FY 2003 ANSS IMPLEMENTATION PLAN
INTERMOUNTAIN WEST (IMW) REGION

Prepared for
U.S. Geological Survey and
ANSS National Implementation Committee

Prepared by
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Foreword

Two circumstances significantly color this FY 2003 implementation plan for the Intermountain West (IMW) Region: (1) no-growth ANSS funding for FY 2003 and (2) ongoing projects involving coordination between USGS/ANSS managers and individual states in the IMW Region. As a result, this planning document is chiefly conceptual. Many implementation details will depend on ANSS funding constraints and USGS decision-making as it relates to ongoing projects in individual IMW states.

Input was requested from all members of the Regional Working Group representing each state in the IMW Region. For reasons given above, response was highly variable. Detailed input received from Colorado, Nevada, and Utah is reproduced here in Appendices A, B, and C, respectively. I shaped the remainder of this FY 2003 plan based on my familiarity with ongoing IMW projects and in consultation with USGS/ANSS managers.

The IMW Regional Advisory Committee (RAC) was kept informed of planning issues for FY 2003 but was not asked to critique this plan, prior to its submission, for the following reasons: (1) Each ANSS region was given guidance that "requests should not exceed the scale of the previous year," so as a practical matter, little of the plan required advisory guidance on a regional basis. (2) Advisory guidance for the continuation of urban strong-motion monitoring in Utah and Nevada was provided by state-level advisory committees (and was also based on feedback from USGS/ANSS managers). (3) Guidance provided by the RAC in the lengthy FY 2002 IMW implementation plan was still relevant and judged to be fully consistent with the "level-effort" ongoing projects described herein.

Walter J. Arabasz
IMW Regional Coordinator
October 31, 2002

1. Introduction

1.1 Region: The ANSS-IMW Region encompasses a large part of the western U.S. and includes the eight core-member states of Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, and New Mexico; Texas is an affiliate member.

1.2 Regional Coordinator: Walter Arabasz, University of Utah.

1.3 Regional Working Group Participants:

Jon Ake (U.S. Bureau of Reclamation); John Anderson (University of Nevada, Reno); Walter Arabasz (University of Utah); Rick Aster (New Mexico Tech); Dave Brumbaugh (Northern Arizona University); Diane Doser (University of Texas at El Paso); Ken Dueker (University of Wyoming); Walt Jungblut (USGS/NSMP); Sue Nava (University of Utah); Suzette Jackson Payne (Idaho National Engineering & Environmental Lab); Ron Porcella (USGS/NSMP); Anne Sheehan (University of Colorado at Boulder); Bob Smith (University of Utah); Mike Stickney (Montana Bureau of Mines and Geology); Jim Zollweg (Boise State University).

1.4 Regional Advisory Panel Members:

Rick Allis (Utah Geological Survey, Salt Lake City, UT); Doug Bausch (FEMA Region VIII, Denver , CO); Jill B. Braun (Williams Gas Pipelines, Salt Lake City, UT); Michael R. Brown (The Confederated Salish and Kootenai Tribes of the Flathead Reservations, Pablo, MT); James C. Case (Wyoming State Geological Survey, Laramie, WY); Diane Doser (University of Texas at El Paso, El Paso, TX); Art Frankel (USGS, Denver, CO); Bob Guenzler (State of Idaho INEEL Oversight, Idaho Falls, ID); Marvin W. Halling (Utah State University, Logan, UT); Rob Jackson, City and County of Denver, Denver, CO); Jeff Kimball (U.S. Department of Energy, Germantown, MD); Samaan Ladkany (University of Nevada at Las Vegas, Las Vegas, NV); Monique Lay (Montana Disaster and Emergency Services (Helena, MT); David W. Love (New Mexico Bureau of Geology and Mineral Resources (Socorro, NM); Ivan Wong (URS Corporation, Oakland, CA).

Note: In addition to the Regional Advisory Committee, active guidance of the urban monitoring component of ANSS is provided by state-level advisory committees in Utah and Nevada; Colorado's state earthquake program is guided by the State of Colorado Earthquake Hazard Subcommittee.

2. Regional Monitoring Strategy and Requirements:

Regional seismic monitoring in the IMW Region continues to rely on a geographic patchwork of seismic networks, involving both stably-funded and unstably-funded operations. Well-established networks cover most of Utah, Nevada, and Montana. Throughout the IMW Region—and especially in Idaho, Wyoming, New Mexico, Colorado, and Arizona—the challenges are to achieve:

- adequate geographic coverage of seismically hazardous areas, especially in gaps between existing networks and in areas that have been historically neglected;

- stable network operations in areas where seismic hazard and/or risk warrants continuous seismic monitoring; and

- coordinated data exchange, uniform earthquake reporting and response, and compilation of homogenous earthquake catalogs for more systematically defined regions of responsibility.

USGS/ANSS efforts for improving regionwide seismic monitoring in the IMW Region have chiefly focused on improved data exchange via Earthworm software and hardware and increased geographic coverage through the addition of USNSN backbone stations and through opportune cooperative funding of some regional broadband stations. The USGS has also tried to incrementally help state-level monitoring through partnerships in Montana, Idaho, Wyoming, and New Mexico. (See also Appendix A for interest by Colorado in partnering with the USGS.) We ask and strongly encourage the USGS to continue these efforts in FY 2003.

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. The imminent shutdown of the U.S. Bureau of Reclamation's "Jackson Lake" regional seismic network in eastern Idaho and western Wyoming emphasizes the timeliness of this need.

3. National Network Request

Because the IMW Region covers a large part of the western United States and because of widespread earthquake activity in the region, national- and regional-scale seismic monitoring is fundamentally important.

During FY 2002, three new broadband stations were added in the IMW Region to the ANSS national-scale backbone network. These were: station MSMT at Missoula, Montana, installed cooperatively with the Montana Bureau of Mines and Geology; station SDCO (Sand Dunes, Colorado) in south-central Colorado; and station CSWY near Casper, Wyoming, installed cooperatively with the University of Wyoming.

Consistent with USGS planning—and with site selection and other cooperative efforts already under way—we request that the following national backbone stations (not ranked) be installed in the IMW Region during FY 2003:

- Eastern Colorado (station KCCO, "Kit Carson [County], CO")

- Northeastern Montana (provisionally identified as station DGMT, "Dagmar, MT"; site recently found near Medicine Lake, MT by Mike Stickney) — involving cooperative efforts of the Montana Bureau of Mines and Geology

- Northwestern New Mexico (provisionally identified as station NNNM, "Navajo Nation, NM") — involving cooperative efforts of the New Mexico Tech and the USGS Albuquerque Seismological Lab

- Southwestern Utah (provisionally identified as station CCUT, "Cedar City, UT"; site recently found near Page Ranch, UT by Univ. of Utah) — involving cooperative efforts of the University of Utah

- Eastern Oregon/Western Idaho (station BMOR, "Blue Mountain, OR") — involving cooperative efforts of Boise State University

- Eastern Arizona (station SVAZ, "Springerville, AZ") — involving cooperative efforts of New Mexico Tech and the USGS Albuquerque Seismological Lab

Also, the Colorado Earthquake Hazard Subcommittee requests the funding and installation of the following ANSS backbone station (see Appendix A):

- Northwestern Colorado (near Maybell, CO)

4. Regional Network Station Request

- **Wyoming:** Request completion of project started in FY 2002 and cooperatively funded by the USGS/ANSS and the University of Wyoming to install five regional broadband stations throughout Wyoming (equipment already in hand).

- **Colorado (see Appendix A):** Anne Sheehan of the University of Colorado at Boulder requests installation of one cooperative broadband seismic station in Colorado during FY 2003. Sheehan will provide one CMG3-ESP broadband seismometer for this purpose and will work with USGS personnel and the Colorado Earthquake Hazard Subcommittee to find a suitable site. The geographic location of the site will be chosen to fill a gap in seismic coverage of Colorado and will be used to improve location and source parameter estimation capability of earthquakes in the state and surrounding regions.

5. Urban Structures Request [None]

6. Urban Reference Network Request

6.1 University of Nevada, Reno

The University of Nevada, Reno ("UNR"), see Appendix B, proposes for FY 2003 to install **10 new urban strong-motion stations divided between the Reno-Carson and Las Vegas urban areas**.

Objectives for Reno and Carson City will include installation of a rock reference station for each, and broadened coverage into growing communities around the city centers. In the Las Vegas Valley, significant areas northwest and west of the city center are presently uninstrumented and comprise primary targets for new recorders. One rock reference station was installed in FY 2002, but based on input from Nevada's strong-motion advisory committee, one or two more will be considered. A rock site in Henderson, Nevada's second most populous city, has been identified as a result of cooperation with the Las Vegas Valley Water District, and will be pursued in FY 2003.

UNR also proposes to **augment five existing Reftek 72A weak-motion stations with strong-motion sensors**. The weak-motion stations were installed using Keck Foundation grant money for the purpose of upgrading the dominantly analog seismic network. By upgrading these stations to six-channel recording UNR will take advantage of existing telemetry, siting, and power installation. This method has been implemented by UNR technicians in southern Nevada at stations around Yucca Mountain, so issues of installation and data collection are completely worked out. The PASSCAL instrumentation center in New Mexico generously provided UNR with digitizer cards for this purpose, so expenses for this work relate chiefly to the field accelerometers and the technician time required for recorder modifications and accelerometer installation. The particular choice of stations for upgrade will be made based on an evaluation of factors such as site relevance as a bound for urban ShakeMaps, likelihood of experiencing strong motion, proximity to important faults, and technical factors such as power availability and telemetry quality.

6.2 University of Utah

The University of Utah (see Appendix C) requests instrumentation and corresponding support for the installation of **10 to 15 new urban strong-motion stations** in the Wasatch Front region during FY 2003. The University of Utah will continue significant sharing of personnel and operational costs of its regional/urban network operations.

The 12-member Utah Strong-Motion Advisory Committee ("USMAC") has selected and justified up to17 new sites in the Wasatch Front area for ANSS strong-motion instrumentation. Based on an advance signal from the USGS, a total of 10–15 new stations are requested. Final site selection will be made later by USMAC after an ANSS funding decision is made.

The highest-priority station will be a free-field station on the grounds of the Utah State Capitol in Salt Lake City. Planning and designing are under way for a $200-million renovation and seismic retrofit of this historic structure, and new construction on Capitol Hill makes it a critical location of essential state-government facilities. USMAC has also recommended seven sites that were chosen as contingency sites but not instrumented in FY 2002 together with nine new sites. The 17 recommended sites include eight sites in the Salt Lake Valley and nine sites elsewhere, either directly within or neighboring the Wasatch Front urban corridor.

USMAC's site recommendations are driven by the following considerations:

- Filling in gaps in network coverage of the Wasatch Front urban corridor, especially in areas of rapid urbanization or commercial development and/or where important lifelines, hazardous facilities, or additional hazards such as landslides and liquefaction may be present

- Strong-motion recording on key site-response units both within and outside the Salt Lake Valley

- Near-fault recording of earthquakes large enough to cause damage in the Salt Lake Valley—including added instrumentation of the Provo and Brigham City segments of the Wasatch fault

7. ANSS Data Center(s) Upgrades:

7.1 University of Nevada, Reno

The University of Nevada, Reno ("UNR"), see Appendix B, proposes a **modest hardware and software extension of UNR capabilities** to prepare for archiving and sharing of recorded weak and strong-motion waveforms as a regional data center [and, implicitly, to implement ShakeMap capabilities].

It is assumed that the USGS will negotiate directly with UNR as part of the normal network-budget process to address these needs.

UNR's ANSS stations have increased the raw data throughput requirements of the Nevada Seismological Laboratory by over 70%. This has necessarily increased requirements for disk and computer resources. In addition, the visibility and importance of network operations has increased. For example, a significant fraction of the CISN capability for monitoring earthquakes in eastern California formerly handled by microwave and telephone circuits now is handled exclusively by an Earthworm digitizing PC and internet data exchange. UNR

proposes to minimize the outage of this connection by purchasing and configuring a **second digitizing computer** to be ready at short notice. UNR also proposes to buy a **high-capacity tape drive to back up on-line archives**. Price reductions and equipment savings from UNR's FY 2002 supplemental contract will enable them to expand disk space, which will not need to be included in their FY 2003 request. (See Appendix B for some additional details.)

7.2 University of Utah

In Appendix C, the University of Utah identifies **three notable ANSS data center problems**—and pleads for USGS attention. The problems are fundamentally community-wide problems whose **solution would require ANSS "system-level" resources**:

- **Continued Earthworm support and development:** The University of Utah is the first regional network operator of significant size to run a complete database version of Earthworm. In the course of bringing an end-to-end system online, U of U discovered a number of bugs and developed a list of items that would improve practical usage of Earthworm for emergency response. On March 15, 2002, U of U staff submitted a 5-page report to Earthworm Central detailing these issues. At the time of this writing, seven months later, they have yet to receive a revised version of Earthworm that addresses their concerns. It is impractical for the University of Utah to attempt to resolve these issues on its own. U of U requests that Earthworm Central resolve these problems for the common good of all Earthworm users.

- **Assistance with resolving ShakeMap-Earthworm interface issues:** This problem relates to assignment of seismic event identification numbers. There currently is no mechanism to submit an automatically created ShakeMap into the national Quake Data Distribution System (QDDS) via the Earthworm Alarm manager. The ID number of the Earthworm-alarm-generated QDDS message is a database ID number that cannot be correlated in an automated system with the ShakeMap ID number (a 4-digit number assigned by the non-database portion of Earthworm). In addition, currently it is not possible to automatically integrate into ShakeMap strong-motion data streams generated external to Earthworm, such as from the USGS's NSMP Data Center.

- **Need for availability of ANSS "metadata":** The University of Utah requests attention to developing a mechanism for distributing station location and instrumentation information between seismograph networks. As more and more local, regional, and national seismograph networks become interconnected, it is imperative that this critical documentation be kept up-to-date and online in a manner accessible to all parties.

8. Budget Summary

The requests contained in this FY 2003 implementation plan are aggregated here in conceptual form only. Specific costs are left to the USGS to estimate—based on knowledge of instrumentation procurement details, existing agreements with individual IMW network operators, and anticipated negotiations with varied network operators for the FY 2003 activities outlined below.

Regional Monitoring Requirements (Section 2):

- Continuation of existing cooperative agreements with USGS-funded seismic networks in the IMW Region
- Ongoing/evolving partnerships aimed at helping to advance state-level seismic monitoring in Montana, Idaho, Wyoming, and New Mexico
- Need for regionwide strategic plan in the IMW Region (resources needed for coordination and meetings to draft strategic plan)

National Network Requests (Section 3):

- Six ANSS national backbone stations (planning under way in FY 2002)
- New ANSS national backbone station, requested by the Colorado Earthquake Hazard Subcommittee, in northwestern Colorado near Maybell

Regional Network Station Requests (Section 4):

- Completion of cooperative project with University of Wyoming to install five regional broadband stations throughout Wyoming (equipment already in hand)
- New cooperative broadband seismic station in Colorado requested by Anne Sheehan, University of Colorado at Boulder (who will provide one CMG3-ESP broadband seismometer)

Urban Reference Network Requests (Section 6):

- 10 stations plus 5 strong-motion sensors to augment 5 existing REF TEK-72A weak-motion stations (University of Nevada, Reno)
- 10–15 stations (University of Utah)

ANSS Data Center(s) Upgrades (Section 7):

- Modest hardware/software expansion (including second digitizing computer and high-capacity tape drive (University of Nevada, Reno)
- ANSS "system-level" request for (a) continued Earthworm support and development, (b) assistance with resolving ShakeMap-Earthworm interface issues, and (c) availability of ANSS metadata for local, regional, and national stations (University of Utah)

APPENDIX A — COLORADO

(Submitted by Anne Sheehan, Univ. of Colorado at Boulder, with input from State of Colorado Earthquake Hazard Subcommittee; October 10, 2002)

The state of Colorado has a rapidly growing population, active tectonics, and seismicity which has never been surveyed statewide. Earthquake hazards in Colorado are poorly understood and may be underestimated. Colorado does not have a statewide seismic network, and until this year was serviced by only one USNSN station (ISCO). Thus, the PDE catalog offers an extremely incomplete view of Colorado seismicity, with a magnitude threshold of about 3.0 and large location uncertainties in most parts of the state. During FY 2002, a new USNSN site was installed in south central Colorado (Great Sand Dunes) and permitting has been started for a station in eastern Colorado (Kit Carson County). These stations are an important first step in regional monitoring. An additional station is planned for NW Colorado.

Our proposed plan for Colorado for FY 2003:

1. Assist USGS with siting of planned NW Colorado **ANSS national backbone site near Maybell, Colorado**. Anne Sheehan and another Colorado Earthquake Hazard Subcommittee member will work to find a suitable site for the ANSS backbone site.

2. We will work with the USGS to install **one cooperative broadband seismic station in Colorado** during FY 2003. Sheehan will provide one CMG3-ESP broadband seismometer for this purpose and will work with USGS personnel and the Colorado Earthquake Hazard Subcommittee to find a suitable site. The geographic location of the site will be chosen to fill a gap in seismic coverage of the state and will be used to improve location and source parameter estimation capability of earthquakes in the state and surrounding regions.

3. The Colorado Earthquake Hazard Subcommittee **will work to make a priority list of 5 to 6 sites for future collaborative stations** and will work to obtain funding from the state of Colorado or external agencies for such cooperative seismograph stations. The state of Colorado suffers from not having an existing regional seismic network, thus lacking the infrastructure to easily add supplemental stations. This lack of coverage results in very poor characterization of seismicity within the state of Colorado. We will work with the state, the USGS, and external agencies to improve this situation.

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APPENDIX B — NEVADA

(Submitted by Glenn Biasi and John Anderson, Nevada Seismological Laboratory, University of Nevada, Reno; with general guidance from the Nevada Strong-Motion Advisory Committee; October 30, 2002)

Overview of Status and Accomplishments

The Nevada Seismological Laboratory ("NSL") has received support under the ANSS urban strong-motion instrumentation program in FY 2001 and 2002. ANSS support has allowed the NSL to install a total of 26 new strong-motion sensors in Reno, Carson City, and the Las Vegas Valley. Although still conspicuously under-instrumented for a city its size, Las Vegas is nevertheless significantly advanced in recording capability and preparedness by virtue of the new recorders. The ANSS program has also, by its emphasis on regional coordination, motivated a new level of dialog between Nevada's engineers, emergency planners, academics, and the seismological community. The proposed elements of the Nevada FY 2003 plan broadly derive from Nevada's [state-level strong-motion advisory committee] recommendations of meetings in January and July 2002.

Proposed Installation Plans for FY 2003

For FY 2003 we propose to continue urban strong-motion instrumentation with **10 new stations divided between the Reno-Carson and Las Vegas urban areas**. Objectives for Reno and Carson City will include installation of a rock reference station for each, and broadened coverage into growing communities around the city centers. In the Las Vegas Valley, significant areas northwest and west of the city center are presently uninstrumented and comprise primary targets for new recorders. One rock reference station was installed in FY 2002, but based on [Nevada's strong-motion advisory committee] input, one or two more will be considered. A rock site in Henderson, Nevada's second most populous city, has been identified as a result of cooperation with the Las Vegas Valley Water District, and will be pursued in FY 2003.

In FY 2003 **we propose to augment five existing Reftek 72A weak-motion stations with strong-motion sensors**. The weak-motion stations were installed using Keck Foundation grant money for the purpose of upgrading the dominantly analog seismic network. By upgrading these stations to six-channel recording we will take advantage of existing telemetry, siting, and power installation. This method has been implemented by NSL technicians in southern Nevada at stations around Yucca Mountain, so issues of installation and data collection are completely worked out. The PASSCAL instrumentation center in New Mexico generously provided us with digitizer cards for this purpose, so expenses for this work consist chiefly in the field accelerometers and the technician time required for recorder modifications and accelerometer installation. The particular choice

of stations for upgrade will be made based on an evaluation of factors such as site relevance as a bound for urban ShakeMaps, likelihood of experiencing strong motion, proximity to important faults, and technical factors such as power availability and telemetry quality.

Collateral Equipment Support

We propose a **modest hardware and software extension of NSL capabilities** to prepare for archiving and sharing of recorded weak and strong-motion waveforms as a regional data center. The ANSS stations have increased the raw data throughput requirements of the NSL by over 70%. This has necessarily increased requirements for disk and computer resources. In addition, the visibility and importance of network operations has increased. For example, a significant fraction of the CISN capability for monitoring earthquakes in eastern California formerly handled by microwave and telephone circuits now is handled exclusively by an Earthworm digitizing PC and internet data exchange. We propose to minimize the outage of this connection by purchasing and configuring a **second digitizing computer** to be ready at short notice. We also propose to buy a **high-capacity tape drive to back up on-line archives**. Price reductions and equipment savings from our FY 2002 supplemental contract will enable us to expand disk space, so this will not need to be included in our FY 2003 request.

Personnel and operating support requirements for new installations will follow estimates from previous years—four man-days per site for installation and telemetry configuration. In addition we include three days per installed station for maintenance of the station, software upgrades, and telemetry maintenance. Time will be required for a records technician to review recorded data for quality and for archiving support. Some time will also be required for improvement and installation of archive and sharing software developed during FY 2002.

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APPENDIX C — UTAH

(Submitted by Walter Arabasz and Sue Nava, Univ. of Utah, with guidance from the 12-member Utah Strong-Motion Advisory Committee and with input from Jim Pechmann and Kris Pankow; October 30, 2002)

Background Information

In FY 2000, the University of Utah successfully began developing an ANSS urban strong-motion network in Utah's densely populated and seismically hazardous Wasatch Front region. Using the infrastructure of this new network, a basic real-time earthquake information system was completed in time for 24/7 operation for public safety during the 2002 Salt Lake City Winter Olympics. The real-time urban network currently includes 65 strong-motion stations, seven of which have collocated broadband sensors. For details of the new urban network, see <www.seis.utah.edu/urban/index.shtml>.

Outside of California, Utah's ANSS urban network has become a model for integrating new strong-motion instrumentation into a traditional regional seismic network. University of Utah personnel have taken a lead among non-California network operators in dealing with ShakeMap implementation and real-time earthquake alerts—and in engaging engineering, emergency response, and earth science stakeholders. They have also taken a lead in dealing with practical issues relating to field installation procedures, telemetry, calibration, and continuous real-time recording of strong-motion data.

Utah's ANSS urban network has catalyzed great interest among local structural and geotechnical engineers and among earth scientists interested in issues of ground-motion modeling and local site response. Adding to this interest was the recent publication by Ivan Wong and others of *Earthquake Scenario & Probabilistic Ground Shaking Maps for the Salt Lake City, Utah, Metropolitan Area* (Utah Geological Survey Publication 02-5, 2002). Also, the USGS has begun new initiatives under its NEHRP external research program aimed at addressing issues of site response, basin modeling, and ground-motion modeling in the Salt Lake Valley.

Instrumentation Request for FY 2003

Note: The following request assumes continuation of (1) USGS/NEHRP base-budget support to the University of Utah for regional seismic monitoring and operation of a regional earthquake information center and (2) ANSS support for operation and maintenance of 65 existing ANSS stations installed to date. The University of Utah will continue significant sharing of personnel and operational costs of the regional/urban network operations.

1. We request instrumentation and corresponding support for the installation of **10 to 15 new urban strong-motion stations** in the Wasatch Front region during FY 2003.

Justification and Plans for 10–15 New Strong-Motion Stations

The 12-member Utah Strong-Motion Advisory Committee ("USMAC") has selected and justified up to17 new sites in the Wasatch Front area for ANSS strong-motion instrumentation. Based on an advance signal from the USGS, a total of 10–15 new stations are requested. Final site selection will be made later by USMAC after an ANSS funding decision is made.

The highest-priority station will be a free-field station on the grounds of the Utah State Capitol in Salt Lake City. Planning and designing are under way for a $200-million renovation and seismic retrofit of this historic structure, and new construction on Capitol Hill makes it a critical location of essential state-government facilities. USMAC has also recommended seven sites that were chosen as contingency sites but not instrumented in FY 2002 together with nine new sites. The 17 recommended sites include eight sites in the Salt Lake Valley and nine sites elsewhere, either directly within or neighboring the Wasatch Front urban corridor.

USMAC's site recommendations are driven by the following considerations:

- Filling in gaps in network coverage of the Wasatch Front urban corridor, especially in areas of rapid urbanization or commercial development and/or where important lifelines, hazardous facilities, or additional hazards such as landslides and liquefaction may be present

- Strong-motion recording on key site-response units both within and outside the Salt Lake Valley

- Near-fault recording of earthquakes large enough to cause damage in the Salt Lake Valley—including added instrumentation of the Provo and Brigham City segments of the Wasatch fault

Other Requests for FY 2003 (Relating to Univ. of Utah's Regional Data Center)

2. We request **continued Earthworm support and development**. The University of Utah is the first regional network operator of significant size to run a complete database version of Earthworm. In the course of bringing an end-to-end system online, we discovered a number of bugs and developed a list of items that would improve practical usage of Earthworm for emergency response. On March 15, 2002, UUSS staff submitted a 5-page report to Earthworm Central detailing these issues. At the time of this writing, seven months later, we have yet to receive a revised version of Earthworm that addresses our concerns. It is impractical for the University of Utah to attempt

to resolve these issues on its own. We request that Earthworm Central resolve these problems for the common good of all Earthworm users.

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4. We request **assistance in developing a mechanism for distributing station location and instrumentation information between seismograph networks**. As more and more local, regional, and national seismograph networks become interconnected, it is imperative that this critical documentation be kept up-to-date and online in a manner accessible to all parties.

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