JUSTIFICATION AND APPROVAL

Justification for Other Than Full and Open Competition (FAR 6.3)

1. Contracting Agency and Activity. The Department of the Interior, United States Geological Survey, Sacramento Office of Acquisition and Grants (OAG) plans to contract by means other than full and open competition. This document sets forth the justification and approval for use of one of the exceptions to full and open competition allowed under the Competition in Contracting Act (CICA) of 1984.

2. Nature of Action Being Approved. The U.S. Geological Survey, Earthquake Science Center, requests award of a non-competitive procurement to Kinemetrics for multi-channel, strong motion Rock Series Granite recorders.

3. Description of Supplies or Services. Equipment consisting of seven Kinemetrics Rock Series Granite recorders (Four 36-channel, three 24-channel) to monitor the performance of structures during seismic shaking. The Western Earthquake Hazards Team (WEHZ) requires this equipment to fulfill a contract between the Veterans Affairs (VA) and the WEHZ to install seismic recorders in VA hospitals that are in seismically high or very high zones.

Since the 1960s the USGS has had an ongoing agreement with the Veteran's Affairs (VA) to maintain and install strong motion instrumentation at their hospitals and facilities. Many of their hospitals are in seismically prone areas and indeed have suffered severe shaking from some of the major earthquakes in the San Francisco Bay and Los Angeles areas over the last 30 years. They are required by law to instrument these facilities so that the ground motion that their buildings are subjected to is known.

Many facilities have sensors already but most sites are not instrumented in a way that the actual building performance can be assessed during a major earthquake. The VA has a seismic hazard commission and they have recommended that their important hospitals in seismically high and very high zones be fully instrumented in order to properly assess the likelihood of structural damage during shaking from a major earthquake. Many of the areas where the VA has major hospital facilities are identified as having a significant probability of a M6.7 earthquake in the next 30 years. The USGS Earthquake Hazards Team in Menlo Park has contracted with the VA to provide this instrumentation, installation, and maintenance for an initial period of three years.

In each building individual sensors are placed around the floors to determine the motion of each floor. Differencing the motion in each floor provides the strain in the columns holding the structure up. The sensors are then wired to a central recorder. Many of the buildings will require 24 or more single channel accelerometers. Each accelerometer is low-noise, low-power, and has stable characteristics over tens of years. The recorders (the subject of this purchase) need to be capable of sampling up to 36 channels simultaneously with a nominal 24 bit ADC. It needs to be

very internet aware, and open source in order for us to integrate the current systems that we are working on. We are building an alarm system that will be installed in each building that monitors the amount of movement that building has undergone (assuming an earthquake has occurred) with respect to design values. The alarm system is an additional piece of software that uses the signals from the installed accelerometers.

4. Estimated Dollar Value. The total cost of the award is estimated to be $171,576. Purchase Request 0040059075 for the 36 channel recorders is for $109,584; combined with Purchase Request 0040043667 (item 0010) for the 24 channel recorders for $61,992.

5. Statutory Authority. The proposed action may be awarded without full and open competition under 41 U.S.C. 253(c)(1) as implemented in FAR 6.302-1, only one responsible source is available and no other supplies will satisfy agency requirements.

6. Rationale Supporting Use of Citation in No. 5. The Kinemetrics Rock series recorders offer features that are not available in any other product. The following is a list and an explanation of why each features or group of features is important.

1. The highest sample rate available on the Rock Series Granite recorder is 2000 samples per second (sps). This gives a bandwidth to 1000 Hz, which is important for detecting and locating damage in a building. For example if seismic waves travel at 3 km/s in the building then the waves travel 3m in a millisecond. That is about the distance between floors. To locate damage at a particular floor or between a floor would require sample rates at 1000 sps or greater. Only the Kinemetrics Rock system provides for the high sample rates without compromising sample rate selection in other data channels.

2. The Rock software that is the operating system for the recorders has numerous unique features that make the Kinemetrics system more flexible and useful in a situation where building performance is being monitored and alarms are being declared. Such as:

    a) Multiple data streams.

    This allows us to have multiple records from a single recorder at different sample rates and with different characteristics such as,
    i) A fail-safe, locally recorded, permanent record of a triggered strong motion data (e.g., 200 sps)
    ii) A ring buffer (e.g., 30 days) of continuous, high-sample rate data (e.g. 2000 sps), grabbed on-demand over the Internet (e.g., for structural research: potentially, one could locate the acoustic emissions from fractures in welds in the steel frame of the building)
    iii) A telemetered (e.g., Internet) continuous data stream to the regional seismic networks.
    iv) A telemetered (e.g., Internet) state-of-health data stream to the regional seismic networks
    v) Similar telemetered data streams to the USGS PI's for the VA project

vi) Similar telemetered data streams to the on-site VA building engineering staff and VA management

b) Synthetic data streams.

For the VA project, we want the instrumentation to be able to generate real-time alerts if the building is shaken out-of-plumb during an earthquake. At a minimum, this will require real-time integration of velocity or acceleration to displacement.

The Kinemetrics OASIS software has built-in modules that can generate a velocity data stream from an acceleration data stream, and a displacement data stream from a velocity data stream. These data streams can be used interchangeably with the sampled data streams (e.g., the A/D data from the accelerometers). The Kinemetrics Rock system allows us to add software which we write to the Rock system to add capabilities to the system. No other vendor has such capability.

c) Customized and/or off-the-shelf.

The Kinemetrics Rock-based systems software, Rockhound, is user-programmable and extensible. Rockhound is based on the modern Java programming language, running on the Linux open-source operating system. Custom modules can be written in Java and integrated into the system. For example, ISTI has a module to integrate a Rocks system into an Earthworm seismic network. Custom transfer functions can be programmed to generate any data stream, which can then be used for triggering alarms, for example. For the VA project, we plan to develop a transfer function that will generate the (true/false) out-of-plumb signal for a building, which will cause the immediate notification of the VA building engineers that a structural failure has occurred.

d) Multiple Rockhound systems can operate together. Modules are available to replicate the data streams from one Rockhound system to another. Each system can then independently process the data in real-time. For example, the data stream can be split off to a second Rockhound system that can drive a real-time status display in the building engineer's office, without affecting the other data streams being telemetered, for example, to the regional seismic networks.

e) Secure data transmissions.
The Department of Interior requires that computers be secure. Secure data transmission satisfies part of that requirement. Because Rockhound sits on top of Linux, numerous techniques are available to secure data transmissions. One other vendor currently offers FTP as the method for transferring data over the Internet, which is not a secure protocol. (Neither the user ID/password authentication transaction or the data transmission are encrypted.)

f) Simplified maintenance.
The Kinemetrics Rock-based systems can be managed using a standard web browser. RefTek systems require a proprietary Windows or Palm program.

g) The Kinemetrics Rock-based systems are very flexible, and can be configured for virtually any combination of data channels (either an actual ground motion signal or a synthetic signal) and data destinations. The Rock OS defines a protocol for retrieving data and state-of- health information remotely as well as a user interface. The NSMP is very familiar with the user interface and significant software was been written based on the Rock protocol to remotely and automatically retrieve SOH and data. We do not have the resources to rewrite this software to talk to another system. Other systems are not similar. This software is our own and cannot be modified by someone else.

3. The channel wiring system for these recorders is completely compatible with the Kinemetrics Episensor that we have about 1000 already procured. It is essential that these recorders work seamlessly with the other devices we already have in order to ensure complete compatibility and communication.

7. Other Information.

The USGS Earthquake Science Center in Menlo Park has contracted with the VA to provide this instrumentation, installation, and maintenance. The project has been funded with a series of one year agreements, but has been ongoing since 2009. We have presently installed granite recorders in about 20 structures of which about 12 are VA hospitals; as well as the Factor Building at UCLA and the Federal Building in San Francisco. The government would incur undue hardship in cost and labor to learn a new system and maintain two different systems.

Each vendor has a unique method for communicating with its equipment (browser or ftp, for example), retrieving data, formatting data, and handling state-of-health information. A substantial investment is made in the computer programs that handle all if these processes. We have made this investment with the Rock-series recorders and the government would incur undue hardship in cost and labor to learn another system and continue to maintain two systems.

8. The Efforts to Identify Additional Sources Including the Market Research Conducted.

Equipment for monitoring the response of buildings to seismic shaking is made by Kinemetrics, Inc., Refraction Technology, Inc. and Geosig. However, the recorders must have certain high sample rates and have operating system features that allow us to add algorithms to it so we can calculate building performance in realtime. Only equipment from Kinemetrics has all of these unique features. No other vendors provide equipment with these required features.

Refraction Technology (Reftek) have adapted a recorder (RT-130) for the purpose of recording multiple channels in a building. The Reftek system does not have as many channels as the Kinemetrics Rock Series Granite recorders, as high sample rates, and as flexible an operating

system particularly in terms of the ability for us (as users) to add modules to it. The equipment from Reftek did not meet the requirements deemed essential for this purpose with respect to sample rates and the extensibility of the operating system, and security. The operating system does not interface with the current Rockhound OS that we have a significant investment in.

There is not enough information on the Geosig systems in order to know if they would be able to meet our needs. However, from what we do know, they do not have the capability to use the specialized Rockhound Operating System in which we have a significant investment in. As well, their sample rates do not match our required rates that can be met by the Kinemetrics systems.

This acquisition will be synopsized in FedBizOpps as required by FAR 5.201 on or around September 4, 2012.

9. Future Plans to Permit Competition.

We continually work with other companies to try and integrate their systems and develop new ones in order for them to meet our needs. We plan on experimenting with other systems out there within the next few years to see if they provide a good solution for us.

10. Recommendation and Certification from Program Office

Based on the above, I recommend this acquisition be conducted on the basis of other than full and open competition. I certify that technical data which form a basis for this justification that are the responsibility of technical or requirements personnel are complete and accurate.

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Research Geophysicist	Signature	Date

11. Certifications from the Contracting Officer:

The estimated cost of the procurement is considered fair and reasonable as the past procurement (G11PX01918) for these supplies was awarded for the same price of the 36 and 24 channel recorders in which the price reasonableness was determined using the commercial item published catalog price list from Kinemetrics.

All of the requirements of the Competition in Contracting Act, (41 U.S.C. 253), as implemented in the Federal and Interior Acquisition Regulations, have been considered in preparing this justification. This justification is accurate and complete to the best of my knowledge and belief.

12. Approvals

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Zachary Buss, Contracting Officer Date

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Nancy Miller, Chief of OAG Sacramento Date