

**Notes from Telephone Conference
ANSS-IMW Regional Advisory Committee
Friday, November 12, 2004 (10:00–11:30 am MST)**

Participants

Walter Arabasz, Regional Coordinator/Recorder
 Rob Jackson — Colorado
 Roy Breckenridge — Idaho
 Robert Clayton — Idaho
 Evonne Gantz — New Mexico
 Wallace Ulrich — Wyoming
 Art Frankel — At Large
 Ivan Wong — At Large

Diane Doser — At Large (pre-conference input via e-mail)

Agenda

1. Introduction and guidance — Walter Arabasz
2. Discussion about regionwide and individual state needs in the IMW region
3. Recommendations

1. Introduction and guidance

This was the first group interaction for the newly updated Regional Advisory Committee (RAC) for the ANSS Intermountain West (IMW) Region (see Web page at <http://www.seis.utah.edu/anss/imw-rac.shtml>).

Walter Arabasz, gave an update on the status of ANSS funding (FY2005 appropriation likely to remain at or only slightly above the FY2004 level of \$4.4 million) and reported the ANSS priorities for FY2005 set by the National Implementation Committee:

- Priority 1 — Operation and Maintenance of the existing installed system
- Priority 2 — Progress on structural monitoring under ANSS
 - Note: A draft *Guideline for ANSS Instrumentation of Engineered Civil Structures* is expected to be made available to the ANSS community in December 2004. The USGS anticipates having a separate solicitation for structural instrumentation in Spring 2005.
- Priority 3 — Development of Procedures and software to serve by Internet an ANSS National Catalog and Bulletin
- Priority 4 — Design of an ANSS Product
- Archiving & Distribution System
- Priority 5 — System software development and support

By way of preface to discussions, Walter quoted from the report of a prior RAC telephone conference (see *Executive Summary and Recommendations* from the IMW FY2002 Implementation Plan (<http://www.seis.utah.edu/anss/toc1.shtml>), “We all have to recognize that individual states [within the larger IMW Region] have their self interests, and we have to be flexible in shaping a regional plan.”

2. Discussion about regionwide and individual state needs in the IMW region

Participants were invited to offer individual perspectives and comments on the compilation of IMW needs statements (http://www.seis.utah.edu/anss/imw-needs_draft.pdf).

Colorado—Rob Jackson. Rob Jackson, Department of Public Works, Denver, asked for more information about the ANSS structural monitoring program and its oversight by structural engineers. Art Frankel, USGS/Golden, described in general terms the makeup of an advisory committee of structural engineers (Structural Instrumentation Guidelines Committee), chaired by Andrew Whittaker of SUNY Buffalo; the committee reports to the ANSS National Steering Committee.

Rob went on to describe his interest in improving seismic monitoring in Colorado—both in terms of regional monitoring of seismicity and strong-motion instrumentation. He pointed to the recent example of an earthquake swarm near Trinidad, Colorado, as an example of inadequate seismographic coverage in Colorado. [A report by the USGS <http://pubs.usgs.gov/of/2002/ofr-02-0073/ofr-02-0073.html> gives details of the swarm in the Fall of 2001, involving the occurrence of 12 widely felt earthquakes ranging in magnitude between 2.8 and 4.6. The nearest permanent seismograph was located nearly 300 km away, resulting in poor location control for the earthquakes and prompting the USGS to deploy a temporary network of 12 instruments in the Trinidad area.]

Rob also remarked on the importance, in his view as a structural engineer, of installing strong-motion instruments in the Denver area. According to Art Frankel, there currently is one strong-motion instrument in the Denver area—in Commerce City near the Rocky Mountain Arsenal. The USGS now has permission to site an instrument within the Arsenal itself and plans to move the instrument from Commerce City to the Arsenal site.

Colorado has had some success in improving regional seismographic coverage in the state through the installation of two, and the planned siting of four more, broadband stations as part of the ANSS national backbone network (see description in Colorado's needs statement). A new broadband station at Aspen, Colorado, is being funded cooperatively by the USGS and the University of Colorado.

Idaho—Robb Clayton. Robb Clayton, Brigham Young University-Idaho, supported giving top priority to the maintenance and operation of existing stations—including “any support we can get” for network monitoring in Idaho. His second priority is improving computer hardware and software, especially for data exchange. Robb emphasized that Idaho needs help and has a serious resource problem.

New Mexico—Evonne Gantz. Evonne Gantz, New Mexico Office of Emergency Management, echoed the importance of maintaining existing stations (in this case, seismic network monitoring in New Mexico, which continues to operate on only shoestring support, according to input from Rick Aster of New Mexico Tech). Evonne reinforced Rob Jackson's reference to the importance of information for public safety relating to the earthquake activity near Trinidad, Colorado. The earthquakes affected New Mexico too. Residents in Raton, NM, felt the shocks and wanted information about what was causing them. Seismically vulnerable buildings in Raton were a concern.

According to Art Frankel, the need for public information was accentuated by controversy as to whether the earthquakes near Trinidad might have been caused by fluid injection associated with coal-bed methane production. Earthquake locations (using the temporary portable network) appeared to occur significantly deeper than the injection wells, however.

Because the closest permanent seismograph was nearly 300 km away, initial USGS earthquake locations for the Trinidad earthquakes were off by as much as 20 km. Another public-safety factor was the proximity to Trinidad Lake Dam and uncertainty about hazard to the dam.

All the above point out the great need, according to Frankel, for the availability of portable seismograph arrays to augment sparse network coverage, when needed, in states like Colorado. Portable arrays were part of the original ANSS plan but have received little attention to date. One attractive option, according to Art, is to have temporary arrays that can be telemetered to a network center for continuous recording and data processing as part of routine operations.

Wyoming—Wallace Ulrich. Wallace Ulrich, President of the Geologists of Jackson Hole, Wyoming, described progress being made in improving seismic monitoring in Wyoming through cooperative efforts of the USGS—most notably in the form of the new ANSS Teton network in NW Wyoming. He briefly reviewed the history of the Teton-net project, including: the operation since 1986 of a network (of up to 22 stations) by the U.S. Bureau of Reclamation (USBR) in the region encompassing Jackson Lake Dam, closure of the network by the USBR in 2003, and the securing of a Congressional add-on (\$250,000) to the ANSS FY2004 budget to reestablish the network in the form of a local broadband network. Seven of 11 broadband stations are operational, according to Ulrich, including three stations on the Idaho side of the Teton Range. The involvement of private and local-government funding—and corresponding activism—was a big factor in this Teton-network success story. Ulrich also credits the USGS for its full partnership and greatly helpful efforts.

On November 11 Ulrich took members of Wyoming's Congressional delegation to see one of the new Teton net broadband stations at Teton Pass, and they were favorably impressed. New broadband stations near Laramie and Rawlins, Wyoming, are also now operational. These are part of a five-station network, cooperatively funded by the University of Wyoming and the USGS, being installed by Dee Overturf of the USGS. Also, an ANSS national backbone broadband station will soon be installed near Casper, Wyoming.

Ulrich also described how Ron Surdam, Wyoming's new state geologist, is working with the Wyoming legislature to gain funds that will potentially help seismic monitoring in the state. A supplemental budget request by Surdam to the legislature, approved by the Governor of Wyoming and opportune because of a state budget surplus from oil and gas revenues, would expand the Wyoming Geological Survey and provide some funding for seismic stations around the state. Finally, Ulrich reported that the USGS has created GIS base maps for Wyoming for use with QuakeWatch software for earthquake reporting to emergency managers. QuakeWatch was developed by the California Integrated Seismic Network for the real-time distribution of earthquake information via the Internet.

Following up on Ulrich's comments, Walter Arabasz emphasized that what Ulrich had described was a model example of the kind of success that can be gained by a state earthquake program. As an aside, Jim Case, who figured prominently in the Wyoming seismic-monitoring success story, recently moved from the Wyoming Geological Survey to the Wyoming Office of Homeland Security/Emergency Management. In his new job, he'll continue to have some influence on state spending for earthquake programs, according to Ulrich. Case will continue to be one of Wyoming's two representatives on the RAC.

Idaho—Roy Breckenridge. Roy Breckenridge, state geologist of Idaho, added to Wallace Ulrich's comments by noting that BYU-Idaho's small three-station network had gained from the development of the Teton seismic network. (Two stations of the BYU-Idaho network were upgraded by the USGS to form part of the new Teton-region broadband network.)

Breckenridge described that seismic networks in Idaho are among the “have not” nets in the IMW region—with the exception of the network operated by the Idaho National Engineering and Environmental Lab (INEEL) in eastern Idaho. Nevertheless, seismic network operators in Idaho (in partnership with the Idaho Geological Survey and the Idaho Bureau of Disaster Services) are progressively building a group consensus to guide cooperative efforts. A Web site for unifying earthquake information in Idaho has been set up (<http://www.mines.uidaho.edu/~quakes/>). See also Idaho’s contribution in the IMW needs statements.

Three new seismic stations were installed in northern Idaho this past summer by Ken Sprende of the University of Idaho at Moscow. Roy credited Mike Stickney of Montana Tech for his great help. Small network operators in Idaho have been liberally copying Earthworm formatting used in Montana. Jim Zollweg at Boise State University has been struggling to keep his seismic network operational in central and western Idaho and to further develop Earthworm capabilities for his net. An earthquake swarm on the Oregon-Idaho border (April–June 2004, $M = 3.4$, approx. 100 km SSW of Boise) helped leverage “a station or two,” according to Roy. Suzette Payne of INEEL is cooperating to help efforts to monitor earthquakes statewide in Idaho by sharing data from the INEEL net; some firewall/security issues remain to be resolved.

Breckenridge pointed out that there is poor ANSS coverage in large parts of Idaho, and he characterized Idaho as “ANSS poor.” One of Idaho’s primary issues is ensuring seismic monitoring of major population centers in the western Snake River Plain, notably Boise. He also expressed concern about monitoring seismicity in eastern Washington (for example, the Spokane area) and a corridor along the Washington-Idaho border.

At large—Art Frankel and Ivan Wong. Art Frankel, speaking for the USGS, said, “I hear what everybody’s saying” [referring to inadequate seismographic monitoring and network support in the IMW region]. He believes that portable arrays for areas of special interest should be an important part of ANSS. However, ANSS planning has concentrated on developing the national backbone array and instrumenting urban areas at risk. This fails to deal with the need for data and information in seismically hazardous areas where population density isn’t high.

Key issues, in Art’s view, are having instrumentation (both broadband and strong-motion) near where we’re likely to have large earthquakes and ensuring some minimum spacing in areas of high seismicity along the Intermountain Seismic Belt, which now has a number of gaps in seismographic coverage. He pointed to the November 2002, $M 7.9$ Denali fault earthquake as an example of a big earthquake occurring in an area of high hazard and low risk and, consequently, poor strong-motion instrumentation and data capture. This points out a “hole” in current ANSS planning. Referring to needs in the IMW, Art said a way has to be found to support non-ANSS seismic network operators. He also expressed concern about new strong-motion attenuation relations predicting that normal-faulting earthquakes in the IMW region will have lower stress drops and produce lower ground motions compared to earthquakes in California. But there’s no data from large earthquakes in the IMW region, and he’s both skeptical and concerned about using the new attenuation relationships in new hazard maps.

Ivan Wong of URS Corporation, along with Art Frankel another “at large” member of the RAC, gave some information on “NGA”—the next generation of attenuation relationships. Ivan agreed with Art that the new relationships involve significant extrapolation of data. First results of the NGA project are scheduled to be released in early December 2004. According to Ivan, predicted ground motions in extensional regions are likely to come down. The expert

teams will be factoring in the model that ground motions from surface-faulting earthquakes are lower than ground motions from buried faults. Ivan agreed that region-specific strong-motion data are greatly important. With the exception of strong-motion instrumentation in Utah's Wasatch Front Area and parts of Nevada, he's concerned about the sparseness of strong-motion instrumentation in the IMW region. Art Frankel suggested that some compromise—between high risk and high hazard—is needed in siting strong-motion instrumentation, and he suggested using the national hazard map as a guide. For example, rather than using only a risk-guided plan, one might consider targeting X stations per Y km² within some reference contour of elevated hazard.

Walter Arabasz asked Art to explain the importance of capturing strong-motion data from large mainshocks as opposed to deploying temporary accelerographs after a large mainshock to record motions from its large aftershocks. Art responded that data from, say, magnitude 5 aftershocks are no substitute for data from magnitude 7 mainshocks. There's uncertainty whether the same stress-release process (and hence resulting ground motions) operates in both the mainshock and aftershocks. Ivan Wong added that capturing mainshock ground motions were important for understanding site response and nonlinear effects.

Continuing his input, Ivan described that unlike the state representatives on the RAC, he has no vested interests. He made two basic points. First, "As a consumer [of earthquake data]," he said, "I'm looking for uniform coverage." Ivan has conducted probabilistic seismic hazard analyses throughout the IMW region, and earthquake catalogs are fundamentally important for his work. He had earlier gone through an informal exercise of examining seismographic coverage in the IMW and estimated that about 18 broadband stations strategically located throughout the IMW region to fill in holes would greatly help to assess hazard. A regionwide strategic plan is needed for seismic monitoring.

The second point Ivan made was his concern that within the USGS and ANSS, there is not adequate support for and attention to continuing the refinement and development of ShakeMap and ShakeCast. In the IMW region, ShakeMap capabilities now exist only in the Wasatch Front area and in parts of Nevada. Based on his work with FEMA, Ivan has a great interest both in getting ShakeMaps created and getting them effectively utilized. He said he'd like to see a capability for producing ShakeMaps in New Mexico.

At large—Diane Doser. Input from another at-large RAC member, Diane Doser of the University of Texas El Paso, was provided to Walter Arabasz prior to the teleconference by e-mail and was read to the participants on the conference call. Diane wrote:

"I looked over the draft [compilation of IMW needs statements] and I can't see anything that I would add. It still strikes me what a disparity there is between some of the networks where they are still worrying about whether 20 year old analog telemetry equipment can keep going and others are trying to bring shake maps on-line."

3. Recommendations

Because the teleconference did not include a majority of members of the RAC, pulling together recommendations necessarily had to be tentative. Walter Arabasz reviewed for the participants a list of recommendations that the RAC had formulated for FY2002 based on much greater deliberation (see <http://www.seis.utah.edu/anss/summary.pdf>). That was the last time the RAC made a full-blown effort to make a list of recommendations (no-growth ANSS funding was a factor in following years). In abbreviated form, the FY2002

recommendations were as follows (*with those most relevant to today's conference call in italics*) :

- 1) *Need for good balance between new instrumentation for urban strong-motion monitoring and regional/national broadband seismic monitoring because of (a) dramatic population growth in metropolitan areas at moderate to high seismic risk and (b) large gaps in broadband coverage of extensive, seismically active areas within the IMW Region.*
- 2) Justification for keeping momentum going in developing urban strong-motion networks in Nevada (Reno-Carson City and Las Vegas areas and Utah (Wasatch Front urban corridor).
- 3) *High-priority importance to augmenting broadband coverage in the IMW Region by adding new national backbone stations.*
- 4) Cost-effective proposal by University of Wyoming to cooperatively fund and install, together with the USGS, five broadband stations throughout Wyoming (already acted upon)
- 5) *Emphatically urging the USGS to consider relatively low-cost ways to help small network operators with technical support—including making available traveling technician and computer professional support and facilitating periodic meetings/workshops.*
- 6) Recognizing that state-level earthquake information centers are a desirable part of the structure of ANSS in the IMW Region.
- 7) *Not using results of HAZUS (FEMA 366) as the only guide to prioritizing ANSS resource allocation in the IMW Region.*
- 8) *Funding for at least one collective meeting of the RAC, possibly a joint meeting with the IMW Working Group (of network operators)*

Rob Jackson agreed that HAZUS should not drive resource allocation. As a structural engineer, he's seen building-code changes made in Colorado based on no new data. One of the important objectives of ANSS, in his view, is to help refine building codes. To do this, he supports installing strong-motion instruments in high-hazard areas that are not necessarily highly populated as well as installing some instruments in highly populated areas, like the Denver area, where HAZUS would arguably indicate lower risk.

Walter Arabasz observed that much of what he had heard suggested the importance of developing a regionwide plan for ANSS in the IMW Region and helping "have not" networks and states in the region.

The first recommendation echoes a statement on page 3 in the FY2003 ANSS implementation plan for the IMW Region (<http://www.seis.utah.edu/anss/imw-fy03plan.pdf>):

“Perhaps the most important ANSS requirement for regional seismic monitoring in the IMW Region—in order to advance beyond the existing patchwork—is a strategic regionwide plan for dealing with earthquake geography and uniform recording and response.”

Art Frankel, who coincidentally is also a member of the ANSS National Steering Committee, told the RAC that there is a tension on the NSC regarding resource allocation for structural monitoring versus regional monitoring. The Regional

Advisory Committee for the ANSS Pacific Northwest Region has indicated that it is not so interested in structural monitoring to the extent of giving it a higher priority over free-field recording to meet engineering needs in its region.

Rob Jackson and Art Frankel briefly discussed and agreed that there is a great uncertainty in our understanding of the level of seismic hazard in Colorado, which goes to argue for an information-gathering need equal to or greater than the need for structural monitoring to guide seismic design in Colorado.

Walter Arabasz offered the view that because gains in ANSS funding were likely to continue to depend on broad-based political support from states and regions throughout the U.S., there had to be some responsiveness to the needs of those states and regions. He referred to his experience of trying to get sign-ons to “Dear Colleague” letters in Congress from as many House Members as possible. Also, noting that the RAC includes three state geologists (ID, MT, UT), he suggested that at some time in the future, the RAC may want to consider gathering a supportive letter from all the state geologists in the IMW Region, together with their counterparts from state emergency-management offices, to push for IMW needs in ANSS.

Art Frankel had the last word: “The NSC needs to hear from the regions.”

In summary, the following recommendations emerged from the teleconference:

- **the need for a coherent regionwide plan for seismic monitoring in the IMW Region**
- **helping “have not” networks and states in the IMW Region**
- **need for the availability of portable seismograph arrays to augment inadequate seismographic coverage in the IMW Region**
- **need to capture strong-motion data for large normal-faulting earthquakes, even if it means instrumenting areas with low population density**
- **need for USGS to continue refining and developing ShakeMap and ShakeCast**
- **need to convey the IMW perspective to the ANSS National Steering Committee—especially fundamental, first-order needs for seismic monitoring in the IMW**