

acc'd with WMA d60. 9/21/95

Audit Plan
YM-ARP-96-01
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OFFICE OF CIVILIAN RADIOACTIVE WASTE MANAGEMENT

QUALITY ASSURANCE AUDIT PLAN

FOR AUDIT YM-ARP-96-01

OF THE

**UNIVERSITY OF NEVADA RENO SEISMOLOGICAL LABORATORY AND THE
UNITED STATES GEOLOGICAL SURVEY**

RENO, NEVADA AND DENVER, COLORADO

OCTOBER 23 THROUGH 27, 1995

Prepared by: Donald J. Harris Date: 9/19/95
Donald J. Harris
Audit Team Leader
Yucca Mountain Quality Assurance Division

Approved by: Donald G. Horton Date: 9/21/95
Donald G. Horton
Director
Office of Quality Assurance

102.7

1.0 SCOPE

This performance based audit of the University of Nevada, Reno, Seismological Laboratory (UNRSL) and the U.S. Geological Survey (USGS) is a limited scope audit to be conducted by a team of auditors from Yucca Mountain Quality Assurance Division (YMQAD). The audit will focus on the implementation of the Quality Assurance (QA) program for specific activities. The activities sampled will consist of a vertical flow from data collection for seismicity for the Southern Great Basin of Nevada and California in the 1994 catalog, the Precarious Rocks and Seismic Shaking at Yucca Mountain, Nevada Report, and the Data Report of Geologic, Geophysical, and Seismic Data on the Contemporary Tectonic Stress Field in the Southern Great Basin.

Specific areas which will be sampled are:

Work Breakdown Structure:

Title:

1.2.3.2.8.4.1

Historical and Current
Seismicity

1.2.3.2.8.3.1

Relevant Earthquake Sources

2.0 AUDIT SCHEDULE

UNRSL Pre-audit Team/Observer Meeting

7:30 a.m.
October 23, 1995
Reno, Nevada

UNRSL Pre-audit Conference

8:00 a.m.
October 23, 1995

UNRSL Audit Activities

9:00 a.m. - 4:00 p.m.
October 23, 1995

8:00 a.m. - 4:00 p.m.
October 24, 1995

USGS Preaudit Team/Observer Meeting

8:00 a.m.
October 25, 1995
Denver, Colorado

USGS Preaudit Conference

8:30 a.m.
October 25, 1995

USGS Audit Activities	9:30 a.m. - 4:00 p.m. October 25, 1995
USGS Audit Activities (Continued)	8:00 a.m. - 4:00 p.m. October 26, 1995
	8:00 a.m. - 11:30 a.m. October 27, 1995
USGS Post-audit conference	1:00 p.m. October 27, 1995 Denver, Colorado

A daily briefing of UNRSL and USGS management will be held at a time agreed in the preaudit conference, and an Audit Team/Observer meeting at 4:15 p.m. will be held daily to communicate audit progress, to discuss potential deficiencies, and to establish needed liaison.

3.0 REQUIREMENTS TO BE AUDITED AND APPLICABLE REFERENCES

The requirements to be audited will be contained in a performance based checklist. This checklist will be developed from the latest available revision of approved and issued USGS QA program procedures, study plans, technical procedures applicable to selected activities agreed with USGS management, and performance objectives established.

The conduct of the audit will be guided by the documents (latest revision) listed below:

- Quality Assurance Procedure (QAP) 18.2, "Audit Program"
- Administrative Procedure (AP) 16.1Q, "Performance/Deficiency Reporting"
- AP 16.2Q, "Corrective Action and Stop Work"

4.0 ACTIVITIES TO BE AUDITED

A performance based audit evaluates products and activities to determine the degree to which they meet program requirements and management commitments and expectations. This evaluation of process effectiveness and product acceptability will be based upon:

- Satisfactory completion of the critical process steps
- Acceptable results and quality of the end product
- Documentation that substantiates quality of products

- Performance of trained and qualified personnel
- Implementation of applicable QA program elements

5.0 AUDIT TEAM MEMBERS

Donald J. Harris, YMQAD, Las Vegas, Nevada, Audit Team Leader
Robert E. Harpster, YMQAD, Las Vegas, Nevada, Lead Technical Specialist
Jeff McCleary, Civilian Radioactive Waste Management System Management and
Operating Contractor (CRWMS M&O), Las Vegas, Nevada, Technical Specialist -
Geology
James D. Agnew, CRWMS M&O, Las Vegas, Nevada, Technical Specialist -
Geophysicist

6.0 AUDIT CHECKLIST

The following checklist will be used during the audit:

YM-ARP-96-01, Performance Based Checklist

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QUALITY ASSURANCE CHECKLIST

1. ORGANIZATION EVALUATED UNRSL/USGS	2. <input checked="" type="checkbox"/> EXTERNAL <input type="checkbox"/> INTERNAL	3. <input checked="" type="checkbox"/> AUDIT <input type="checkbox"/> SURVEILLANCE	4. PREPARED BY <u>Donald J. Harris, ATL</u> DATE <u>09/25/95</u>
5. DATES OF EVALUATION October 23-27, 1995			7. ACTIVITY EVALUATED
6. CONTROLLING DOCUMENT QARD DOE/RW-0333P, Revision 4			

8. ITEM NO.	9. CHARACTERISTICS TO BE EVALUATED	10. REMARKS	11. RESULTS
1-1	<p>R. Harpster - Lead Technical Specialist J. McCleary - Technical Specialist J. Agnew - Technical Specialist</p> <p>Topical Report 1 on the DOE seismic hazards methodology, particularly in Appendix A, describes the approach to the evaluation and characterization of relevant seismic sources. However, it stops short of identifying the studies that will provide data to the identification of relevant seismic sources and the studies that will use the relevant seismic source information. The topical report further explicitly acknowledges that changes to study plans or new study plans may be necessary to implement the methodology. What is the planned flow of information and analyses and what study plans are affected?</p>		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1-2	The PACS sheet for Relevant Earthquake sources 1.2.3.8.3.1), describe a deliverable (due 9/29/95) that includes data summaries and analyses to be used by the PSHA project. A review of the report, "Initial Summary of Geological, Geophysical, and Seismicity Data to Support Earthquake Source Characterization for Seismic Hazard Analysis at the Proposed Nuclear Waste repository, Yucca Mountain, Nevada," indicates that while some data are presented it is mostly a guide to the literature. Few, if any, analyses are presented. Why was the scope of the report changed and what are the plans for finalization given the postponement of the PSHA project?		

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1-3	Page 4 of the "Summary of GeoData Review Draft," states the the "heart of the seismic hazards project concerns the calculation of fault displacement and vibratory ground motion values," and lists 4 parallel activities (attached). The first topical report on the seismic hazards methodology in section 2.3 on page 12 (attached) describes the " methodology to assess vibratory ground motion and fault displacement hazards, : and lists 5 steps that are similar to, but some what different than the "4 activities." Why are there differences in these steps and activities and what is the significances of the differences?		

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1-4	The "Summary of GeoData Review Draft," specifically references NUREG 1452 guidance. However, it sometimes uses different definitions for the same terms. For example, on Page 8, the term "Geologic Setting," is defined as NUREG 1451 defines "Geologic System." Are there specific reasons for defining terms differently than they are used by the regulator?		

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1-5	Topical Report 1 on seismic hazard methodology goes into a detailed explanation of the advantages of using moment magnitude (M_w). However, the GeoData Summary provides magnitude information as M_L or sometimes M_D . Are there plans to convert the present data set to M_w ?		

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1-6	The YMP Reference Information Base (RIB) provides earthquake design values for the ESF of .3g for both horizontal and vertical acceleration. A 1986 study by Blume, also in the RIB, provides design earthquake values for the repository of .4g horizontal and .27g vertical. Given the proximity of faults with documented Quaternary displacement that would be classified as type 1 in a NUREG 1451 type study (Solitario Canyon and Paintbrush Canyon, for example). are these design values still considered reasonable?		

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1-7	<p>The Quaternary Geochronology section of the "Summary of GeoData Review Draft," briefly mentions Uranium-trend dating. At the February 1995 Technical Program Review, the USGS stated in a presentation that the Uranium-trend technique was flawed and they no longer supported any of those dates. Does the inclusion of Uranium-trend references in this report (Rosholt and others 1988 and 1985) indicate a change in the USGS position?</p>		

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1-8	In the Tectonic Models section of the "Summary of GeoData Review Draft," it is noted on page 147 that Detachment faults are inferred in the Calico Hills. On page 148 it is suggested that some form of the detachment fault model may be the preferred model. Is this consistent with the findings of the detachment fault study (Study Plan 8.3.1.17.4.5)?		

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1-9	<p>Relative to the report on "Precarious Rocks and Seismic Shaking at Yucca Mountain, Nevada," the following simplistic statements could be made:</p> <p>The presence of darkly varnished precarious rocks indicates that surface rupturing earthquakes have not occurred for the last several tens of thousands of years.</p> <p>The recurrence interval for surface faulting on faults in the vicinity of Yucca Mountain is several tens of thousands of years.</p> <p>Therefore, a surface rupturing earthquake in the vicinity of Yucca Mountain is likely in the near future. What factors complicate this simplistic logic?</p>		

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1-10	<p>In the "Summary of Geo Data Review Draft," the solution in Leveling (page 76) indicates that a first order line in an area of interest to the project was first surveyed in 1956-1959 and has been resurveyed regularly (every 1 to 2 years) since 1983. This suggests that 8 to 10 surveys have been run. The statement is made that the data are tabulated, but not fully interpreted. No preliminary data or interpretation are provided and no references cited. When will this data be available and in what form?</p>		

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1-11	In the "Summary of Geo Data Review Draft," Figure 17 is very confusing. The map and the level line cover different areas and one at different scales, some features on the level line seem to be mislocated (Rush Valley FZ), there is no index for the map, and no explanation for the "structural trough" shown on the level line. In addition holding the 3rd order line constant and comparing 1st order lines to it may not provide meaningful information. What is the intent of this figure?		

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1-12	<p>Questions related to the Deliverable, "Seismicity for the Southern Great Basin of Nevada and California in 1994." (Preliminary Draft dated July 17, 1995)</p> <p>On page 5 it is stated that "the seismic network is divided into 14 subnets for purposes of event detection." Is the entire net also considered to be a "subnet," i.e., if fewer than the minimum number of stations are triggered within each of the 14 subnets, but more than the minimum number of stations are triggered netwide, is the event recorded? Are more than 14 subnets possible with the current equipment?</p>		

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1-13	Have the subnet configurations changed over the course of the year, and if so, is there a record of these changes? Have the number of stations changed over the year, or have any been moved?		
1-14	What percentage of triggered events are considered to be real events as opposed to spurious triggers? How are spurious triggers distinguished from real events?		

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1-15	Has the detection threshold been determined for each subnet? How does the detection threshold vary from one subnet to another? Is there a statistical difference in magnitude threshold between subnets?		
1-16	Are there any visual readouts (e.g., drum recorders) that can quickly be scanned by an analyst for a) events that the triggering system may have missed, and/or b) events that occurred during downtimes of the digital system?		

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1-17	It is stated that the realtime system's downtime was 0.07% for 1994. For what portion of this downtime was the backup magnetic tape system operational? With the two systems together, is the downtime closer to zero? How much of the "375 minutes" (Appendix B) was covered by the redundant system? Were any events missed?		

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1-18	Does the timing system have a tendency to drift away from UTC? How is this drift accounted for? How often is the clock drift corrected, and is a record of these clock corrections maintained? Is a consistent method employed to make these corrections?		

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1-19	Is clock drift routinely accounted for in the earthquake location process? When using data from other networks, is the clock drift of the other network's clock requested, and vice-versa?		
1-20	On page 6 it is stated that two redundant time channels are used, IRIG-E and WWVB. Isn't IRIG-E a time reporting <u>format</u> rather than a source of timecode?		

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1--21	How are teleseismic events distinguished from local events, and are the seismic analysts trained (in a formal sense) to distinguish them? Are these teleseisms reviewed by anyone else to ensure that they are not relevant to the Project?		
1--22	On Figure 3, it is difficult to judge whether the statement on page 7, last paragraph ("...the background seismicity rate for the SGB is actually lower toward the end of 1994 than prior to the 1992 Little Skull Mountain earthquake.") is, in fact, true. Is it a statistically significant difference?		

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1-23	How many people actually read the seismograms? Are the readings spot-checked by others for accuracy? Are there any significant differences in how each analyst reads the same event? (Pick one event at random and have two or more analysts locate it, and see if there is any significant difference in the location parameters.) How are the seismic analysts trained in the reading of seismograms?		

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1-24	For depth determinations, are "RMS error versus focal depth" plots routinely run? Are these data reported to the Technical Database?		
1-25	On page 8, it is stated that there are significant velocity variations within the network. Is an attempt being made to improve the one-dimensional velocity models? Is it possible to compile a 3-D velocity model from the data gathered thus far? (e.g., from the NPE explosion.)		

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1-26	Has the FASTHYPO computer program been modified from the published version? Have any of the other computer programs been modified? If so, is there a record of these changes?		
1-27	How are the individual field stations calibrated? Is there a procedure for their calibration? Do the field stations vary appreciably in gain (magnification) and sensitivity? How is this accounted for when determining Local Magnitude (M_L)?		

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1-28	How are the velocity responses digitally reshaped to equivalent Wood-Anderson displacement responses? Is it essentially a derivative with a correction factor?		
1-29	A cluster of 110 events located 20km east of Mercury is discussed on page 11. Are there any mapped faults in the general vicinity?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1-30	On page 12 it is stated that "many of the larger events are clipped on most stations." What is the maximum magnitude that will not clip? Will future additions of broadband equipment alleviate this problem significantly?		
1-31.	The apparent difference between M_D and M_L is quite large at small magnitudes. Will there be any attempt to reconcile the differences between these two methods of determining magnitude? For example, will the M_D scale be adjusted to better fit the M_L scale for similar magnitudes?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1-32	It is stated on page 13, 2nd paragraph, that the detection threshold for M_L is about 0.5 units lower than for M_D . Is this considered significant or merely an artifact of the difference in the two magnitude scales?		

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1-33	<p>For the large number of events located, very few have reported focal mechanism solutions. Why were only the unique solutions reported? Were more focal mechanisms analyzed? Were these additional focal mechanism solutions reported to the technical database?</p> <p>For example, in addition to those events with reported focal mechanisms, there are approximately 88 events in Appendix C that had magnitudes of 2.0 or greater and quality estimates of "aa." There were a total of about 165 events of magnitude 2.0 or greater with quality estimates of "ab" or "ba" or better (including the 88 events above), including one event having a magnitude greater than 4, and 18 events greater than or equal to magnitude 3. Were any of these events analyzed for their focal mechanisms?</p>		

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1-34	<p>On page 15 it is reported that the focal mechanisms have different extension (T-axis) directions than "the general extension direction proposed for the southern Great Basin as a whole (Rogers et al., 1987)." What is this general direction? Is the difference considered to be significant?</p> <p>(Since this is a report to DOE and not a refereed research paper, restating more of the general background material might be appropriate, rather than referencing it.)</p>		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
1-35	For the single Crater Flat event listed on page 15 and discussed on page 19, what is the accuracy of the depth estimate? Can a mapped fault be associated with this event? Have similar events occurred in that area in the past?		

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1-36	On page 18, 2nd paragraph, it is stated that "seismic activity is nearly the same as typically reported in years prior to 1992." However, on page 7 you stated that background seismicity for the SGB is lower in late 1994 than prior to the LSM earthquake; which of these statements is more correct?		
1-37	On Table 3, the latitude, longitude and depth are reported differently from the format in Appendix 3. Also, the origin time listed for event #9 in Table 3 differs from the same event as listed in Appendix C. Does this indicate that a different database is being used for Table 3?		

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1--38	In Appendix C, some routine information from the FASTHYPO location results are not listed, such as number of stations used (NS), distance to nearest station (STA), maximum azimuthal gap (GAP), etc. These same comments apply to Appendix D as well. Also, it would be helpful to know which events were located with additional data from other regional networks, if possible. Will this information be listed in the final draft, and will it be reported to the technical database?		
1-39	Is the magnitude reported in Appendix 3 M_D or M_L ?		

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1-40	General Comment - on the whole, the report is sound and the results are acceptable in accordance with expected seismic network operations. However, a little too much is left to the reader's imagination, such as the relation between located earthquakes and mapped faults (if any), and the reference to previous research instead of briefly summarizing it herein. In addition, I would expect to see more focal mechanisms given the large number of events located. Can any of these issues be addressed in the final draft?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
2-1	The Study Plan states that attenuation characteristics will be determined (amplitude decay versus distance) for the SGB. No mention of this was made in this report. Is this task still planned? Is it part of a separate report?		
2-2	What are the field site selection criteria? Are some areas better covered than by others? Are there any areas requiring better coverage? Are there any plans to move stations in the future? Who makes these decisions?		

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2-3	Have construction activities at the ESF interfered with event detection in any appreciable way?		
2-4	The contract calls for duplicate data recording and storage systems. Can these be demonstrated? Does the duplicate data recording system overlap any recording medium "changing period" so that data are not lost? Are data stored in more than one location?		

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2-5	How quickly are necessary repairs made to field and laboratory equipment? Who performs these repairs? What is his/her qualifications? What is the average downtime of a field station when it is down?		
2-6	The contract documents state that "Integrated programs have....been developed with scientists from National Laboratories and other Universities." Can you describe them? How do they add value to the data analyses?		

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2-7	Are measuring instruments calibrated to a traceable National Standard? Are documents on file indicating that calibration of equipment has occurred on a reasonable schedule (e.g., annually)?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3-1	<p>Questions related to the "Precarious Rocks and Seismic Shaking (Preliminary Draft):"</p> <p>What reasoning or guidance was used in deciding where to look for the presence of precariously-balanced rocks? What determines the size and location of the area searched? What past research has been conducted on this subject?</p>		
3-2.	<p>What planning document (e.g., Study Plan) includes this study? Is this considered to be a prototype study?</p>		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3-3	On page 38, some dates are given for sediments and ash layers in Solitario Canyon trenches. Which trenches are these? What are the error estimates associated with these dates? The date of the ash layer (80,000 years) is older than that of the sediments underlying the ash (60,000 years) - obviously one or more of these dates is incorrect. Three different types of dating technique are mentioned - which one is the most accurate? Are they directly correlative to each other? Other researchers have dated the ash deposits in Solitario Canyon Trench #8 at between 750,000 to 1,000,000 years old using Argon 40/39 age-dating techniques, which are alleged to be more accurate than the techniques discussed here. How would the acceptance of these older dates affect your conclusions?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3-4	Fracturing of the cemented basaltic fissure fill is attributed to low levels of ground motion on nearby faults; are there any other possible explanations for the formation of these fractures, such as weathering (hydration/dehydration cracking, freeze/thaw cycles)?		

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3-5	<p>(Page 44) Your conclusion is that the Yucca Mountain area has not been subjected to ground accelerations sufficient to topple precariously-balanced rocks for the last 40,000 to 80,000 years. However, the average recurrence interval on individual faults in the Southern Great Basin is reported to be on the order of 40,000 years (Whitney, USGS). Could this indicate that, in some zones of precariously-balanced rocks with numerous nearby faults such as those found near Yucca Mountain, the faults are <u>more</u> likely to rupture in the near future?</p>		

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3-6	(Page 43) Why was Styrofoam chosen as a modeling medium? Would a material having the specific gravity of rock be more appropriate? This modeling was mentioned in passing, but not elaborated upon; what were the results of the Styrofoam modeling?		

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3-7	(Page 43 and Appendix B) Have all computer programs been validated? Were they written in-house or obtained commercially? Have changes been made to the programs? Are these changes documented?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3-8	(Page 43) How were the pulling forces (used to topple precarious rocks) converted to horizontal accelerations? How was the center of mass of the rocks determined? Were rapidly changing vertical accelerations (during earthquakes) taken into account when determining minimum horizontal accelerations necessary to topple precarious rocks? Would it be correct to assume the coincident vertical accelerations would lower the minimum horizontal acceleration necessary to topple the precarious rock?		

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3-9	<p>(Appendix A, page 6, last paragraph) It is stated that "...over the long time period represented by precarious rocks, even relatively infrequent random earthquakes eventually produce strong ground motion at nearly all sites." Would the maximum background earthquake (MBE) of Magnitude 6.3-6.6 (dePolo 1994, BSSA Vol 84, No.2, pp 446-472), if it happened at or near Yucca Mountain, topple most, if not all, of the precariously-balanced rocks in the area? If so, then is there still some relationship between ages of precariously-balanced rocks and dates of near-surface offsets found in nearby trenching?</p>		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
3-10	Mention is made of approximating the age of the precariously-balanced rock formations by examining the rock varnish. How is this done? Is there a standard procedure within the scientific community to date rock varnish?		

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3-11	Would some of the observed precariously-balanced rocks have a greater tendency to fall from accelerations in one given direction (e.g., East-West) than from these in a different direction (North-South)? Has this tendency to fall in a preferred direction been considered when comparing locations of precarious rocks to the probable ground motion radiation patterns of nearby known large earthquakes?		

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3-12	My general impression from reading the report is that this is a very preliminary first draft which does not include much detail that would be necessary to the Project's Technical Database (TDB). Most of the above questions could easily be answered by including more detail in the report. Will this detail be included in the final draft? Will it be transmitted to the TDB?		

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4-1	<p>Qualification and Training</p> <p>Verify the qualification of personnel documentation is available for the Non-Federal Personnel supporting UNRSL is available in accordance with QMP-2.08. (Position description, resume, qualification statement)</p>		
4-2	<p>Verify a system is in place to identify the UNRSL personnel involved, Required Training for work functions identified for those personnel and the personnel training is current.</p>		

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4-3	Do interviews with management and staff of UNRSL and USGS personnel indicate the training program is effective and the personnel are familiar with the content of the assigned procedures.?		

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5-1	Procurements Document Control Is there a detailed review of the final purchase document to verify the technical and quality purchase requisition requirements are included in the purchase documents?		
5-2	Are changes to procurement documents reviewed by the initiator and Quality Assurance?		

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6-1	<p>Document Control</p> <p>Are control copies of USGS technical and quality procedures at UNRSL current and readily available to the UNRSL staff?</p>		

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7-1	Receipt of Purchased Items and Services Are suppliers Certification of Conformance periodically evaluated for appropriateness and validity and are the results documented?		
7-2	Are there instances where items or services procured and represented by documented evidence of acceptability found to be defective?		

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8-1	Calibration Are supplier performed calibrations Certification of Calibration information reported in accordance with QMP-12.1?		
8-2	Are UNRSL performed calibration performed in accordance with Technical Procedure NWM-USGS-SP-11 and the results recorded in a Scientific Notebook or a notebook log in accordance with QMP-12.1?		

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8. ITEM NO.	9. CHARACTERISTICS TO BE EVALUATED	10. REMARKS	11. RESULTS
8-3	Are calibration status stickers utilized to segregate the type of instruments (periodic calibration, operator to calibrate, or no calibration required)?		
8-4	Are instruments in use, in current calibration?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
8-5	Is the Southern Great Basin Seismic Network Calibrated Instruments traceable to the location, use and do the records support which instruments are physically in use at any given time?		

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ITEM NO.	CHARACTERISTICS TO BE EVALUATED	REMARKS Record objective evidence reviewed, method of verification, personnel contacted	RESULTS
9-1	Nonconformances Are Nonconformance Reports initiated for instrumentation found out of tolerance, or instrumentation that failed in service?		
9-2	Are Nonconformance Reports dispositioned and the required action completed in a timely manner?		

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10-1	Corrective Action Are corrective actions identified in audits and surveillances directed by USGS management at a sufficient level of management to obtain results?		
10-2	Do the USGS audit and surveillance reports of UNRSL reflect an evaluation for timeliness and effectiveness of previous Corrective Action Requests and Nonconformance Reports?		