Fuel Tests at the Nevada Test Site, H. R. Pratt, W. H. Hustrulid and R. Simonson, Terra Tek, Inc., Contractor Report TR78-48, submitted to Lawrence Livermore Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15809, August 1978.
6. Measuring the Permeability of Eleana Argillite from Area 17, Nevada Test Site, Using the Transient Method, W. Lin, Lawrence Livermore National Laboratory Report UCRL-52604, December 11, 1978.
7. Waste Isolation Projects: FY 1978, L. D. Ramspott, Editor, Lawrence Livermore National Laboratory Report UCRL-50050-78, January 12, 1979.
- 8.\* Technical Concept for Rock Mechanics Tests, Climax Granite, Nevada Test Site, J. Hearst, Lawrence Livermore National Laboratory Report UCID-18009, February 1979.
- 9.\* Simultaneous Measurements of Permeability, Electrical Conductivity and Ultrasonic Velocity in Igneous and Metamorphic Rocks, H. C. Heard, D. Trimmer, W. Lin, A. Duba, and B. Bonner, published in "Trans Am. Geop. Union 46", pp. 1113, 1980, also available as Lawrence Livermore National Laboratory Report UCRL-82389, February 1979.
- 10.\* Permeability of Generic Repository Rocks at Simulated In Situ Conditions, H. C. Heard, D. Trimmer, A. Duba, and B. Bonner, published in the Proceedings of the Workshop on Low-Flow, Low Permeability Measurements in Largely Impermeable Rocks, 1979, OECD Publication Center, Washington, D. C. 20006, also available as Lawrence Livermore National Laboratory Report, UCRL-82609, April 1979.

- 11.\* Technical Concept for a Test of Geologic Storage of Spent Reactor Fuel in the Climax Granite, Nevada Test Site, L. D. Ramspott, L. B. Ballou, R. C. Carlson, D. N. Montan, T. R. Butkovich, J. E. Duncan, W. C. Patrick, D. G. Wilder, W. G. Brough and M. C. Mayr, Lawrence Livermore National Laboratory Report UCRL-52796, June 1979.
12. Proceedings of a Workshop on Thermomechanical Modeling for a Hardrock Waste Repository, F. Holzer and L. Ramspott, Editors, Lawrence Livermore National Laboratory Report UCAR-10043, June 1979.
- 13.\* Laboratory Measured Material Properties of Quartz Monzonite, Climax Stock, Nevada Test Site, H. Pratt, R. Lingle and T. Schrauf, Terra Tek, Inc., submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15073, June 1979.
- 14.\* Instrument Selection, Installation, and Analysis of Data for the Spent Fuel Mine-By, Nevada Test Site, Climax Stock, T. Schrauf and M. Board, Terra Tek, Inc., Report TR 79-51, submitted to Lawrence Livermore Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15076, July 1979.
- 15.\* Thermal Expansion and Inferred Permeability of Climax Quartz Monzonite to 300°C and 27.6 MPa, H. C. Heard, published in "International Journal of Rock Mechanics and Mining Science", Vol. 17, p. 289-296, 1980, also available as Lawrence Livermore National Laboratory Report UCRL-83697, December 1979.
- 16.\* Climax Granite Test Results, L. D. Ramspott, Lawrence Livermore Laboratory Report UCRL-82841, Rev. 1, August 10, 1979, published in Proceedings of a Workshop on Thermomechanical Modeling for a Hardrock Waste Repository, Lawrence Livermore National Laboratory Report UCAR-10043, June 1979, an Offprint from UCAR-10043, also available as UCID-18502, January 1980.
- 17.\* Test Storage of Spent Reactor Fuel in the Climax Granite at the Nevada Test Site, L. D. Ramspott and L. B. Ballou, published in "Waste Management '80: The State of Waste Disposal Technology, Mill Tailings, and Risk Analysis Models", Vol. 2, pg. 515, University of Arizona, Tucson, AZ, March 1980, also available as Lawrence Livermore National Laboratory Report UCRL-83976, February 1980.
- 18.\* Finite Element Calculations of Near-Field Transient Horizontal Temperature and Thermal Stress Distributions for the Climax Granite Nuclear Spent Fuel Storage Experiment, R. C. Greenlaw, Lawrence Livermore National Laboratory Report UCID-18840, March 1980.
- 19.\* A Method for Calculating Internal Radiation and Ventilation with the ADINAT Heat-Flow Code, T. R. Butkovich and D. N. Montan, Lawrence Livermore National Laboratory Report UCRL-52918, April 1, 1980.
- 20.\* Spent Fuel Handling System for a Geologic Storage Test at the Nevada Test Site, J. E. Duncan, P. A. House and G. W. Wright, published in Proceedings of American Nuclear Society Meeting, Las Vegas, NV, Transactions, Vol. 34, 1980, pp. 833-839, also available as Lawrence Livermore National Laboratory Report UCRL-83728, May, 1980.
- 21.\* Seismic Hazard Analysis for the NTS Spent Reactor Fuel Test Site, K. W. Campbell, Tera Corp., submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15260, May 2, 1980.
- 22.\* Stressmeter Placement at Spent Fuel Test in Climax Granite, A. E. Abey and H. R. Washington, Lawrence Livermore National Laboratory Report UCID-18629, May 20, 1980.

- 23 . Mechanical and Thermomechanical Calculations Related to the Storage of Spent Nuclear Fuel Assemblies in Granite, T. R. Butkovich, Lawrence Livermore National Laboratory Report UCRL-52985, May 1980, superseded by UCRL-52985, Rev. 1, August 1981.
- 24.\* Status of LLNL Granite Projects, L. D. Ramspott, published in Proceedings of ONW/LBL Workshop on Thermomechanical-Hydrochemical Modeling for a Hardrock Waste Repository, Berkeley, CA, July 29-31, 1980, pp. 37-44, also available as Lawrence Livermore National Laboratory Report UCRL-84613, July 29, 1980.
- 25.\* Response of Borehole Extensometers to Explosively Generated Dynamic Loads, W. C. Patrick and W. G. Brough, Lawrence Livermore National Laboratory Report UCRL-53087, August 25, 1980.
- 26.\* Thermal Analysis for a Spent Reactor Fuel Storage Test in Granite, D. N. Montan, published in Proceedings of the International Symposium on the Scientific Basis for Nuclear Waste Management, Vol. 3, pp. 615-622, 1981, also available as Lawrence Livermore National Laboratory Report UCRL-83995, September 1980.
- 27.\* Permeability Testing of Fractures in Climax Stock Granite, NTS, W. A. Murray, published in Proceedings of the Repository Sealing Field Testing Workshop 1980, Santa Fe, NM, DOE-ONWI-239, pg. 42, also available as Lawrence Livermore National Laboratory Report UCRL-85231, September 1980.
- 28.\* The Spent Fuel Test Project, Climax Granitic Stock, Nevada Test Site, L. D. Ramspott, published in Proceedings of the International Symposium for Environmental Protection, Low-Cost Storage and Energy Savings (Rockstore 80), Stockholm, Sweden, also available as Lawrence Livermore National Laboratory Report UCRL-85078, October 1980.
- 29.\* Field Testing at the Climax Stock on the Nevada Test Site: Spent-Fuel Test and Radionuclide Migration Experiments, L. B. Ballou, in the Proceedings of the 1980 National Waste Terminal Storage Meeting, Columbus, OH, 1980, also available as Lawrence Livermore National Laboratory Report UCRL-85047, October 1980.
- 30.\* Program Plan: Field Radionuclide Migration Studies in Climax Granite, D. Isherwood, E. Raber, D. Coles and R. Stone, Lawrence Livermore National Laboratory Report UCID-18838, November 1, 1980.
- 31.\* Geotechnical Status Report For Test Storage of Spent Reactor Fuel in Climax Granite, Nevada Test Site, D. G. Wilder and W. C. Patrick, published in "AEG Bulletin", Vol. XVIII, No. 4, pp. 355-367, 1981, also available as Lawrence Livermore National Laboratory Report UCRL-85096, November 1980.
- 32.\* Spent Fuel Test-Climax: Technical Measurements Interim Report FY 1980, R. C. Carlson, W. C. Patrick, D. G. Wilder, W. G. Brough, D. N. Montan, P. E. Harben, L. B. Ballou and H. C. Heard, Lawrence Livermore National Laboratory Report UCRL-53064, December 1980.
- 33.\* Thermal, Thermal-Elastic and Water Transport Behavior of Generic High Level Waste Repository Rocks, H. C. Heard, D. Trimmer, W. B. Durham, and A. Abey, presented at the Geologic Society of American Annual Meeting, Atlanta, GA, November 17-20, 1980, also available as Lawrence Livermore National Laboratory report UCRL-84404, December 1980.
- 34.\* Status Report on the Spent Fuel Test-Climax: A Test of Geologic Storage of High-Level Waste in Granite, L. D. Ramspott, L. B. Ballou and W. C. Patrick, presented at the AIME 110th Annual Meeting, Chicago, IL, February 22, 1981, also available as Lawrence Livermore National Laboratory Report UCRL-85516, January 1981.

- 35.\* Elastic Moduli, Thermal Expansion and Inferred Permeability of Two Grants to 350C and 55 MPa, H. C. Heard and L. Page, published in "Journal of Geophysical Research", Vol. 87, 1982, also available as Lawrence Livermore National Laboratory Report UCRL-86603, January 1981.
- 36.\* The Climax Granite, Nevada Test Site, as a Host for a Rock Mechanics Test Facility Related to the Geologic Disposal of High-Level Nuclear Wastes, F. E. Heuze, Lawrence Livermore National Laboratory Report UCID-18946, February 1981.
- 37.\* Geomechanics of the Climax 'Mine-By' Nevada Test Site, F. E. Heuze, published in Proceedings of the 22nd Symposium on Rock Mechanics Symposium, MIT, Cambridge, MA, June 29-July 2, 1981, pp. 428-434, also available as Lawrence Livermore National Laboratory Report UCRL-85768, March 1981.
- 38.\* Elastic Moduli, Thermal Expansion and Inferred Permeability of Climax Quartz Monzonite and Sudbury Gabbro to 500C and 55 MPa, L. E. Page and H. C. Heard, published in the Proceedings of the 22nd U.S. Symposium on Rock Mechanics, MIT, Cambridge, MA, June 29-July 2, 1981, pp. 97-104, also available as Lawrence Livermore National Laboratory Report UCRL-85736, March 1981.
- 39.\* In Situ Geomechanics, Climax Granite, Nevada Test Site, F. E. Heuze, W. C. Patrick, R. V. De la Cruz and C. F. Voss, Lawrence Livermore National Laboratory Report UCRL-53076, April 1981.
- 40.\* Radiation Dose Calculations for Geologic Media Around Spent Fuel Emplacement Holes in the Climax Granite, Nevada Test Site, T. P. Wilcox and R. A. Van Konynenburg, Lawrence Livermore National Report UCRL-53159, May 27, 1981.
- 41.\* Fracture Mapping at the Spent Fuel Test--Climax, D. G. Wilder and J. L. Yow, Jr., Lawrence Livermore National Laboratory Report UCRL-53201, May 1981.
- 42.\* Fracture Mapping for Radionuclide Migration Studies in Climax Granite, R. Thorpe and J. Springer, Lawrence Livermore National Laboratory Report UCID-19081, May 1981.
- 43.\* Geohydrology of the Climax Stock Granite and the Surrounding Rock Formations, Nevada Test Site, W. A. Murray, Lawrence Livermore National Laboratory Report UCRL-53138, May 1981.
- 44.\* An Analysis of the 'Mine-By' Experiment, Climax Granite, Nevada Test Site, F. E. Heuze, T. R. Butkovich and J. C. Peterson, Lawrence Livermore National Laboratory Report UCRL-53133, June 1981.
- 45.\* Field Testing at the Climax Stock on the Nevada Test Site: Spent Fuel Test and Radionuclide Migration Experiments, L. B. Ballou, D. J. Isherwood and W. C. Patrick, published in Office of Nuclear Waste Isolation annual publication, "The Technology of High-Level Nuclear Waste Disposal, Advances in the Science and Technology of the Management of High-Level Nuclear Waste", Oak Ridge, TN, 1981, DOE/TIC-4621, Vol. 2, pp. 53-75, also available as Lawrence Livermore National Laboratory Report UCID-19073, June 1981.
- 46.\* Site Characterization for Field Radionuclide Migration Studies in Climax Granite, D. Isherwood, E. Raber, R. Stone and S. V. Topp, Editor, published in "Scientific Basis for Nuclear Waste Management", Vol. 6, pp. 199-206, 1982, also available as Lawrence Livermore National Laboratory Report UCRL-86194, June 1981.
- 47\* The Effect of Pressure and Temperature on the Thermal Properties of a Salt and a Quartz Monzonite, W. B. Durham and A. E. Abey, published in the Proceedings of the 22nd U.S. Symposium on Rock Mechanics, Cambridge, MA, June 29-July 2, 1981, pp. 79-84, also available as Lawrence Livermore National Laboratory Report UCRL-85285, June 1981.

- 48.\* Mechanical and Thermomechanical Calculations Related to the Storage of Spent Nuclear Fuel Assemblies in Granite (Revision I), T. R. Butkovich, Lawrence Livermore National Laboratory Report UCRL-52985, Rev. 1, August 1981.
- 49.\* Near-Field Heat Transfer at the Spent Fuel Test--Climax: A Comparison of Measurements and Calculations, W. C. Patrick, D. N. Montan and L. B. Ballou, published in Proceedings of the OECD Nuclear Energy Agency Workshop in Near-Field Phenomena in Geologic Repositories, pp. 147-160, September 1981, also available as Lawrence Livermore National Laboratory Report UCRL-86043, August 1981.
- 50.\* Thermal Properties of Rock Salt and Quartz Monzonite to 573 K and 50 MPa Confining Pressure, W. B. Durham and A. E. Abey, presented at the 20th ASME-AIChE National Heat Transfer Conference, Milwaukee, WI, August 2-5, 1981, also available as Lawrence Livermore National Laboratory Report UCRL-85191, August 1981.
- 51.\* Tape Extensometer Sensitivity and Reliability, J. L. Yow, Jr. and D. G. Wilder, presented at 24th Annual Meeting of the Association of Engineering Geologists, Portland, OR, September 27- October 2, 1981, also available as Lawrence Livermore National Laboratory Report UCRL-86100, September 1981.
- 52.\* Sources of Compass Error in Tunnel Mapping, J. L. Yow, Jr., published in "Association of Engineering Geologists Bulletin", Vol. 19, #2, pp. 133-140, May 1982, also available as Lawrence Livermore National Laboratory Report UCRL-86749, September 1981.
- 53.\* Thermoluminescence for Self Dosimetry in Climax Stock Quartz Monzonite, R. C. Carlson, published in "Nuclear Technology", Vol. 60, pp. 244-252, February 1983, also available as Lawrence Livermore National Laboratory Report UCRL-86627, September 1981.
- 54.\* As-Built Mechanical and Thermomechanical Calculations of a Spent Fuel Test in Climax Stock Granite, T. R. Butkovich, Lawrence Livermore National Laboratory Report UCRL-53198, September 1981.
- 55.\* Thermal Calculations for the Design, Construction, Operation, and Evaluation of the Spent Fuel Test--Climax, Nevada Test Site, D. N. Montan and W. C. Patrick, Lawrence Livermore National Laboratory Report UCRL-53238, September 1981.
- 56.\* Calibration Characteristics of IRAD Gage Vibrating Wire Stressmeter at Normal and High Temperature. Vol. 1 & Vol. 2, P. Dutta, R. Hatfield and P. Runstadler, Jr., IRAD Gage, Creare Products, Inc., Contractor Technical Report 80-2, submitted to Lawrence Livermore National Laboratory under subcontract, October 1981, also available as Lawrence Livermore National Laboratory Report UCRL-15426, October 1981.
- 57.\* Climax Spent Fuel Dosimetry - Progress Report, September 1980 - September 1981, W. Quam and T. DeVore, EG&G, Santa Barbara, CA, EG&G 1183-2432, SANL 909-034, submitted to Lawrence Livermore National Laboratory under subcontract, also available as Lawrence Livermore National Laboratory Contractor Report UCRL-15419, October 1981.
- 58.\* Preliminary Report on Radiation-Induced Thermoluminescence in Climax Stock Quartz Monzonite, R. C. Carlson, L. E. Page, L. Koons and C. Sundbeck, Lawrence Livermore National Laboratory Report UCID-19229, October 1981.
- 59.\* Excavation and Drilling Activities Associated with a Spent Fuel Test Facility in Granitic Rock, W. C. Patrick and M. C. Mayr, Lawrence Livermore National Laboratory Report UCRL-53227, November 1981.

- 60.\* Instrumentation Report #2: Identification, Evaluation, and Remedial Actions Related to Transducer Failures at the Spent Fuel Test--Climax, W. C. Patrick, R. C. Carlson and N. L. Rector, Lawrence Livermore National Laboratory Report UCRL-53251, November 1981.
- 61.\* Rock Mechanics Studies of Mining in the Climax Granite, F. E. Heuze, W. C. Patrick, T. R. Butkovich, J. C. Peterson, R. V. De la Cruz and C. F. Voss, published in "International Journal Rock Mechanics and Mining Sciences", Vol. 19, pp. 167-183, 1982, also available as Lawrence Livermore National Laboratory Report UCRL-86968, November 1981.
- 62.\* Thermal Conductivity and Diffusivity of Climax Stock Quartz Monzonite at High Pressure and Temperature, W. B. Durham, A. E. Abey and J. Hust, Editor, published in "Thermal Conductivity", Vol. 17, Proceedings of the 17th International Thermal Conductivity Conference, pp. 459-468, 1983, Gaithersburg, MD, June 15-19, 1981, also available as Lawrence Livermore National Laboratory Report UCRL-86619, Rev. 1, November 1981.
- 63.\* Scoping Analysis for Radionuclide Migration Test, F. A. Morrison, Jr., Lawrence Livermore National Laboratory Report UCID-19369, January 1982.
- 64.\* Instrumentation Report #1: Specification, Design, Calibration, and Installation of Instrumentation for an Experimental, High-Level, Nuclear Waste Storage Facility, W. G. Brough and W. C. Patrick, Lawrence Livermore National Laboratory Report UCRL-53248, January 1982.
- 65.\* Laboratory Measurements of Ultra-Low Permeability Geologic Materials, D. A. Trimmer, published in "Review of Scientific Instrumentation", Vol. 53, pp. 1246-1254, 1982, also available as Lawrence Livermore National Laboratory Report UCRL-86722, January 1982.
- 66.\* Borehole Collector for In Situ Chemical Analysis of Ground Water, J. Harrar and E. Raber, published in "Ground Water Journal", July-August 1982, Vol. 20, No. 4, pp. 479-481, also available as Lawrence Livermore National Laboratory Report UCRL-87252, February 1982.
- 67.\* Status Report on the Spent Fuel Test-Climax. NTS: A Test of Dry Storage of Spent Fuel in a Deep Granite Location, L. D. Ramspott, L. B. Ballou, W. C. Patrick, R. G. Post and M. E. Wacks, Editor, published in "Waste Management 1982", Vol. 3, pp. 131-139, also available as Lawrence Livermore National Laboratory Report UCRL-87448, March 1982.
68. The Sorption of Selected Radionuclides on Various Metal and Polymeric Materials, E. Raber and J. Garrison, published in "Radioactive Waste Management Journal", Vol. 4 (1), pp. 41-52, September 1983, also available as Lawrence Livermore National Laboratory Report UCRL-87653, March 1982.
- 69.\* The Effect of Gamma Irradiation on the Strength of Climax Stock Quartz Monzonite, W. B. Durham, Lawrence Livermore National Laboratory Report UCRL-87475, March 1982.
- 70.\* Calculated and Measured Drift Closure During the Spent Fuel Test in Climax Granite, J. L. Yow, Jr. and T. R. Butkovich, published in Proceedings of the 23rd U.S. Symposium on Rock Mechanics, University of California, Berkeley, CA, August 25-27, 1982, Chap. 86, pp. 855-863, 1982, also available as Lawrence Livermore National Laboratory Report UCRL-87179, April 1982.
- 71.\* Spent Fuel Test-Climax: Technical Measurements Interim Report Fiscal Year 1981, W. Patrick, L. Ballou, T. Butkovich, R. Carlson, W. Durham, G. Hage, E. Majer, D. Montan, R. Nyholm, N. Rector, D. Wilder and J. Yow, Jr., Lawrence Livermore National Laboratory Report UCRL-53294, April 1982.

72. Leach Testing of Waste Forms--Interrelationship of ISO and MCC Type Tests, V. Oversby, published in "Workshop on Leaching Mechanisms of Nuclear Waste Forms", May 19-21, 1982, PNL-4382, pp. 97-129, also available as Lawrence Livermore National Laboratory Report UCRL-87621, May 1982.
- 73\*. Hydrologic Test System for Fracture Flow Studies in Crystalline Rock, E. Raber, D. Lord and P. W. Burklund, published in "Ground Water", Vol. 22, #4, pp. 468-473, July-August 1984, also available as Lawrence Livermore National Laboratory Report UCID-19405, May 1982.
- 74.\* Core Logging for Site Investigation and Instrumentation. Spent Fuel Test-Climax, D. Wilder, J. Yow, Jr. and R. Thorpe, Lawrence Livermore National Laboratory Report UCID-19646, May 1982.
- 75.\* Laboratory Studies of Radionuclide Transport in Fractured Climax Granite, R. Failor, D. Isherwood, E. Raber and T. Vandergraaf, Lawrence Livermore National Laboratory Report UCRL-53308, June 1982.
- 76.\* Spent Fuel Test-Climax Data Acquisition System Integration Report, R. Nyholm, W. Brough and N. Rector, Lawrence Livermore National Laboratory Report UCRL-53304, June 1982.
- 77.\* Engineering Test Plan for Field Radionuclide Migration Experiments in Climax Granite, D. Isherwood, E. Raber, R. Stone, D. Lord, N. Rector and R. Failor, Lawrence Livermore National Laboratory Report UCRL-53286, June 1982.
- 78.\* Characterization of Climax Granite Ground Water, D. Isherwood, J. Harrar and E. Raber, Lawrence Livermore National Laboratory Report UCRL-53309, August 1982.
- 79.\* Climax Spent Fuel Dosimetry - Progress Report, September 1981 - September 1982, W. Quam and T. DeVore, EG&G, Santa Barbara, CA, EG&G 1183-2455, SANL 909-034, submitted to Lawrence Livermore National Laboratory under subcontract, available as Lawrence Livermore National Laboratory Contractor Report UCRL-15419-1, August 1982.
- 80.\* Influence of Heat Flow on Drift Closure During Climax Granite Spent Fuel Test: Measurements and Calculations, T. R. Butkovich, J. L. Yow, Jr. and D. N. Montan, published in Proceedings of the International Conference on Radioactive Waste Management, Winnipeg, Manitoba, Canada, September 12-15, 1982, pp. 131-135, also available as Lawrence Livermore National Laboratory Report UCRL-87248, September 8, 1982.
- 81.\* The Spent Fuel Test-Climax: A Progress Report, W. C. Patrick and L. B. Ballou, published in Proceedings of the NWTs Program Information Meeting, Las Vegas, NV, December 14-16, 1982, DOE/NWTs-30, pp. 101-104, also available as Lawrence Livermore National Laboratory Report UCRL-88174, September 20, 1982.
82. Development of Waste Packages for Tuff, A. J. Rothman, published in Proceedings of the NWTs Program Information Meeting, Las Vegas, NV, December 14-16, 1982, DOE/NWTs-30, pp. 119-122, also available as Lawrence Livermore National Laboratory Report UCRL-88175, September 20, 1982.
83. Laboratory Measurements of Ultra-Low Permeability Geologic Materials, D. A. Trimmer, published in "Review of Scientific Instruments", Vol. 53, pp. 1246-1254, August 1982, also available as Lawrence Livermore National Laboratory Report UCRL-86722, September 1982.
- 84.\* Test Completion Plan for Spent Fuel Test-Climax, Nevada Test Site, L. Ballou, W. Patrick, D. Montan and T. Butkovich, Lawrence Livermore National Laboratory Report UCRL-53367, September 1982.

- 85.\* Comparison of Measured and Calculated Radiation Doses in Granite Around Emplacement Holes in the Spent Fuel Test-Climax Nevada Test Site, R. Van Konynenburg, Lawrence Livermore National Laboratory Report UCRL-53341, October 1982.
- 86.\* Thermal Properties of Climax Stock Quartz Monzonite to 523 K and 50-MPa Confining Pressure, W. Durham, Lawrence Livermore National Laboratory Report UCRL-53349, October 1982.
- 87.\* Experimental and Calculational Results from the Spent Fuel Test-Climax, W. C. Patrick, L. D. Ramspott and L. B. Ballou, presented at the OECD Nuclear Energy Agency - Stripa 1982: In Situ Experiments in Granite Associated with Geological Disposal of Radioactive Waste, October 25-27, 1982, Stockholm, Sweden, also available as Lawrence Livermore National Laboratory Report UCRL-88254, October 1982.
- 88.\* The Effects of Boundary Conditions on Thermomechanical Calculations: Spent Fuel Test-Climax, T. Butkovich, Lawrence Livermore National Laboratory Report UCRL-53338, October 1982.
- 89.\* Drilling-Induced Borehole-Wall Damage at Spent Fuel Test-Climax, H. Weed and W. Durham, Lawrence Livermore National Laboratory Report UCID-19672, December 1982.
- 90.\* Spent Fuel Test-Climax Data Acquisition System Operations Manual, R. A. Nyholm, Lawrence Livermore National Laboratory Report UCID-19834, January 1983.
- 91.\* Handling Encapsulated Spent Fuel in a Geologic Repository Environment, L. Ballou, published in "Radioactive Waste Management", Vol. 3, IAEA-CN-43/223, International Atomic Energy Agency, Vienna, Austria 1984, pp. 463-472, also available as Lawrence Livermore National Laboratory Report UCRL-87872, February 1983.
92. Design of a Nuclear Waste Package for Emplacement in Tuff, W. C. O'Neal, A. J. Rothman, D. W. Gregg, J. N. Hockman, M. A. Revelli, E. W. Russell and J. R. Schornhorst, published in Proceedings of the ANS/ASME Waste Management '83 Meeting in Tucson, AZ, February 27-March 3, 1983, Vol. 2, pp. 3-9, also available as Lawrence Livermore National Laboratory Report UCRL-88192, February 1983.
- 93.\* Spent Fuel Test-Climax Technical Measurements Interim Report FY82, W. Patrick, L. Ballou, T. Butkovich, R. Carlson, W. Durham, G. Hage, E. Majer, D. Montan, R. Nyholm, N. Rector, D. Wilder and J. Yow, Jr., Lawrence Livermore National Laboratory Report UCRL-53294-82, February 1983.
- 94.\* BREAD. A CDC 7600 Program That Processes Spent Fuel Test-Climax Data, G. L. Hage, Lawrence Livermore National Laboratory Report UCID-19814, April 1983.
95. EO3NR. A Computer Program for Geochemical Aqueous Speciation-Solubility Calculations: Users Guide and Documentation, T. Wolery, Lawrence Livermore National Laboratory Report UCRL-53414, April 1983.
- 96.\* Planning Exploratory Drilling: The Effect of Blind Zones and Level of Logging Effort, J. L. Yow, Jr. and D. G. Wilder, published in Proceedings of the 24th Symposium on Rock Mechanics at Texas A&M University, June 20, 1983, pp. 807-812, also available as Lawrence Livermore National Laboratory Report UCRL-88374, June 1983.

- 97.\* Reliability of Instrumentation in a Simulated Nuclear-Waste Repository Environment, W. C. Patrick, N. L. Rector and K. Kovari, Editor, published in Proceedings of the International Symposium on Field Measurements in Geomechanics, Zurich, Switzerland, September 5-8, 1983, pp. 1431-1440, also available as Lawrence Livermore National Laboratory Report UCRL-88806, June 1983.
98. Permeability and Pore-Fluid Chemistry of the Bullfrog Tuff in a Temperature Gradient: Summary of Results, J. Byerlee, C. Morrow and D. Moore, U.S. Geological Survey Open-File Report 83-475, also available as Lawrence Livermore National Laboratory Contractor Report UCRL-15790, June 1983.
99. Reaction of Bullfrog Tuff with J-13 Well Water at 90°C and 150°C, V. M. Oversby and K. G. Knauss, Lawrence Livermore National Laboratory Report UCRL-53442, September 15, 1983.
100. Initial Specifications for Nuclear Waste Package External Dimensions and Materials, D. W. Gregg and W. C. O'Neal, Lawrence Livermore National Laboratory Report UCID-19926, September 1983.
101. Petrologic and Geochemical Characterization of the Bullfrog Member of the Crater Flat Tuff: Outcrop Samples Used in Waste Package Experiments, K. G. Knauss, Lawrence Livermore National Laboratory Report UCRL-53470, September 1983.
102. Containment Barrier Metals for High-Level Waste Packages in a Tuff Repository, E. W. Russell, R. D. McCright and W. C. O'Neal, Lawrence Livermore National Laboratory Report UCRL-53449, October 12, 1983.
103. Uncertainty Analysis: An Illustration from Nuclear Waste Package Development, W. G. Sutcliffe, published in "Nuclear and Chemical Waste Management Journal", Vol. 5, pp. 131-140, 1984, also available as Lawrence Livermore National Laboratory Report UCRL-90042, October 1983.
104. Selection of Barrier Metals for a Waste Package in Tuff, E. W. Russell, R. D. McCright and W. C. O'Neal, published in Proceedings of the Materials Research Society Meeting, Vol. 26, pp. 763-772, 1984, also available as Lawrence Livermore National Laboratory Report UCRL-89404, Rev. 1, October 1983.
105. The Characteristics of Spent LWR Fuel Relevant to its Storage in Geologic Repositories, R. E. Woodley, Hanford Engineering Development Laboratory, HEDL TME 83-28, submitted to Lawrence Livermore National Laboratory under subcontract, October 1983.
106. Post Emplacement Environment of Waste Packages, K. G. Knauss, V. M. Oversby and T. J. Wolery, published in Proceedings of the Materials Research Society Meeting, Symposium Proc., Vol. 26, pp. 301-308, 1984, also available as Lawrence Livermore National Laboratory Report UCRL-89475, November 1983.
107. The NNWSI Waste Form Test Program, V. M. Oversby, published in Proceedings of the Materials Research Society Meeting, Vol. 26, pp. 319-327, 1984, also available as Lawrence Livermore National Laboratory Report UCRL-89477, November 1983.
108. Permeability and Pore-Fluid Chemistry of the Topopah Spring Member of the Paintbrush Tuff, Nevada Test Site, in a Temperature Gradient: Application to Nuclear Waste Storage, C. A. Morrow, D. E. Moore and J. D. Byerlee, published in Proceedings of the Materials Research Society Symposium, Boston, MA, Vol. 26, pp. 883-890, 1984, November 1983.

109. Corrosion Test Plan to Guide Canister Material Selection and Design for a Tuff Repository, R. D. McCright, R. A. Van Konynenburg and L. B. Ballou, published in Proceedings of the Materials Research Society Meeting, Vol. 26, pp. 309-318, 1984, also available as Lawrence Livermore National Laboratory Report UCRL-89476, November 1983.
110. Selection of Candidate Canister Materials for High-Level Nuclear Waste Containment in a Tuff Repository, R. D. McCright, H. Weiss, M. C. Juhas and R. W. Logan, presented at Corrosion/84 Conference, National Association of Corrosion Engineers, Houston, TX, April 1984, paper #198, also available as Lawrence Livermore National Laboratory Report UCRL-89988, November 1983.
111. Performance Testing of Waste Forms in a Tuff Environment, V. M. Oversby, published in Proceedings of the Civilian Radioactive Waste Management Information Meeting, Washington, DC, December 12-15, 1983, CONF. 831217, pp. 270-279, also available as Lawrence Livermore National Laboratory Report UCRL-90045, November 1983.
112. Waste Package for a Repository Located in Tuff, L. B. Ballou, published in Proceedings of the Civilian Radioactive Waste Management Information Meeting, Washington, D.C., December 12-15, 1983, CONF. 831217, pp. 265-269, also available as Lawrence Livermore National Laboratory Report UCRL-90044, November 1983.
- 113.\* Radiation Dosimetry and Monitoring for a Test of Geologic Storage of Spent Nuclear Fuel, K. E. Raschke, W. C. Patrick, T. C. Roy and T. Straume, Lawrence Livermore National Laboratory Report UCRL-53498, November 1983.
114. Test Plan for Spent Fuel Cladding Containment Credit Tests, C. N. Wilson, Hanford Engineering Development Laboratory, HEDL TC-2353-2, submitted to Lawrence Livermore National Laboratory under subcontract, November 1983.
115. Nuclear Criticality Safety Analysis of a Spent Fuel Waste Package in a Tuff Repository, B. H. Weren, M. A. Capo and W. C. O'Neal, Westinghouse Electric Corporation, Waste Technology Services Division, Pittsburgh, PA, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15575, December 1983.
- 116.\* Mineralogic and Petrologic Investigation of Pre-Test Core Samples from the Spent Fuel Test-Climax, F. J. Ryerson and B. J. Qualheim, Lawrence Livermore National Laboratory Report UCID-19976, December 1983.
117. An Overview of Low Temperature Sensitization, M. J. Fox and R. D. McCright, Lawrence Livermore National Laboratory Contractor Report UCRL-15619, December 1983.
- 118.\* A Rapid Technique for Counting Cracks in Granitic Rocks, W. B. Durham, J. M. Beiriger and H. C. Weed, published in "Scanning Electron Microscopy", I-1985, pp. 133-142, also available as Lawrence Livermore National Laboratory Report UCRL-90257, January 1984.
- 119.\* SEM Studies of Stressed and Irradiated Climax Stock Quartz Monzonite, J. Beiriger and W. Durham, Lawrence Livermore National Laboratory Report UCID-20052, February 1984.
120. Nuclear Waste Package Design for the Vadose Zone in Tuff, W. C. O'Neal, L. B. Ballou, D. W. Gregg and E. W. Russell, published in Proceedings of the ANS/ASME Waste Management '84 Meeting, Tucson, AZ, March 11-15, 1984, Vol. 1, pp. 547-551, also available as Lawrence Livermore National Laboratory Report UCRL-89830, February 1984.

121. Thermal Modeling of Nuclear Waste Package Designs for Disposal in Tuff, J. N. Hockman and W. C. O'Neal, published in Proceedings of the ANS/ASME Waste Management '84 Meeting, Tucson, AZ, March 11-15, 1984, Vol. 1, pp. 441-448, also available as Lawrence Livermore National Laboratory Report UCRL-89820, Rev. 1, February 1984.
122. Spent Fuel Cladding Containment Credit Tests, C. N. Wilson and V. M. Oversby, published in Proceedings of the ANS/ASME Waste Management '84 Meeting, Tucson, AZ, March 11-15, 1984, Vol. 1, pp. 569-572, also available as Lawrence Livermore National Laboratory Report UCRL-89869, February 1984.
- 123.\* Spent Fuel Test-Climax Technical Measurements Interim Report FY83, W. C. Patrick, T. R. Butkovich, R. C. Carlson, W. B. Durham, H. C. Ganow, G. L. Hage, E. L. Majer, D. N. Montan, R. A. Nyholm, N. L. Rector, F. J. Ryerson, H. Weiss and J. L. Yow, Jr., Lawrence Livermore National Laboratory Report UCRL-53294-83, February 1984.
124. Hydrothermal Interaction Studies of Bullfrog Member Tuff Core Wafers in J-13 Water at 150°C Quantitative Analyses of Aqueous and Solid Phases, K. Knauss, Lawrence Livermore National Laboratory Report UCRL-53521, February 1984.
- 125.\* The Application of Proving-Ring Technology to Measure Thermally Induced Displacements in Large Boreholes in Rock, W. C. Patrick, N. L. Rector and T. R. Butkovich, published in Proceedings of the 5th International Congress on Experimental Mechanics, Montreal, Quebec, Canada, June 10-14, 1984, pp. 189-196, also available as Lawrence Livermore National Laboratory Report UCRL-88933, March 1984.
126. Reference Waste Forms and Packing Material for the Nevada Nuclear Waste Storage Investigations Project, V. M. Oversby, Lawrence Livermore National Laboratory Report UCRL-53531, April 1984.
127. EO3/6 Geochemical Modeling Task Plan for Nevada Nuclear Waste Storage Investigations (NNWSI), D. Isherwood and T. Wolery, Lawrence Livermore National Laboratory Report UCID-20069, April 1984.
128. Thermal Analysis of NNWSI Conceptual Waste Package Designs, W. Stein, J. Hockman and W. O'Neal, Lawrence Livermore National Laboratory Report UCID-20091, April 1984.
- 129.\* Acoustic Emission and Wave Propagation Monitoring at the Spent Fuel Test - Climax, Nevada, E. L. Majer and T. V. McEvilly, published in "International Journal Rock Mechanics Mining Science and Geomechanics Abstract", Vol. 22, No. 4, pp. 215-226, 1985, also available as LBL-17546, April 1984.
- 130.\* In-Situ Stress Measurements at the Spent Fuel Test-Climax Facility, J. B. Creveling, F. S. Shuri, K. M. Foster and S. V. Mills, Foundation Sciences, Inc., submitted to Lawrence Livermore National Laboratory under subcontract, available as Lawrence Livermore National Laboratory Contractor Report UCRL-15628, May 1984.
131. Overview of Geochemical Modeling Needs for Nuclear Waste Management, D. Isherwood and T. Wolery, published in Proceedings of the Workshop on Fundamental Geochemistry Needs for Nuclear Waste Isolation, Los Alamos, NM, pp. 183-191, June 20-22, 1984, also available as Lawrence Livermore National Laboratory Report UCRL-90846, May 1984.
132. Hydrothermal Interaction of Topopah Spring Tuff w/J-13 Water as a Function of Temperature, K. Knauss, J. Delany, J. Beiriger and D. Peifer, published in Proceedings of the Materials Research Society Meeting, Boston, MA, Vol. 44, pp. 539-546, November 1984, also available as Lawrence Livermore National Laboratory Report UCRL-90853, May 1984.

133. Reaction of the Topopah Spring Tuff with J-13 Well Water at 90°C and 150°C, V. Oversby, Lawrence Livermore National Laboratory Report UCRL-53552, May 1984.
134. Petrologic & Geochemical Characterization of the Topopah Spring Member of the Paintbrush Tuff: Outcrop Samples Used in Waste Package Experiments, K. Knauss, Lawrence Livermore National Laboratory Report UCRL-53558, June 1984.
135. Electrochemical Determination of the Corrosion Behavior of Candidate Alloys Proposed for Containment of High Level Nuclear Waste in Tuff, R. S. Glass, G. E. Overturf, R. E. Garrison and R. D. McCright, Lawrence Livermore National Laboratory Report UCID-20174, June 1984.
- 136.\* Climax Spent Fuel Dosimetry Progress Report Sept. 82-Jan. 84, W. Quam and T. DeVore, EG&G, Goleta, CA, EGG 10282-2042, submitted to Lawrence Livermore National Laboratory under subcontract, also available as Lawrence Livermore National Laboratory Contractor Report UCRL-15419-2, June 1984.
- 137.\* Climax Spent Fuel Dosimetry. Short Term Exposure, W. Quam and T. DeVore, EG&G, Goleta, CA, EGG 10282-2041, submitted to Lawrence Livermore National Laboratory under subcontract, also available as Lawrence Livermore National Laboratory Contractor Report UCRL-15419-3, June 1984.
- 138.\* An Analysis of Fracturing in Hole UG2. SFT-C, R. Thorpe, Lawrence Livermore National Laboratory Report UCID-20130, June 1984.
139. Changes in Permeability and Fluid Chemistry of the Topopah Spring Member of the Paintbrush Tuff (NTS) When Held in a Temperature Gradient: Summary of Results, D. E. Moore, C. A. Morrow and J. D. Byerlee, USGS, USGS Open-File 84-273, submitted to Lawrence Livermore National Laboratory under subcontract, also available as Lawrence Livermore National Laboratory Contractor Report UCRL-15620, June 1984.
140. Reaction of the Topopah Spring Tuff with J-13 Water at 120°C, V. Oversby, Lawrence Livermore National Laboratory Report UCRL-53574, July 1984.
- 141.\* Radiation Doses in Granite Around Emplacement Holes in the SFT-C, R. Van Konynenburg, Lawrence Livermore National Laboratory Report UCRL-53580, July 1984.
- 142.\* Measurement of Displacement in Large Boreholes with a Stain Gauged Proving Ring, W. C. Patrick and N. L. Rector, published in "Experimental Techniques", Vol. 9, No. 2, also available as Lawrence Livermore National Laboratory Report UCRL-91360, July 1984.
143. Effects of Tuff Waste Package Components on Release From 76-68 Simulated Waste Glass, G. L. McVay and G. R. Robinson, Pacific Northwest Laboratory, PNL-4897, submitted to Lawrence Livermore National Laboratory under subcontract, August 1984.
144. Report on Static Hydrothermal Alteration Studies of Topopah Spring Tuff Core Wafers in J-13 Water at 150°C, K. Knauss and J. Beiriger, Lawrence Livermore National Laboratory Report UCRL-53576, August 1984. [HQS.19880517.2007]
145. NNWSI Interim Acceptance Specifications for Defense Waste Processing Facility and West Valley Demonstration Project Waste Forms and Canisterized Waste, V. Oversby, Lawrence Livermore National Laboratory Report UCID-20165, August 1984.

146. Potential Corrosion and Degradation Mechanisms of Zircaloy Cladding on Spent Nuclear Fuel in a Tuff Repository, A. Rothman, Lawrence Livermore National Laboratory Report UCID-20172, September 1984.
- 147.\* Overcoring and Calibration of IRAD Gage Stressmeters at the Spent Fuel Test in Climax Granite, N. Mao, Lawrence Livermore National Laboratory Report UCID-20318, September 1984.
- 148.\* Petite Sismique Measurements at the Spent Fuel Test-Climax, J. J. Zucca, Lawrence Livermore National Laboratory Report UCRL-53597, September 1984.
- 149.\* A User's Guide to REVERT: A CDC 7600 Program for Converting SFT-C Data to Engineering Units, with Corrections, G. Hage, Lawrence Livermore National Laboratory Report UCID-30206, October 1984.
150. Corrosion Behavior of Carbon Steels Under Tuff Repository Environmental Conditions, D. McCright and H. Weiss, published in Proceedings of the Materials Research Society Meeting, Vol. 44, pp. 287-294, Boston, MA, November 1984, also available as Lawrence Livermore National Laboratory Report UCRL-90875, October 1984.
151. Test Plan for Series 2 Spent Fuel Cladding Containment Credit Tests, C. N. Wilson, Hanford Engineering Development Laboratory, HEDL-TC-2353-3, submitted to Lawrence Livermore National Laboratory under subcontract, October 1984.
152. Transport Properties of Topopah Spring Tuff, W. Lin and W. Daily, Lawrence Livermore National Laboratory Report UCRL-53602, October 1984. [NNA.891026.0025;203004]
- 153.\* Heater Test No. 1. Climax Stock Granite, Nevada, D. Montan and W. Bradkin, Lawrence Livermore National Laboratory Report UCRL-53496, October 1984.
- 154.\* Structural Geology Report, Spent Fuel Test-Climax, D. Wilder and J. L. Yow, Jr., Lawrence Livermore National Laboratory Report UCRL-53381, October 1984.
155. Pre-closure Analysis of Conceptual Waste Package Designs for a Nuclear Waste Repository in Tuff, W. O'Neal, D. Gregg, J. Hockman, E. Russell and W. Stein, Lawrence Livermore National Laboratory Report UCRL-53595, November 1984.
156. Leaching Savannah River Plant Nuclear Waste Glass in a Saturated Tuff Environment, N. Bibler, G. Wicks and V. Oversby, published in Proceedings of the Materials Research Society Meeting, Vol. 44, pp. 247-256, Boston, MA, November 1984, also available as Lawrence Livermore National Laboratory Report UCRL-91258, November 1984.
157. The Behavior of Actinide Containing Glasses During Gamma Irradiation in a Saturated Tuff Environment, J. Bates and V. Oversby, published in Proceedings of the Material Research Society Meeting, Vol. 44, pp. 257-264, Boston, MA, November 1984, also available as Lawrence Livermore National Laboratory Report UCRL-90818, November 1984.
158. Behavior of Stressed and Unstressed 304L Specimens in Tuff Repository Environmental Conditions, M. Juhas, D. McCright and W. Garrison, published in Proceedings of Corrosion 85, Boston, MA, March 25-29, 1985, paper #117, also available as Lawrence Livermore National Laboratory Report UCRL-91804, November 1984.
159. NNWSI Waste Form Performance Test Development, J. K. Bates and T. J. Gerding, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Materials Research Society Meeting, Vol. 44, pp. 295-302, Boston, MA, November 1984.

160. Behavior of Carbon-14 in Waste Packages for Spent Fuel in a Repository in Tuff, R. A. Van Konynenburg, C. F. Smith, H. W. Culham and C. H. Otto, published in Proceedings of the Materials Research Society Meeting, Vol. 44, pp. 405-412, Boston, MA, November 1984, also available as Lawrence Livermore National Laboratory Report UCRL-90855, Rev. 1, November 1984.
161. Laboratory Experiments Designed to Provide Limits on the Radionuclide Source Term for the NNWSI Project, V. M. Oversby and R. D. McCright, published in Proceedings of the Workshop on the Source Term for Radionuclide Migration from HLW or Spent Nuclear Fuel, Albuquerque, NM, November 13-15, 1984, SAND85-0380, Hunter and Muller, Editors, pp. 175-186, also available as Lawrence Livermore National Laboratory Report UCRL-91257, November 1984.
- 162.\* Geologic Structure Mapping Database Spent Fuel Test--Climax Nevada Test Site, J. L. Yow, Jr., Lawrence Livermore National Laboratory Report UCID-20301, December 1984.
163. Preliminary Evaluation of Alterant Geophysical Tomography in Welded Tuff, A. Ramirez and W. Daily, Lawrence Livermore National Laboratory Report UCID-20289, December 1984.
164. EQ3/6: Status and Applications, T. J. Wolery, D. J. Isherwood, K. J. Jackson, J. M. Delany, I. Puigdomenech and G. K. Jacobs and S. K. Whatley, Editors, published in Proceedings of the Conference on the Application of Geochemical Models to High-Level Nuclear Waste Repository Assessment, Oak Ridge, TN, October 2-5, 1984, NUREG/CP-0062, ORNL/TM-9285, pp. 54-65, 1985, also available as Lawrence Livermore National Laboratory Report UCRL-91884, December 1984.
- 165.\* Instrumentation Report No. 3: Performance and Reliability of Instrumentation Deployed for the Spent Fuel Test-Climax, W. C. Patrick, N. L. Rector and J. J. Scarafioti, Lawrence Livermore National Laboratory Report UCRL-53637, December 1984.
166. Fixed Fugacity Option for the EO6 Geochemical Reaction Path Code, J. Delany and T. Wolery, Lawrence Livermore National Laboratory Report UCRL-53598, December 1984.
167. Spent Fuel Cladding Characteristics and Choice of Experimental Specimens for Cladding-Corrosion Evaluation Under Tuff Repository Conditions, H. D. Smith, Hanford Engineering Development Laboratory, HEDL-TC-2530, submitted to Lawrence Livermore National Laboratory under subcontract, January 1985.
168. Parametric Testing of a DWPF Borosilicate Glass, F. Bazan and J. Rego, published in Proceedings of the Materials Research Society Meeting, Vol. 44, pp. 303-310, Boston, MA, 1984, also available as Lawrence Livermore National Laboratory Report UCRL-90857, January 1985.
169. NNWSI Phase II Materials Interaction Test Procedure and Preliminary Results, J. K. Bates and T. J. Gerding, Argonne National Laboratory, Argonne National Laboratory ANL-84-81, submitted to Lawrence Livermore National Laboratory under subcontract, January 1985.
- 170.\* Radiation Safety Considerations for a Test of Deep Geologic Storage of Spent Nuclear Fuel, K. Raschke and T. Straume, published in "Nuclear Science and Engineering", Vol. 94, No. 3, pp. 282-286, November 1986, also available as Lawrence Livermore National Laboratory Report UCRL-92003, January 1985.
- 171.\* Operational and Technical Results from the Spent Fuel Test-Climax, W. C. Patrick, published in "Journal of Environmental Sciences", pp. 51-54, January/February 1986, also available as Lawrence Livermore National Laboratory Report UCRL-92065, January 1985.

- 172.\* Physical and Chemical Changes to Rock Near Electrically Heated Boreholes at Spent Fuel Test-Climax, J. Beiriger, W. Durham and R. Ryerson, Lawrence Livermore National Laboratory Report UCID-20412, January 1985.
- 173.\* Observations of Borehole Deformation Modulus Values Before and After Extensive Heating of a Granitic Rock Mass, W. C. Patrick, J. L. Yow, Jr. and M. C. Axelrod, published in Proceedings of the U.S. Symposium on Rock Mechanics, Rapid City, SD, pp. 851-858, June 26-28, 1985, also available as Lawrence Livermore National Laboratory Report UCRL-91468, February 1985.
- 174.\* Logging of Post-Test and CCH Record Core Samples for the Spent Fuel Test-Climax, R. Thorpe and B. Qualheim, Lawrence Livermore National Laboratory Report UCID-20351, February 1985.
175. Preliminary Evaluation of Alterant Geotomography in Welded Tuff, A. Ramirez and W. Daily, published in Proceedings of the 26th U.S. Symposium on Rock Mechanics, Rapid City, SD, pp. 807-816, June 26-28, 1985, also available as Lawrence Livermore National Laboratory Report UCRL-92229, February 1985.
176. Gamma Radiation Effects on Corrosion: Electrochemical Mechanisms for the Aqueous Corrosion Processes of Austenitic Stainless Steels, R. S. Glass, G. E. Overturf III, R. A. Van Konyenburg and R. D. McCright, published in "Corrosion Science," Vol. 26, No. 8, pp. 577-590, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-92311, February 1985.
- 177.\* Mineralogic and Petrologic Investigation of Post-Test Core Samples from the Spent Fuel Test-Climax, F. Ryerson and J. Beiriger, Lawrence Livermore National Laboratory Report UCRL-53625, February 1985.
178. Parametric Testing of a DWPF Glass, F. Bazan and J. Rego, Lawrence Livermore National Laboratory Report UCRL-53606, March 1985.
179. Zircaloy Spent Fuel Cladding Electrochemical Corrosion Scoping Experiment, H. D. Smith, Hanford Engineering Development Laboratory, HEDL-TC-2562, submitted to Lawrence Livermore National Laboratory under subcontract, March 1985.
180. Radionuclide Release From PWR Fuels in a Reference Tuff Repository Groundwater, V. Oversby and C. Wilson, published in Proceedings of the Waste Management 85 Meeting, Vol. 1, pp. 497-503, Tucson, AZ, March 25-29, 1985, also available as Lawrence Livermore National Laboratory Report UCRL-91464, March 1985.
181. Corrosion Performance of Metals and Alloys in a Tuff Geochemical Environment, R. A. Van Konyenburg and R. D. McCright, published in Proceedings of the Waste Management '85 Meeting, Vol. 1, pp. 453-457, Tucson, AZ, March 25-29, 1985, also available as Lawrence Livermore National Laboratory Report UCRL-91740, March 1985.
182. Permeability and Fluid Chemistry Studies of the Topopah Spring Member of the Paintbrush Tuff, Nevada Test Site: Part II, D. E. Moore, C. A. Morrow and J. D. Byerlee, Lawrence Livermore National Laboratory Contractor Report UCRL-15667, March 1985.
183. NNWSI Waste Form Test Method for Unsaturated Disposal Conditions, J. Bates and T. Gerding, published in Proceedings of the Waste Management 85 Meeting, Vol. 1, pp. 459-465, Tucson, AZ, March 25-29, 1985, also available as Lawrence Livermore National Laboratory Contractor Report UCRL-15723, March 1985.

184. The Reaction of Topopah Spring Tuff with J-13 Water at 150°C - Samples From Drill Cores USWG-1, USWGU-3, USW G-4, and UE-25h#], V. Oversby, Lawrence Livermore National Laboratory Report UCRL-53629, March 1985. [HQS.19880517.2517]
185. Evaluation of the Potential for Spent Fuel Oxidation Under Tuff Repository Conditions, R. Einziger and R. Woodley, Hanford Engineering Development Laboratory, HEDL 7452, submitted to Lawrence Livermore National Laboratory under subcontract, March 1985.
- 186.\* The Effect of Gamma Irradiation on the Strength and Elasticity of Climax Stock and Westerly Granites, W. B. Durham, J. M. Beiriger, M. Axelrod, and S. Trettenero, published in "Nuclear and Chemical Waste Management", Vol. 6, pp. 159-168, also available as Lawrence Livermore National Laboratory Report UCRL-92526, March 1985.
187. Field Investigation of Keyblock Stability, J. Yow, Jr., Lawrence Livermore National Laboratory Report UCRL-53632, April 1985.
188. Application of the Ruthenium and Technetium Thermodynamic Data Bases Used in the EQ3/6 Geochemical Codes, D. Isherwood, Lawrence Livermore National Laboratory Report UCRL-53594, April 1985.
189. Metallurgical Analysis of a 304L Stainless Steel Canister from the Spent Fuel Test-Climax, H. Weiss, R. A. Van Konynenburg and R. D. McCright, Lawrence Livermore National Laboratory Report UCID-20436, April 1985.
190. Microstructural Characteristics of PWR Spent Fuel Relative to Its Leaching Behavior, C. N. Wilson, Hanford Engineering Development Laboratory, HEDL-SA-3313, submitted to Lawrence Livermore National Laboratory under subcontract for presentation at the American Ceramic Society 87th Annual Meeting, Cincinnati, OH, May 5-9, 1985, (no printed Proceedings), Lawrence Livermore National Laboratory Contractor Report UCRL-15976, April 1985.
191. Hydrothermal Interaction of Crushed Topopah Spring Tuff and J-13 Water at 90°C, 150°C, and 250°C Using Dickson-Type Gold Bag Rocking Autoclaves, K. Knauss, W. Beiriger and D. Peifer, Lawrence Livermore National Laboratory Report UCRL-53630, May 1985. [NNA.19931005.0010]
192. Concept for Waste Package Environment Tests in the Yucca Mountain Exploratory Shaft, J. L. Yow, Jr., Lawrence Livermore National Laboratory Report UCID-20450, May 1985.
193. Spent Fuel Cladding Corrosion Under Tuff Repository Conditions - Initial Observations, H. D. Smith and V. M. Oversby, Lawrence Livermore National Laboratory Report UCID-20499, June 1985.
194. Zircaloy Cladding Corrosion Degradation in a Tuff Repository. Initial Experimental Plan, H. D. Smith, Hanford Engineering Development Laboratory, HEDL-7455, Rev. 1, submitted to Lawrence Livermore National Laboratory under subcontract, July 1985.
195. Blind Zones in Acquisition of Discontinuity Orientation Data, J. L. Yow, Jr., published in "International Journal of Rock Mechanics and Mining Sciences and Geomechanics Abstracts", Vol. 24, No. 5, pp. 317-318, October 1987, also available as Lawrence Livermore National Laboratory Report UCRL-89960, July 1985.
- 196.\* Post-Test Thermomechanical Computational and Preliminary Data Analyses, T. R. Butkovich and W. C. Pactick, Lawrence Livermore National Laboratory Report UCRL-53688, July 1985.

197. Technical Test Description of Activities to Determine the Potential for Spent Fuel Oxidation in a Tuff Repository, R. Einziger, Hanford Engineering Development Laboratory, HEDL-7540, submitted to Lawrence Livermore National Laboratory under subcontract, August 1985.
- 198.\* Spent Fuel Test-Climax: Technical Measurements Data Management System Description and Data Presentation, R. C. Carlson, Lawrence Livermore National Laboratory Report UCID-20712, August 1985.
- 199.\* Negative Hysteresis Effect Observed During Calibration of the U.S. Bureau of Mines Borehole Deformation Gauge, H. C. Ganow, Lawrence Livermore National Laboratory Report UCID-20523, August 1985.
200. Results from NNWSI Series I Spent Fuel Leach Tests, C. N. Wilson, Hanford Engineering Development Laboratory, HEDL-TME 84-30, submitted to Lawrence Livermore National Laboratory under subcontract, August 1985.
201. FY85 Status Report on Feasibility Assessment of Copper-Base Waste Package Container Materials in a Tuff Repository, D. McCright, Lawrence Livermore National Laboratory Report UCID-20509, September 1985.
202. Corrosion Processes of Austenitic Stainless Steels and Copper-Based Materials in Gamma-Irradiated Aqueous Environments, R. Glass, R. Van Konynenburg and G. Overturf, published in Corrosion 86, paper #258, March 17-21, 1986, Houston, TX, also available as Lawrence Livermore National Laboratory Report UCRL-92941, September 1985.
203. Derivation of a Waste Package Source Term for NNWSI from the Results of Laboratory Experiments, V. M. Oversby and C. N. Wilson, published in Proceedings of the Materials Research Society 1985 Symposium on the Scientific Basis for Nuclear Waste Management, Stockholm, Sweden, Vol. 50, pp. 337-346, also available as Lawrence Livermore National Laboratory Report UCRL 92096, September 1985.
204. Water Transport in Topopah Spring Tuff--Implications for a Nuclear Waste Repository in Tuff, W. Lin and W. Daily, Lawrence Livermore National Laboratory Report UCRL-93382, September 1985.
205. A Ground Reaction Curve Based Upon Block Theory, J. L. Yow, Jr. and R. Goodman, published in "Journal of Rock Mechanics and Rock Engineering", Vol. 20, No. 3, pp. 167-190, July-September 1987, also available as Lawrence Livermore National Laboratory Report UCRL-93431, September 1985.
206. Hydrothermal Interaction of Solid Wafers of Topopah Spring Tuff with J-13 Water and Distilled Water at 90°, 150°, and 250°C Using Dickson-Type, Gold-Bag Rocking Autoclaves, K. Knauss, W. Beiriger, D. Peifer and A. Piwinski, Lawrence Livermore National Laboratory Report UCRL-53645, September 1985. [NNA.19900207.0282; HQS.19980517.2482]
- 207.\* Post-Test Thermomechanical Calculations and Preliminary Data Analysis for the Spent Fuel Test - Climax, T. Butkovich and W. Patrick, Lawrence Livermore National Laboratory Report UCRL-53688, September 1985.
208. Reaction of Topopah Spring Tuff with J-13 Water: A Geochemical Modeling Approach Using the EO3/6 Reaction Path Code, J. Delany, Lawrence Livermore National Laboratory Report UCRL-53631, November 25, 1985. [NNA.871111.0114;HQS. 19880517.2419]

209. Improvements in the Solid Solution Modeling Capabilities of the EO3/6 Geochemical Code, W. L. Bourcier, Lawrence Livermore National Laboratory Report UCID-20587, November 1985.
210. The Effect of Gamma Irradiation on the Strength and Elasticity of Climax Stock and Westerly Granites, W. Durham, W. Beiriger, M. Axelrod and S. Trettenaro, published in "Nuclear and Chemical Waste Management", Vol. 6, pp. 159-168, also available as Lawrence Livermore National Laboratory Report UCRL-92526, Rev. 1, December 1985.
211. Low Temperature Spent Fuel Oxidation Under Tuff Repository Conditions, R. Einziger and R. Woodley, published in Proceedings of the Waste Management 85 Meeting, Vol. 1, pp. 505-512, Tucson, AZ, March 25-29, 1985, Hanford Engineering Development Laboratory Report, HEDL-SA-3271FP, submitted to Lawrence Livermore National Laboratory under subcontract, December 1985.
- 211a. Control of Research Oriented Software Development, L. C. Lewis, J. J. Dronkers and B. Pitsker, published in 1986 ASCQ Quality Congress Transaction, Anaheim, CA, May 19-21, 1986, pp. 364-371, also available as Lawrence Livermore National Laboratory Report UCRL-94031, December 1985.
- 212.\* Spent Fuel Test-Climax Mine-By Revisited, T. R. Butkovich, Lawrence Livermore National Laboratory Report UCID-20673, December 1985.
- 213.\* Estimates of In-Situ Deformability with an NX Borehole Jack, Spent Fuel Test-Climax, Nevada Test Site, W. C. Patrick, J. Yow, Jr. and M. C. Axelrod, Lawrence Livermore National Laboratory Report UCRL-53673, December 1985.
214. Hydrological Properties of Topopah Spring Tuff - Laboratory Measurements, W. Daily, W. Lin and T. Buscheck, published in "Journal of Geophysical Research", Vol. 92, No. B8, pp. 7854-7864, July 10, 1987, also available as Lawrence Livermore National Laboratory Report UCRL-94363, December 1985. [203030]
215. Effectiveness of Geologic Characterization Techniques, Climax Granite Stock, Nevada Test Site, D. G. Wilder and J. L. Yow, Jr., published in "Bulletin of the Association of Engineering Geologists", Vol. XXIV, No. 4, 1987, pp. 537-548, also available as Lawrence Livermore National Laboratory Report UCRL-92687, January 1986.
216. Evaluation of Alterant Geophysical Tomography in Welded Tuff, A. Ramirez and W. Daily, published in "Journal of Geophysical Research", Vol. 92, No. B8, pp. 7843-7853, July 1987, also available as Lawrence Livermore National Laboratory Report UCRL-94291, January 1986.
217. An Exact Similarity Solution for Coupled Deformation and Fluid Flow in Discrete Fractures, A. M. Wijesinghe, Lawrence Livermore National Laboratory Report UCID-20675, February 1986.
218. High Temperature Permeability of Some Nevada Test Site Tuffs, D. Moore, C. Morrow and J. Byerlee, USGS, published in "Journal of Geophysical Research", Vol. 91, No. B2, pp. 2163-2171, February 1986.
219. Test Plan for Series 2 Thermogravimetric Analyses of Spent Fuel Oxidation, R. E. Einziger and R. E. Woodley, Hanford Engineering Development Laboratory, HEDL-7556, submitted to Lawrence Livermore National Laboratory under subcontract, February 1986.
220. The Reaction of Glass During Gamma Irradiation in a Saturated Tuff Environment. Part I: SRL 165 Glass, J. K. Bates, D. F. Fischer and T. J. Gerding, Argonne National Laboratory Report, ANL-85-62, submitted to Lawrence Livermore National Laboratory under subcontract, February 1986.

221. Important Radionuclides in High Level Nuclear Waste Disposal: Determination Using a Comparison of the EPA and NRC Regulations, V. Oversby, published in "Nuclear and Chemical Waste Management", Vol. 7, No. 2, pp. 149-161, 1987, also available as Lawrence Livermore National Laboratory Report UCRL-94222, February 1986.
222. The PLUS Family. A Set of Computer Programs to Evaluate Analytical Solutions of the Diffusion Equation, D. N. Montan, Lawrence Livermore National Laboratory Report UCID-20680, February 1986.
223. Proton Procession Magnetometer, R. Stager, Lawrence Livermore National Laboratory Report UCID-21113, March 1986.
224. Analysis and Observation of Keyblock Occurrence in Tunnels in Granite, J. L. Yow, Jr., published in Proceedings of the 27th Rock Mechanics Symposium, Alabama, pp. 827-833, June 23-25, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-93412, March 1986.
225. Inelastic Deformations of Fault and Shear Zones in Granitic Rock, D. G. Wilder, published in Proceedings of the 27th Rock Mechanics Symposium, Alabama, pp. 868-873, June 23-25, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-93422, March 1986.
- 226.\* Thermomechanical Modeling of the Spent Fuel Test-Climax, T. R. Butkovich and W. C. Patrick, published in Proceedings of the 27th Rock Mechanics Symposium, Alabama, pp. 898-905, June 23-25, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-93421, March 1986.
227. Some Forms of Transition State Theory. Including Non-Equilibrium Steady State Forms. and Their Applications in Geochemistry, T. J. Wolery, Lawrence Livermore National Laboratory Report UCRL-94221, March 1986.
228. An Application of Software Quality Assurance to a Specific Scientific Code Development Task, J. J. Dronkers, presented at the 17th California Quality Week, Santa Clara, CA, March 21-22, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-94600, March 1986.
229. NNWSI Waste Form Testing at Argonne National Laboratory. Semi-Annual Report. July-December 1985, J. K. Bates, T. J. Gerding, T. A. Abrajano, Jr. and W. Ebert, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15801, March 1986.
230. Thermomechanical Scoping Calculations for the Waste Package Environment Tests, T. R. Butkovich and J. L. Yow, Jr., Lawrence Livermore National Laboratory Report UCID-20758, March 1986.
231. Thermal Calculations Pertaining to Experiments in the Yucca Mountain Exploratory Shaft, D. N. Montan, Lawrence Livermore National Laboratory Report UCID-20780, March 1986.
- 232.\* Spent Fuel Test-Climax: An Evaluation of the Technical Feasibility of Geologic Storage of Spent Nuclear Fuel in Granite - Final Report, W. C. Patrick, Lawrence Livermore National Laboratory Report UCRL-53702, March 1986.
233. "C-Ring" Stress Corrosion Cracking Scoping Experiment for Zircaloy Spent Fuel Cladding, H. D. Smith, Hanford Engineering Development Laboratory, Report HEDL-7546, submitted to Lawrence Livermore National Laboratory under subcontract, April 1986.

234. Zircaloy Spent Fuel Cladding Electrochemical Corrosion Experiment at 170 and 120 PSIA H<sub>2</sub>O, H. D. Smith, Hanford Engineering Development Laboratory Report, HEDL-7545, submitted to Lawrence Livermore National Laboratory under subcontract, April 1986.
235. Estimates of Radionuclide Release From Glass Waste Forms in a Tuff Repository and the Effects on Regulatory Compliance, R. D. Aines, published in the Proceedings of the American Ceramic Society, 3rd International Symposium on Nuclear Waste Disposal", Advances in Ceramics", Nuclear Waste Management II, Chicago, IL, April 1986, Vol. 20, pp. 91-98, also available as Lawrence Livermore National Laboratory Report UCRL-93735, April 1986.
236. A Monte Carlo Investigation of a Proposed Screen for NX-Borehole Jack Data, M. C. Axelrod, S. P. Verrill, W. C. Patrick and J. L. Yow, Jr., published in "ASTM Geotechnical Testing Journal", Vol. 11, No. 1, pp. 20-29, March 1988, also available as Lawrence Livermore National Laboratory Report UCRL-94087, April 1986.
237. Test Plan for Series 3 NNWSI Spent Fuel Leaching/Dissolution Tests, C. N. Wilson, Hanford Engineering Development Laboratory, HEDL-7577, submitted to Lawrence Livermore National Laboratory under subcontract, May 1986.
238. Radiation Chemical Effects in Experiments to Study the Reaction of Glass in a Gamma-Irradiated Air Groundwater and Tuff Environment, R. Van Konynenburg, Lawrence Livermore National Laboratory Report UCRL-53719, May 1986.
239. Application of EO3/6 to Modeling of Nuclear Waste Glass Behavior in a Tuff Repository, R. Aines, Lawrence Livermore National Laboratory Report UCID-20895, May 1986.
240. Precipitation Kinetics Option for the EO3/6 Geochemical Reaction Path Code, J. Delany, I. Puigdomenech and T. Wolery, Lawrence Livermore National Laboratory Report UCRL-53642, May 1986.
241. The Effects of Gamma Radiation on Groundwater Chemistry and Glass Leaching as Related to the NNWSI Repository Site, T. Abrajano, J. Bates, W. Ebert and T. Gerding, Argonne National Laboratory, Lawrence Livermore National Laboratory Contract Report UCRL-15825, May 1986.
242. Geochemical Gradients in the Topopah Spring Member of the Paintbrush Tuff: Evidence for Eruption across a Magmatic Interface, B. C. Schuraytz, T. Vogel and L. Younker, Lawrence Livermore National Laboratory Report UCRL-53698, June 1986.
243. The Tuff Reaction Vessel Experiment, F. Bazan and J. H. Rego, Lawrence Livermore National Laboratory Report UCRL-53735, June 1986.
244. Corrosion of Copper-Based Materials in Gamma Radiation, W. Yunker, Hanford Engineering Development Laboratory Report, HEDL-7612, submitted to Lawrence Livermore National Laboratory under subcontract, June 1986.
- 245.\* Post-Test Thermal Calculations and Data Analyses for the Spent Fuel Test-Climax, D. Montan and W. Patrick, Lawrence Livermore National Laboratory Report UCRL-53728, June 1986.
246. Test Plan for Long-Term, Low-Temperature Oxidation of Spent Fuel Series I, R. E. Einziger, Westinghouse Hanford Company Report, HEDL-7560, submitted to Lawrence Livermore National Laboratory under subcontract, July 1986.

247. One-Year Results of the NNWSI Unsaturated Test Procedure: SRL 165 Glass Application, J. Bates and T. Gerding, Argonne National Laboratory, ANL-85-41, submitted to Lawrence Livermore National Laboratory under subcontract, August 1986.
248. Geochemical Modeling (EO3/6) Plan Office of Civilian Radioactive Waste Management Program, W. McKenzie, T. Wolery, J. Delany, R. Silva, K. Jackson, W. Bourcier and D. Emerson, Lawrence Livermore National Laboratory Report UCID-20864, August 1986.
249. Feasibility Assessment of Copper-Based Waste Package Container Materials in Tuff Repository, C. Acton and R. McCright, Lawrence Livermore National Laboratory Report UCID-20847, August 1986.
- 250.\* Spent Fuel Test-Climax: An Evaluation of the Technical Feasibility of Geologic Storage of Spent Nuclear Fuel in Granite. Executive Summary of Final Results, W. C. Patrick, Lawrence Livermore National Laboratory UCRL-53762, September 1986.
251. Reference Waste Package Environment Report, W. Glassley, Lawrence Livermore National Laboratory Report UCRL-53726, October 1986. [NNA.920506.0035;20314]
252. Waste Package Assessment: Deterministic System Model Program Scope and Specification, W. O'Connell and R. Drach, Lawrence Livermore National Laboratory Report UCRL-53761, October 1986.
253. Carbon-14 in Waste Packages for Spent Fuel in a Tuff Repository, R. Van Konynenburg, C. Smith, C. Culham and H. D. Smith, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 185-196, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-94708, October 1986.
254. Scientific Investigation Plan for NNWSI. WBS Element 1.2.2.5.L. NNWSI Waste Package Performance Assessment, K. Eggert, W. O'Connell and D. Lappa, Lawrence Livermore National Laboratory Report UCID-20967, October 1986.
255. Reaction of Vitric Topopah Spring Tuff and J-13 Ground Water Under Hydrothermal Conditions Using Dickson-Type Gold-Bag Rocking Autoclaves, K. Knauss and D. Peifer, Lawrence Livermore National Laboratory Report UCRL-53795, November 1986. [NAA.891102.0117]
256. The Effects of Gamma Radiation on Groundwater Chemistry and Glass Reaction in a Saturated Tuff Environment, W. Ebert, J. Bates, T. Gerding and R. Van Konynenburg, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 613-622, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-95884, December 1986.
257. Experimental Study of the Dissolution of Spent PWR Fuel at 85°C in Natural Groundwater, C. Wilson and H. Shaw, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 123-130, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-94633, December 1986.
258. Integrated Testing of SRL-165 Glass Waste Form, D. Phinney, R. Ryerson, V. Oversby, R. Lanford, R. Aines and J. Bates, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 433-446, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-94658, December 1986.

259. Spent Fuel as a Waste Form - Data Needs to Allow Long Term Performance Assessment Under Repository Disposal Conditions, V. M. Oversby, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 87-101, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-94659, December 1986.
260. Zeolitization of Glassy Topopah Spring Tuff Under Hydrothermal Conditions, K. G. Knauss, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 737-745, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-94664, December 1986. [NNA.920302.0050]
261. Copper Corrosion in Irradiated Environments. The Influence of H<sub>2</sub>O<sub>2</sub> on the Electrochemistry of Copper Dissolution in HCL Electrolyte, W. H. Smyrl, B. T. Bell, R. T. Atanasoski and R. S. Glass, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 591-601, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-95961, December 1986.
262. Transport and Reaction Kinetics at the Glass: Solution Interface Regions: Results of Repository Oriented Leaching Experiments, T. Abrajano and J. Bates, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 533-546, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Contractor Report UCRL-15881, December 1986.
263. Long-Term Corrosion Behavior of Copper-Based Materials in a Gamma-Irradiated Environment, W. Yunker and R. Glass, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 579-590, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-94500, December 1986.
264. Hydrogen Speciation in Hydrated Layers on Nuclear Waste Glass, R. D. Aines, H. C. Weed and J. K. Bates, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 547-558, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-95962, January 1987.
265. Leaching of Actinide-Doped Nuclear Waste Glass in a Tuff-Dominated System, F. Bazan, J. Rego and R. Aines, published in Proceedings of the Materials Research Society Symposium, Vol. 84, pp. 447-458, Boston, MA, December 1-5, 1986, also available as Lawrence Livermore National Laboratory Report UCRL-94721, January 1987.
266. Preliminary Evaluation of an Electromagnetic Experiment to Map In Situ Water in Heated Welded Tuff, W. Daily and A. Ramirez, Lawrence Livermore National Laboratory Report UCRL-96816, February 1987.
267. The PLUS Family - A Set of Computer Programs to Evaluate Analytical Solutions of the Diffusion Equation and Thermoelasticity, D. Montan, Lawrence Livermore National Laboratory UCID-21099, February 1987.
268. Influence of Stress-Induced Deformation on Observed Water Flow in Fractures at the Climax Granitic Stock, D. G. Wilder, published in Proceedings of the 28th U.S. Symposium on Rock Mechanics, Tucson, AZ, pp. 491-500, June 26-July 1, 1987, also available as Lawrence Livermore National Laboratory Report UCRL-95539 Rev. 1, March 1987. [NNA.19880425.0044;20306]

269. Electromagnetic Experiment to Map In Situ Water in Heated Welded Tuff: Preliminary Results, A. Ramirez and W. Daily, published in Proceedings of the 28th U.S. Symposium on Rock Mechanics, Tucson, AZ, pp. 37-46, June 26-July 1, 1987, also available as Lawrence Livermore National Laboratory Report UCRL-96318, March 1987.
270. An Experiment to Determine Drilling Water Imbibition by In Situ Densely Welded Tuff, W. Daily and A. Ramirez, Lawrence Livermore National Laboratory Report UCID-21249, Rev. 1, April 1987.
271. Thermomechanical Calculations Pertaining to Experiments in the Yucca Mountain Exploratory Shaft, D. Montan, Lawrence Livermore National Laboratory Report UCID-21100, April 1987.
272. Hydrothermal Interaction of Solid Wafers of Topopah Spring Tuff with J-13 Water at 90°C and 150°C Using Dickson-Type, Gold-Bag Rocking Autoclaves: Long-Term Experiments, K. Knauss, W. Beiriger, and D. Peifer, Lawrence Livermore National Laboratory Report UCRL-53722, May 1987. [NNA.19870713.0081;203013]
273. The Influence of Copper Zircaloy Spent Fuel Cladding Degradation Under a Potential Tuff Repository Condition, H. D. Smith, Westinghouse Hanford Co., HEDL-SA-3583, submitted to Lawrence Livermore National Laboratory under subcontract, as Lawrence Livermore National Laboratory Report UCRL-15993, May 1987.
274. Plan for Integrated Testing for NNWSI Non-EO3/6 Data Base Portion, V. M. Oversby, Lawrence Livermore National Laboratory Report UCID-21274, May 1987.
275. Test Concept for Waste Package Environment Tests at Yucca Mountain, J. L. Yow, Jr., published in Proceedings of the 28th U. S. Symposium on Rock Mechanics, Tucson, AZ, pp. 1035-1042, June 26-July 1, 1987, also available as Lawrence Livermore National Laboratory Report UCRL-95568, June 1987.
- 276.\* Geomechanics of the Spent Fuel Test-Climax, D. Wilder and J. Yow, Jr., Lawrence Livermore National Laboratory Report UCRL-53767, July 1987.
277. NNWSI Waste Form Testing at Argonne National Laboratory Semiannual Report: January-June 1986, J. Bates, T. Gerding, T. Abrajano and W. Ebert, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contract Report UCRL-15801-86-1, July 1987.
278. Results From Cycles 1 and 2 of NNWSI Series 2 Spent Fuel Dissolution Tests, C. N. Wilson, Westinghouse Hanford Company, HEDL-TME 85-22, submitted to Lawrence Livermore National Laboratory under subcontract, August 1987.
279. Summary of Results from the Series 2 and 3 NNWSI Bare Fuel Dissolution Tests, C. N. Wilson, Westinghouse Hanford Company, Pacific Northwest Laboratory, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 30-December 5, 1987, Vol. 1, pp. 473-483, also submitted to Lawrence Livermore National Laboratory under subcontract, August 1987.
280. Thermochemistry of Uranium Compounds. XVI. Calorimetric Determination of the Standard Molar Enthalpy of Formation at 298.25°K, Low-Temperature Heat Capacity, and High-Temperature Enthalpy Increments of  $UO_2(OH)_2(OH)_2 \cdot H_2O$  (Schoepite), I. Tasker, P. O'Hare, B. Lewis, G. Johnson and E. Cordfunke, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractors Report UCRL-21055, August 1987.

281. Synthesis and Characterization of Uranium Silicate Minerals, S. Nguyen, R. Silva and H. Weed, report included in "LLNL Nuclear Chemistry Division Annual Report", pp. 3-5 - 3-8, Lawrence Livermore National Laboratory, August 1987.
282. The Dissolution Kinetics of Quartz as a Function of pH and Time at 70°C, K. Knauss and T. Wolery, published in "Geochimica and Cosmochimica Acta", Vol. 52, No. 1, pp. 43-53, January 1988, also available as Lawrence Livermore National Laboratory Report UCRL-96071, September 1987.
283. Plan for Glass Waste Form Testing for NNWSI, R. D. Aines, Lawrence Livermore National Laboratory Report UCID-21190, September 1987.
284. Predicting Spent Fuel Oxidation States in a Tuff Repository, R. Einziger and R. Woodley, Hanford Engineering Development Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, HEDL-SA-3627, submitted to Workshop on Chemical Reactivity of Oxide Fuel and Fission Product Release, Berkeley, England, September 1987.
285. Estimates of the Hydrologic Impact of Drilling Water on Core Samples Taken from Partially Saturated Densely Welded Tuff, T. Buscheck and J. Nitao, Lawrence Livermore National Laboratory Report UCID-21294, September 1987.
286. Impact of Phase Stability on the Corrosion Behavior of the Austenitic Candidate Materials for NNWSI, D. Bullen, G. Gdowski and D. McCright, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 30-December 5, 1987, Vol. 112, pp. 795-803, also available as Lawrence Livermore National Laboratory Report UCRL-97562, October 1987.
287. The Performance of Actinide-Containing SRL-165 Type Glass in Unsaturated Conditions, J. Bates and T. Gerding, published in Proceedings of the Materials Research Society Symposium, Vol. 112, pp. 651-662, Boston, MA, November 30-December 5, 1987, October 1987.
288. Thermodynamic Data Bases for Multivalent Elements: An Example for Ruthenium, J. A. Rard, submitted to International Conference on Thermodynamics of Aqueous Systems with Industrial Applications, Warrenton, VA, May 10-14, 1987, Lawrence Livermore National Laboratory Report UCRL-96555, November 1987.
289. Plan for Spent Fuel Waste Form Testing for NNWSI, H. Shaw, Lawrence Livermore National Laboratory Report UCID-21272, November 1987.
290. Geochemical Simulation of Reaction between Spent Fuel Waste Form and J-13 Water at 25 and 90°C, C. Bruton and H. Shaw, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 30-December 5, 1987, Vol. 112, pp. 485-494, also available as Lawrence Livermore National Laboratory Report UCRL-96702, November 1987.
291. Geochemical Simulation of Dissolution of West Valley and DWPF Glasses in J-13 Water at 90°C, C. Bruton, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 30-December 5, 1987, Vol. 112, pp. 607-619, also available as Lawrence Livermore National Laboratory Report UCRL-96703, November 1987.
292. Effect of Ionizing Radiation on Moist Air Systems, D. Reed and R. Van Konynenburg, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 30-December 5, 1987, Vol. 112, pp. 393-404, also available as Lawrence Livermore National Laboratory Report UCRL-97936, November 1987.

293. Corrosion Testing of Type 304L Stainless Steel in Tuff Groundwater Environments, R. Westerman, S. Pitman and J. Haberman, Pacific Northwest Laboratories, PNL-5829, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contract Report UCRL-21005, November 1987.
294. The Reaction of Glass in a Gamma Irradiated Saturated Tuff Environment: Part II. Data Package for ATM-1c and ATM-8 Glass, J. Bates, T. Gerding, D. Fischer and W. Ebert, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contract Report UCRL-15991, (no distribution), November 1987.
295. An Approximate Calculation of Advective Gas Phase Transport of Carbon 14 at Yucca Mountain, Nevada, R. Knapp, published in the "Journal of Contaminant Hydrology", Vol. 5, 1990, pp. 133-154, also available as Lawrence Livermore National Laboratory Report UCRL-97805, November 1987.
296. Preliminary Technique Assessment for Nondestructive Evaluation Certification of the NNWSI Disposal Container Closure, R. A. Day, Lawrence Livermore National Laboratory Report UCID-21323, November 1987.
297. Progress Report on the Results of Testing Advanced Conceptual Design Metal Barrier Materials Under Relevant Environmental Conditions for a Tuff Repository, D. McCright, W. Halsey and R. Van Konynenburg, Lawrence Livermore National Laboratory Report UCID-21044, December 1987.
298. Spent Fuel Performance Data: An Analysis of Data Relevant to the NNWSI Project, V. Oversby and H. Shaw, Lawrence Livermore National Laboratory Report UCID-20926, December 1987.
299. Interim Report on Modeling Sorption with EO3/6, B. Viani, Lawrence Livermore National Laboratory Report UCID-21308, January 1988.
300. Thermochemistry of Uranium Compounds XVII. Standard Molar Enthalpy of Formation at 298.15°K of Dehydrated Schoepite  $UO_3 \cdot 0.9H_2O$ . Thermodynamics of (Schoepite + Dehydrated Schoepite + Water), P. O'Hare and S. Nguyen, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-21053, January 1988.
301. The Reaction of Glass in a Gamma-Irradiated Saturated Tuff Environment Part III: Long Term Experiments at  $1 \times 10^4$  Rad/hour, T. Abrajano, J. Bates, T. Gerding and W. Ebert, Argonne National Laboratory Report ANL-88-14, submitted to Lawrence Livermore National Laboratory under subcontract, February 1988.
302. Plan for Waste Package Environment for NNWSI, W. Glassley, Lawrence Livermore National Laboratory Report UCID-21326, February 1988.
303. NNWSI Waste Form Testing at Argonne National Laboratory Semiannual Report. July-December 1986, J. Bates, T. Gerding, A. Abrajano, W. Ebert and J. Mazer, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Report UCRL-15801-86-2, February 1988.
304. Plan for Design, Fabrication, and Prototype Testing for NNWSI, E. W. Russell and T. A. Nelson, Lawrence Livermore National Laboratory Report UCID-21347, February 1988.
305. Plan for Metal Barrier Selection and Testing for NNWSI, W. G. Halsey and R. D. McCright, Lawrence Livermore National Laboratory Report UCID-21262, April 1988.

306. NNWSI Waste Form Testing at Argonne National Laboratory Semi-Annual Report, January-June 1987, J. Bates, T. Gerding, A. Abrajano, W. Ebert and J. Mazer, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-21060-87-1, April 1988.
307. Hydrological Properties of Topopah Spring Tuff Under a Thermal Gradient Laboratory Results, W. Lin and W. Daily, published in "International Journal of Rock Mechanics", Vol. 27, #5, pp. 373-385, 1990, also available as Lawrence Livermore National Laboratory Report UCRL-96926, April 1988.
308. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Volume 3. Localized Corrosion and Stress Corrosion Cracking of Austenitic Alloys, J. C. Farmer, R. A. Van Konynenburg, D. McCright, LLNL, and D. B. Bullen, Science & Engineering Associates, Inc., Lawrence Livermore National Laboratory Report UCID-21362, Vol. 3, April 1988.
309. Numerical Modeling of the Thermal and Hydrological Environment Around a Nuclear Waste Package Using the Equivalent Continuum Approximation: Horizontal Emplacement, J. Nitao, Lawrence Livermore National Laboratory Report, UCID-21444, May 1988. [NNA.890317.0021;201832]
310. Estimates of the Width of the Wetting Zone Along a Fracture Subjected to an Episodic Infiltration Event in Variably Saturated, Densely Welded Tuff, T. Buscheck and J. Nitao, Lawrence Livermore National Laboratory Report UCID-21579, May 1988. [HQX.19890522.0064]
311. Electrochemical Corrosion Studies on Copper-Base Waste Package Container Materials in Unirradiated 0.1 N NaNO<sub>3</sub> at 95°C, Akkaya and Verink with forward by R. Van Konynenburg, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Report UCRL-21076, May 1988.
312. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Volume 4. Stress Corrosion Cracking of Copper-Based Alloys, J. C. Farmer, R. A. Van Konynenburg, R. D. McCright, LLNL and G. E. Gdowski Science & Engineering Associates, Inc., Lawrence Livermore National Laboratory Report UCID-21362 Vol. 4, May 1988.
313. The Reaction of Reference Commercial Nuclear Waste Glasses During Gamma Irradiation in a Saturated Tuff Environment, J. Bates, W. Ebert, D. Fischer and T. Gerding, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in "Journal of Materials Research 3" (3), pp. 576-597, May/June 1988.
314. Long-Term, Low-Temperature Oxidation of PWR Spent Fuel Interim Transition Report, R. E. Einziger and H. C. Buchanan, WHC-EP-0070, submitted to Lawrence Livermore National Laboratory under subcontract, June 1988.
315. Assessment of Engineered Barrier Systems and Design of Waste Packages, L. Ramspott, presented at the American Nuclear Society Meeting, San Diego, CA, June 12-16, 1988, published in Transactions, pg. 216, also available as Lawrence Livermore National Laboratory Report UCRL-98029, June 1988.
316. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Overview, J. C. Farmer, R. D. McCright and J. N. Kass, Lawrence Livermore National Laboratory Report UCID-21362, June 1988.

317. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Volume 5. Localized Corrosion of Copper-Based Alloys. J. C. Farmer, R. A. Van Konynenburg, R. D. McCright, LLNL and G. E. Gdowski, Science & Engineering Associates, Inc., Lawrence Livermore National Laboratory Report UCID-21362, Vol. 5, June 1988.
318. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Volume 7. Weldability of Austenitic Alloys. M. J. Strum, H. Weiss and J. C. Farmer, LLNL and D. B. Bullen, Science & Engineering Associates, Inc., Lawrence Livermore National Laboratory Report UCID-21362, Vol. 7, June 1988.
319. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Volume 8. Weldability of Austenitic Alloys. D. B. Bullen and G. E. Gdowski, Science & Engineering Associates, Inc., and H. Weiss, LLNL, Lawrence Livermore National Laboratory Report UCID-21362, Vol. 8, June 1988.
320. Simulations of the Transport of Radionuclides by Liquid Diffusion at Yucca Mountain - Comparisons With and Without Backfill. J. Nitao, Lawrence Livermore National Laboratory Report UCID-21466, July 1988.
321. Annotated History of Container Candidate Material Selection. R. McCright, Lawrence Livermore National Laboratory Report UCID-21472, July 1988.
322. Measurement of the Oxidation of Spent Fuel Between 140° and 225°C. R. Woodley, R. Einziger and H. Buchanan, Pacific Northwest Laboratory, PNL-SA-15496, submitted to Lawrence Livermore National Laboratory under subcontract, July 1988.
323. Application of the NNWSI Unsaturated Test Method to Actinide Doped SRL 165 Type Glass. J. Bates and T. Gerding, Argonne National Laboratory Report ANL-89/24, submitted to Lawrence Livermore National Laboratory under subcontract, July 1988.
324. The Reaction of Glass During Gamma Irradiation in a Saturated Tuff Environment Part 4: SRL 165, ATM-1c, and ATM-8 Glasses at 1E3 R/h and 0 R/h. W. Ebert, J. Bates and T. Gerding, Argonne National Laboratory Report ANL-90/13 (1990), submitted to Lawrence Livermore National Laboratory under subcontract, August 1988.
325. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Volume 1. Phase Stability. D. B. Bullen and G. E. Gdowski, Science & Engineering Associates, Inc., Lawrence Livermore National Laboratory Report UCID-21362 Vol. 1, August 1988.
326. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Volume 2. Oxidation and Corrosion. D. B. Bullen and G. E. Gdowski, Science & Engineering Associates, Inc., Lawrence Livermore National Laboratory Report UCID-21362, Vol. 2, August 1988.
327. Survey of Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers. Volume 6. Effects of Hydrogen in Austenitic and Copper-Based Alloys. G. E. Gdowski and D. B. Bullen, Science & Engineering Associates, Inc., Lawrence Livermore National Laboratory Report UCID-21362, Vol. 6, August 1988.
328. NNWSI Waste Form Testing at Argonne National Laboratory Semi-Annual Report January - June 1988. J. Bates, T. Gerding, W. Ebert, J. Mazer and B. Biwer, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-CR-21060-88-1, August 1988.

329. Measurement of the Oxidation of Spent Fuel between 140° and 225°C by Thermogravimetric Analysis, R. Woodley, R. Einziger and H. Buchanan, Westinghouse Hanford Company Report WHC-EP-0107, submitted to Lawrence Livermore National Laboratory under subcontract, September 1988.
330. Thermal Performance of a Buried Nuclear Waste Storage Container Storing a Hydride Mix of PWR and BWR Spent Fuel Rods, G. Johnson, Lawrence Livermore National Laboratory Report UCID-21414, September 1988.
331. Fabrication Development for High-Level Nuclear Waste Containers for the Tuff Repository Phase 1 Final Report, H. Domian, R. Holbrook and D. LaCount, Babcock and Wilcox, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15965, September 1988.
332. Uranium Transport in Topopah Spring Tuff: An Ion-Microscope Investigation, K. McKeegan, D. Phinney, V. Oversby, M. Buchholtz and D. Smith, submitted to Material Research Society, Berlin, Germany, October 1988, Vol. 127, pp. 813-821, Lawrence Livermore National Laboratory Report UCRL-99734, Rev. 1, October 1988.
333. NNWSI Waste Form Testing at Argonne National Laboratory - Semi-Annual Report, July-December 1987, J. Bates, T. Gerding, W. Ebert, J. Mazer and B. Biwer, Lawrence Livermore National Laboratory Contractor Report UCRL-21060-87-2, October 1988.
334. Electrochemical Corrosion Scoping Experiments--An Evaluation of the Results, H. D. Smith, Westinghouse Hanford Co., WHC-EP-0065 (formerly HEDL-7637), submitted to Lawrence Livermore National Laboratory under subcontract, October 1988.
335. Initial Report on Stress-Corrosion-Cracking Experiments Using Zircaloy-4 Spent Fuel Cladding C-Rings, H. D. Smith, Westinghouse Hanford Co., WHC-EP-0096 (formerly HEDL-7665), submitted to Lawrence Livermore National Laboratory under subcontract, October 1988.
336. Localized Corrosion and Stress Corrosion Cracking of Candidate Materials for High-Level Radioactive Waste Disposal Containers in U.S.: A Literature Review, J. Farmer and D. McCright, published in Proceedings of the Material Research Society Symposium, Berlin, Germany, October 1988, Vol. 127, pp. 359-372, also available as Lawrence Livermore National Laboratory Report UCRL-98756, November 1988.
337. Preliminary Scoping Calculations of Hydrothermal Flow in Variably Saturated, Fractured, Welded Tuff During the Engineered Barrier Design Test at the Yucca Mountain Exploratory Shaft Test Site, T. Buscheck and J. Nitao, Lawrence Livermore National Laboratory Report UCID-21571, November 1988.
338. MCRT User's Guide and Documentation, K. Jackson, T. Wolery, W. Bourcier, J. Delany, R. Moore, M. Clinnick and S. Lundeen, Lawrence Livermore National Laboratory Report UCID-21406, November 1988.
339. A Review of Models Relevant to the Predication of Performance of High-Level Radioactive Waste Disposal Containers, J. Farmer and D. McCright, published in Proceedings of the National Association Corrosion Engineers Conference, New Orleans, LA, Paper #519, April 17-21, 1989, also available as Lawrence Livermore National Laboratory Report UCRL-100172, November 1988.
340. Test Plan for Long-Term, Low Temperature Oxidation of BWR Spent Fuel, R. E. Einziger, Pacific Northwest Laboratories, PNL-6427, submitted to Lawrence Livermore National Laboratory under subcontract, December 1988.

341. Test Plan for Thermogravimetric Analysis of BWR Spent Fuel Oxidation, R. Einziger, Pacific Northwest Laboratory, PNL-6745, submitted to Lawrence Livermore National Laboratory under subcontract, December 1988.
342. Waste Package Performance Assessment for the Yucca Mountain Project, W. O'Connell, D. Lappa and T. Thatcher, published in Proceedings of the Waste Management '89 Symposia, Tucson, AZ, March 1-3, 1989, Vol. 1, pp. 551-558, also available as Lawrence Livermore National Laboratory Report UCRL 100395, January 1989.
343. Evaluation of the Post-Emplacement Environment of High-Level Radioactive Waste Packages at Yucca Mountain, Nevada, W. Glassley, published in Proceedings of the Waste Management '89 Symposia, Tucson, AZ, March 1-3, 1989, Vol. 1, pp. 477-483, also available as Lawrence Livermore National Laboratory Report UCRL-100603, March 1989.
344. Studies on Spent Fuel Dissolution Behavior under Yucca Mountain Repository Conditions, C. N. Wilson and C. Bruton, PNL-SA-16832, Pacific Northwest Laboratory, published in Proceedings of the American Ceramic Society Annual Meeting, Ceramics Transactions of Nuclear Waste Management III, Indianapolis, IN, April 23-27, 1989, G. B. Mellinger, Editor, Vol. 9, pp. 423-441, also available as Lawrence Livermore National Laboratory Report UCRL-10023, March 1989.
345. Fabrication and Closure Development of Nuclear Waste Containers for Storage at Nevada's Yucca Mountain, E. W. Russell, T. Nelson, H. Domian, D. LaCount, E. Robitz and K. Stein, published in Proceedings of the 1st International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 8-12 1990, Vol. 2, pp. 1406-1413, also available as Lawrence Livermore National Laboratory Report UCRL-99513, April 1989.
346. Americium (III) Carbonate Complexation in Aqueous Perchlorate Solution, H. Nitsche, E. Standifer and R. Silva, Lawrence Berkeley Laboratory, LBL-25118, published in "Radiochimica Acta Journal", Vol. 46, #4, pp. 185-189, April 1989.
347. The Influence of Penetrating Gamma Radiation on the Reaction of Simulated Nuclear Waste Glass in Tuff Groundwater, W. L. Ebert, Argonne National Laboratory, published in Proceedings of the American Ceramic Society Annual Meeting, Ceramics Transactions of Nuclear Waste Management III, Indianapolis, IN, April 23-27, 1989, G. B. Mellinger, Editor, Vol. 9, submitted to Lawrence Livermore National Laboratory under subcontract, April 1989.
348. Evaluation of the Austenitic Alloy 304L, 316L and Alloy 825 under Tuff Repository Conditions, J. Kass, presented at the Workshop on Corrosion of Nuclear Waste Containers, Winnipeg, Canada, February 9-10, 1988, Lawrence Livermore National Laboratory Report UCRL-101096, May 1989.
349. Evaluation of Copper, Aluminum Bronze, and Copper-Nickel for YMP Container Material, J. Kass, presented at the Workshop on Corrosion of Nuclear Waste Containers, Winnipeg, Canada, February 9-10, 1988, Lawrence Livermore National Laboratory Report UCRL-101097, May 1989.
350. Yucca Mountain Project Waste Package Design for MRS System Studies, T. Nelson, E. Russell, G. L. Johnson, R. Morissette, D. Stahl, L. LaMonica and G. Hertel, Lawrence Livermore National Laboratory Report UCID-21700, May 1989.
351. A Kinetic Model for Dissolution of Borosilicate Glass, W. L. Bourcier, K. G. Knauss and C. I. Merzbacher, published in Proceedings of the 6th International Symposium on Water-Rock Interaction, Malvern, UK, August 1989, Water-Rock Interaction-6, pp. 107-110, also available as Lawrence Livermore National Laboratory Report UCRL-101285, May 1989.

352. Yucca Mountain Project Container Fabrication, Closure, and Non-Destructive Evaluation Development Activities, E. Russell and T. Nelson, presented at the Workshop on Corrosion of Nuclear Waste Containers, Winnipeg, Canada, February 9-10, 1988, Lawrence Livermore National Laboratory Report UCRL-101183, June 1989.
353. The EO3/6 Software Package for Geochemical Modeling: Current Status, T. J. Wolery, K. J. Jackson, W. L. Bourcier, C. J. Bruton, B. E. Viani, K. G. Knauss and J. M. Delany, published in Proceedings of the American Chemical Society Conference, Los Angeles, CA, September 25-30, 1988, Vol. 416, pp. 104-116, also available as Lawrence Livermore National Laboratory Report UCRL-98729, June 1989. [NNA.19900117.0112]
354. Microstructural Examination of Oxidized Spent PWR Fuel by Transmission Electron Microscope, L. Thomas, R. Einziger, and W. Woodley, Pacific Northwest Laboratory Report PNL-SA-15796, submitted to Lawrence Livermore National Laboratory under subcontract, published in "Journal of Nuclear Materials" 166, 1989, pp. 243-251, June 1989.
355. A Lagrangian Reactive Transport Simulator with Multiple Paths and Stationary-States: Concepts, Implementation and Verification, R. Knapp, submitted to the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Las Vegas, NV, September 18-21, 1989, (not published in Proceedings), Lawrence Livermore National Laboratory Report UCRL-100952, June 1989. [NNA.19900419.0143]
356. Prototype Engineered Barrier System Field Tests -- Progress Report, A. Ramirez, J. Beatty, T. Buscheck, R. Carlson, W. Daily, V. Latorre, K. Lee, W. Lin, N. Mao, J. Nitao, D. Towse, T. Ueng, D. Watwood and D. Wilder, published in Proceedings of the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Las Vegas, NV, September 18-21, 1989, Vol. 1, pp. 30-37, also available as Lawrence Livermore National Laboratory Report UCRL-101615, July 1989.
357. Dissolution and Precipitation Kinetics of Kaolinite: Initial Results at 80°C with Application to Porosity Evolution in a Sandstone, K. L. Nagy, C. I. Steefel, A. E. Blum and A. C. Lasaga, submitted to Lawrence Livermore National Laboratory under subcontract, also submitted to AAPG Memoir volume, "Prediction of Reservoir Quality through Chemical Modeling", July 1989.
358. Microwave Measurements of Water Vapor Partial Pressure at Temperatures up to 350°C, V. Latorre, published in Proceedings of the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Las Vegas, NV, September 18-21, 1989, Vol. 1, pp. 434-440, also available as Lawrence Livermore National Laboratory Report UCRL-101866, July 1989.
359. Current Status of Waste Package Designs for the Yucca Mountain Project, L. B. Ballou, submitted to the Institute of Nuclear Materials Management 30th Annual Meeting, Orlando, FL, July 9-12, 1989, (not published in Proceedings), Lawrence Livermore National Laboratory Report UCRL-100790, July 1989.
360. Laboratory Study of Fracture Healing in Topopah Spring Tuff - Implications for Near Field Hydrology, W. Lin, published in the Proceedings of the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Las Vegas, NV, September 18-21, 1989, Vol. 1, pp. 443-447, also available as Lawrence Livermore National Laboratory Report UCRL-100624, July 1989. [NNA.19900711.0241;224040]

361. Measurement of Soluble Nuclide Dissolution Rates From Spent Fuel, C. N. Wilson and W. J. Gray, Pacific Northwest Laboratory, PNL-SA-17120, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 27-30, 1989, Vol. 1, pp. 489-491, also submitted to Lawrence Livermore National Laboratory under subcontract, August 1989.
362. On the Infiltration of a Liquid Front In an Unsaturated, Fractured Porous Medium, J. Nitao and T. Buscheck, published in Proceedings of the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Las Vegas, NV, September 18-21, 1989, Vol. 1, pp. 381-397, also available as Lawrence Livermore National Laboratory Report UCRL-100777, August 1989.
363. An Investigation of Thermal Release of 14°C from PWR Spent Fuel Cladding, H. Smith and D. Baldwin, Pacific Northwest Laboratory Report PNL-SA-16606, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the American Nuclear Society Topical Meeting, Vol. 1, pp. 46-49, Las Vegas, NV, September 18-21, 1989,.
364. Spent Fuel Drybath Oxidation Testing, R. Einziger, Pacific Northwest Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Vol. 1, pp. 38-40, Las Vegas, NV, September 18-21, 1989.
365. An Experimental Investigation of Copper-Zircaloy Interactions Under Potential Tuff Repository Conditions, H. D. Smith, WHC-EP-0173, Pacific Northwest Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, September 1989.
366. Statistical Model for Grain Boundary and Grain Volume Oxidation Kinetics in UO<sub>2</sub> Spent Fuel, R. B. Stout, H. Shaw and R. Einziger, submitted to the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Las Vegas, NV, September 18-21, 1989, (not published in Proceedings), Lawrence Livermore National Laboratory Report UCRL-100859, September 1989.
367. High Frequency Electromagnetic Tomography, W. Daily, A. Ramirez, T. Ueng and V. Latorre, published in Proceedings of the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Vol. 1, pp. 409-416, Las Vegas, NV, September 18-21, 1989, also available as Lawrence Livermore National Laboratory Report UCRL-101865, September 1989.
368. Dissolution Kinetics of a Simple Analogue Nuclear Waste Glass as a Function of pH, Time and Temperature, K. G. Knauss, W. L. Bourcier, K. D. McKeegan, C. I. Merzbacher, S. N. Nguyen, F. J. Ryerson, D. K. Smith and H. C. Weed, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 27-30, 1989, Vol. 1, pp. 371-381, also available as Lawrence Livermore National Laboratory Report UCRL-101112, September 1989.
369. A Kinetic Model for Borosilicate Glass Dissolution Based on the Dissolution Affinity of a Surface Alteration Layer, W. L. Bourcier, D. W. Peifer, K. G. Knauss, K. D. McKeegan, and D. K. Smith, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 27-30, 1989, Vol. 1, pp. 209-217, also available as Lawrence Livermore National Laboratory Report UCRL-101107, September 1989.
370. Modeling of Zircaloy Cladding Degradation Under Repository Conditions, L. Santanam, H. Shaw and B. Chin, published in Proceedings of the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Las Vegas, NV, September 18-21, 1989, Vol. 1, pp. 41-45, also available as Lawrence Livermore National Laboratory Report UCRL-100211, September 1989.

371. Corrosion Product Identification and Relative Rates of Corrosion of Candidate Metals in an Irradiated Air-Steam Environment, D. T. Reed, V. Swayambunathan, Argonne National Laboratory and R. A. Van Konynenburg, Lawrence Livermore National Laboratory, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 27-30, 1989, Vol. 1, pp. 517-524, also available as Lawrence Livermore National Laboratory Report UCRL-102597, September 1989.
372. In-Situ Observation of the Alpha-Beta Cristobalite Transition Using High-Voltage Electron Microscopy, A. Meike and W. Glassley, published in Proceedings of the Materials Research Society Symposium, Boston, MA, November 27-30, 1989, Vol. 1, pp. 631-638, also available as Lawrence Livermore National Laboratory Report UCRL-101323, September 1989.
373. Selection Criteria for Container Materials at the Proposed Yucca Mountain High Level Nuclear Waste Repository, W. G. Halsey, presented at the National Association of Corrosion Engineers Conference 90, Las Vegas, NV, April 23-28, 1990, Lawrence Livermore National Laboratory Report UCRL-102285, October 1989.
374. Identification of Secondary Phases Formed During Unsaturated Reaction of UO<sub>2</sub> with EJ-13 Water, J. K. Bates, et al., Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Materials Research Society Symposium, Vol. 1, pp. 499-506, Boston, MA, November 27-30, 1989.
375. Parametric Effects of Glass Reaction Under Unsaturated Conditions, J. K. Bates, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Materials Research Society Symposium, Vol. 1, pp. 347-354, Boston, MA, November 27-30, 1989.
376. Comparison of the Layer Structure of Vapor Phase Leached SRL Glass by Use of AEM, B. Biwer, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Materials Research Society Symposium, Vol. 1, pp. 255-263, Boston, MA, November 27-30, 1989.
377. The Reaction of Synthetic Nuclear Waste Glass in Steam and Hydrothermal Solution, W. L. Ebert and J. K. Bates, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Materials Research Society Symposium, Vol. 1, pp. 339-346, Boston, MA, November 27-30, 1989.
378. Geochemical Modeling: An Integrated Approach to Nuclear Waste Disposal Issues, C. J. Bruton, B. E. Viani, W. L. Bourcier, K. J. Jackson and R. D. Aines, published in Proceedings of the International High Level Radioactive Waste Management Conference, April 8-12, 1990, Las Vegas, NV, Vol. 1, pp. 594-595, also available as Lawrence Livermore National Laboratory Report UCRL-102019, December 1989.
379. Vapor Hydration and Subsequent Leaching of Transuranic-Containing SRL and WV Glasses, J. K. Bates, W. L. Ebert and T. J. Gerding, Argonne National Laboratory, published in Proceedings of the International High Level Radioactive Waste Management Conference, April 8-12, 1990, Las Vegas, NV, Vol. 2, pp. 1095-1102, submitted to Lawrence Livermore National Laboratory under subcontract, December 1989.

380. Prototype Heater Test of the Environment Around a Simulated Waste Package, A. L. Ramirez, T. A. Buscheck, R. Carlson, W. Daily, V. R. Latorre, K. D. Lee, W. Lin, N. Mao, D. Towse, T. S. Ueng and D. Watwood, published in Proceedings of the International High Level Radioactive Waste Management Conference, April 8-12, 1990, Las Vegas, NV, Vol. 2, pp. 870-881, also available as Lawrence Livermore National Laboratory Report UCRL-101693, December 1989.
381. Geochemical Modeling of Radioactive Waste Glass Dissolution Using EO3/6: Preliminary Results and Data Needs, W. L. Bourcier, Lawrence Livermore National Laboratory Report UCID-21869, January 1990.
382. The Use of Performance Assessments in Yucca Mountain Repository Waste Package Design Activities, L. J. Jardine, published in Proceedings of the International High Level Radioactive Waste Management Conference, April 8-12, 1990, Las Vegas, NV, Vol. 2, pp. 1284-1286, also available as Lawrence Livermore National Laboratory Report UCRL-102116, January 1990.
383. Container Material Performance Assessment Modeling and Failure Modes, W. L. Clarke, J. C. Farmer, W. G. Halsey and R. D. McCright, published in Proceedings of the International High Level Radioactive Waste Management Conference, April 8-12, 1990, Las Vegas, NV, Vol. 1, pp. 437-442, also available as Lawrence Livermore National Laboratory Report UCRL-101877, January 1990.
- 383a. Report of the Committee to Review the Use of J-13 Well Water in Nevada Nuclear Waste Storage Investigations, J. E. Harrar, Chairman, J. F. Carley, W. F. Isherwood, E. Raber, Lawrence Livermore National Laboratory Report UCID-21867, Manuscript Date: September 1988, Publication Date: January 1990. [NNA.910131.0274]
384. Thermal Calculations Pertaining to a Proposed Yucca Mountain Nuclear Waste Repository, G. Johnson and D. N. Montan, available as Lawrence Livermore National Laboratory Report UCRL-ID-103534, February 1990.
385. Calibration of a High Frequency Electromagnetic Measurement System Used in Geophysics, W. D. Daily, V. R. Latorre and H. M. Buettner, submittal to "IEEE Geoscience and Remote Sensing Journal", also available as Lawrence Livermore National Laboratory Report UCRL-102049, February 1990.
386. On the Movement of a Liquid Front in an Unsaturated, Fractured Porous Medium. Part I, J. Nitao and T. Buscheck, Lawrence Livermore National Laboratory Report UCID-21714, February 1990.
387. On the Movement of a Liquid Front in an Unsaturated, Fractured Porous Medium. Part II -- Mathematical Theory, J. Nitao, Lawrence Livermore National Laboratory Report UCID-21743, February 1990.
388. A Deformation and Thermodynamic Model for Hydride Precipitation Kinetics in Spent Fuel Cladding, R. B. Stout, submitted to the American Nuclear Society Topical Meeting, Focus '89, Nuclear Waste Isolation in an Unsaturated Zone, Las Vegas, NV, September 18-21, 1989, (not published in Proceedings), Lawrence Livermore National Laboratory Report UCRL-100860, March 1990.
389. Effects of Water Composition on the Dissolution Rate of UO<sub>2</sub> Under Oxidizing Conditions, C. N. Wilson and W. J. Gray, Pacific Northwest Laboratory Report PNL-SA-17574, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the International High Level Radioactive Waste Management Conference, April 8-12, 1990, Las Vegas, NV, Vol. 2, pp. 1431-1436, April 1990.

390. Chemical Thermodynamics of Technetium II, J. A. Rard, prepared for inclusion in "Book of Chemical Thermodynamics of Technetium", Nuclear Energy Agency, Paris, France, Lawrence Livermore National Laboratory Report UCRL-102708, May 1990.
391. V-TOUGH - An Enhanced Version of the TOUGH Code for the Thermal and Hydrologic Simulation of Large-Scale Problems in Nuclear Waste Isolation, J. J. Nitao, Lawrence Livermore National Laboratory Report UCID-21954, May 1990.
392. Status of Integrated Performance Assessment of the Waste Packages and Engineered Barrier System, W. J. O'Connell, published in Proceedings of the International High Level Radioactive Waste Management Conference, April 8-12, 1990, Las Vegas, NV, Vol. 1, pp. 380-387, also available as Lawrence Livermore National Laboratory Report UCRL-102114, May 1990.
393. Natural Glass Analogues to Alteration of Nuclear Waste Glass: A Review and Recommendations for Further Study, W. F. McKenzie, Lawrence Livermore National Laboratory Report, UCID-21871, June 1990.
395. Results from NNWSI Series 3 Spent Fuel Dissolution Tests, C. N. Wilson, Pacific Northwest Laboratory, PNL-7170, submitted to Lawrence Livermore National Laboratory under subcontract, June 1990.
396. Preliminary Calculations of Release Rates of Tc-99, I-129, and Np-237 from Spent Fuel in a Potential Repository in Tuff, M. J. Apted, W. J. O'Connell, K. Lee, A. T. MacIntyre, T. -S. Ueng, and W. W. Lee, T. H. Pigford, Lawrence Berkeley Laboratory LBL-31069 UC-814, June 1990.
397. Use of pH STAT System in the Measurement of Zircaloy-4 Corrosion in the Presence of Fluoride, N. H. Uziemblo, Washington State University, thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Materials Science and Engineering, submitted to Lawrence Livermore National Laboratory under subcontract, July 1990.
398. Engineered Barrier Systems and Canister Orientation Studies for the Yucca Mountain Project, Nevada, D. Wilder, published in Proceedings of the International Symposium on Unique Underground Structures, June 12-15, 1990, Denver, CO, Vol. 2, Chpt. 62, pp. 1-28, also available as Lawrence Livermore National Laboratory Report UCRL-JC-103105, July 1990.
399. Preliminary Selection Criteria for the Yucca Mountain Project Waste Package Container Material, W. G. Halsey, Lawrence Livermore National Laboratory Report UCRL-ID-104552, July 1990.
400. Secondary Phase Formation During Nuclear Waste Glass Dissolution, T. A. Abrajano, J. K. Bates, A. B. Woodland, J. P. Bradley, Argonne National Laboratory and W. L. Bourcier, Lawrence Livermore National Laboratory, published in "Clays and Clay Minerals," Vol. 30, #5, pp. 537-548, August 1990.
401. Preclosure Safety Analysis for a Prospective Yucca Mountain Conceptual Design Repository, C. W. Ma, Bechtel and L. J. Jardine, published in Proceedings of the International High Level Radioactive Waste Management Conference, April 8-12, 1990, Las Vegas, NV, Vol. 1, pp. 370-379, also available as Lawrence Livermore National Laboratory Report UCRL-102115, August 1990.
402. The Raman Spectra of Several Uranyl-Containing Minerals Using a Microprobe, B. M. Biwer, W. L. Ebert and J. K. Bates, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in "Journal of Nuclear Materials", Vol. 175, pp. 188-193, August 1990.

403. Spent Fuel Receipt Scenarios Study, L. B. Ballou, D. N. Montan, and M. A. Revelli, Lawrence Livermore National Laboratory Report UCID-21530, October 1990.
404. Calibration of Electrical Impedance Tomography for Imaging of Rock Core Samples, E. Owen and W. Daily, Lawrence Livermore National Laboratory Report UCRL-JC-103138, November 1990.
405. Chemical Thermodynamics of Technetium III, J. A. Rard, prepared for inclusion "Book of Chemical Thermodynamics of Technetium," Nuclear Energy Agency, Paris, France, Lawrence Livermore National Laboratory Report UCRL-103728, November 1990.
406. Results from NNWSI Series 2 Bare Fuel Dissolution Tests, C. N. Wilson, Pacific Northwest Laboratory, PNL-7169, submitted to Lawrence Livermore National Laboratory under subcontract, November 1990.
407. Corrosion Behavior of Copper-Base Materials in a Gamma-Irradiated Environment - Final Report, W. Yunker, WHC-EP-0188, Pacific Northwest Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, UCRL-21118, November 1990.
408. Zircaloy Cladding Degradation Under Repository Conditions, L. Santanam, H. Shaw and B. A. Chin, presented at the Fourth International Symposium on Environmental Degradation of Materials in Nuclear Power Systems, Jekyll Island, GA, August 6-10, 1989, Lawrence Livermore National Laboratory Report UCRL-100212, January 1991.
409. Prototype System Field Test -- Progress Report through November 1, 1988, J. Beatty, T. Buscheck, R. Carlson, W. Daily, V. Latorre, K. Lee, W. Lin, N. Mao, J. Nitao, A. Ramirez, D. Towse, T. Ueng, D. Watwood and D. Wilder, Lawrence Livermore National Laboratory Report UCID-21640, February 1991.
410. Standard Gibbs Free Energies of Formation at 30°C of Four Uranyl Silicates: Soddyite, Uranophane, Sodium Boltwoodite and Sodium Weeksite, S. N. Nguyen, R. J. Silva, H. C. Weed and J. E. Andrews, Jr., published in "Chemical Thermodynamics", Vol. 24, pp. 359-376, 1992, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106032, February 1991. [NNA.19940221.0163]
411. NNWSI Waste Form Testing at Argonne National Laboratory. Semi-Annual Report. January - June 1988, J. K. Bates, T. J. Gerding, W. L. Ebert, J. J. Mazer and B. M. Biwer, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractors Report UCRL-21060-88-1, February 1991.
412. Variation of Permeability with Temperature in Fractured Topopah Spring Tuff Samples, W. Lin, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 3, 1991, Vol. 2, pp. 988-993, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104765, February 1991. [NNA.910523.0105;201212]
413. Theory of Fracture-Matrix Flow Regimes in Unsaturated Porous Media, J. J. Nitao, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 3, 1991, Vol. 1, pp. 845-852, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104933, February 1991. [NNA.910523.0117;234964]

414. Microwave Measurement of the Water Content of Bentonite, V. R. Latorre and H. D. Glenn, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28- May 2, 1991, Vol. 1, pp. 578-582, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104768, February 1991.
415. Fabrication and Closure Development of Corrosion Resistant Containers for Nevada's Yucca Mountain High-Level Nuclear Waste Repository, E. W. Russell, T. A. Nelson, H. A. Domian, D. F. LaCount, E. S. Robitz and K. O. Stein, presented at the National Association of Corrosion Engineers Conference 90, Las Vegas, Nevada, April 23-28, 1990, Lawrence Livermore National Laboratory Report UCRL-102081, February 1991.
416. The Importance of Secondary Phases in Glass Corrosion, W. L. Ebert and J. K. Bates, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Materials Research Society Symposium - Fall Meeting, Scientific Basis for Nuclear Waste Management XIV, Boston, MA, November 27-29, 1990, Vol. 212, pp. 89-97, March 1991.
417. Results from Long-Term Dissolution Tests Using Oxidized Spent Fuel, C. N. Wilson, Pacific Northwest Laboratory, Report PNL-SA-18263, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Materials Research Society Symposium - Fall Meeting, Scientific Basis for Nuclear Waste Management XIV, November 26-29, 1990, Boston, MA, Vol. 212, pp. 197-204, March 1991.
418. Solution Thermodynamics at High Temperature. I. Pr-Diglycolate Stability Constants from 23-95°C, P. M. Grant, P. Robouch, R. A. Torres, P. A. Baisden and R. J. Silva, published in "Journal of Physical Chemistry", Vol. 21, #3, pp. 213-227, 1992, also available as Lawrence Livermore National Laboratory Report UCRL-JC-105360, March 1991.
419. Actinide Transport in Topopah Spring Tuff: Pore Size, Particle Size and Diffusion, M. Buchholtz ten Brink, D. L. Phinney and D. K. Smith, published in Proceedings of the Materials Research Society Symposium - Fall Meeting, Scientific Basis for Nuclear Waste Management XIV, Boston, MA, November 27-29, 1990, Vol. 212, pp. 641-648, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104530, March 1991.
420. Closure Development for High-Level Nuclear Waste Containers for the Tuff Repository Phase I Final Report, E. Robitz, Jr., M. McAninch and D. Edmonds, Babcock and Wilcox, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report UCRL-15964, March 1991.
421. Overview of Chemical Modeling of Nuclear Waste Glass Dissolution, W. L. Bourcier, published in Proceedings of the Materials Research Society Symposium - Fall Meeting, Scientific Basis for Nuclear Waste Management XIV, Boston, MA, November 27-29, 1990, Vol. 212, pp. 3-18, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104531, March 1991.
422. Effects of Heterogeneity on Actinide Distribution Rates in Tuff Rock, M. Buchholtz ten Brink, D. L. Phinney and D. K. Smith, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 1, pp. 161-168, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104754, April 1991.

423. Uncertainty Analysis of Preclosure Accident Doses for the Yucca Mountain Repository, C. W. Ma, D. D. Miller, S. J. Zavoshy and L. J. Jardine, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 2, pp. 1694-1703, also available as Lawrence Livermore National Laboratory Report UCRL-JC-107567, April 1991.
424. An Electrochemical Approach to Predicting Corrosion Performance of Container Materials, R. D. McCright, J. C. Farmer, and D. L. Fleming, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 2, pp. 940-944, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104949, April 1991.
425. Yucca Mountain Near Field Environment Considerations for Engineered Barrier System Design and Performance, D. G. Wilder, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 2, pp. 1366-1374, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104764, April 1991.
426. Dissolution Characteristics of Mixed UO<sub>2</sub> Powders in J-13 Water Under Saturated Conditions, E. Veleckis, J. C. Hoh and J. K. Bates, Argonne National Laboratory Report ANL-91/8, submitted to Lawrence Livermore National Laboratory under subcontract, April 1991.
427. Nonuniform Oxidation of LWR Spent Fuel in Air, L. E. Thomas, O. D. Slagle and R. E. Einziger, Pacific Northwest Laboratory Report PNL-SA-19332, submitted to Lawrence Livermore National Laboratory under subcontract, submitted to "Journal of Nuclear Materials", Vol. 184, pp. 117-126, 1991, April 1991.
428. Gaseous Release of Carbon-14: Why the High Level Waste Regulations Should be Changed, R. Van Konynenburg, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 1, pp. 313-319, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104763, April 1991.
429. Yucca Mountain Site Characterization Project Waste Package Plan, D. J. Harrison-Giesler, R. P. Morissette and L. J. Jardine, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 1, pp. 296-300, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106161, April 1991.
430. Spent Fuel Waste Form Characteristics: Grain and Fragment Size Statistical Dependence for Dissolution Response, R. B. Stout, H. Leider, H. Weed, S. Nguyen, W. McKenzie, S. Prussin, C. N. Wilson and W. J. Gray, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 1, pp. 103-111, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104931, May 1991.
431. Thermodynamic Studies of Zeolites: Clinoptilolite<sup>a</sup>, G. K. Johnson, I. R. Tasker, R. Jurgens and P. A. G. O'Hare, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, submitted to "Journal of Chemical Thermodynamics", Vol. 23, pp. 475-484, May 1991.
432. Spent Fuel Waste Form Characteristics: Grain and Fragment Size Statistical Dependence for Oxidation Response, R. B. Stout, E. Kansa, R. E. Einziger, H. C. Buchanan and L. E. Thomas, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 1, pp. 112-119, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104932, May 1991.

433. Using a Systems Engineering Process to Develop Engineered Barrier System Design Concepts, L. Jardine and D. Short, published in Waste Management 91 Conference, Tucson, AZ, February 24-28, 1991, Vol. 1, pp. 221-225, also available as Lawrence Livermore National Laboratory Report UCRL-JC-107190, May 1991.
434. Laboratory Determined Suction Potential of Topopah Spring Tuff, W. Daily and W. Lin, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, Nevada, April 28-May 2, 1991, Vol. 1, pp. 583-588, also available as Lawrence Livermore National Laboratory Report UCRL-102127, May 1991.
435. Cost Estimate of High-Level Radioactive Waste Containers for the Yucca Mountain Project, E. W. Russell, LLNL, H. A. Domain, Babcock and Wilcox and A. A. Madson, Kaiser Engineers, Lawrence Livermore National Laboratory Report UCID-21863, June 1991.
436. Grain Boundary Oxidation of PWR Spent Fuel in Air, L. E. Thomas, Pacific National Laboratory, published in "Materials Characterization", 28, 1992, pp. 149-156, submitted to Lawrence Livermore National Laboratory under subcontract PNL-SA-19715, June 1991.
437. Effect of Ionizing Radiation on the Waste Package Environment, D. T. Reed, Argonne National Laboratory and R. Van Konynenburg, Lawrence Livermore National Laboratory, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, Vol. 2, pp. 1396-1403, June 1991.
438. An Elevated Temperature Titration Calorimeter, J. R. Smith, P. L. Zanonato and G. R. Choppin published in the "Journal of Chemical Thermodynamics", Vol. 24, #1, pp. 99-106, also available as Lawrence Livermore National Laboratory Report UCRL-CR-107905, June 1991.
439. Mineralogical, Textural and Compositional Data on the Alteration of Basaltic Glass from Kilauea, Hawaii to 300°C: Insights to the Corrosion of a Borosilicate Glass Waste-Form, D. K. Smith, published in Proceedings of the Materials Research Society Symposium - Fall Meeting, Boston, MA, November 27-29, 1990, Scientific Basis for Nuclear Waste Management XIV, Vol. 212, pp. 115-121, also available as Lawrence Livermore National Laboratory Report UCRL-JC-103739, June 1991.
440. Preliminary Calculations of Release Rates from Spent Fuel in a Tuff Repository, M. J. Apter, W. J. O'Connell, K. D. Lee, A. T. MacIntyre, T. S. Ueng, and T. H. Pigford, W. W. Lee, Lawrence Berkeley Laboratory, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28-May 2, 1991, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104832, July 1991.
441. Performance Implications of Waste Package Emplacement Orientation, D. Wilder, Lawrence Livermore National Laboratory Report UCID-21607, July 1991.
442. Container Materials for High-Level Nuclear Waste at the Proposed Yucca Mountain Site, R. D. McCright, published in Proceedings of the Materials Research Society Symposium - Fall Meeting, Scientific Basis for Nuclear Waste Management XIV, Boston, MA, November 27-29, 1990, Vol. 212, pp. 249-260, also available as Lawrence Livermore National Laboratory Report UCRL-JC-103726, July 1991.
443. Mechanistic Interpretation of Glass Reaction: Input to Kinetic Model Development, J. Bates, W. Ebert, J. Bradley and W. Bourcier, Argonne National Laboratory, published in Proceedings of the International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 28- May 2, 1991, Vol. 1, pp. 720-727, also available as Lawrence Livermore National Laboratory Report UCRL-JC-107287, July 1991.

444. Corrosion of Copper-Based Materials in Irradiated Moist Air Systems, D. T. Reed, Argonne National Laboratory and R. Van Konynenburg, Lawrence Livermore National Laboratory, published in the Proceedings of the Materials Research Society Symposium - Fall Meeting, Scientific Basis for Nuclear Waste Management XIV, Boston, MA, November 27-29, 1990, Vol. 212, pp. 317-351, July 1991.
445. Modeling Hydrothermal Flow in Variably Saturated, Fractured, Welded Tuff During the Prototype Engineered Barrier System Field Test of the Yucca Mountain Project, T. A. Buscheck and J. J. Nitao, submitted to Flow and Transport Through Unsaturated Fractured Rock -- Related to High-Level Radioactive Waste Disposal, Tucson, AZ, January 7-10, 1991, Lawrence Livermore National Laboratory Report UCRL-JC-106521, July 1991.
446. Corrosion Models for Performance Assessment of High-Level Radioactive-Waste Containers, J. C. Farmer, G. E. Gdowski, R. D. McCright and H. S. Ahluwalia, published in "Nuclear Engineering and Design", Vol. 129, pp. 57-88, also available as Lawrence Livermore National Laboratory Report UCRL-JC-103517, July 1991.
447. Corrosion Considerations of High-Nickel Alloys and Titanium Alloys for High-Level Radioactive Waste Disposal Containers, G. E. Gdowski and R. D. McCright, presented at the CORROSION/91 meeting, Cincinnati, OH, March 11-15, 1991, Lawrence Livermore National Laboratory Report UCRL-JC-103744, July 1991.
448. The LLNL Thermochemical Data Base and Revised Data and File Format for the EQ3/6 Package, J. M. Delany and S. R. Lundeen, Lawrence Livermore National Laboratory Report UCID-21658, July 1991.
449. The Effect of Dislocation Density on the Dissolution Rate of Quartz, A. Blum, Yale University, R. Yund, Brown University and A. Lasaga, Yale University, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Report UCRL-101612, July 1991.
450. Leaching Action of EJ-13 Water on Unirradiated UO<sub>2</sub> Surfaces Under Unsaturated Conditions at 90°C: Interim Report, J. K. Bates, T. J. Gerding, E. Veleckis, D. J. Wronkiewicz and B. S. Tani, Argonne National Laboratory Report ANL-91/11, submitted to Lawrence Livermore National Laboratory under subcontract, July 1991.
451. Temperature Measurements from the Prototype Engineered Barrier System Field Test, W. Lin, A. L. Ramirez and D. Watwood, Lawrence Livermore National Laboratory Report UCRL-ID-104757, July 1991.
452. Remote Photoacoustic Measurements in Aqueous Solutions Using an Optical Fiber, R. E. Russo, D. Rojas, P. Robouch and R. J. Silva, published in "Review of Scientific Instruments", Vol. 61, Issue 12, 1990, pp. 3729-3732, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106029, July 1991.
453. In Situ Changes in the Moisture Content of Heated Welded Tuff Based on Thermal Neutron Measurements, A. L. Ramirez, R. C. Carlson and T. A. Buscheck, Lawrence Livermore National Laboratory Report UCRL-ID-104715, July 1991.
454. Prototype Engineered Barrier System Field Test - Final Report, T. Buscheck, R. Carlson, W. Daily, K. Lee, W. Lin, N. Mao, A. , T. Ueng, H. Wang and D. Watwood, Lawrence Livermore National Laboratory Report UCRL-ID-106159, August 1991.
455. The Sorption of Water on Obsidian and a Nuclear Waste Glass, W. L. Ebert, R. F. Hoburg, and J. K. Bates, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in "Physics and Chemistry of Glasses", Vol. 32, #4, pp. 133-137, August 1991.

456. Air Injection Field Tests to Determine the Effect of a Heat Cycle on the Permeability of Welded Tuff, K. D. Lee and T. S. Ueng, Lawrence Livermore National Laboratory Report UCRL-ID-105163, September 1991. [NNA.19910912.0001;203447]
457. Chemical Thermodynamics of Technetium IV, J. A. Rard, prepared for inclusion in "Book of Chemical Thermodynamics of Technetium," Nuclear Energy Agency, Paris, France, Lawrence Livermore National Laboratory Report UCRL-JC-108178, September 1991.
458. Remote Measurements of Actinide Species in Aqueous Solutions Using an Optical Fiber Photoacoustic Spectrometer, R. Russo, P. Robouch and R. Silva, published in Proceedings of the Materials Research Society Symposium - Fall Meeting, Scientific Basis for Nuclear Waste Management XIV, Boston, MA, November 27-29, 1990, Vol. 212, pp. 539-544, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106010, September 1991.
459. Development of High-Temperature UV-VIS-NIR Spectroscopy for the Measurement of Free Energies of Complexation at Elevated Temperatures, P. Robouch, P. Grant, R. Torres, P. Baisden and R. Silva, published in Proceedings of the Materials Research Society Symposium - Fall Meeting, Scientific Basis for Nuclear Waste Management XIV, Boston, MA, November 27-29, 1990, Vol. 212, pp. 545-549, also available as Lawrence Livermore National Laboratory Report UCRL-JC-103705, September 1991.
460. Thermocouple Psychrometer Measurements of In Situ Water Potential in Heated Welded Tuff, N. Mao, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 42-49, also available as Lawrence Livermore National Laboratory Report UCRL-ID-104729, October 1991.
461. Temperature Measurements from a Horizontal Heater Test in G-Tunnel, W. Lin, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 73-80, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106693, October 1991.
462. Progress in Assessing the Effect of Ionizing Radiation on the Anticipated Waste Package Environment at the Yucca Mountain Potential Repository Site, D. T. Reed, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 58-67, October 1991.
463. Status Report - Fabrication and Closure Development of Nuclear Waste Disposal Containers for the Yucca Mountain Project, H. A. Domian, E. S. Robitz, Jr., C. C. Conrardy, D. F. La Count, M. D. McAninch, R. L. Fish, Babcock and Wilcox and E. W. Russell, Lawrence Livermore National Laboratory, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 136-143, also available as Lawrence Livermore National Laboratory Report UCRL-JC-107985, October 1991.
464. Electrochemical Polarization Measurements on Pitting Corrosion Susceptibility of Nickel-Rich Alloy 825, R. D. McCright and D. L. Fleming, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 177-184, also available as Lawrence Livermore National Laboratory Report UCRL-JC-107065, October 1991.

465. Gap and Grain-Boundary Inventories Cs, Tc, and Sr in Spent Fuel LWR Fuel, W. J. Gray, D. M. Strachan and C. N. Wilson, Pacific Northwest Laboratory, submitted to Proceedings of the Materials Research Society Symposium - Fall Meeting, Nuclear Waste Management, Strasbourg, France, November 4-7, 1991, Vol. 257, pp. 353-360, submitted to Lawrence Livermore National Laboratory under subcontract, October 1991.
466. Dissolution Kinetics of UO<sub>2</sub> Flow-Through Samples on the UO<sub>2,00</sub> Pellets and Polycrystalline Schoepite Samples in Oxygenated, Carbonate/Bicarbonate Buffer Solutions at 25°C, S. N. Nguyen, H. C. Weed, H. R. Leider and R. B. Stout, submitted to Proceedings of the Materials Research Society Symposium - Fall Meeting, Nuclear Waste Management, Strasbourg, France, November 4-7, 1991, Vol. 257, pp. 339-344, Lawrence Livermore National Laboratory Report UCRL-JC-107478, October 1991.
467. Stochastic Models for Predicting Pitting Corrosion Damage of HLRW Containers, G. A. Henshall, Lawrence Livermore National Laboratory Report UCRL-JC-107063, also published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 225-231, October 1991.
468. Candidate Container Materials for Yucca Mountain Waste Package Designs, R. D. McCright, W. G. Halsey, G. E. Gdowski and W. L. Clarke, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 125-135, also available as Lawrence Livermore National Laboratory Report UCRL-JC-107066, October 1991.
469. Field Air Injection Test to Determine the Effect of a Heat Cycle on the Permeability of Welded Tuff, K. D. Lee and T. S. Ueng, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 68-72, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106703, October 1991.
470. The Impact of Episodic Nonequilibrium Fracture Matrix Flow On Geological Repository Performance, T. A. Buscheck, J. J. Nitao and D. A. Chesnut, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 312-323, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106759, October 1991. [NNA.911231.0023;2032525]
471. Diffusive Barrier Simplified Analysis - Design and Sensitivity Applications, T. S. Ueng and W. J. O'Connell, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 277-284, also available as Lawrence Livermore National Laboratory Report UCRL-JC-104913, October 1991.
472. Progress in Evaluating the Corrosion of Candidate HLW Container Metals in Irradiated Air-Steam Mixtures, D. T. Reed, Argonne National Laboratory and R. A. Van Konynenburg, Lawrence Livermore National Laboratory, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 185-192, also available as Lawrence Livermore National Laboratory Report UCRL-JC-108307, October 1991.
473. Engineered Barrier System and Waste Package Design Concepts for a Potential Geological Repository at Yucca Mountain, D. W. Short, L. J. Jardine and D. J. Ruffner, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 113-124, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106916, October 1991.

474. The Impact of Episodic Nonequilibrium Fracture Matrix Flow On Repository Performance at the Potential Yucca Mountain Site, T. A. Buscheck, J. J. Nitao and D. A. Chesnut, submitted to Proceedings of the Materials Research Society Symposium - Fall Meeting, Nuclear Waste Management, Strasbourg, France, November 4-7, 1991, Vol. 257, pp. 607-616, Lawrence Livermore National Laboratory Report UCRL-JC-107920, October 1991.
475. Effects of an Oxidizing Atmosphere in a Spent Fuel Packaging Facility, R. E. Einziger, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 88-99, October 1991.
476. High-Temperature Spectroscopy for Nuclear Waste Applications, P. M. Grant, P. Robouch, R. A. Torres and R. J. Silva, presented at the Methods & Applications of Radioanalytical Chemistry II Conference, Kona, HI, April 21-17, 1991, Lawrence Livermore National Laboratory, UCRL-JC-106028, October 1991.
477. Crack-Growth-Rate Testing of Candidate Waste Container Materials, J. Y. Park, W. J. Shack, D. R. Diercks, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 163-169, October 1991.
478. Corrosion Models for Predictions of Performance of High-Level Radioactive-Waste Containers, J. C. Farmer, G. E. Gdowski and R. D. McCright, Lawrence Livermore National Laboratory Report UCID-21756, November 1991.
479. Dissolution and Precipitation of Kaolinite at 80°C and pH3: The Dependence on Solution Saturation State, K. L. Nagy, A. E. Blum and A. C. Lasaga, Yale University, submitted to Lawrence Livermore National Laboratory under subcontract, published in the "American Journal of Science", pp. 649-686, November 1991.
480. Parametric Effects on Glass Reaction in the Unsaturated Test Method, A. B. Woodland, J. K. Bates and T. J. Gerding, Argonne National Laboratory Report ANL-91/36, submitted to Lawrence Livermore National Laboratory under subcontract, November 1991.
481. Repository Relevant Testing Applied to the Yucca Mountain Project, J. K. Bates, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, not published, November 1991.
482. Survey of Degradation Modes of Four Nickel-Chromium-Molybdenum Alloys, G. E. Gdowski, Lawrence Livermore National Laboratory Report UCRL-ID-108330, November 1991.
483. Characterization of Spent Fuel Approved Testing Material -- ATM-105, R. J. Guenther, D. E. Blahnik, T. K. Campbell, U. P. Jenquin, J. E. Mendel, L. E. Thomas and C. K. Thornhill, Pacific Northwest Laboratory Report PNL-5109-105, submitted to Lawrence Livermore National Laboratory under subcontract, November 1991.
484. Characterization of Spent Fuel Approved Testing Material -- ATM-104, R. J. Guenther, D. E. Blahnik, U. P. Jenquin, J. E. Mendel, L. E. Thomas and C. K. Thornhill, Pacific Northwest Laboratory Report PNL-5109-104, submitted to Lawrence Livermore National Laboratory under subcontract, November 1991.
485. Dissolution and Precipitation Kinetics of Gibbsite at 80°C and pH3: The Dependence on Solution Saturation, K. L. Nagy, and A. C. Lasaga, submitted to Lawrence Livermore National Laboratory under subcontract, November 1991.

486. The Hydration of Borosilicate Waste Glass in Liquid Water and Steam at 200°C, W. L. Ebert, J. K. Bates, Argonne National Laboratory and W. L. Bourcier, published in "Waste Management", Vol. 11, pp. 205-221, submitted to Lawrence Livermore National Laboratory under subcontract, December 1991.
487. AFM Analyses of SRL 131 Glass Altered as a Function of Sa/V, J. J. Mazer, J. K. Bates, B. M. Biwer and C. Bradley, Argonne National Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, submitted to Proceedings of the Materials Research Society Symposium - Fall Meeting, Nuclear Waste Management, Strasbourg, France, November 4-7, 1991, Vol. 257, pp. 73-81, December 1991.
488. Physical Limits on Steam Generation by Radioactive Decay Heat, D. A. Chesnut, Lawrence Livermore National Laboratory Report UCRL-ID-108153, December 1991.
489. Thermal Performance of a Buried Nuclear Waste Storage Container Storing a Hydride Mix of PWR and BWR Spent Fuel Rods, G. Johnson, Lawrence Livermore National Laboratory Report UCID-21414, Rev. 1, December 1991.
490. The Impact of Burnup and Fission Gas Release Distributions of the U.S. LWR Spent Fuel Inventory on the Selection of Spent Fuel Test Materials for the U.S. Geologic Repository Project, M. E. Cunningham, W. F. Lyon, C. E. Beyer, R. J. Guenther, J. E. Mendel and G. B. Mellinger, submitted to Lawrence Livermore National Laboratory under subcontract, December 1991.
491. Estimating the Time for Dissolution of Spent Fuel Exposed to Unlimited Water, H. R. Leider, S. N. Nguyen, R. B. Stout and H. C. Weed, Lawrence Livermore National Laboratory Report UCRL-ID-107289, December 1991.
492. Microstructural Analyses of LWR Spent Fuels at High Burnup, L. E. Thomas, C. E. Beyer and L. A. Charlot, Pacific Northwest Laboratory, published in the "Journal of Nuclear Materials", 188, 1992, pp. 80-89, PNL-SA-20092, March 1992.
493. Demands Placed on Waste Package Performance Testing and Modeling by Some General Results of Reliability Analysis, D. A. Chesnut, published in Proceedings of the Focus '91, Nuclear Waste Packaging Conference, September 29-October 2, 1991, Las Vegas, NV, pp. 217-223, October 1991, also available as Lawrence Livermore National Laboratory Report UCRL-JC-106758, October 1991, and also published in Proceedings of the 3rd International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 12-16, 1992, pp. 994-1002, April 1992.
494. Oxidation of Spent Fuel in Air at 175°C to 195°C, (previously titled "Ceramographic Determination of Spent Fuel Oxidation Rate"), R. E. Einziger, L. E. Thomas, and H. C. Buchanan Pacific Northwest Laboratory, and R. B. Stout, Lawrence Livermore National Laboratory, published in Proceedings of the 3rd International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 12-16, 1992, pp. 1449-1457, April 1992.
495. The Implications of Episodic Nonequilibrium Fracture-Matrix Flow on Site Suitability and Total System Performance, J. J. Nitao, T. A. Buscheck, and D. A. Chesnut, published in Proceedings of the 3rd International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 12-16, 1992, pp. 279-296, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-109216, April 1992. [NNA.19930727.0005;208836]

496. The Impact of Thermal Loading on Repository Performance at Yucca Mountain, T. A. Buscheck and J. J. Nitao, published in Proceedings of the 3rd International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 12-16, 1992, pp. 1003-1017, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-109232, April 1992. [NNA.19920408.0008]
497. Dissolution Rates of As-Received and Partially Oxidized Spent Fuel, W. J. Gray and L. E. Thomas Pacific Northwest Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, published in Proceedings of the 3rd International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 12-16, 1992, pp. 1458-1464, April 1992.
498. Characterizing the Altered Zone at Yucca Mountain: The Beginning of a Testing Strategy, D. A. Chesnut, published in Proceedings of the 3rd International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 12-16, 1992, pp. 1026-1039, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-109231, April 1992. [NNA.19920324.0014;208832]
499. Colloid Formation During Waste Form Reaction: Implications for Nuclear Waste Disposal, J. K. Bates, J. P. Bradley, A. Teetsov, C. Bradley, Argonne National Laboratory and M. Buchholtz ten Brink, Lawrence Livermore National Laboratory, submitted to "Science" , Vol. 256, pp. 649-651, April 1992.
500. Modeling Pitting Corrosion Damage of High-Level Radioactive-Waste Containers Using a Stochastic Approach, G. A. Henshall, published in the "Journal of Nuclear Materials", Vol. 256, pp. 649-651, May 1992, also available as Lawrence Livermore National Laboratory Report UCRL-JC-109020, April 1992.
501. Photoacoustic Spectroscopy and the Effect of Amplified Spontaneous Emission (ASE), G. Klunder, R. E. Russo, Lawrence Berkeley Laboratory and R. E. Silva, Lawrence Livermore National Laboratory, submitted to "Analytical Chemistry", Vol. 64, No. 20, pp. 2429-2433, Lawrence Livermore National Laboratory Report UCRL-JC-110174, April 1992.
502. Diffusion Releases Through One and Two Finite Planar Zones from a Nuclear Waste Package, T. S. Ueng and W. J. O'Connell, Lawrence Livermore National Laboratory Report UCRL-ID-109215, July 1992.
503. Chemical Thermodynamics of Technetium V, J. A. Rard, prepared for inclusion in "Book of Chemical Thermodynamics of Technetium", Nuclear Energy Agency, Paris, France, Lawrence Livermore National Laboratory Report UCRL-JC-109638, May 1992.
504. Modeling Ion Exchange in Clinoptilolite Using EQ3/6 Geochemical Modeling Code, B. E. Viani and C. J. Bruton, submitted to 7th International Symposium Water Rock Interaction, Park City, UT, July 13-18, 1992, Vol. 1, pp. 73-77, Lawrence Livermore National Laboratory Report UCRL-JC-109952, June 1992. [MOL.19960607.0056; 230491]
505. Parametric Study of LWR Spent Fuel Dissolution Kinetics, W. J. Gray, Pacific Northwest Laboratory, H. R. Leider and S. A. Steward, Lawrence Livermore National Laboratory, submitted to "Journal of Nuclear Materials", Vol. 190, pp. 46-52, Lawrence Livermore National Laboratory Report UCRL-JC-110160, June 1992.
506. Free Energy Dependence of Albite Dissolution Kinetics at 80°C. pH 8.8, T. E. Burch, K. Nagy and A. C. Lasaga, Yale University, submitted to "Chemical Geology", Vol. 105, pp. 137-162, July 1992.

507. Reverse/Reengineering an Existing Database, S. R. Lundeen, submitted to "Inquire Ingres" for the Ingres World '92 conference (not published in the Proceedings), Lawrence Livermore National Laboratory Report UCRL-JC-111325, September 1992.
508. EO3/6. A Software Package for Geochemical Modeling of Aqueous Systems: Package Overview and Installation Guide, Version 7.0. T. J. Wolery, Lawrence Livermore National Laboratory Report UCRL-MA-110662-PT-1, November 1992. [NNA.199210 23.0028]
509. Dissolution Kinetics of Heulandite at pH 2-12 and 25°C, K. Ragnarsdottir, Bristol University, submitted to Lawrence Livermore National Laboratory under subcontract, submitted to *Geochimica Cosmochimica Acta*, Vol. 57, Num. 11, pp. 2439-2449, November 1992.
510. Effects of Fission Products on Air-Oxidation of LWR Spent Fuel, L. E. Thomas, R. E. Einziger, and H. C. Buchanan, Pacific Northwest Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, submitted to the "Journal of Nuclear Materials", Vol. 201, pp. 310-319, November 1992.
511. EO3NR. A Computer Program for Geochemical Aqueous Speciation-Solubility Calculations: Theoretical Manual, User's Guide and Related Documentation, Version 7.0, T. J. Wolery, Lawrence Livermore National Laboratory Report, UCRL-MA-110662-PT-III, December 1992. [NNA.19921218.0010]
512. Modeling Pitting Corrosion Damage of High-Level Radioactive-Waste Containers, with Emphasis on the Stochastic Approach, G. A. Henshall, Lawrence Livermore National Laboratory Report, UCRL-ID-111624, December 1992.
513. EOPT. A Data File Preprocessor for the EO3/6 Software Package: User's Guide and Related Documentation, Version 7.0, S. A. Daveler, and T. J. Wolery, Lawrence Livermore National Laboratory Report, UCRL-MA-110662-PT-II, December 1992.
514. EO6. A Computer Program for Reaction Path Modeling of Aqueous Geochemical Systems: Theoretical Manual, User's Guide and Related Documentation, Version 7.0, T. J. Wolery and S. A. Daveler, Lawrence Livermore National Laboratory Report, UCRL-MA-110662-PT-IV, December 1992. [MOL.19980218.0570]
515. Uranium Release and Secondary Phase Formation During Unsaturated Testing of UO<sub>2</sub> at 90°C, D. J. Wronkiewicz, J. K. Bates, T. J. Gerding, E. Veleckis and B. S. Tani (Argonne National Laboratory), published in the "Journal of Nuclear Materials", Vol. 190, pp. 107-127, December 1992.
516. Large Scale In Situ Heater Tests for Hydrothermal Characterization at Yucca Mountain, T. A. Buscheck, D. G. Wilder and J. J. Nitao, published in Proceedings of the 4th International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 26-30, 1993, pp. 1854-1872, April 1993, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-112445, January 1993.
517. Single Hole In Situ Thermal Probe for Hydrothermal Characterization at Yucca Mountain, G. Danko and T. A. Buscheck, published in Proceedings of the 4th International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 26-30, 1993, pp. 975-985, April 1993, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-112825, January 1993.
518. Kinematics and Thermodynamics of Non-Stoichiometric Oxidation Phase Transitions in Spent Fuel, R. B. Stout, E. J. Kansa and A. M. Wijesinghe, published in Proceedings of the Material Research Society meeting in Boston, MA on November 30-December 4, 1992, Vol. 294, pp. 25-34, Lawrence Livermore National Laboratory Report, UCRL-JC-110678, January 1993.

519. Alternative Strategies - A Means for Saving Money and Time on Yucca Mountain, D. G. Wilder, published in Proceedings of the 4th International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 26-30, 1993, pp. 1263-1270, April 1993, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-111652, February 1993.
520. The Analysis of Repository-Heat-Driven Hydrothermal Flow at Yucca Mountain, T. A. Buscheck and J. J. Nitao, published in Proceedings of the 4th International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 26-30, 1993, pp. 847-867, April 1993, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-112444, February 1993. [NNA.19930315.0010]
521. Selection of Candidate Container Materials for the Conceptual Waste Package Design for a Potential High Level Nuclear Waste Repository at Yucca Mountain, R. Van Konynenburg, W. G. Halsey, W. L. Clarke, R. D. McCright (LLNL) and G. E. Gdowski (KMI, Inc.), Lawrence Livermore National Laboratory Report, UCRL-ID-112058, February 1993.
522. Scientific Investigation Plan for Initial Engineered Barrier System Field Tests, W. Lin, Lawrence Livermore National Laboratory Report, UCRL-ID-112036, February 1993.
523. Drift Emplaced Waste Package Thermal Response, D. Ruffner, G. Johnson, E. Platt, J. Blink (LLNL) and T. Doering (M&O), published in Proceedings of the 4th International High Level Radioactive Waste Management Conference, Las Vegas, NV, April 26-30, 1993, pp. 538-543, April 1993, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-112435, February 1993.
524. Engineered Barrier Environment, Yucca Mountain, D. G. Wilder, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 3, pp. 1179-1187, also available as Lawrence Livermore National Laboratory Report UCRL-JC-110677, June 1993.
525. Preliminary Near Field Environment Report, Vol. I and II, D. G. Wilder, Scientific Editor, Lawrence Livermore National Laboratory Report UCRL-LR-107476, June 1993. [NNA.19920501.0002]
526. CNGBOCHS: An Integrated Ingres-Email-Interleaf System for Processing Change Requests Associated with the GEMBOCHS Database and EO3/6, S. A. Daveler, S. R. Lundeen and J. W. Johnson, Lawrence Livermore National Laboratory Report UCRL-MA-111991, June 1993.
527. Collinear Photothermal Deflection Spectroscopy of Liquid Samples at Varying Temperature, J. S. Spear (Lawrence Berkeley Laboratory), R. J. Silva (Lawrence Livermore National Laboratory), G. L. Klunder and R. E. Russo, (Lawrence Berkeley Laboratory), published in "Applied Spectroscopy", Vol. 47, Num. 10, pp. 1580-1584, July 1993.
528. The Role of Multiple Barriers in Assuring Waste Package Reliability, R. M. Bradford, Lawrence Livermore National Laboratory Report UCRL-ID-114739, August 1993.
529. Chemical and Mineralogical Concerns for the Use of Man-Made Materials in the Post-Emplacement Environment, A. Meike, UCRL-ID-113383, August 1993.
530. Technical Basis and Programmatic Requirements for Large Block Testing of Coupled Thermal-Mechanical-Hydrological-Chemical Processes, W. Lin, Lawrence Livermore National Laboratory Report UCRL-ID-112834, September 1993.

531. Coupled Hydro-Geochemical Processes and Their Significance for Yucca Mountain Site Characterization, W. Glassley, published in the Proceedings of the FOCUS '93 meeting, Las Vegas, NV, September 26-29, 1993, pp. 122-126, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-114783, September 1993. [MOL.19971031.0400]
532. Formation of Colloids from Introduced Materials in the Post-Emplacement Environment: A Report on the State of Understanding, A. Meike and C. Wittwer (BRGM), published in the Proceedings of the FOCUS '93 meeting, Las Vegas, NV, September 26-29, 1993, pp. 95-102, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-114782, September 1993.
533. Thermodynamic and Structural Characteristics of Cement Minerals at Elevated Temperature, C.J. Bruton, A. Meike, B. E. Viani, S. Martin and B. L. Phillips, published in the Proceedings of the FOCUS '93 meeting, Las Vegas, NV, September 26-29, 1993, pp. 150-156, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-114116, September 1993.
534. Technical Basis and Programmatic Requirements for Laboratory Study of the Hydrological Properties of the Near Field Environment, W. Lin, Lawrence Livermore National Laboratory Report UCRL-ID-112432, October 1993.
535. Post-Closure Performance Assessment of Waste Packages for the Yucca Mountain Project, W. O'Connell, T. Ueng and L. Lewis, Lawrence Livermore National Laboratory Report UCRL-ID-111979, October 1993.
536. Kinematics and Thermodynamics Across a Propagating Non-Stoichiometric Oxidation Phase Front in Spent Fuel Grains, R. Stout, E. Kansa and A. Wijesinghe, presented at a joint ASME, SES and ASCE meeting on Micromechanics of Random Media, Charlottesville, VA, June 6-9, 1993, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-112821, October 1993.
537. Technical Basis and Programmatic Requirements for Engineered Barrier System Field Tests, W. Lin, Lawrence Livermore National Laboratory Report UCRL-ID-112433, October 1993.
538. The Impact of Repository Heat on Thermo-Hydrological Performance at Yucca Mountain, T. A. Buscheck and J.J. Nitao, published in the Proceedings of the FOCUS '93 Meeting, Las Vegas, NV, September 26-29, 1993, pp. 127-144, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-114791, October 1993. [NNA.19940121.0144;114791]
539. Testing Geochemical Modeling Codes Using New Zealand Hydrothermal Systems, C. J. Bruton, W. E. Glassley and W. L. Bourcier, published in the Proceedings of the FOCUS '93 meeting, Las Vegas, NV, September 26-29, 1993, pp. 240-245, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-114798, October 1993.
540. Introduced Materials and Colloid Formation: A Report on the Current State of Knowledge, A. Meike and C. Wittwer (BRGM), published in the Proceedings of the Materials Research Society meeting, Boston, MA, November 29-December 3, 1993, Vol. 333, pp. 783-789, also available as Lawrence Livermore National Laboratory Report UCRL-JC-114122, November 1993. [NNA.19940316.0115]
541. Cement Minerals at Elevated Temperature: Thermodynamic and Structural Characteristics, C. J. Bruton, B. L. Phillips, A. Meike, S. Martin and B. E. Viani, published in the Proceedings of the Materials Research Society Fall meeting, Boston, MA, November 29-December 3, 1993, Vol. 333, pp. 327-334, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115796, November 1993. [NNA.19940318.0008]

542. Science and Licensing: Let's Get Off The Collision Course, R. A. Van Konynenburg, published in the Proceedings of the Materials Research Society Fall meeting, Boston, MA, November 29-December 3, 1993, Vol. 333, pp. 183-191, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115734, November 1993.
543. Modeling of UO<sub>2</sub> Aqueous Dissolutions Over a Wide Range of Conditions, S. A. Steward and H. C. Weed, published in the Proceedings of the Materials Research Society Fall meeting, Boston, MA, November 29-December 3, 1993, Vol. 333, pp. 409-416, also available as Lawrence Livermore National Laboratory Report UCRL-JC-114118, November 1993.
544. The Impact of Repository Heat on Hydrological Behavior at Yucca Mountain, T. A. Buscheck and J. J. Nitao, submitted to "RADWASTE" Magazine, Vol. 1, No. 2, pp. 71-76, April 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115798, January 1994.
545. The Testing of Thermal-Mechanical-Hydrological-Chemical Processes Using a Large Block, W. Lin, D. G. Wilder, J. A. Blink, S. C. Blair, T. A. Buscheck, D. A. Chesnut, W. E. Glassley, K. Lee and J. J. Roberts, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 1938-1945, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-114776, January 1994.
546. Rationale for Determining Spent Fuel Acquisitions for Repository Testing, S. C. Marschman, R. E. Einziger (Pacific Northwest Laboratories) and R. B. Stout (Lawrence Livermore National Laboratory), published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 2, pp. 1074-1079, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116357, January 1994.
547. Electrical Properties of Topopah Spring Tuff as a Function of Saturation, J. J. Roberts and W. Lin, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 2112-2120, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-114784, January 1994.
548. On the Benefits of an Integrated Nuclear Complex for Nevada, J. A. Blink and W. G. Halsey, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 1, pp. 18-25, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-114786, January 1994.
549. Dispersivity in Heterogeneous Permeable Media, D. A. Chesnut, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 1822-1841, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-114790, January 1994.
550. Integrated Modeling of Near Field and Engineered Barrier System Processes, A. Lamont and J. Gansemer, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 3, pp. 1195-1201, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115230, January 1994.
551. Identifying Significant Uncertainties in Thermally Dependent Processes for Repository Performance Analysis, J. Gansemer and A. Lamont, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 2197-2206, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116315, January 1994.

552. Performance Assessment Model of a Single Waste Package, W. J. O'Connell, T-S. Ueng and L. C. Lewis, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 3, pp. 1188-1194, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-114699, January 1994.
553. Constraints on the Affinity Term for Modeling Long-Term Glass Dissolution Rates, W. L. Bourcier, S. A. Carroll and B. L. Phillips, published in the Proceedings of the Materials Research Society Fall meeting, Boston, MA, November 29-December 3, 1993, Vol. 333, pp. 507-512, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116132, January 1994.
554. Experimental Investigation of Hydrous Pyrolysis of Diesel Fuel and the Effect of Pyrolysis Products on Performance of the Candidate Nuclear Waste Repository at Yucca Mountain, Nevada, K. J. Jackson and S. A. Carroll, published in the Proceedings of the Materials Research Society Fall meeting, Boston, MA, November 29-December 3, 1993, Vol. 333, pp. 841-847, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116352, January 1994.
555. What Do We Mean By a "Cold Repository?", W. G. Halsey, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 2183-2188, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116147, January 1994. [NNA.19940524.0039]
556. The Effect of Fuel Type in Unsaturated Spent Fuel Tests, P.A. Finn, M. Gong, J. K. Bates, J.W. Emery and J.C. Hoh (Argonne National Laboratory), published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 2, pp. 1080-1087, submitted to Lawrence Livermore National Laboratory under subcontract, January 1994.
557. Results of Drip Tests on Sludge-Based and Actinide-Doped Glasses, J. K. Bates and E.C. Buck, Argonne National Laboratory, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 2, pp. 1088-1101, submitted to Lawrence Livermore National Laboratory under subcontract, January 1994.
558. Interlaboratory Comparison of UO<sub>2</sub> Dissolution Rates, W. J. Gray (Pacific Northwest Laboratories), S. A. Steward (Lawrence Livermore National Laboratory), J.C. Tait and D.W. Shoesmith (Whiteshell Laboratories), published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 2597-2601, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115356, February 1994.
559. Limitations on Scientific Prediction and How They Could Affect Repository Licensing, R. Van Konynenburg, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 1, pp. 285-295, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116530, February 1994.
560. Comparison of Uranium Dissolution Rates from Spent Fuel and Uranium Dioxide, S. A. Steward and W. Gray (Pacific Northwest Laboratories), published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol 4, pp. 2602-2608, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115355, February 1994.

561. In Situ Photothermal Deflection Spectroscopy of Uranium Dioxide Dissolution, J. D. Rudnicki and R. Russo, Lawrence Berkeley Laboratory, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 2609-2615, submitted to Lawrence Livermore Laboratory under subcontract, February 1994.
562. Evaluation of Thermo-Hydrological Performance in Support of the Thermal Loading Systems Study, T. A. Buscheck, J. J. Nitao (Lawrence Livermore National Laboratory) and S. Saterlie (M&O/TRW Environmental Safety Systems, Inc.), published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 2, pp. 592-610, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115352, February 1994.
563. The Impact of Buoyant Gas-Phase Flow and Heterogeneity on Thermo-Hydrological Behavior at Yucca Mountain, T. A. Buscheck and J. J. Nitao, published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 2450-2474, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115351, February 1994.
564. Progress in Understanding the Structure and Thermodynamics of Calcium Hydrates, A. Meike (Lawrence Livermore National Laboratory), M. Onofrei (Whiteshell Laboratories), C. J. Bruton and B. E. Viani (LLNL), published in the Proceedings of the 5th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 22-26, 1994, Vol. 4, pp. 2590-2596, May 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116358, February 1994. [NNA.19940517.0130]
565. Photothermal Deflection Spectroscopy Investigations of Uranium Dioxide Oxidation, J. D. Rudnicki, R. Russo (Lawrence Berkeley Laboratory) and D.W. Shoesmith (Whiteshell Laboratories), submitted to the Journal of Electroanalytical Chemistry, Vol. 372, pp. 63-74, submitted to Lawrence Livermore National Laboratory under subcontract, February 1994.
566. Behavior of Carbon-14 in Waste Packages for Spent Fuel in a Tuff Repository, R. Van Konynenburg, submitted to "Waste Management, Vol. 14, pp. 363-383, 1994, also available as Lawrence Livermore National Laboratory Report UCRL-JC-117262, March 1994.
567. On Integrating Modeling Software for Application to Total System Performance Assessment, L. C. Lewis and M. Wilson (Sandia National Laboratories), submitted to the American Nuclear Society Spectrum '94 Conference, Atlanta, GA, August 14-19, 1994, Vol. 2, pp. 1108-1112, also available as Lawrence Livermore National Laboratory Report UCRL-JC-115613, May 1994.
568. User's Guide to the Yucca Mountain Integrating Model (YMIM), J. Gansemer and A. Lamont, Lawrence Livermore National Laboratory Report UCRL-MA-116446, June 1994.
569. Stochastic Modeling of the Influence of Environment on Pitting Corrosion Damage of Radioactive-Waste Containers, G.A. Henshall, published in the Proceedings of the 18th International Symposium on the Scientific Basis for Nuclear Waste Management, Kyoto, Japan, October 23-27, 1994, Vol. 353, pp. 679-686, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116435, June 1994.

570. A Large Block Heater Test for High Level Nuclear Waste Management, W. Lin, D. G. Wilder, J. A. Blink, S. C. Blair, T. A. Buscheck, R. S. Glass, W. E. Glassley, K. Lee, R. D. McCright, M. W. Owens, and J. J. Roberts, published in the Proceedings of the 18th International Symposium on the Scientific Basis for Nuclear Waste Management, October 23-27, 1994, Kyoto, Japan, Vol. 353, pp. 411-418, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116431, July 1994.
571. Groundwater Flux, Travel Time, and Radionuclide Transport, D.A. Chesnut, published in the Proceedings of the 18th International Symposium on the Scientific Basis for Nuclear Waste Management, Kyoto, Japan, October 23-27, 1994, Vol. 353, pp. 463-470, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116436, August 1994.
572. Field-Based Tests of Geochemical Modeling Codes Using New Zealand Hydrothermal Systems, C. J. Bruton, W. E. Glassley, and W. L. Bourcier, Lawrence Livermore National Laboratory Report UCRL-ID-118009, August 1994. [MOL.19950314.0162]
573. Preliminary Waste Form Characteristics Report, Version 1.0, R. B. Stout and H. R. Leider, Lawrence Livermore National Laboratory Report UCRL-ID-108314, written October, 1991, published December 1994.
574. The Importance of Thermal Loading Conditions to Waste Package Performance at Yucca Mountain, T. A. Buscheck and J. J. Nitao, published in the Proceedings of the 18th International Symposium on the Scientific Basis for Nuclear Waste Management, Kyoto, Japan, October 23-27, 1994, Vol. 353, pp. 403-410, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116429, October 1994.
575. Aqueous Dissolution Rates of Uranium Oxides, S. A. Steward and E. T. Mones, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 603-605, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119118, October 1994.
576. Integrated Corrosion Facility for Long-Term Testing of Candidate Materials for High-Level Radioactive Waste Containment, J. C. Estill, E. N. C. Dalder, G. E. Gdowski, and R. D. McCright, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 562-564, also available as Lawrence Livermore National Laboratory Report UCRL-JC-118689, October 1994.
577. Alteration of Spent Fuel Matrix Under Unsaturated Water Conditions, P. A. Finn, J. K. Bates, E. C. Buck, D. J. Wronkiewicz, J. C. Hoh, and S. F. Wolf (Argonne National Laboratory), published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 606-608, submitted to Lawrence Livermore National Laboratory under subcontract, October 1994.
578. Reaction Progress Pathways for Glass and Spent Fuel Under Unsaturated Conditions, J. K. Bates, P. A. Finn (Argonne National Laboratory), W. Bourcier, and R. B. Stout (Lawrence Livermore National Laboratory), published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 600-602, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119115, October 1994.
579. Behavior of Spent Fuel Under Unsaturated Conditions, P. A. Finn, J. C. Hoh, J. K. Bates, and S. F. Wolf (Argonne National Laboratories), submitted to the DOE Spent Nuclear Fuel - Challenges and Initiatives Conference, Salt Lake City, Utah, December 13-16, 1994, pp. 421-429, submitted to Lawrence Livermore National Laboratory under subcontract, October 1994.

580. Synthesis of Tobermorite: A Cement Phase Expected Under Repository Conditions, S. I. Martin, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 571-573, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119131, November 1994.
581. Effect of Areal Power Density and Relative Humidity on Corrosion Resistant Container Performance, J. D. Gansemer and A. Lamont, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 313-315, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119119, November 1994.
582. A Comparison of Creep Strains Predicted from Constitutive Equations for Zircaloy-Clad Spent Fuel Rods, R. S. Rosen and W. J. O'Connell, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 621-624, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119209, November 1994.
583. Permeability of Fractured Tuff as Functions of Temperature and Confining Pressure, J. J. Roberts and W. Lin, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 44-45, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119116, November 1994.
584. The Large Block Test. A Progress Report, W. Lin, D. G. Wilder, J. A. Blink, P. A. Berge, S. C. Blair, V. Brugman, R. Carlson, K. Lee, M. W. Owens, R. Pletcher, N. Rector, J. J. Roberts, D. Ruddle, S. Sommer, T. S. Ueng, and J. Wagoner, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 46-47, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119106, November 1994.
585. Measuring Geomechanical Properties of Topopah Spring Tuff at the 1-Meter Scale, S. C. Blair and P. A. Berge, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 48-49, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119121, November 1994.
586. A Progress Report for the Large Block Test of the Coupled Thermal-Mechanical-Hydrological-Chemical Processes, W. Lin, D. G. Wilder, P. A. Berge, S. C. Blair, S. Boyd, V. Brugman, P. Burklund, T. A. Buscheck, Y. Chang, D. A. Chesnut, W. Daily, R. S. Glass, W. Glassley, L. Hall, C. Landram, K. H. Lee, J. Nitao, J. Noring, M. W. Owens, R. Pletcher, A. Ramirez, N. Rector, T. Reitter, J. J. Roberts, D. Ruddle, S. Sommer, D. Trummer, T. S. Ueng, and J. Wagoner, and R. J. Glass and M. Nicholl (Sandia National Laboratories), and G. Danko (University of Nevada Reno), Lawrence Livermore National Laboratory Report UCRL-ID-119101, November 1994.
587. A Heated Large Block Test for High Level Nuclear Waste Management, W. Lin, D. G. Wilder, J. A. Blink, S. C. Blair, T. A. Buscheck, W. Glassley, K. H. Lee, M. W. Owens, J. J. Roberts, published in the Proceedings of the 2nd International Conference on Mechanics of Jointed and Faulted Rock (MJFR-2), Vienna, Austria, April 10-14, 1995, Supplementary Volume, pp. 20-24, also available as Lawrence Livermore National Laboratory Report UCRL-JC-116418, January 1995.
588. Progress Report on Pre-Test Calculations for the Large Block Test, K. H. Lee, Lawrence Livermore National Laboratory Report, UCRL-ID-118699 January 1995. [MOL.19950314.0178;214965]

589. The Role of Cation Exchange in Controlling Groundwater Chemistry at Äspö, Sweden, B. E. Viani and C. J. Bruton, published in the Proceedings of the 6th International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 1-5, 1995, pp. 94-96, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119724, January 1995.
590. Hydrological Property Measurements of Topopah Spring Tuff, J. J. Roberts and W. Lin, Lawrence Livermore National Laboratory Report UCRL-ID-119033, Manuscript Date: October 1994, Publication Date: April 1995.
591. Corrosion of Candidate Materials in Lake Rotokawa Geothermal Exposure, J. C. Estill and R. D. McCright, Lawrence Livermore National Laboratory Report UCRL-ID-119832, May 1995.
592. Survey of the Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers - Iron-Base Corrosion-Allowance Materials, D. W. Vinson, W. M. Nutt, and D. B. Bullen (Iowa State University), prepared for R. D. McCright, Lawrence Livermore National Laboratory Contractors Report UCRL-CR-120464, Manuscript Date: July 1994, Publication Date: June 1995.
593. Ceramic Package Fabrication for YMP Nuclear Waste Disposal, K. Wilfinger, Lawrence Livermore National Laboratory Report UCRL-ID-118660, Manuscript Date: August 1994, Publication Date: June 1995.
594. The Effect of Rock-Water Interaction on Permeability, W. Lin, J. J. Roberts, W. Glassley and D. Ruddle, submitted to the International Congress on Rock Mechanics, Tokyo, Japan, September 25-30, 1995, available as Lawrence Livermore National Laboratory Report UCRL-JC-119574, June 1995. [MOL.19960416.0275]
595. Spent Fuel's Behavior Under Dynamic Drip Tests, P. A. Finn, E. C. Buck, J. C. Hoh, and J. K. Bates (Argonne National Laboratories), submitted to Global '95, Versailles, France, September 11-14, 1995, pp. 240-248, submitted to Lawrence Livermore National Laboratory under subcontract, July 1995.
596. Engineered Materials Characterization Report for the Yucca Mountain Site Characterization Project, Volumes 1, 2, & 3, R. A. Van Konynenburg, R. D. McCright (Lawrence Livermore National Laboratory), A. K. Roy (B & W Fuel Company), and D. A. Jones (University Nevada Reno), UCRL-ID-119564, Manuscript Date: December 1994, Publication Date: August 1995. [MOL.19960402.0547]
597. The Release of Uranium, Plutonium, Cesium, Strontium, Technetium, and Iodine From Spent Fuel Under Unsaturated Conditions, P. A. Finn, J. C. Hoh, S. F. Wolf, S. A. Slater, and J. K. Bates, published in "Radiochimica Acta", Vol. 74, pp. 65-71, also available as Lawrence Livermore National Laboratory Subcontract Report, August 1995.
598. An Overview of EXTOOL: An Analysis Tool for V-TOUGH and NUFT, S. Daveler, Lawrence Livermore National Laboratory Report UCRL-ID-119723, August 1995.
599. Summary of Pre and Post-Processors for V-TOUGH, S. Daveler, Lawrence Livermore National Laboratory Report UCRL-ID-122055, August 1995
600. Microbial Activity at Yucca Mountain, J. M. Horn and A. Meike, Lawrence Livermore National Laboratory Report UCRL-ID-122256, September 1995. [222145]
601. Survey of the Degradation Modes of Candidate Materials for High-Level Radioactive Waste Disposal Containers - Nickel-Copper Alloys, D. W. Vinson, W. M. Nutt, and D. B. Bullen (Iowa State University), prepared for E. Dalder, Lawrence Livermore National Laboratory Contractors Report UCRL-CR-122862, September 1995.

602. Updated Candidate List for Engineered Barrier Materials, R. D. McCright, Lawrence Livermore National Laboratory Report UCRL-ID-119442, Manuscript Date: November 1994, Publication Date: October 1995.
603. Geothermal Areas as Analogues to Chemical Processes in the Near-Field and Altered Zone of the Potential Yucca Mountain, Nevada Repository, C. J. Bruton, W. E. Glassley and A. Meike, Lawrence Livermore National Laboratory Report UCRL-ID-119842, October 1995. [MOL.19960408.0120]
- 603a Thermal-Hydrological Analysis of Large-Scale Thermal Tests in the Exploratory Studies Facility at Yucca Mountain, T. A. Buscheck and J.J. Nitao, Lawrence Livermore National Laboratory Report UCRL-ID-121791, October 30, 1995. [MOL.19960501.0392;223657]
604. Second Progress Report on Pre-Test Calculations for the Large Block Test, K. Lee, Lawrence Livermore National Laboratory Report UCRL-ID-122300, November 1995.
605. Uranium Dioxide Dissolution Under Acidic Aqueous Conditions, S. A. Steward and E. T. Mones, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 388-389, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122573, November 1995.
606. Nonequilibrium Thermodynamical Model for Spent Fuel Dissolution Rate, R. B. Stout, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 393-395, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122737, November 1995.
607. Pitting Corrosion of Container Materials in Anticipated Repository Environments, A. K. Roy and R. D. McCright, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 454-455, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122572, November 1995.
608. The Effect of Water Vapor on the Corrosion of Carbon Steel at 65°C, G. Gdowski and J. Estill, published in the Proceedings of the Materials Research Society Fall meeting, Boston, MA, November 27-December 1, 1995, Vol. 412, pp. 433-538, also available as Lawrence Livermore National Laboratory Report UCRL-JC-121542, November 1995.
609. Electrochemical Corrosion Studies of Container Materials in Repository-Relevant Environments, A. K. Roy, G. A. Henshall and R. D. McCright, Lawrence Livermore National Laboratory Report UCRL-ID-122860, December 1995.
610. Long-Term Results from Unsaturated Testing of Actinide-Doped DWPF and WCDP Waste Glasses, J. A. Fortner and J. K. Bates (Argonne National Laboratories), published in the Proceedings of the Materials Research Society Fall meeting, Boston, MA, November 27-December 1, 1995, Vol. 412, pp. 205-211, also available as Lawrence Livermore National Laboratory Subcontract Report UCRL-CR-122614, December 1995.
611. Localized Dryout: An Approach for Managing the Thermal-Hydrological Effects of Decay Heat at Yucca Mountain, T. A. Buscheck, J. J. Nitao and L. D. Ramspott, published in the Proceedings of the Materials Research Society Fall meeting, Boston, MA, November 27-December 1, 1995, Vol. 412, pp. 715-722, also available as Lawrence Livermore National Laboratory Report UCRL-JC-121232, December 1995.

612. Water Vapor Effects on the Corrosion of Steel, J. C. Estill and G. E. Gdowski, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 457-458, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122736, December 1995
613. A Phenomenological Approach to Simulating the Evolution of Radioactive Waste Container Damage Due to Pitting Corrosion, G. A. Henshall, published in the Proceedings of the Materials Research Society Fall meeting in Boston, MA, November 27 to December 1, 1995, Vol. 412, pp. 613-619, Lawrence Livermore National Laboratory Report UCRL-JC-121540, December 1995.
614. A Progress Report on the Large Block Test, W. Lin, D. Wilder, J. Blink, P. Berge, S. Blair, V. Brugman, K. Lee, M. Owens, C. Radewan, A. Ramirez, N. Rector, J. Roberts, D. Ruddle, and J. Wagoner, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 122-124, also available as Lawrence Livermore National Laboratory Report UCRL-JC-119106-95, December 1995. [MOL.19960208.0304]
615. Intracrystalline Diffusion in Clinoptilolite: Implications for Radionuclide Isolation, S. K. Roberts, B. E. Viani and D. Phinney, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 48-49, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122735, December 1995.
616. Uniaxial Compression Behavior of Small Blocks of Welded Tuff, S. C. Blair and P. A. Berge, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 409-411, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122733, December 1995. [231905]
617. Discrete-Fracture Modeling of Thermal-Hydrological Processes at Yucca Mountain and the LLNL G-Tunnel Heater Test, J. J. Nitao and T. A. Buscheck, published in the Proceedings of the Materials Research Society Fall meeting in Boston, MA, November 27 to December 1, 1995, Vol. 412, pp. 747-754, also available as Lawrence Livermore National Laboratory Report UCRL-JC-121231, December 1995.
618. Relative Humidity in the Near-Field Environment, W. Lin, J. Roberts and D. Ruddle, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 128-129, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122613, December 1995.
619. X-Ray Radiography of Fracture Flow and Matrix Imbibition, J. J. Roberts and W. Lin, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 89-91, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122504, December 1995.
620. Spent Fuel Dissolution Studies FY 1991 - 1994, W. J. Gray and C. N. Wilson (Pacific Northwest Laboratories), PNL-1050/UC-802, Manuscript Date: August 1994, Publication Date: January 1996.
621. EO3/6 Software Test and Verification Report 9/94, T. Kishi, Lawrence Livermore National Laboratory Report UCRL-ID-119140, Manuscript Date: October 1994, Publication Date: January 1996.

622. Corrosion Test on Candidate Waste Package Basket Materials for the Yucca Mountain, R. A. Van Konynenburg and P. G. Curtis, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 464-467, also available as Lawrence Livermore National Laboratory Report UCRL-JC-123236, January 1996.
623. Initial Studies to Assess Microbial Impacts on Nuclear Waste Disposal, J. M. Horn, B. Economides, A. Meike and R. D. McCright, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 7-8, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122587, February 1996. [MOL.19960409.0170]
624. Discrete-Fracture Modeling of Thermal-Hydrological Processes at G-Tunnel and Yucca Mountain, J. J. Nitao and T. Buscheck, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 117-118, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122734, February, 1996.
625. A Program to Assess Microbial Impacts on Nuclear Waste Containment, J. Horn and A. Meike, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 1-3, also available as Lawrence Livermore National Laboratory Report UCRL-JC-122732, February 1996. [MOL.19960409.0194]
626. Scoping Analysis of In Situ Thermal-Hydrological Testing at Yucca Mountain, T. A. Buscheck and J. J. Nitao, published in the Proceedings of the 1996 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, April 29-May 3, 1996, pp. 130-132, also available as Lawrence Livermore National Laboratory Report UCRL-JC-123241, February 1996.
- 626a. Deformation and Velocity Measurements at Elevated Temperature in a Fractured 0.5 MBlock of Tuff, S. C. Blair and P. A. Berge, published in the Proceedings of the NY Rocks 97 Conference, 36th U.S. Rock Mechanics Symposium, New York, NY, June 29-July 2, 1997, Vol. 34, No. 3-4, 1997 ISSN 0148-9062 #030, also available as Lawrence Livermore National Laboratory Report UCRL-JC-125626, February 1996.
627. Report on Laboratory Tests of Drying and Re-Wetting of Intact Rocks, J. J. Roberts and W. Lin, Lawrence Livermore National Laboratory Report UCRL-ID-121513, March 1996.
628. Potential Long-Term Chemical Effects of Diesel Fuel Emissions on a Mining Environment: A Preliminary Assessment Based on Data from a Deep Subsurface Tunnel at Rainier Mesa, Nevada Test Site, A. Meike, W. L. Bourcier, and M. Alai (Lawrence Livermore National Laboratory), D. L. Haldeman, P. S. Amy, and T. Lagadinos (University of Nevada, Las Vegas), and L. Hersman (Los Alamos National Laboratory), Lawrence Livermore National Laboratory Report UCRL-ID-121046, April 1996. [MOL.19950406.0141]
- 628a. Ten-Year Results from Unsaturated Drip Tests With UO<sub>2</sub> at 90°C: Implications for the Corrosion of Spent Nuclear Fuel, D. J. Wronkiewicz, J. K. Bates, S. F. Wolf and E. C. Buck (Argonne National Laboratory), submitted to the "Journal of Nuclear Materials", Vol. 238, pp. 78-95, June 1996, submitted to Lawrence Livermore National Laboratory under subcontract, April 1996.
629. Localized Corrosion of Container Materials in Anticipated Repository Environments, A. K. Roy, D. L. Fleming and S. R. Gordon, published in the Proceedings of the 189th Meeting of the Electrochemical Society, Los Angeles, CA, May 5-10, 1996, Vol. 96-1, pp. 112-113, also available as Lawrence Livermore National Laboratory Report UCRL-JC-124641, August 1996.

630. Electrical Properties of Partially Saturated Topopah Spring Tuff: Water Distribution as a Function of Saturation, J. Roberts and W. Lin, submitted to the journal of *Water Resources Research*, 33, 577-587, 1997, also available as Lawrence Livermore National Laboratory Report UCRL-JC-125763, June 1996.
631. Corroded Spent Nuclear Fuel Examined with EELS, E. C. Buck, N. Dietz and J. Bates (Argonne National Laboratory), presented at the 30th Annual Meeting of the Microbeam Analysis Society, Minneapolis, MN, August 11-15, 1996, June 1996. [MOL.19960708.0449]
632. Ten-Year Results from Unsaturated Drip Tests with UO<sub>2</sub> at 90°C: Implications for the Corrosion of Spent Nuclear Fuel, D. J. Wronkiewicz, J. K. Bates, S. F. Wolf and E. C. Buck, submitted to the "Journal of Nuclear Materials", Vol. 238, pp. 78-95, June 1996. [MOL.19970512.0029]
633. Thermodynamic Database Needs for Modeling Studies of the Yucca Mountain Project, C.E.A. Palmer, R. Glass (Lawrence Livermore National Laboratory) and J. Bucher (Lawrence Berkeley Laboratory), also available as Lawrence Livermore National Laboratory Report UCRL-ID-125343, July 1996. [MOL.19970123.0014]
634. Stability Quotients of Neodymium Acetate Complexes from 20 to 70°C by Laser-Induced Photoacoustic Spectroscopy, D. A. Wruck, P. Zhao, C. E. A. Palmer, R. J. Silva, published in the *Journal of Solution Chemistry*, Vol. 26, pp. 267-275, 1997, also available as Lawrence Livermore National Laboratory Report UCRL-JC-124641, August 1996. [MOL.19961022.0313]
635. Effect of Radiation on the Mechanical Properties of Topopah Spring Tuff, S. C. Blair, J. M. Kelly, O. Pine, R. Pletcher and P. A. Berge, Lawrence Livermore National Laboratory Report UCRL-ID-122899, August 1996. (MOL.19961021.0128)
636. The Effects of Diesel Exhaust on the Microbiota Within a Tuffaceous Tunnel System, D. L. Haldeman, T. Lagadinos (University of Nevada, Las Vegas), L. Hersman (Los Alamos National Laboratory), A. Meike (Lawrence Livermore National Laboratory), and P. S. Amy (University of Nevada, Las Vegas), Lawrence Livermore National Laboratory Report, Manuscript Date: May 1995, Publication Date: September 1996.
637. A Study of Americium (III) Carbonate Complexation at Elevated Temperatures by Pulsed Laser Photoacoustic Spectroscopy, D. A. Wruck, C. E. A. Palmer and R. J. Silva, submitted to "Radiochimica Acta", (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-125198, September 1996. [MOL.19970512.0038]
638. Geomechanical Analysis of the Large Block Test, S. C. Blair, P. A. Berge and H. F. Wang, Lawrence Livermore National Laboratory Report UCRL-ID-122898, September 1996. [MOL.19970506.0117]
639. Effect of Radiation on Topopah Spring Tuff Mechanical Properties, P. A. Berge and S. C. Blair, published in the Proceedings of the Materials Research Society Fall Meeting, Symposium II, December 2-6, 1996, Boston, MA, Vol. 465, pg. 641, also available as Lawrence Livermore National Laboratory Report UCRL-JC-124343, November 1996. [MOL.19971210.0296]
640. Numerical Predictions of Dry Oxidation of Iron and Low-Carbon Steel at Moderately Elevated Temperatures, G. A. Henshall, published in the Proceedings of the Materials Research Society Fall Meeting, Symposium II, December 2-6, 1996, Boston, MA, Vol. 465 pg. 667, also available as Lawrence Livermore National Laboratory Report UCRL-JC-124639, November 1996. [MOL.19970122.01197]

641. Comparison and Modeling of Aqueous Dissolution Rates of Various Uranium Oxides, S. A. Steward and E. T. Mones, published in the Proceedings of the Materials Research Society Fall Meeting, Symposium II, December 2-6, 1996, Boston, MA, Vol. 465, pg. 557, also available as Lawrence Livermore National Laboratory Report UCRL-JC-124602, November 1996. [MOL.19971210.0274]
642. Modeling Pitting Degradation of Corrosion Resistant Alloys, G. A. Henshall, Lawrence Livermore National Laboratory Report UCRL-ID-125300, November 1996. [MOL.19970122.0128]
643. Degradation Mode Survey - Galvanic Corrosion of Candidate Metallic Materials for High-Level Radioactive Waste Disposal Containers, A. K. Roy, D. A. Jones and R. D. McCright, Lawrence Livermore National Laboratory Report UCRL-ID-125645, November 1996. [MOL.19970121.0084]
644. Volume II: Near-Field and Altered-Zone Environmental Report, D. G. Wilder, et al, Lawrence Livermore National Laboratory Report UCRL-LR-124998, November 1996. [MOL.19961212.0121;MOL.19961212.0122]
- 644a. Experimental Investigation of Cement, Topopah Spring Tuff, and Water Interactions at 200°C, S. A. Carroll, M. Alai, and C. J. Bruton, published in *Applied Geochemistry*, Vol. 13, pp. 579-587, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128323, November 22, 1996. [MOL.19980501.0030]
645. Electrical Resistivity Monitoring of the Thermomechanical Heater Test in Yucca Mountain, A. Ramirez, W. Daily, H. M. Buettner and D. LaBrecque, published in the Proceedings of the Symposium on the Application of Geophysics to Engineering & Environmental Problems, March 23-26, 1997, Reno, NV, Vol. 1, pp. 11-20, also available as Lawrence Livermore National Laboratory Report UCRL-JC-126011, December 1996. [MOL.19971212.0592]
646. Near-Field Thermal-Hydrological Behavior for Alternative Repository Designs at Yucca Mountain, T. A. Buscheck, J. J. Nitao and L. D. Ramspott, published in the Proceedings of the Materials Research Society Fall Meeting, Symposium II, December 2-6, 1996, Boston, MA, Vol. 465, pg. 1029, also available as Lawrence Livermore National Laboratory Report UCRL-JC-124629, December 1996. [MOL.19961014.0031]
647. Spent Fuel Reaction: The Behavior of the  $\epsilon$ -Phase Over 3.1 Years, P. A. Finn, J. C. Hoh, S. F. Wolf, M. Surchik, E. C. Buck and J. K. Bates (Argonne National Laboratory), published in the Proceedings of the Materials Research Society Fall Meeting, Symposium II, December 2-6, 1996, Boston, MA, Vol. 465, pg. 527, submitted to Lawrence Livermore National Laboratory under subcontract, December 1996. [MOL.19970121.0092]
648. Solution-Borne Colloids from Drip Tests Using Actinide-Doped and Fully-Radioactive Waste Glasses, J. A. Fortner, S. F. Wolf, E. C. Buck, C. Mertz and J. K. Bates (Argonne National Laboratory), published in the Proceedings of the Materials Research Society Fall Meeting, Symposium II, December 2-6, 1996, Boston, MA, Vol. 465, pg. 165, submitted to Lawrence Livermore National Laboratory under subcontract, December 1996. [MOL.19961008.0016]
649. Effect of Chloride Concentration and pH on Pitting Corrosion of Waste Package Container Materials, A. K. Roy, D. L. Fleming and S. R. Gordon, submitted to the 190th Meeting of the Electrochemical Society, San Antonio, TX, October 6-11, 1996, Vol. 96-2, pp. 244-245, also available as Lawrence Livermore National Laboratory Report UCRL-JC-123891, December 1996 [MOL.19971217.0332].

650. Effect of Environmental Variables on Localized Corrosion of High-Performance Container Materials, A. K. Roy, D. L. Fleming and B. Y. Lum, published in the Proceedings of the Fifth International Conference on Nuclear Engineering, paper No.# ICONE5-2093, ASME/SFEN/JSME, Nice, France, May 1997, also available as Lawrence Livermore National Laboratory Report UCRL-JC-125329, January 1997. [MOL.19971217.0031]
651. Literature Review of Intrinsic Actinide Colloids Related to Spent Fuel Waste Package Release Rates, P. Zhao and S. A. Steward, Lawrence Livermore National Laboratory Report UCRL-ID-126039, January 1997. [MOL.19971212.0585]
652. Chemical Modeling of Backfill Composed of Quartz Sand, Lime and an Fe-Phase, A. Meike and W. E. Glassley, Lawrence Livermore National Laboratory Report UCRL-ID-124631, January 1997. [MOL.19971217.0351]
- 652a. Thermal-Mechanical-Hydrological-Chemical Responses in the Single Heater Test in the ESE, W. Lin, S. Blair, M. Buettner, T. Buscheck, W. Daily, G. Gdowski, W. Glassley, K. Lee, A. Ramirez, D. Ruddle, J. Roberts, S. Trettenero, D. Watwood (Lawrence Livermore National Laboratory), and R. Carlson (Woodward-Clyde Federal Services), published in the Proceedings of NYRocks '97, 36th U.S. Rock Mechanics Symposium, Columbia University, NY, June 29-July 2, 1997, Vol. 34 No. 3-4, 1997, ISSN 0148-9062 No. 178, also available as Lawrence Livermore National Laboratory Report UCRL-JC-125611, February 1997.
653. Grain Boundary Corrosion and Alteration Phase Formation During the Oxidative Dissolution of UO<sub>2</sub> Pellets, D. J. Wronkiewicz, E. C. Buck and J. K. Bates, published in the Proceedings of the Materials Research Society Fall Meeting, Symposium II, December 2-6, 1996, Boston, MA, Vol. 465, pg. 519, submitted to Lawrence Livermore National Laboratory under subcontract, February 1997. [MOL.19971217.0007]
654. Chemical Thermodynamics of Technitium VI, J. A. Rard, Lawrence Livermore National Laboratory Report UCRL-JC-126426, February 1997. [MOL.19971215.0668]
655. X-Ray Radiography of Fracture Flow and Matrix Imbibition in Topopah Spring Tuff Under a Thermal Gradient, J. J. Roberts and W. Lin, published in the Proceedings of NYRocks '97, 36th U.S. Rock Mechanics Symposium, Columbia University, NY, June 29-July 2, 1997, Vol. 34 No. 3-4, 1997, ISSN 0148-9062 No. 259, also available as Lawrence Livermore National Laboratory Report UCRL-JC-125612, March 1997. [MOL.19980105.0514]
656. A New Reflective Optical Extensometer (ROX) System for Geomechanical Deformation Measurements, S. C. Blair, D. Sweider, S. Trettenero and C. Boro, published in the Proceedings of NYRocks '97, 36th U.S. Rock Mechanics Symposium, Columbia University, NY, June 29-July 2, 1997, International J. Rock Mechanics and Mining Science, 35, April 5, 1997, p. 654, Special Issue, NARMS '98, May 1998, also available as Lawrence Livermore National Laboratory Report UCRL-JC-125628, March 1997. [MOL.19980421.0102]
657. Deformation and Velocity Measurements at Elevated Temperatures in Fractured Blocks of Tuff, S. C. Blair and P. A. Berge, published in the Proceedings of NYRocks '97, 36th U.S. Rock Mechanics Symposium, Columbia University, NY, June 29-July 2, 1997, Vol. 34 No. 3-4, 1997, ISSN 0148-9062 No. 030, also available as Lawrence Livermore National Laboratory Report UCRL-JC-125626, March 1997. [MOL.19980511.0062]
658. A New Uranyl Oxide Hydrate Phase Derived From Spent Fuel Alteration, E. C. Buck, D. J. Wronkiewicz, P. A. Finn, J. K. Bates (Argonne National Laboratories), published in the "Journal of Nuclear Materials", Vol. 249, pg. 70, submitted to Lawrence Livermore National Laboratory under subcontract, March 1997. [MOL.19980107.0446]

- 658a. The State of Chemical Modeling Modules for the Degradation of Concrete and Cements, A. Meike, C. Seibel, L. Clodic, W. L. Bourcier, and P. A. Sterne, Lawrence Livermore National Laboratory Report UCRL-ID-123275, April 15, 1997. [MOL.19980121.0153]
659. Electrochemical and Metallographic Evaluation of Alloys C-22 and 625, A. K. Roy, D. L. Fleming and B. Y. Lum, Lawrence Livermore National Laboratory Report UCRL-ID-127355, May 1997. [MOL.19980114.0137]
660. Retention of Neptunium in Uranyl Alteration Phases Formed During Spent Fuel Corrosion, E. C. Buck, R. J. Finch, P. A. Finn, J. K. Bates (Argonne National Laboratory), published in the Proceedings of the MRS'97 Conference, Scientific Basis for Nuclear Waste Management XXI, Davos, Switzerland, September 28-October 3, 1997, Vol. 506, pp. 87-94, submitted to Lawrence Livermore National Laboratory under subcontract, June 1997. [MOL.19980211.0518]
- 660a. Thermal-Mechanical Behavior of a Heated 3m Block of Fractured Tuff, S. C. Blair and W. Lin, published in the Proceedings of the Third International Conference on the Mechanics of Jointed and Fractured Rock (MJFR-3), Vienna, Austria, April 6-9, 1998, Rossmanith ed. (Balkema), also available as Lawrence Livermore National Laboratory Report UCRL-JC-128350, June 1997.
661. Performance Assessment Modeling for Savannah River Glass HLW Disposal in a Potential Repository at Yucca Mountain, W. J. O'Connell, W. L. Bourcier, J. D. Gansemer, T. S. Ueng, to be published in the Proceedings of the ACS National Meeting/Symposium on Science and Technology for Disposal of Radioactive Tank Wastes, Las Vegas, NV, September 8-11, 1997, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-127352, August 1997. [MOL.19980211.0541]
662. A Comparative Study of Alloys C-22 and 625, A. K. Roy, D. L. Fleming, B. Y. Lum, published in the Proceedings of the ANS 1998 International High Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 666-668, also available as Lawrence Livermore National Laboratory Report UCRL-JC-127355, August 1997. [MOL.19980211.0560]
- 662a. Near-Field and Altered-Zone Environment Report Volume 1: Technical Bases for EBS Design, D. G. Wilder, Lawrence Livermore National Laboratory Report UCRL-LR-124998, Vol 1, August 1997. [MOL.19980928.0388]
663. Corrosion Mechanisms of Spent Fuel under Oxidizing Conditions, P. A. Finn, R. J. Finch, E. C. Buck, J. K. Bates (Argonne National Laboratory), published in the Proceedings of the MRS' 97 Conference, Scientific Basis for Nuclear Waste Management XXI, Davos, Switzerland, September 28-October 3, 1997, Vol. 506, pp. 123-132, submitted to Lawrence Livermore National Laboratory under subcontract, August 1997. [MOL.19980211.0569]
- 663a. Geomechanical Properties of Topopah Spring Tuff at the 0.5-m Scale: Preliminary Results of Compression Tests at Elevated Temperature, S. C. Blair and P. A. Berge, Lawrence Livermore National Laboratory Report UCRL-ID-125089, August 25, 1997. [MOL.19961107.0096;226211]
664. Mapping Moisture Distribution in Yucca Mountain Using Electrical Resistance Tomography, W. Daily and A. Ramirez, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 143-147, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128743, September 1997. [MOL.19980423.0223]

665. Amorphous Silica Precipitation (60° to 120° C): Comparison of Laboratory and Field Rates, S. Carroll, M. Alai, M. Ebert (Lawrence Livermore National Laboratory), E. Mroczek (Institute of Geological & Nuclear Sciences), published in the journal of *Geochimica et Cosmochimica Acta*, Vol. 62, No. 8, pp 1379-1396, 1998 also available as Lawrence Livermore National Laboratory Report UCRL-JC-128486, September 1997. [MOL.19980421.0111]
666. Long-Term Corrosion Testing of Candidate Materials for High-Level Radioactive Waste Containment, J. C. Estill, S. Doughty, G. E. Gdowski, S. R. Gordon, K. King, R. D. McCright, F. Wang, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, Nevada, May 11-14, 1998, pp. 669-673, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128965 Extended Abstract., October 1997. [MOL.19980423.0215]
667. Estimating Changes in Rock Permeability Due to Thermal-Mechanical Effects, H. F. Wang, P. A. Berge, and S. C. Blair, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, Nevada, May 11-14, 1998, pp. 108-110, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128799 Extended Abstract, October 1997. [MOL.19980423.0186]
668. Anisotropic Behavior in 0.5m Scale Blocks of Topopah Spring Tuff, S. C. Blair and M.S. Costantino, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 60-62, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128800 Extended Abstract, October 1997. [MOL.19980120.0045]
669. Geomechanical Observations During the Large Block Test, S. C. Blair and S. A. Wood, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 769-771, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128797 Extended Abstract, October 1997. [MOL.19980423.0206]
670. Electrical Resistance Tomography of the Large Block Test Near Yucca Mountain, A. Ramirez and W. Daily, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 52-53, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128798 Extended Abstract, October 1997. [MOL.19980211.0514]
671. Experimental Tests of Enhancement of Thermal Vapor Diffusion in Topopah Spring Tuff, D. Wildenschild, E. L. Hardin, J. J. Roberts, and W. Lin, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 40-43, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128747, February 1998. [MOL.19990118.0058]
672. The Large Block Test of the Exploratory Studies Facility Thermal Tests, (formerly An Overview of Progress on the Large Block Test), W. Lin, D. G. Wilder, S. C. Blair, T. Buscheck, W. Daily, G. Gdowski, W. Glassley, K. Lee, A. Meike, A. Ramirez, J. Roberts, D. Ruddle, J. Wagoner, D. Watwood, T. Williams (Lawrence Livermore National Laboratory), R. C. Carlson (Woodward Clyde Federal Services), and D. Neubauer (SAIC), published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 49-51, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128796 Extended Abstract, October 1997. [MOL.19980120.0041]

673. Hydrothermal Alteration of Concrete: Yucca Mountain Repository Analogues, K. B. Myers and A. Meike, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 659-661, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128948, October 1997. [MOL.19980421.0120]
674. Dynamic Light Scattering of Waste Form Colloids, C. J. Mertz and J. K. Bates (Argonne National Laboratories), published in the Proceedings of the American Chemical Society National Spring Meeting, Dallas, TX, March 29-April 2, 1998, (volume and page numbers not available at this time), submitted to Lawrence Livermore National Laboratory under subcontract, October 1997. [MOL.19980423.0200]
675. The Burnup Dependence of the  $UO_{2.4}$  to  $U_3O_8$  Transition in LWR Spent Fuel, B. Hanson and S. Prussin (Pacific Northwest National Laboratory) and R. Einziger and H. C. Buchanan (University of California at Berkeley), submitted to the *Journal of Nuclear Materials*, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Subcontract Report UCRL-JC-128971, October 1997. [MOL.19980512.0061]
676. MIC Evaluation and Testing for the Yucca Mountain Repository, J. M. Horn and A. Rivera (Lawrence Livermore National Laboratory), T. Lian and D. Jones (University of Nevada, Reno), published in the Proceedings of the NACE Corrosion/98 Conference, San Diego, CA, March 22-27, 1998, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-129198, October 1997. [MOL.19980512.0164]
- 676a. Crevice Corrosion & Pitting of High-Level Waste Containers: Integration of Deterministic & Probabilistic Models, J. Farmer and R. D. McCright, published in the Proceedings of the National Association of Corrosion Engineers (NACE) in San Diego, CA, March 22-27, 1998, (volume and page numbers not available at this time), Lawrence Livermore National Laboratory Report, UCRL-JC-127980 Part 1, October 1997.
677. Stress Corrosion Cracking of Fe-Ni-Cr-Mo, Ni-Cr-Mo and Ti Alloys in 90°C Acidic Brine, A. K. Roy, D. L. Fleming, B. Y. Lum, published in the Proceedings of the NACE Corrosion/98 Conference, San Diego, CA, March 22-27, 1998, Paper No. 157, pp. 1-6, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128477, November 1997. [MOL.19980211.0551]
678. Galvanic Corrosion Study of Container Materials Using Zero Resistance Ammeter, A. K. Roy, D. L. Fleming, B. Y. Lum, published in the Proceedings of the Corrosion/98 Conference, San Diego, CA, March 22-27, 1998, Paper No. 156, pp. 1-8, also available as Lawrence Livermore National Laboratory Report UCRL-JC-128475, November 1997. [MOL.19980121.0137]
679. Waste Form Characteristics Report, Revision 1, R. B. Stout and H. Leider, Lawrence Livermore Laboratory Report UCRL-ID-108314, Version 1.2, November 1997. [MOL.19980512.0129]
680. Initiation and Growth of Localized Attack in Nuclear Waste Package Materials, A. K. Roy, D. L. Fleming, B. Y. Lum, published in the Proceedings of the ICONE-6 International Conference on Nuclear Engineering, San Diego, CA, May 10-15, 1998, ICONE-6014, Page 628, Book of Abstracts, also available as Lawrence Livermore National Laboratory Report UCRL-JC-129068, November 1997. [MOL.19980421.0093]

681. UO<sub>2</sub> Corrosion in High Surface-Area-To-Volume Batch Experiments, R. J. Finch, S. F. Wolf, J. M. Hanchar, and J. K. Bates (Argonne National Laboratories), published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference in Las Vegas, NV on May 11-14, 1998, pp. 619-621, submitted to Lawrence Livermore National Laboratory under subcontract, November 1997. [MOL.19980508.0730]
682. Modeling the Corrosion of High-Level Waste Containers: CAM-CRM Interface, J. Farmer and D. McCright, published in the Proceedings of the Spectrum '98, American Nuclear Society, Denver, CO, September 13-18, 1998, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-129120, December 9, 1997. [MOL.19980918.0275]
683. Synthesis Report on Thermally Driven Coupled Processes, E. L. Hardin and D. A. Chesnut, Lawrence Livermore Laboratory Report UCRL-ID-128495, December 1997. [MOL.19980120.0035]
684. Degradation Mode Survey Candidate Titanium-Base Alloys for Yucca Mountain Project Waste Package Materials, G. Gdowski, Lawrence Livermore Laboratory Report UCRL-ID-121191, Revision 1, December 1997. [MOL.19980120.0053]
685. Assessing Microbiologically Induced Corrosion of Waste Package Materials in the Yucca Mountain Repository, J. M. Horn, M. Davis, and S. Martin (Lawrence Livermore National Laboratory), T. Lian and D. Jones (University of Nevada), published in the Proceedings of the ICONE-6 International Conference on Nuclear Engineering, San Diego, CA, May 10-15, 1998, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-130567, January 1998.
686. Determination of Mineral Abundance in Samples from the Exploratory Studies Facility, Yucca Mountain, Nevada, Using X-ray Diffraction, S. K. Roberts and B. Viani, Lawrence Livermore National Laboratory Report UCRL-ID-129748, January 13, 1998. [MOL.19981109.0291]
- 686a. Experimental Tests of Enhancement of Thermal Vapor Diffusion in Topopah Spring Tuff, D. Wildenschild, J. J. Roberts, E. Hardin, W. Lin, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference in Las Vegas, NV, May 11-14, 1998, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-128747, February 1998.
687. Sustaining Native Microbial Growth with Endogenous Nutrients at Yucca Mountain, M. A. Davis, S. I. Martin, A. Miranda, J. M. Horn, published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference in Las Vegas, NV, May 11-14, 1998, pp. 662-665, also available as Lawrence Livermore National Laboratory Report UCRL-JC-129185, February 1998. [MOL.19980521.0034]
688. A Report on Laboratory Scale Thermally-Coupled Processes Experiments, W. Lin, J. J. Roberts, and D. Wildenschild, Lawrence Livermore National Laboratory Report UCRL-ID-129843, February 1998. [MOL.19981123.0397]
689. Temperature and Moisture Control Using Pre-Closure Ventilation, J. A. Blink and D. A. Chesnut (Lawrence Livermore National Laboratory), G. Danko (University of Nevada, Reno), published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference in Las Vegas, NV, May 11-14, 1998, pp. 762-766, also available as Lawrence Livermore National Laboratory Report UCRL-JC-129175, March 1998. [MOL.19981109.0153]

690. Scoping Corrosion Tests on Candidate Waste Package Basket Materials for the Yucca Mountain Project, R. A. Van Konynenburg, P. G. Curtis, T.S.E. Summers, Lawrence Livermore National Laboratory Report UCRL-ID-130386, March 1998. [MOL.19980727.0381]
691. Near-Field/Altered-Zone Models Report, E. L. Hardin, with contributions from: S. C. Blair, W. L. Bourcier, T. A. Buscheck, D. A. Chesnut, L. D. DeLoach, W. E. Glassley, J. W. Johnson, R. B. Knapp, K. G. Knauss, K. Lee, A. Meike, K. Myers, J. J. Nitao, C. E. Palmer, L. L. Rogers, N. D. Rosenberg, B. E. Viani, C. Wittwer, and T. J. Wolery, Lawrence Livermore National Laboratory Report UCRL-ID-129179, March 1998. [MOL.19981029.0115]
692. Humid Air Corrosion of YMP Waste Package Candidate Materials, G. E. Gdowski, published in the Proceedings of the NACE Corrosion '98 Conference, San Diego, CA, March 22-27, 1998, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-130202, March 1998.
693. Major Repository Design Issues, J. A. Blink, D. A. Chesnut (Lawrence Livermore National Laboratory), J. N. Bailey (TRW), J. Compton (U.S. Department of Energy), R. D. Snell (Fluor-Daniel), published in the Proceedings of the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 560-561, also available as Lawrence Livermore National Laboratory Report, UCRL-JC-129167, March 1998.
694. Factors Affecting Performance of Engineered Barriers, J. A. Blink (Lawrence Livermore National Laboratory), R. Andrews, J. Lee, D. Sevougian, V. Vallikat (Duke Engineering), J. Bailey (TRW), T. Doering (Framatome Cogema Fuels), and D. McKenzie (Morrison Knudson), published in the Proceedings of the ANS International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, pp. 290-292, also available as Lawrence Livermore National Laboratory Report UCRL-JC-129166, March 1998. [MOL.19981118.0344]
695. Large Block Test Status Report, D. G. Wilder, W. Lin, S. C. Blair, T. Buscheck, K. Lee, A. Meike, A. L. Ramirez, J. L. Wagoner (Lawrence Livermore National Laboratory), R. C. Carlson (Woodward Clyde), and J. Wang (LBL), Lawrence Livermore National Laboratory Report UCRL-ID-128776, May 1998. [234859]
696. Water Entering Waste Packages: Drawdown Limited Flow on the Waste Package Surface, E. Hardin, published in the Proceedings of the ANS International High-Level Radioactive Waste Management Conference in Las Vegas, NV, May 11-14, 1998, pp. 417-418, also available as Lawrence Livermore Laboratory Report UCRL-JC-128844 Extended Abstract, May 1998. [MOL.19980918.0267]
697. Modeling the Corrosion of High-Level Waste Containers: CAM-CRM Interface, J. Farmer and D. McCright, Lawrence Livermore National Laboratory Report UCRL-ID-129120, June 1998. [MOL.19980918.0275]
698. Yucca Mountain Project--Argonne National Laboratory. Annual Progress Report. FY 1997 for Activity WP 1221. Unsaturated Drip Condition Testing of Spent Fuel Unsaturated Dissolution Tests of Glass, P. A. Finn, D. J. Wronkiewicz, R. J. Finch, J. C. Hoh, J. W. Emery, E. C. Buck, J. Fortner, S. F. Wolf, L. A. Neimark, and J. K. Bates, Argonne National Laboratory Report ANL-98/12, submitted to Lawrence Livermore National Laboratory under subcontract, June 1998.
699. Development of Integrated Mechanistically-Based Degradation-Mode Models for Performance Assessment of High-Level Waste Containers, Joseph C. Farmer, R. Daniel McCright, Jia-Song Huang, Ajit Roy, Keith Wilfinger, Robert Hopper, Francis Wang, Peter Bedrossian, John Estill, and Joanne Horn, Lawrence Livermore National Laboratory Report UCRL-ID-130811, June 1998.

700. The Burnup Dependence of Light Water Reactor Spent Fuel Oxidation, B. D. Hanson (Pacific Northwest National Laboratory Report PNNL-11929), submitted to Lawrence Livermore National Laboratory under subcontract, July 1998.
701. Localized Corrosion of Candidate Container Materials in Ferric Chloride Solutions, Ajit K. Roy, Dennis L. Fleming, Beverly Y. Lum, published in the Proceedings of the NACE Annual Conference and Exposition, CORROSION '99, San Antonio, TX, April 25-30, 1999, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-132146, October 1998.
702. Grain Size and Burnup Dependence of Spent Fuel Oxidation: Geological Repository Impact, Edward J. Kansa and Ray B. Stout (Lawrence Livermore National Laboratory), and Brady D. Hanson (Pacific Northwest National Laboratory), published in the Proceedings of the Materials Research Society (MRS) 1998 Fall Meeting, Scientific Basis for Nuclear Waste Management XXII, Boston, MA, November 30-December 4, 1998, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-131592, October 1998.
- 702a. A Quantitative Assessment of Microbiological Contributions to Corrosion of Candidate Nuclear Waste-Package Materials, T. Lian and D. Jones (University of Nevada), S. Martin and J. Horn (Lawrence Livermore National Laboratory), published in the Proceedings of the Materials Research Society 1998 Fall Meeting (MRS '98), Scientific Basis for Nuclear Waste Management XXII, November 30 to December 4, 1998, Boston, MA, also available as Lawrence Livermore National Laboratory Report UCRL-JC-131555, October 30, 1998.
- 702b. Investigation of Bacterial Transport in the Large Block Test. A Thermally Perturbed Block of Topopah Spring Tuff, Ching-I Chen, Annemarie Meike, Yue-Jen Chuu, April Sawvel, and Wunan Lin, published in the Proceedings of the MRS '98 Fall Meeting, Scientific Basis for Nuclear Waste Management XXII, Boston, MA, November 30-December 4, 1998, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-131038, November 1998.
703. Development of Integrated Mechanistically-Based Degradation-Mode Models for Performance Assessment of High-Level Waste Containers, J. C. Farmer, R. D. McCright, J. C. Estill, S. R. Gordon, published in the Proceedings of the Materials Research Society Fall Meeting (MRS '98), Boston, MA, November 30-December 4, 1998, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-130811, Revision 1, November 6, 1998.
704. Nutrient Limitation and Microbially Mediated Chemistry: Studies Using Tuff Inoculum Obtained From the Exploratory Studies Facility, Yucca Mountain, C.-I. Chen, A. Meike, A. Sawvel, Y.-J. Chuu, L. Rogers, A. Barr, published in the Proceedings of the MRS '98 Fall Meeting, Scientific Basis for Nuclear Waste Management XXII, November 30-December 4, 1998, Boston, MA, also available as Lawrence Livermore National Laboratory Report UCRL-JC-131039, December 18, 1998.
705. Stress Corrosion Cracking of Alloy C-22 and Ti GR-12 Using Double-Cantilever-Beam Technique, Ajit K. Roy, Dennis L. Fleming, Dennis C. Freeman, Beverly L. Lum, published in *MICRON*, an Elsevier Science Journal, Vol.30/Issue 6, pp 647-652, September 1999, also available as Lawrence Livermore National Laboratory Report UCRL-JC-132145, December 1998.
706. Waste Form Characteristics Report CD ROM Version, Editors: Ray B. Stout and Herman R. Leider, Lawrence Livermore National Laboratory Report UCRL-ID-132375 (Version 1.3 of UCRL-ID-108314), December 1998.

707. Engineered Materials Characterization Report 1994-98, R.Daniel McCright, Lawrence Livermore National Laboratory Report UCRL-ID-119564, December 1998.
708. Corrosion of Candidate Container Materials by Yucca Mountain Bacteria, Tiangan Lian, Sue Martin, Angel Rivera, and Joanne Horn, Lawrence Livermore National Laboratory, and Denny Jones, University of Nevada-Reno, to be published in the Proceedings of the NACE Annual Conference and Exposition, CORROSION/99, San Antonio, TX, April 25-30, 1999, Paper #99476, also available as Lawrence Livermore National Laboratory Report UCRL-JC-132825, January 1999.
709. Coupled THM Analysis of the Single-Heater Test at Yucca Mountain, Stephen Blair, Wunan Lin, Abe Ramirez, William Daily, Tom Buscheck, Laura Deloach, to be submitted to the Vail Rocks '99, Rock Mechanics for Industry, June 6-9, 1999, Vail, CO, Lawrence Livermore National Laboratory Report UCRL-JC-132052, January 15, 1999.
710. Stress Corrosion Cracking of Ni-Base and Ti Alloys Under Controlled Potential, Ajit K. Roy, John C. Estill, Steven R. Gordon, and Lawrence F. Logoteta, to be published in the Proceedings of the 7th International Conference on Nuclear Engineering (ICONE), Tokyo, Japan, April 19-23, 1999, (volume and page numbers not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-132511, February 1999.
711. Galvanic Corrosion - Effect of Environmental and Experimental Variables, Ajit K. Roy, Dennis L. Fleming, and Beverly Y. Lum, to be published in the Proceedings of the NACE Annual Conference and Exposition, CORROSION '99, San Antonio, TX, April 25-30, 1999, (volume and page number not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-132374, February 1999.
712. Fluid Flow in 0.5-m Scale Blocks of Topopah Spring Tuff, M. S. Costantino, S. C. Blair, and S. R. Carlson, to be published in the Proceedings of the Vail Rocks '99, Rock Mechanics for Industry, Vail, CO, June 6-9, 1999, (volume and page number not available at this time), also available as Lawrence Livermore National Laboratory Report UCRL-JC-131762, February 1, 1999.

## MISCELLANEOUS REPORTS IN PROGRESS:

JEWEL: A Graphical-User Interface for Generating Custom GEMBOCHS Thermodynamic Datafiles for use with Geochemical Modeling Software, J. W. Johnson and S. R. Lundeen, Lawrence Livermore National Laboratory Report, January 1995.

GEMBOCHS Thermodynamic Datafiles for use with the EO3/6 Software Package, J. W. Johnson and S. R. Lundeen, Lawrence Livermore National Laboratory Report, January 1995.

Experimental Investigation of Hydrous Pyrolysis of Diesel Fuel: Potential Impact on the Proposed High-Level Radioactive Waste Repository, Yucca Mountain, Nevada, S. A. Carroll, M. Alai and S. A. Copenhaver, Lawrence Livermore National Laboratory Report, April 1995.

Considerations on the Performance and Fabrication of Candidate Materials for the Yucca Mountain Repository Waste Packages: Highly Corrosion Resistant Nickel-Base and Titanium-Base Alloys, Alfred Goldberg and Edward N. Dalder, Lawrence Livermore National Laboratory Report, November 30, 1995.

Pretest Thermal-Hydrological Analysis of the Drift-Scale Thermal Test at Yucca Mountain, T. Buscheck, R. Shaffer, J. Nitao, Lawrence Livermore National Laboratory Report, June 1997.

Thermal-Chemical Analyses of the Drift Scale Heater Test: Mineralogical and Geochemical Characteristics, W. Glassley, Lawrence Livermore National Laboratory Report, July 1997.

Radionuclide Release in Vapor Tests by Means of Thin-Film Flow, P. A. Finn, S. Tam, and J. K. Bates, Argonne National Laboratory, to be submitted to the ANS 1998 International High-Level Radioactive Waste Management Conference in Las Vegas, NV, May 11-14, 1998, submitted to Lawrence Livermore National Laboratory under subcontract, November 1997.

Estimates of Permeability Change in the Drift Scale Test Due to Thermal-Mechanical Effects, S. C. Blair, H. F. Wang, and P. A. Berge, presented at the FTAM-Field Testing and Modeling Workshop, Lawrence Berkeley Laboratory, December 15-16, 1997, Lawrence Livermore National Laboratory Report, December 1997.

Anisotropic Behavior in 0.5M Scale Blocks of Topopah Spring Tuff, S. C. Blair and M. S. Costantino, to be submitted to the ANS 1998 International High-Level Radioactive Waste Management Conference, Las Vegas, NV, May 11-14, 1998, Lawrence Livermore National Laboratory Report, UCRL-JC-128800, February 1998.

Models for the Distribution of Percolation at the Repository Level and Seepage into Drifts under Pre-Emplacement Conditions, J. J. Nitao, Lawrence Livermore National Laboratory Report, March 1998.

Preliminary Bounds for the Drift-Scale Distribution of Percolation and Seepage at the Repository Level under Pre-Emplacement Conditions, J. J. Nitao, Lawrence Livermore National Laboratory Report, March 1998.

Distribution of Post-Emplacement Seepage into the Repository Drifts with Parametric Variation of Intrinsic Properties and Models and Bounds for Post-Emplacement Seepage into the Repository, J. J. Nitao, Lawrence Livermore National Laboratory Report, March 1998.

Concentration of Uranium and Plutonium in Unsaturated Spent Fuel Tests, P. A. Finn, R. J. Finch, S. F. Wolf, and J. K. Bates, Argonne National Laboratory, to be submitted to the Third Topical Meeting on DOE Spent Nuclear Fuel and Fissile Materials Management, Charleston, South Carolina, September 8-11, 1998, submitted to Lawrence Livermore National Laboratory under subcontract, March 1998.

The Relative Importance of Alpha Radiolysis of Water for the Reaction of Spent Fuel, P. A. Finn, Argonne National Laboratory, to be submitted to the Scientific Basis for Nuclear Waste Management XXII, Materials Research Society 1998 Fall Meeting (MRS '98), Boston, MA, November 30-December 4, 1998, submitted to Lawrence Livermore National Laboratory under subcontract, June 1998.

Oxidative Corrosion of Spent UO<sub>2</sub> Fuel in Vapor and Dripping Groundwater at 90°C, Robert J. Finch, Edgar C. Buck, Patricia A. Finn, and John K. Bates, Argonne National Laboratory, to be submitted to the Scientific Basis for Nuclear Waste Management XXII, Materials Research Society 1998 Fall Meeting (MRS '98), Boston, MA, November 30-December 4, 1998, submitted to Lawrence Livermore National Laboratory under subcontract, June 1998. (abstract)

Investigation of Bacterial Transport in the Large Block Test. A Thermally Perturbed Block of Topopah Spring Tuff, C.-I. Chen, A. Meike, Y.-J. Chuu, A. Sawvel, and Wunan Lin, submitted to the Scientific Basis for Nuclear Waste Management XXII, Materials Research Society 1998 Fall Meeting (MRS '98), Boston, MA, November 30-December 4, 1998, Lawrence Livermore National Laboratory Report, UCRL-JC-131038abs, June 1998. (abstract)

Waste Package Relative Humidity Environment-Some Preliminary Experimental Results, Dwayne A. Chesnut and Thomas A. Buscheck, Lawrence Livermore National Laboratory, Mark T. Peters, Los Alamos National Laboratory, Robin N. Datta, Woodward-Clyde Federal Services, to be submitted to the National Association of Corrosion Engineering (NACE '99), San Antonio, TX, April 25-30, 1999, Lawrence Livermore National Laboratory Report UCRL-JC-131827abs, August 1998.

Prediction of Fracture Slip and Associated Permeability Changes in a Potential Geologic Repository for Nuclear Waste, P. A. Berge and S. C. Blair, Lawrence Livermore National Laboratory, and H. F. Wang, University of Wisconsin, to be submitted to the Dynamic of Fluids in Fractured Rocks: Concepts and Recent Advances, International Symposium In Honor of Paul A. Witherspoon's 80th Birthday, Berkeley, CA, February 10-12, 1999, Lawrence Livermore National Laboratory Report UCRL-JC-133207extabs, September 1998.

Hydrothermal Alteration of Cementitious Materials. Part II: Second and Third Batch of Samples, K. B. L. Myers and A. Meike, Lawrence Livermore Laboratory Report UCRL-ID-128735 Pt. 2, September 1998.

Thermodynamics of Calcium Silicate Hydrates-Development of a Database to Model Concrete Dissolution at 25°C Using the EO 3/6 Geochemical Modeling Code, Laurence Clodic and Annemarie Meike, Lawrence Livermore National Laboratory Report, UCRL-ID-132088, October 1998.

Software Quality Assurance Documentation for the Release of NUFT 2.0s for SUN Platforms, Ronald J. Shaffer and Michael W. Fernandez, Lawrence Livermore National Laboratory Report UCRL-ID-132250, October 1998.

Analysis of Large Block Test Data Using the DDA Method, M. Ronald Yeung, San Jose State University, and Stephen C. Blair, Lawrence Livermore National Laboratory, to be submitted to 3rd International Conference on Analysis of Discontinuous Deformation (ICADD3), Vail, CO, June 6-9, 1999, Lawrence Livermore National Laboratory Report UCRL-JC-132542abs, November 1998.

The Role of Electrical Resistance Tomography In the U.S. Nuclear Waste Site Characterization Program, William D. Daily and Abe Ramirez, to be submitted to the 1st World Congress on Industrial Process Tomography on April 14-17, 1999, Buxton, Derbyshire, England, Lawrence Livermore National Laboratory Report UCRL-JC-131895, November 1998.

Oxidative Corrosion of Spent UO<sub>2</sub> Fuel in Vapor and Dripping Groundwater at 90°C, Robert J. Finch, Edgar C. Buck, Patricia A. Finn, John K. Bates, Argonne National Laboratory, submitted to the MRS '98 Fall Meeting, Scientific Basis for Nuclear Waste Management XXII, November 30-December 4, 1998 in Boston, MA, submitted to Lawrence Livermore National Laboratory under subcontract, November 1998. (conference paper)

Water Chemistry Results from Thermal Tests at Yucca Mountain, Laura D. DeLoach, William E. Glassley, Roger E. Martinelli, Nina A. Rosenberg, and Marina L. Chirappa, to be submitted to Field Testing and Associated Modeling of Potential High-Level Nuclear Waste Geologic Disposal Sites, Berkeley, CA, December 11 and 12, 1998, Lawrence Livermore National Laboratory UCRL-JC-132673abs, December 1998.

Inventories of I-129 and Cesium-137 in the Gaps and Grain Boundaries of LWR Spent Fuels, Walter J. Gray, Pacific Northwest Laboratory, submitted to Lawrence Livermore National Laboratory under subcontract, Lawrence Livermore National Laboratory Contractor Report, November 1998.

Biochemical Contributions to Corrosion of Carbon Steel and Alloy 22 in a Continual Flow System, J. Horn, S. Martin, B. Masterson, and T. Lian, to be submitted to NACE Annual Conference and Exposition, CORROSION/99, San Antonio, TX, April 25-30, 1999, Lawrence Livermore National Laboratory Report, December 1998.

Multi-Scale Near-Field Thermal-Hydrological Analysis of Alternative Designs for the Potential Repository at Yucca Mountain, Thomas A. Buscheck, James Gansemer, John J. Nitao, and Truc H. DeLorenzo, to be submitted to the Fall Meeting of the Materials Research Society (MRS '98), Scientific Basis for Nuclear Waste Management XXII, Boston, MA, November 30-December 4, 1998, Lawrence Livermore National Laboratory Report UCRL-JC-131171, December 1998.

Passive Films and Blistering of Titanium, Peter J. Bedrossian, Joseph C. Farmer, R. Daniel McCright, Douglas L. Phinney, and John C. Estill, to be submitted to the Fall Meeting of the Materials Research Society (MRS '98), Scientific Basis for Nuclear Waste Management XXII, Boston, MA, November 28-December 4, 1998, Lawrence Livermore National Laboratory Report UCRL-JC-132775, January 1999.

Biochemical Contributions to Corrosion of Nuclear Waste Container Materials, S. Martin, B. Masterson, A. Rivera, M. Miranda, T. Lian, and J. M. Horn, to be submitted to the American Society for Microbiology, 99th General Meeting, Chicago, IL, May 30-June 3, 1999, Lawrence Livermore National Laboratory Report UCRL-JC-132828abs, January 1999.

Thermomechanical Effects on Permeability for a 3-D Model of YM Rock, P. A. Berge, S. C. Blair, H. F. Wang, to be submitted to the Vail Rocks '99, Rock Mechanics for Industry on June 6-9, 1999 in Vail, CO, Lawrence Livermore National Laboratory Report UCRL-JC-132065, January 1999.

Electrical Resistance Tomography of Unsaturated Flow and Transport in Yucca Mountain, M. Buettner, A. Ramirez, and W. Daily, submitted to the Symposium on the Application of Geophysics to Environmental and Engineering Problems, Oakland, CA, March 14-18, 1998, Lawrence Livermore National Laboratory Report, UCRL-JC-131761, January 1999.

Phase Stability and Mechanical Properties of Alloy C-22 Aged in the Temperature Range 590 to 760°C for 16,000 Hours, T. S. Edgecumbe Summers, M. Wall, Lawrence Livermore National Laboratory, S. J. Matthews, R. B. Rebak, Haynes International Inc., Kokomo, IN, submitted to the Materials Research Society 1998 Fall Meeting, Scientific Basis for Nuclear Waste Management XXII, November 30 to December 4, 1998, Boston, MA, Lawrence Livermore National Laboratory Report UCRL-JC-130816, January 1999.

Modeling the Formation of Colloids During Nuclear Waste Form Corrosion, E. C. Buck, Argonne National Laboratory, to be submitted to the Seventh International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere (MIGRATION '99), Lake Tahoe, CA/NV, September 26-October 1, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, January 1999. (abstract)

The Origin of Colloids from High Level Waste Glass Corrosion, J. A. Fortner, E. C. Buck, S. F. Wolf, and J. K. Bates, Argonne National Laboratory, to be submitted to the Seventh International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere (MIGRATION '99), Lake Tahoe, CA/NV, September 26-October 1, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, January 1999. (abstract)

Radionuclide Release Rates and Concentrations in Unsaturated Tests With Oxide Fuels - First 4.8 Years, P. A. Finn, S. F. Wolf, and R. A. Leonard, Argonne National Laboratory, to be submitted to the Seventh International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere (MIGRATION '99), Lake Tahoe, CA/NV, September 26-October 1, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, January 1999. (abstract)

Development of Integrated Mechanistically-Based Degradation-Mode Models for Performance Assessment of High-Level Waste Containers, Joseph Farmer, Daniel McCright, Jia-Song Huang, Ajit Roy, Keith Wilfinger, Robert Hopper, Francis Wang, Peter Bedrossian, John Estill, and Joanne Horn, Lawrence Livermore National Laboratory Report UCRL-ID-130811, Revision 1, February 1999.

The Formation and Stability of Glass Waste Form Colloids, C. J. Mertz, E. C. Buck, J. A. Fortner, and S. F. Wolf, Argonne National Laboratory, to be submitted to the Seventh International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere (MIGRATION '99), Lake Tahoe, CA/NV, September 26-October 1, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, February 1999. (abstract)

Corrosion Protection of Metallic Waste Packages Using Thermal Sprayed Ceramic Coatings, Keith R. Wilfinger, Joseph C. Farmer, Robert W. Hopper, and Thomas E. Shell, to be submitted to the MRS '98 Fall Meeting, Scientific Basis for Nuclear Waste Management XXII, Boston, MA, November 30 to December 4, 1998, Lawrence Livermore National Laboratory Report UCRL-JC-131484, February 1999.

Prediction of the Lifetime Integrity of A Nuclear Waste Container Material Based on Thermal Stability Studies, Tammy S. Edgecumbe Summers and Tien Shen, Lawrence Livermore National Laboratory, Raul B. Rebak, Haynes International Inc., to be submitted to the International Conference on Ageing Studies and Lifetime Extension Materials, Oxford, United Kingdom, July 12-14, 1999, Lawrence Livermore National Laboratory UCRL-JC-133423abs, March 1999.

Interaction of Waste Glass Colloids With Iron Oxide Solid, D. A. Wruck, P. Torretto, and C.E.A. Palmer, to be submitted to the Seventh International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere (MIGRATION '99), Lake Tahoe, CA/NV, September 26-October 1, 1999, Lawrence Livermore National Laboratory Report UCRL-JC-134200abs, May 1999.

Solubility of Np(V) in the Presence of U(VI) Hydroxide Solid, D. A. Wruck, A. Brachmann, C.E.A. Palmer, to be submitted to the Seventh International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere (MIGRATION '99), Lake Tahoe, CA/NV, September 26-October 1, 1999, Lawrence Livermore National Laboratory Report UCRL-JC-134199abs, May 1999.

Fracture Characterization of the Large-Block Test, Fran Ridge, Yucca Mountain, Nevada, Jeffrey L. Wagoner, Lawrence Livermore National Laboratory Report UCRL-ID-133846, May 1999.

Release of Tc From Fuel-Grain Boundaries During Oxidative Corrosion of Spent UO<sub>2</sub> Fuel in Dripping Groundwater, Robert J. Finch, Patricia A. Finn, Stephen F. Wolf, Ralph Leonard, Edgar C. Buck, and James C. Cunnane, Argonne National Laboratory, to be submitted to the Scientific Basis for Nuclear Waste Management XXII, Materials Research Society 1999 Fall Meeting, Boston, MA, November 30-December 4, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, June 1999. (abstract)

Hydride-Related Degradation of Spent Fuel Cladding Under Repository Conditions, H. M. Chung, Argonne National Laboratory, to be submitted to the Scientific Basis for Nuclear Waste Management XXII, Materials Research Society 1999 Fall Meeting, Boston, MA, November 30-December 4, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, June 1999. (abstract)

Vapor Hydration of Borosilicate Waste Glass, Rudolph A. Olson, Jeffrey A. Fortner, William L. Ebert, Shiu-Wing Tam, Stephen F. Wolf, and James C. Cunnane, Argonne National Laboratory, to be submitted to the Scientific Basis for Nuclear Waste Management XXII, Materials Research Society 1999 Fall Meeting, Boston, MA, November 30-December 4, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, June 1999. (abstract)

Estimating Model Parameter Values for High-Level Waste Glasses for Total System Performance Assessment, William L. Ebert, Shiu-Wing Tam, and James C. Cunnane, Argonne National Laboratory, to be submitted to the Scientific Basis for Nuclear Waste Management XXII, Materials Research Society 1999 Fall Meeting, Boston, MA, November 30-December 4, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, June 1999. (abstract)

Effects of Alteration Phase Formation Under Unsaturated Conditions in LWR Fuels With Breached Cladding, Stephen F. Wolf, Robert J. Finch, Rudolph A. Olson, and James C. Cunnane, Argonne National Laboratory, to be submitted to the Scientific Basis for Nuclear Waste Management XXII, Materials Research Society 1999 Fall Meeting, Boston, MA, November 30-December 4, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, June 1999. (abstract)

Cracking of Titanium Alloys under Cathodic Applied Electrochemical Potential, Ajit K. Roy, Maura K. Spragge, Dennis L. Fleming, and Beverly Y. Lum, to be submitted to MICRON, an Elsevier Science Journal, Lawrence Livermore National Laboratory Report, June 1999.

Using Engineering Design to Control the Influence of Thermal Processes on the Hydrologic System Around an Underground Nuclear Waste Repository, T. A. Buscheck, N. D. Rosenberg, Jim Gansemer, and Yunwei Sun, to be submitted to the Fourth USA/CIS Joint Conference on Environmental Hydrology and Hydrogeology, Hydrologic Issues for the 21st Century: Ecology, Environment and Human Health, San Francisco, CA, November 7-10, 1999, Lawrence Livermore National Laboratory Report UCRL-JC-134219abs, July 1999.

Geophysical Monitoring of the Busted Butte Unsaturated Zone Transport Test, William Daily, Mike Buettner, Abelardo Ramirez, Lawrence Livermore National Laboratory, Ken Williams, Lawrence Berkeley National Laboratory, Gilles Bussod, Las Alamos National Laboratory, to be submitted to the 1999 GSA Annual Meeting, Denver, CO, October 25-28, 1999, Lawrence Livermore National Laboratory Report, July 1999.

The Role of Capillary Barriers in Reducing Moisture Content on Waste Packages, N. D. Rosenberg, T. A. Buscheck, and Yunwei Sun, to be submitted to the Fourth USA/CIS Joint Conference on Environmental Hydrology and Hydrogeology, Hydrologic Issues for the 21st Century: Ecology, Environment and Human Health, San Francisco, CA, November 7-10, 1999, Lawrence Livermore National Laboratory Report, UCRL-JC-134046abs, July 1999.

The Roles of Solid Alteration Products in Limiting Releases of U, Np, Pu and Lanthanides From Corroded Nuclear-Waste Forms, Robert Finch, Edgar Buck, Jeffery Fortner, Carol Mertz, Stephen Wolf, Patricia Finn, William Ebert, and James Cunnane, Argonne National Laboratory, to be submitted to the Seventh International Conference on the Chemistry and Migration Behavior of Actinides and Fission Products in the Geosphere (MIGRATION '99), Lake Tahoe, CA/NV, September 26-October 1, 1999, submitted to Lawrence Livermore National Laboratory under subcontract, July 1999. (abstract)

Assessing Microbiologically Induced Corrosion of Candidate Waste Package Alloys in the Yucca Mountain High Level Nuclear Waste Repository, J. M. Horn, S. Martin, M. Davis, A. Rivera, A. Miranda, T. Lian, and D. A. Jones, to be submitted to the American Nuclear Society, Nuclear Technology, Lawrence Livermore National Laboratory Report UCRL-JC-134459, July 1999.

The Yucca Mountain Site Characterization Project, Cynthia E. A. Palmer, to be submitted to the 218th American Chemical Society Meeting, The Scientific Basis, Regulatory Issues and Litigation in Radioactive Waste Disposal: Current Problems, Experiences, and Examples, New Orleans, LA, August 22-26, 1999, Lawrence Livermore Laboratory Report UCRL-JC-134533abs, August 1999.

LAWRENCE LIVERMORE NATIONAL LABORATORY  
YUCCA MOUNTAIN PROJECT  
LISTING BY AUTHOR

Abey, A. E.	22, 33, 47, 50, 62
Abrajano, T. A.	229, 241, 262, 277, 301, 303, 306, 400
Acton, C.	249
Ahluwalia, H. S.	446
Aines, R.	235, 239, 258, 264, 265, 283, 378
Akkaya, M.	311
Alai, M.	628, 644a, 665
Amy, P. S.	628, 636
Andrews, J. E., Jr.	410
Andrews, R.	694
Apted, M. J.	396, 440
Atanasoski, R. T.	261
Axelrod, M. C.	173, 186, 210, 213
Bailey, J. N.	693, 694
Baisden, P. A.	418, 459
Baldwin, D.	363
Ballou, L. B.	3, 11, 17, 29, 32, 34, 45, 49, 67, 71, 81, 84, 87, 91, 93, 109, 112, 120, 359, 403
Barr, A.	704
Bates, J. K.	157, 159, 169, 183, 220, 229, 241, 247, 256, 258, 262, 264, 277, 287, 294, 301, 303, 306, 313, 323, 324, 328, 333, 374, 375, 377, 379, 400, 402, 411, 416, 426, 443, 450, 455, 480, 481, 486, 487, 499, 515, 556, 557, 577, 578, 579, 595, 597, 611, 628a, 631, 632, 647, 648, 653, 658, 660, 663, 674, 681, 698
Bazan, F.	168, 178, 243, 265
Beatty, J.	356, 409
Bedrossian, P.	699
Beiriger, J.	118, 119, 132, 144, 172, 177, 186
Beiriger, W.	191, 206, 210, 272
Bell, B. T.	261

Berge, P. A.	584, 585, 586, 614, 616, 626a, 635, 638, 639, 657, 663a, 667
Beyer, C. E.	490, 492
Bibler, N.	156
Biwer, B. M.	328, 333, 376, 402, 411, 487
Blahnik, D. E.	483, 484
Blair, S. C.	545, 570, 584, 585, 586, 587, 614, 616, 626a, 635, 638, 639, 652a, 656, 657, 660a, 663a, 667, 668, 669, 672, 691, 695, 709, 712
Blink, J. A.	523, 545, 548, 570, 584, 587, 614, 689, 693,694
Blum, A. E.	357, 449, 479
Board, M.	14
Boardman, C. R.	2A
Boro, C.	656
Bourcier, W. L.	209, 248, 338, 351, 353, 368, 369, 378, 381, 400, 421, 443, 486, 539, 553, 572, 578, 628, 658a, 661, 691
Boyd, O. S.	586
Bradford, R. M.	528
Bradkin, W.	153
Bradley, C.	487, 499
Bradley, J. P.	400, 443, 499
Brough, W. G.	11, 25, 32, 64, 76
Brugman, V.	584, 586, 614
Bruton, C. J.	290, 291, 344, 353, 378, 504, 533, 539, 541, 564, 572, 589, 603, 644a
Buchanan, H. C.	314, 322, 329, 432, 494, 510, 675
Bucher, J.	633
Buchholtz ten Brink, M.	332, 419, 422, 499
Buck, E. C.	557, 577, 595, 628a, 631, 632, 647, 648, 653, 658, 660, 663, 698
Buettner, H. M.	385, 645, 652a
Bullen, D. B.	286, 308, 318, 319, 325, 326, 327, 592, 601
Burch, T. E.	506
Burklund, P. W.	73, 586

Buscheck, T.	214, 285, 310, 337, 356, 362, 380, 386, 409, 445, 453, 454, 470, 474, 495, 496, 516, 517, 520, 538, 544, 545, 562, 563, 570, 574, 586, 587, 603a, 611, 617, 624, 626, 646, 652a, 672, 691, 695, 709
Butkovich, T. R.	11, 19, 22, 44, 48, 54, 61, 70, 71, 80, 84, 88, 93, 123, 125, 196, 207, 212, 226, 230
Byerlee, J.	98, 108, 139, 182, 218
Campbell, K. W.	21
Campbell, T. K.	483
Capo, M. A.	115
Carley, J.F.	383a
Carlson, R. C.	11, 32, 53, 58, 60, 71, 93, 123, 198, 356, 380, 409, 453, 454, 584, 652a, 672, 695
Carlson, S. R.	712
Carroll, S. A.	553, 554, 644a, 665
Chang, Y.	586
Charlot, L. A.	492
Chen, C.	704
Chesnut, D. A.	470, 474, 488, 493, 495, 498, 545, 549, 571, 586, 683, 689, 691, 693
Chin, B.	370, 408
Choppin, G. R.	438
Chuu, Y.	704
Clarke, W. L.	383, 468, 521
Clinnick, M.	338
Clodic, L.	658a
Coles, D.	30
Compton, J.	693
Conrardy, C. C.	463
Cordfunke, E.	280
Costantino, M. S.	668, 712
Creveling, J. B.	130
Culham, C.	253
Culham, H. W.	160

Cunningham, M. E.	490
Curtis, P. G.	622, 690
Daily, W.	152, 163, 175, 204, 214, 216, 266, 269, 270, 307, 356, 367, 380, 385, 404, 409, 434, 454, 586, 645, 652a, 664, 670, 672, 709
Dalder, E. N.	576
Danko, G.	517, 586, 689
Daveler, S. A.	513, 514, 526, 598, 599
Davis, M. A.	684, 685, 687
Day, R. A.	296
De la Cruz, R. V.	39, 61
Delany, J.	132, 164, 166, 208, 240, 248, 338, 353, 448
DeLoach, L.	691, 709
DeVore, T.	57, 79, 136, 137
Diercks, D. R.	477
Dietz, N.	631
Doering, T.	522, 694
Domian, H.	331, 345, 415, 463
Doughty, S.	666
Drach, R.	252
Dronkers, J. J.	211a, 228
Duncan, J. E.	11, 20
Durham, W. B.	33, 47, 50, 62, 69, 712, 86, 89, 93, 118, 119, 123, 172, 186, 210
Dutta, P.	56
Ebert, M.	665
Ebert, W.	229, 241, 256, 277, 294, 301, 303, 306, 313, 324, 328, 333, 347, 377, 379, 402, 411, 416, 443, 455, 486
Economides, B.	623
Edmonds, D.	420
Eggert, K.	254
Einzigler, R.	185, 197, 211, 219, 246, 284, 314, 322, 329, 340, 341, 354, 364, 366, 427, 432, 475, 494, 510, 546, 675

Emerson, D.	248
Emery, J. W.	556, 698
Estill, J. C.	576, 591, 608, 612, 666, 699, 703, 710
Failor, R.	75, 77
Farmer, J. C.	308, 312, 316, 317, 318, 336, 339, 383, 424, 446, 478, 676a, 682, 697, 699, 703
Finch, R. J.	660, 663, 681, 698
Finn, P. A.	556, 577, 578, 579, 595, 597, 647, 658, 660, 663, 698
Fish, R. L.	463
Fischer, D. F.	220, 294, 313
Fleming, D. L.	424, 464, 629, 649, 650, 659, 662, 677, 678, 680, 701, 705, 711
Fortner, J. A.	610, 648, 698
Foster, K. M.	130
Fox, M. J.	117
Freeman, D. C.	705
Ganow, H. C.	123, 199
Gansemer, J. D.	550, 551, 568, 581, 661
Garrison, J.	68
Garrison, R. E.	135
Garrison, W.	158
Gdowski, G.	286, 312, 317, 319, 325, 326, 327, 446, 447, 468, 478, 482, 521, 576, 608, 612, 652a, 666, 672, 684, 692
Gerding, T. J.	159, 169, 183, 220, 229, 241, 247, 256, 277, 287, 294, 301, 303, 306, 313, 323, 324, 328, 333, 379, 411, 450, 480
Glass, R. S.	135, 176, 202, 261, 263, 570, 586, 633
Glass, R. J.	586
Glassley, W. E.	251, 302, 343, 372, 531, 539, 545, 570, 572, 586, 587, 594, 603, 652, 652a, 672, 691
Glenn, H. D.	414
Goodman, R.	205
Gong, M.	556
Gordon, S. R.	629, 649, 666, 703, 710

Grant, P. M.	418, 459, 476
Gray, W. J.	361, 389, 430, 465, 497, 505, 558, 560, 620
Greenlaw, R. C.	18
Gregg, D. W.	92, 100, 120, 155
Guenther, R. J.	483, 484, 490
Haberman, J.	293
Harben, P. E.	32
Hage, G.	71, 93, 94, 123, 149
Haldeman, D. L.	628, 636
Hall, L.	586
Halsey, W.	297, 305, 373, 383, 399, 468, 521, 548, 555
Hanchar, J. M.	681
Hanson, B.	675, 700, 702
Hardin, E. L.	671, 683, 686a, 691, 696
Harrar, J. E.	66, 78, 383a
Harrison-Giesler, D. J.	429
Hatfield, R.	56
Heard, H. C.	1, 9, 10, 15, 32, 33, 35, 38
Hearst, J.	8
Henshall, G. A.	467, 500, 512, 569, 609, 613, 640, 642
Hertel, G.	350
Hersman, L.	628, 636
Heuze, F. E.	36, 37, 39, 44, 61
Hoburg, R. F.	455
Hockman, J. N.	92, 121, 128, 155
Hoh, J. C.	426, 556, 577, 579, 595, 597, 647, 698
Holbrook, R.	331
Holzer, F.	12
Hopper, R.	699
Horn, J. M.	600, 623, 625, 676, 685, 687, 699, 702a, 708
House, P. A.	20

Huang, J.	699
Hust, J. G.	62
Hustrulid, W. H.	5
Isherwood, D. J.	30, 45, 46, 75, 77, 78, 127, 131, 164, 188
Isherwood, W. F.	383a
Jackson, K. J.	164, 248, 338, 353, 378, 554
Jacobs, G. K.	164
Jardine, L. J.	382, 401, 423, 429, 433, 473
Jenquin, U. P.	483, 484
Johnson, G.	280, 330, 350, 384, 431, 489, 523
Johnson, J. W.	525, 691
Jones, D. A.	596, 643, 676, 685, 702a, 708
Juhas, M. C.	110, 158
Jurgens, R.	431
Kansa, E. J.	432, 518, 536, 702
Kass, J. N.	316, 348, 349
Kelly, J. M.	635
King, K.	666
Kishi, T.	621
Klunder, G.	501, 527
Knapp, R. B.	295, 355, 691
Knauss, K. G.	99, 101, 106, 124, 132, 134, 144, 191, 206, 255, 272, 282, 351, 353, 368, 369, 691
Knutson, C. F.	2a
Koons, L.	58
Kovari, K.	97
LaBrecque, D.	645
LaCount, D.	331, 345, 415
Lagadinos, T.	628, 636
LaMonica, L.	350
Lamont, A.	550, 551, 568, 581

Landram, C.	586
Lanford, R.	258
Lappa, D.	254, 342
Lasaga, A. C.	357, 449, 479, 485, 506
Latorre, V. R.	356, 358, 367, 380, 385, 409, 414
Lee, J.	694
Lee, K. D.	356, 380, 396, 409, 440, 454, 456, 469, 545, 570, 584, 586, 587, 588, 604, 614, 652a, 672, 691, 695
Lee, W. W.	396, 440
Leider, H. R.	430, 466, 491, 505, 573, 679, 706
Lewis, B.	280
Lewis, L. C.	211a, 535, 552, 567
Lian, T.	676, 685, 702a, 708
Lin, W.	6, 152, 204, 307, 356, 360, 380, 409, 412, 434, 451, 454, 461, 522, 530, 534, 537, 545, 547, 570, 583, 584, 586, 587, 590, 594, 614, 618, 619, 627, 630, 652a, 655, 660a, 671, 672, 686a, 688, 695, 709
Lingle, R.	4, 13
Logan, R. W.	110
Logoteta, L. F.	710
Lord, D.	73, 77
Lum, B. Y.	650, 659, 662, 677, 678, 680, 701, 705, 711
Lundeen, S.	338, 448, 507, 526
Lyon, W. F.	490
Ma, C. W.	401, 423
MacIntyre, A. T.	396, 440
Madson, A. A.	435
Majer, E.	71, 93, 123, 129
Mao, N.	147, 356, 380, 409, 454, 460
Marschman, S. C.	546
Martin, S. I.	533, 541, 580, 685, 687, 702a, 708
Mayr, M. C.	11, 59
Mazer, J.	303, 306, 328, 333, 411, 487

McCright, R. D.	102, 104, 109, 110, 117, 135, 150, 158, 161, 176, 181, 189, 201, 249, 286, 297, 305, 308, 312, 316, 317, 321, 336, 339, 383, 424, 442, 446, 447, 464, 468, 478, 521, 570, 576, 591, 596, 602, 607, 609, 623, 643, 666, 676a, 682, 697, 699, 703, 707
McEvelly, T. V.	129
McAninch, M.	420, 463
McKeegan, K.	332, 368, 369
McKenzie, D.	694
McKenzie, W. F.	248, 393, 394, 430
McVay, G. L.	143
Meike, A.	372, 529, 532, 533, 540, 541, 564, 600, 603, 623, 625, 628, 636, 652, 658a, 672, 673, 691, 695, 704
Mellinger, G. B.	344, 347, 490
Mendel, J. E.	483, 484, 490
Mertz, C.	648, 674
Merzbacher, C. I.	351, 368
Miller, D. D.	423
Mills, S. V.	130
Miranda, A.	687
Mones, E. T.	575, 605, 641
Montan, D. N.	11, 19, 26, 32, 49, 55, 71, 80, 84, 93, 123, 153, 222, 231, 245, 267, 271, 384, 403
Moore, D.	98, 108, 139, 182, 218
Moore, R.	338
Morissette, R.	350, 429
Morrison, F. A.	63
Morrow, C.	98, 108, 139, 182, 218
Mroczek, E.	665
Murray, W. A.	27, 43
Myers, K. B.	673, 691
Nagy, K. L.	357, 479, 485, 506
Neimark, L. A.	698
Nelson, T. A.	304, 345, 350, 352, 415

Neubauer, D.	672
Nguyen, S.	281, 300, 368, 410, 430, 466, 491
Nicholl, M.	586
Nitao, J.	285, 309, 310, 320, 337, 356, 362, 386, 387, 391, 409, 413, 445, 470, 474, 495, 496, 516, 520, 538, 544, 562, 563, 574, 586, 603a, 611, 617, 624, 626, 646, 691
Nitsche, H.	346
Noring, J.	586
Nutt, W. M.	592, 601
Nyholm, R.	71, 76, 90, 93, 123
O'Connell, W. J.	252, 254, 342, 392, 396, 440, 471, 502, 535, 552, 582, 661
O'Hare, P.	280, 300, 431
O'Neal, W. C.	92, 100, 102, 104, 115, 120, 121, 128, 155
Onofrei, M.	564
Otto, C. H.	160
Oversby, V.	72, 99, 106, 107, 111, 122, 126, 133, 140, 145, 156, 157, 161, 180, 184, 193, 203, 221, 258, 259, 274, 298, 332
Overturf, G. E.	135, 176, 202
Owen, E.	404
Owens, M.	570, 584, 586, 587, 614
Page, L. E.	35, 38, 58
Palmer, C. E. A.	633, 634, 637, 691
Park, J. Y.	477
Patrick, W. C.	11, 25, 31, 32, 34, 39, 45, 49, 55, 59, 60, 61, 64, 67, 71, 81, 84, 87, 93, 97, 113, 123, 125, 142, 165, 171, 173, 207, 213, 226, 232, 236, 245, 250
Peifer, D.	132, 191, 206, 255, 272, 369
Peterson, J. C.	44, 61
Phillips, B. L.	533, 541, 553
Phinney, D.	258, 332, 419, 422, 615
Pigford, T. H.	396, 440
Pine, O.	635

Pitman, S.	293
Pitsker, B.	211a
Piwinskii, A.	206
Platt, E.	523
Pletcher, R.	584, 586, 635
Post, R. G.	67
Pratt, H. R.	4, 5, 13
Prussin, S.	430, 675
Puigdomenech, I.	164, 240
Qualheim, B. J.	116, 174
Quam, W.	57, 79, 136, 137
Raber, E.	383a
Radewan, C.	614
Ragnarsdottir, K.	509
Ramirez, A.	163, 175, 216, 266, 269, 270, 356, 367, 380, 409, 451, 453, 586, 614, 645, 652a, 664, 670, 672, 695, 709
Ramspott, L. D.	2, 7, 11, 12, 16, 17, 24, 28, 34, 67, 87, 315, 611, 646
Rard, J. A.	288, 390, 405, 457, 503, 654
Raschke, K. E.	113, 170
Rector, N. L.	60, 71, 76, 77, 93, 97, 123, 125, 142, 165, 584, 586, 614
Reed, D.	292, 371, 437, 444, 462, 472
Rego, J.	168, 178, 243, 265
Reitter, T.	586
Revelli, M. A.	92, 403
Rivera, A.	676, 708
Roberts, J. J.	545, 547, 570, 583, 584, 586, 587, 590, 594, 614, 618, 619, 627, 630, 652a, 655, 671, 672, 686a, 688
Roberts, S. K.	615, 686
Robinson, G. R.	143
Robitz, E.	345, 415, 420, 463
Robouch, P.	418, 443, 449, 450, 467

Rogers, L.	691, 704
Rojas, D.	452
Rosen, R. S.	582
Rosenburg, N.	691
Rothman, A. J.	82, 92, 146
Roy, A. K.	596, 607, 609, 629, 643, 649, 650, 659, 662, 677, 678, 680, 699, 701, 705, 710, 711
Roy, T. C.	113
Ruddle, D.	584, 586, 594, 614, 618, 652a, 672
Rudnicki, J. D.	561, 565
Ruffner, D. J.	473, 523
Runstadler, P., Jr.	56
Russell, E. W.	92, 102, 104, 120, 155, 304, 345, 350, 352, 415, 435, 463
Russo, R. E.	452, 458, 501, 527, 561, 565
Ryerson, F. J.	116, 123, 172, 177, 258, 368
Santanam, L.	370, 408
Saterlie, S.	562
Sawvel, A.	704
Scarafiotti, J. J.	165
Schornhorst, J. R.	92
Schrauf, T.	13, 14
Schuraytz, B. C.	242
Seibel, C.	658a
Sevougian, D.	694
Shack, W. J.	477
Shaw, H.	257, 289, 290, 298, 366, 370, 408
Shoesmith, D. W.	558, 565
Short, D.	433, 473
Shuri, F. S.	130
Silva, R. J.	248, 281, 346, 410, 418, 452, 458, 459, 476, 501, 527, 634, 637

Simonson, R.	5
Slagle, O. D.	427
Slater, S. A.	597
Smith, C. F.	160, 253
Smith, D. K.	332, 368, 369, 419, 422, 439
Smith, H. D.	167, 179, 193, 194, 233, 234, 253, 273, 334, 335, 363, 365
Smith, J. R.	438
Smyrl, W. H.	261
Snell, R. D.	693
Sommer, S.	584, 586
Spear, J. S.	527
Springer, J.	42
Stager, R.	223
Stahl, D.	350
Standifer, E.	346
Steefel, C. I.	357
Stein, K. O.	345, 415
Stein, W.	128, 155
Sterne, P. A.	658a
Steward, S. A.	505, 543, 558, 560, 575, 605, 641, 651
Stone, R.	30, 46, 77
Stout, R. B.	366, 388, 430, 432, 466, 491, 494, 518, 536, 546, 573, 578, 606, 679, 702, 706
Strachan, D. M.	465
Straume, T.	113, 170
Strum, M. J.	318
Summers, T.S.E	690
Sundbeck, C.	58
Surchik, M.	647
Sutcliffe, W. G.	103
Swayambunathan, V.	371

Sweider, D.	656
Tait, J. C.	558
Tani, B. S.	450, 515
Tasker, I.	280, 431
Teetsov, A.	499
Thatcher, T.	342
Thomas, L.	354, 427, 432, 436, 483, 484, 492, 494, 497, 510
Thornhill, C. K.	483, 484
Thorpe, R.	42, 74, 138, 174
Topp, S. V.	46
Torres, R. A.	418, 459, 476
Towse, D.	356, 380, 409
Trettenero, S.	210, 652a, 656
Trimmer, D. A.	1, 9, 10, 33, 65, 83
Trummer, D.	586
Ueng, T. S.	356, 367, 380, 396, 409, 440, 454, 456, 469, 471, 502, 535, 552, 584, 586, 661
Uziemblo, N. H.	397
Vallikat, V.	694
Vandergraaf, T.	75
Van Konynenburg, R. A.	40, 85, 141, 160, 181, 238, 253, 256, 292, 311, 371, 428, 437, 472, 521, 542, 559, 566, 596, 622, 690
Veleckis, E.	426, 450, 515
Verrill, S. P.	236
Viani, B.	299, 353, 378, 504, 533, 541, 564, 589, 615, 686, 691
Vinson, D. W.	592, 601
Vogel, T.	242
Voss, C. F.	39, 61
Wacks, M. E.	67
Wagoner, J. L.	584, 586, 614, 672, 695
Wang, F.	666, 699
Wang, H. F.	454, 638, 667

Wang, J.	695
Washington, H. R.	22
Watwood, D.	356, 380, 409, 451, 454, 652a, 672
Weed, H.	89, 118, 264, 281, 368, 410, 430, 466, 491, 543
Weiss, H.	110, 123, 150, 189, 318, 319
Weren, B. H.	115
Westerman, R.	293
Whatley, S. K.	164
Wicks, G.	156
Wijesinghe, A. M.	217, 518, 536
Wilcox, T. P.	40
Wildenschild, D.	671, 686a, 688
Wilder, D. G.	11, 31, 32, 41, 51, 71, 74, 93, 96, 154, 215, 225, 268, 276, 356, 398, 409, 425, 441, 516, 519, 524, 525, 545, 570, 584, 586, 587, 614, 644, 662a, 672, 695
Wilfinger, K.	593, 699
Williams, T.	672
Wilson, C. N.	114, 122, 151, 180, 190, 200, 203, 237, 257, 278, 279, 344, 361, 389, 395, 406, 417, 430, 465, 620
Wilson, M.	567
Wittwer, C.	532, 540, 691
Wolery, T.	95, 106, 127, 131, 164, 166, 227, 240, 248, 282, 338, 353, 508, 511, 513, 514, 691
Wolf, S. F.	577, 579, 597, 628a, 632, 647, 648, 681, 698
Wood, S. A.	669
Woodland, A. B.	400, 480
Woodley, R. E.	105, 185, 211, 219, 284, 322, 329
Woodley, W.	354
Wright, G. W.	20
Wronkiewicz, D. J.	450, 515, 577, 628a, 632, 653, 658, 698
Wruck, D. A.	634, 637
Yunker, L.	242

Yow, J. L., Jr.	41, 51, 52, 70, 71, 74, 80, 93, 96, 123, 154, 162, 173, 187, 192, 195, 205, 213, 215, 224, 230, 236, 275, 276
Yund, R.	449
Yunker, W.	244, 263, 407
Zanonato, P. L.	438
Zavoshy, S. J.	423
Zhao, P.	634, 651
Zucca, J. J.	148

LAWRENCE LIVERMORE NATIONAL LABORATORY  
YUCCA MOUNTAIN PROJECT  
LISTING BY SUBJECT

**PROJECT OVERVIEW**

251,315, 359, 429, 433, 473, 519, 542, 548, 559

**GEOCHEMICAL MODELING**

95, 127, 131, 164, 166, 188, 209, 211a, 227, 239, 240, 248, 290, 291, 299, 338, 353, 381, 448, 504, 507, 508, 511, 513, 514, 526, 539, 598, 599, 621, 633

**WASTE PACKAGE MATERIALS TESTING AND MODELING**

23, 68, 82, 92, 100, 102, 103, 104, 109, 110, 112, 117, 120, 121, 128, 135, 150, 155, 158, 160, 161, 176, 181, 189, 201, 202, 238, 244, 249, 261, 263, 286, 292, 293, 297, 304, 305, 308, 311, 312, 316, 317, 318, 319, 321, 325, 326, 327, 331, 336, 339, 345, 348, 349, 350, 352, 371, 373, 383, 399, 407, 408, 415, 420, 424, 435, 437, 442, 444, 446, 447, 463, 464, 467, 468, 472, 477, 478, 482, 500, 512, 521, 528, 569, 576, 581, 591, 592, 593, 596, 601, 602, 607, 608, 609, 612, 613, 622, 625, 629, 640, 642, 643, 649, 650, 659, 662, 666, 676, 676a, 677, 678, 680, 684, 687, 689, 690, 692, 697, 699, 701, 702a, 703, 705, 707, 708, 710, 711

**NEAR FIELD ENVIRONMENT MODELING AND TESTING**

6, 83, 98, 99, 101, 106, 108, 124, 132, 133, 134, 139, 140, 144, 152, 163, 175, 182, 184, 187, 191, 192, 195, 204, 205, 206, 208, 214, 215, 216, 217, 218, 224, 225, 230, 231, 242, 255, 260, 266, 268, 269, 270, 271, 272, 274, 275, 282, 285, 302, 307, 309, 310, 320, 332, 337, 343, 356, 360, 362, 367, 372, 380, 383a, 385, 386, 387, 398, 404, 409, 412, 413, 414, 419, 422, 425, 434, 441, 445, 449, 451, 453, 454, 456, 460, 461, 469, 470, 474, 485, 488, 495, 496, 498, 506, 516, 517, 520, 522, 523, 524, 525, 529, 530, 531, 532, 533, 534, 537, 538, 540, 541, 544, 545, 547, 549, 550, 554, 562, 563, 564, 570, 571, 572, 574, 580, 583, 584, 585, 586, 587, 588, 589, 590, 594, 600, 603, 603a, 604, 611, 614, 615, 616, 617, 618, 619, 623, 624, 626, 626a, 627, 628, 630, 635, 636, 638, 639, 644, 645, 646, 652, 652a, 654, 655, 656, 657, 658a, 660a, 662a, 663a, 664, 667, 668, 669, 670, 671, 672, 673, 682, 683, 685, 686, 686a, 688, 689, 691, 693, 694, 695, 696, 702b, 704, 709, 712

**PERFORMANCE ANALYSIS**

252, 254, 342, 382, 392, 423, 440, 471, 502, 535, 551, 552, 567, 568, 661

**SPECIAL STUDIES**

2, 2a, 7, 12, 210, 221, 222, 223, 228, 236, 267, 296, 355, 358, 384, 391, 401, 428, 489, 493, 555

**SPENT FUEL TEST - CLIMAX\***

1, 3, 4, 5, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 84, 85, 86, 87, 88, 89, 90, 91, 93, 94, 96, 97, 113, 116, 118, 119, 123, 125, 129, 130, 136, 137, 138, 141, 142, 147, 148, 149, 153, 154, 162, 165, 170, 171, 172, 173, 174, 177, 186, 196, 198, 199, 207, 212, 213, 226, 232, 245, 250, 276

**WASTE FORM TESTING AND MODELING**

72, 105, 107, 111, 114, 122, 126, 143, 145, 146, 151, 156, 157, 159, 167, 168, 169, 178, 179, 180, 183, 185, 190, 193, 194, 197, 200, 203, 211, 219, 220, 229, 233, 234, 235, 237, 241, 243, 246, 247, 253, 256, 257, 258, 259, 262, 264, 265, 273, 277, 278, 279, 280, 281, 283, 284, 287, 288, 289, 294, 295, 298, 300, 301, 303, 306, 313, 314, 322, 323, 324, 328, 329, 330, 333, 334, 335, 340, 341, 344, 346, 347, 351, 354, 357, 361, 363, 364, 365, 366, 368, 369, 370, 374, 375, 376, 377, 379, 388, 389, 390, 393, 395, 396, 397, 400, 402, 403, 405, 406, 410, 411, 416, 417, 418, 421, 426, 427, 430, 431, 432, 436, 438, 439, 443, 450, 452, 455, 457, 458, 459, 462, 465, 466, 475, 476, 479, 480, 481, 483, 484, 486, 487, 490, 491, 492, 494, 497, 499, 501, 503, 505, 509, 510, 515, 518, 527, 536, 543, 546, 553, 556, 557, 558, 560, 561, 565, 566, 573, 575, 577, 578, 579, 582, 595, 597, 605, 606, 610, 620, 628a, 631, 634, 637, 641, 644a, 647, 648, 651, 653, 658, 660, 663, 665, 674, 675, 679, 681, 698, 700, 702, 706

*Technical Information Department* • Lawrence Livermore National Laboratory  
University of California • Livermore, California 94551