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AEES is a Technical Society of IEAust The Institution of Engineers Australia and is affiliated with IAEE

2/2004

AEES Newsletter

Contents

President's Column

Greetings to all our members and recipients of this Newsletter. It is frightening to find that 2004 is rapidly slipping away! However, I think it has already been a good year for AEES. The national executive took the lead role in organizing a commemorative lecture, held in Bonython Hall on The University of Adelaide campus on March 1st in recognition of the 50th anniversary of the 1954 Adelaide earthquake (M5.5). Over 200 people attended this public lecture, which also received wide attention from the local media. My thanks to David Love and Allan McDougall for being co-speakers with me for this significant event.

Further, I attended a meeting of Engineers Australia in Sydney for representatives of all the technical societies of the Institution of Engineers. I am pleased to report that there has been support for our proposal from the Structural Engineers College and that I hope to be able to report something definite before my term ends in November. I am also pleased to report that John Wilson and I will be attending the Urban Search and Rescue Training Course for Engineers in September. This is a pilot course that we have proposed to sponsor in Australia and so getting firsthand knowledge of it will assist us greatly in running it successfully here.

I would like to remind members that this year's annual technical seminar and AGM is being held in Mount Gambier, November 5 – 7, 2004. Please pencil this date in your diary. We are trying a slightly different format this year that we think will prove popular. For example, this year's conference will start after lunch on the Friday with a couple of technical sessions followed by our AGM at 5pm and a social dinner in the evening. We will meet again on the Saturday morning for two more technical sessions, have the afternoon free for social/recreational activities (golf, wine tasting, touring) and gather again for the official conference dinner which is being held at a winery in the Coonawarra district. The conference concludes at mid-day on the Sunday after another morning session of presentations. At this stage we have received abstracts for 26 technical papers and several keynote speakers have been invited to prepare papers for plenary session talks covering the topics of engineering seismology, structural engineering and emergency management.

A further developments that I am pleased to report is that the EERI has nominated Professor Andrew Whittaker from the State University of New York at Buffalo (an expatriate from Melbourne) as their representative to liaise with AEES in the development of a list of potential collaborative projects for our two societies. Professor Whittaker will be visiting Adelaide in August following the World Earthquake Engineering Conference in Vancouver. During his visit, he will meet with me to start this dialogue and I intend to organize a meeting of the full national executive committee with Andrew during his visit.

In closing, I am pleased to report that Barb Butler is making steady progress in her recovery and that she is confident that she will be able to attend our conference in Mt Gambier to run the registration desk. With the new format, it is an ideal opportunity to mix some business with pleasure and bring family members along. I look forward to seeing you all at this year's conference.

Mike Griffith

AEES Conference Mt Gambier South Australia, Fri 5 to Sun 7 Nov 2004

This year's conference is attracting considerable interest as mentioned by our President above. Perhaps the new format has helped, starting after lunch on Friday with a Saturday afternoon devoted to social activities and finishing Sunday lunchtime. Perhaps it is the picturesque town of Mt Gambier, halfway between Melbourne and Adelaide and nestled in one of Australia's most recently active volcanos. Only the cynics would attribute this popularity to the proximity

of Australia's famous wine growing area of Coonawarra and the exotic seafood towns of Kingston, Robe and Beachport.

Members and locals know it is the scene of one of Australia's largest earthquakes, a magnitude 6.5 event in 1897 that caused considerable damage and was felt as far north as Port Augusta and east to Melbourne.

A flyer will be distributed shortly.

Kevin McCue

Notes for Authors

The Organising Committee would be pleased to consider the completed typescript, to reach us not later than **July 31** (to ensure it is refereed **for DETYA purposes**) ***or*** **August 30** (for non-refereed publications). You are requested to supply an extended abstract, rather than a full paper, which conforms with the "Guide to Authors" available from the editor or the conference organisers (mcgrif@civeng.adelaide.edu.au).

Following modern practice, papers should be prepared "camera-ready" for printing in accordance with these guidelines. Typescripts which do not comply with this cannot be accepted. Please note that the total length of the papers, including photographs and figures, is restricted to 5 pages. It is anticipated that speakers will be allotted 20 minutes including questions for their presentations. It is assumed that the paper contains original material especially prepared for the Conference, and that the paper (or a slightly modified version) has not been submitted for publication elsewhere. Submission of your paper would be taken as implied confirmation of this assumption.

It is expected that at least one of the authors of each paper will attend the Conference in order to deliver the paper. Registration forms will be sent out shortly. Please note that papers will only be included in the programme from authors who have registered.

Please send your paper, preferably by email (or post the original and two copies to arrive absolutely no later than 30 August) to Kevin McCue at:

EMAIL: asc@netspeed.com.au

Post: Kevin McCue, AEES 2004 Conference,
PO Box 324, Jamison Centre, ACT 2614

Your paper will then go to be peer-reviewed by at least two referees with the relevant expertise.

Thank you for your interest, and we look forward to seeing you in Mt Gambier at the Conference.

Mike Griffith

AEES Executive

President	Mike Griffith
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Newsletter Editor	Kevin McCue

Earthquakes in Australia

Jan 2004 – Jun 2004

The following list of earthquakes was extracted from the Geoscience Australia website which includes information from ES&S and PIRSA. The computed focal depths of all events are within the upper crust (less than 20 km deep). No damage was reported.

Note that Tennant Ck is still quite active and that the largest event, on 11 February, was also in the Northern Territory (near the WA border) at Mt Redvers.

January – June 2004 Australian region

Date	Time	Lat	Long	ML	Place
05/01	00:55:01	32.149	138.497	2.5	S of Hawker SA
08/01	13:07:13	32.612	138.504	2.5	NW Peterborough SA
08/01	07:06:52	37.1	146.3	2.9	Mansfield Vic
08/01	03:30:55	19.874	134.062	2.8	Tennant Creek NT
16/01	15:05:56	25.072	151.275	4.4	SE of Monto QLD
17/01	16:08:42	18.783	122.396	4.0	S of Broome WA
17/01	00:11:46	31.359	118.111	2.0	Merredin WA
20/01	16:57:01	38.631	146.101	2.4	Leongatha Vic
23/01	15:31:47	31.672	123.549	4.3	N of Balladonia WA
23/01	09:28:38	22.297	132.786	3.2	Reynolds Range NT
26/01	20:39:28	26.181	131.849	3.2	Mt Cuthbert SA
31/01	05:42:11	37.327	155.583	4.3	Tasman Sea
03/02	23:39:57	30.746	117.094	2.9	Cadoux WA
03/02	20:47:46	30.552	117.058	2.1	Burakin WA
03/02	12:49:57	37.142	148.134	2.4	Mt Nunniong Vic
11/02	19:35:24	31.129	121.132	2.9	S of Coolgardie WA
11/02	09:30:39	22.68	129.823	**5.4**	Mt Redvers NT
11/02	09:17:58	22.738	129.871	5.0	Mt Redvers NT
20/02	10:51:04	24.975	151.524	2.3	Mount Perry QLD
20/02	02:08:13	19.721	134.009	2.8	Tennant Creek NT
21/02	23:55:34	26.416	151.38	3.7	Durong Qld
21/02	22:03:55	40.602	155.602	3.5	Tasman Sea
22/02	10:32:29	26.355	151.289	2.8	Boondooma QLD
23/02	17:23:30	20.832	125.571	3.8	Great Sandy Desert WA
26/02	22:58:41	53.25	159.56	6.0	Macquarie Island region
28/02	11:32:09	34.996	147.675	3.9	Junee NSW
01/03	22:33:36	32.423	123.171	3.1	Dundas Nature Reserve WA
05/03	00:11:29	32.472	127.034	4.4	SE of Cocklebiddy

					WA
05/03	00:08:11	32.504	127.019	3.5	SE of Cocklebiddy WA
06/03	08:49:20	33.056	150.008	2.0	Capertee NSW
08/03	09:47:41	30.477	117.068	2.0	Burakin WA
10/03	03:16:08	33.755	150.874	2.2	Blacktown NSW
13/03	19:28:21	19.585	133.899	2.8	Tennant Creek NT
17/03	08:45:57	36.82	150.687	2.5	Tasman Sea
24/03	10:10:45	29.074	144.084	2.7	Hungerford area NSW
24/03	06:27:22	29.849	124.144	3.1	Plumridge Lakes WA
03/04	07:29:24	16.756	128.715	3.1	S of Kununurra WA
04/04	15:10:46	32.108	138.244	3.0	Hawker SA
04/04	11:50:36	32.972	138.192	2.7	NE of Port Pirie SA
05/04	15:31:28	19.879	134.074	2.2	Tennant Creek NT
06/04	18:07:48	19.875	134.057	3.1	Tennant Creek NT
10/04	17:45:36	30.991	117.971	2.5	22k SE Bencubbin WA
12/04	02:14:03	37.281	145.991	2.8	Lake Eildon, Vic
15/04	05:54:17	31.976	138.792	3.5	Hawker SA
03/05	22:09:14	33.668	149.352	2.3	SE of Blayney NSW
03/05	17:43:20	31.708	117.079	2.0	Meckering WA
03/05	08:38:57	19.869	134.05	2.1	Tennant Creek NT
03/05	22:09:14	33.668	149.352	2.3	SE of Blayney NSW
03/05	17:43:20	31.708	117.079	2.0	Meckering WA
03/05	08:38:57	19.869	134.05	2.1	Tennant Creek NT
03/05	22:09:14	33.668	149.352	2.3	SE of Blayney NSW
03/05	17:43:20	31.708	117.079	2.0	Meckering WA
03/05	08:38:57	19.869	134.05	2.1	Tennant Creek NT
03/05	22:09:14	33.668	149.352	2.3	SE of Blayney NSW
03/05	17:43:20	31.708	117.079	2.0	Meckering WA
03/05	08:38:57	19.869	134.05	2.1	Tennant Creek NT
05/05	10:16:26	25.689	131.045	2.9	S of Uluru NT
05/05	10:08:30	25.697	130.941	3.5	S of Uluru NT
05/05	10:16:26	25.689	131.045	2.9	S of Uluru NT
05/05	10:08:30	25.697	130.941	3.5	S of Uluru NT
05/05	10:16:26	25.689	131.045	2.9	S of Uluru NT
05/05	10:08:30	25.697	130.941	3.5	S of Uluru NT
05/05	10:16:26	25.689	131.045	2.9	S of Uluru NT
05/05	10:08:30	25.697	130.941	3.5	S of Uluru NT
10/05	18:39:34	24.516	113.004	3.4	NW of Carnarvon WA
10/05	18:39:34	24.516	113.004	3.4	NW of Carnarvon WA
12/05	11:25:47	19.78	116.924	3.3	N of Karratha WA
12/05	11:25:47	19.78	116.924	3.3	N of Karratha WA
15/05	21:38:40	32.314	151.973	2.8	SW of Taree NSW
15/05	21:38:40	32.314	151.973	2.8	SW of Taree NSW
19/05	20:38:04	19.911	134.1	2.8	Tennant Creek NT
19/05	20:38:04	19.911	134.1	2.8	Tennant Creek NT
21/05	21:53:39	19.728	133.974	3.5	Tennant Creek NT
21/05	21:53:39	19.728	133.974	3.5	Tennant Creek NT
23/05	18:35:52	34.36	139.14	3.3	East of Kapunda SA
23/05	18:35:52	34.36	139.14	3.3	East of Kapunda SA
24/05	21:55:49	19.835	134.063	3.6	Tennant Creek NT
24/05	21:55:49	19.835	134.063	3.6	Tennant Creek NT
27/05	07:20:51	36.27	115.962	3.2	Southern Ocean
27/05	07:20:51	36.27	115.962	3.2	Southern Ocean
31/05	22:32:16	31.326	121.76	3.7	SE of Kambalda WA
31/05	22:32:16	31.326	121.76	3.7	SE of Kambalda WA
27/05	07:20:51	36.27	115.962	3.2	Southern Ocean
31/05	22:32:16	31.326	121.76	3.7	SE of Kambalda WA
02/06	17:04:38	30.491	117.076	2.7	Burakin WA
02/06	13:27:40	33.441	138.29	2.7	Crystal Brook SA
03/06	15:12:10	30.514	117.04	2.1	Burakin WA
04/06	04:32:32	37.6	142.7	2.6	Dunkeld Vic
07/06	13:40:23	27.695	125.483	3.8	SW of Warburton WA
13/06	10:15:35	32.244	138.324	2.9	Hawker SA
15/06	22:59:01	17.435	145.876	3.3	Innisfail QLD
16/06	04:29:58	34.272	148.717	2.3	N of Boorowa NSW
23/06	12:22:22	19.74	134.054	3.3	Tennant Creek NT

NEWS!

The Ubiquitous Magnitude Problem

U.S. DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY MAY 21, 2004
NEIC/WDCS-D QUICK EPICENTER
DETERMINATIONS

Date and Time: MAY 14 at 003035.1 UTC
Location: 45.030N, 7.480E NTH ITALY
Depth: 10 km
Magnitude: ML 4.2 (GRF) ML 3.9 (GEN) ML3.6 (ZAMG) ML3.6 (STR)

The extract above from the USGS QED has four agency reports of an earthquake's magnitude. The computed average magnitude is 3.8 with a range of 0.6 but each of these is an average network solution so there are obviously problems in magnitude assessment in central Europe similar to those in Australia.

Magnitude is a useful index, like the soil liquidity index, but a very simplistic measure of earthquake size.

Draft Code out for Public Comment

The draft: *Structural design actions Part 4: Earthquake actions in Australia* was released by Standards Australia on 10 June for public comment.

Closing date for comment is 12 August 2004.

(The following articles were provided by our prolific correspondent Col Lynam.)

Quake In Alaska Changed Yellowstone Geysers

A powerful earthquake that rocked Alaska in 2002 not only triggered small earthquakes almost 3000 km away at Wyoming's Yellowstone National Park – as was reported at the time – but also changed the timing and behavior of some of Yellowstone's geysers and hot springs, a new study says.

"We did not expect to see these prolonged changes in the hydrothermal system," says University of Utah seismologist Robert B. Smith, a co-author of the study in the June issue of the journal Geology.

While other large quakes have been known to alter the activity of nearby geysers and hot springs, the Denali fault earthquake of Nov. 3, 2002, is the first known to have changed the behavior of such hydrothermal features at great distances, according to Smith and his colleagues. They say the magnitude 7.9 quake was one of the strongest of its type in North America in the past 150 years.

Smith conducted the study with Stephan Husen, a University of Utah adjunct assistant professor of geophysics who works at the Swiss Federal Institute of Technology; Ralph Taylor, an engineer who designs geyser monitoring equipment at Yellowstone National Park; and Henry Heasler, Yellowstone National Park's geologist.

Less than 18 hours after the Denali earthquake in Alaska, Smith and colleagues at the University of Utah Seismograph Station reported the major jolt had triggered more than 200 small earthquakes in Yellowstone – something widely reported by news media in the days following the quake.

Smith now says the triggered quakes at Yellowstone numbered more than 1,000 within a week of the Denali quake – if the count includes tiny temblors that were not "located," meaning their epicenters and depths were not determined. He says the quakes ranged in magnitude from minus 0.5 to just under 3.0. (Tiny quakes have negative magnitudes because modern seismic equipment can detect quakes smaller than was possible when the logarithmic magnitude scales were devised.)

Most of the triggered quakes were centered near geysers and hot springs.

Strong Earthquakes as Seismic and Geothermal Triggers

Scientists once believed that an earthquake at one location could not trigger earthquakes at distant sites. That belief was shattered in 1992 when the magnitude 7.3 Landers earthquake in California's Mojave Desert triggered a swarm of quakes more than 800 miles away at Yellowstone, as well as other temblors near Mammoth Lakes, California, and Yucca Mountain, Nevada

The magnitude 7.5 Hebgen Lake, Montana, quake northwest of Yellowstone – a 1959 disaster that killed 28 people – triggered changes in Yellowstone's geysers and hot springs, something not unexpected for a strong quake nearby.

Smith believes the Denali fault ruptured in such a direction – from northwest to southeast – that the brunt of its energy and its powerful surface waves were aimed southeast toward Yellowstone. As a result, the stresses rippling through the ground at Yellowstone were 200 to 300 times greater than if the Denali quake's waves were aimed elsewhere, he says.

As the Denali quake's surface waves arrived at Yellowstone, changes in hydrothermal activity first were noted at the 100 Spring Plain hot spring system in Norris Geyser Basin.

"Several small hot springs, not known to have geysered before, suddenly surged into a heavy boil with eruptions as high as 1 meter", Smith and colleagues wrote in Geology. "The temperature at one of these springs increased rapidly from about 42 to 93 degrees Celsius" and became much less acidic than normal. "In the same area, another hot spring that was usually clear showed muddy, turbid water."

Meanwhile, some geysers erupted more frequently than normal, while others erupted less frequently.

How the Denali Quake Sparked Yellowstone Activity

Credit: Stephan Husen, University of Utah

Yellowstone has more than 10,000 geysers, hot springs and fumaroles (steam vents), and scientists monitored how often 22 of the geysers erupted during the winter of 2002-2003. Eight of the 22 "displayed notable changes in their eruption intervals" after the Denali quake, 10 showed no significant changes and the other four were too erratic in the timing of their eruptions to determine if the quake changed them, the researchers wrote. Of the eight that changed:

• Geysers that erupted more frequently following the Denali quake included Daisy, Depression, Plume and Riverside geysers in Upper Geyser Basin, and Pink Geyser in Lower Geyser Basin.• Geysers that erupted less frequently after the Denali quake included Castle and Plate geysers in Upper Geyser Basin and Lone Pine Geyser in West Thumb Geyser Basin.

Most geysers returned to their normal timing days to months after the Denali quake.

Oddly, geysers affected by earlier nearby earthquakes – most notably Old Faithful and Grand Geyser in Upper Geyser Basin – were not affected by the Denali earthquake.Scientists do not know if the strong surface waves from the Denali quake independently triggered Yellowstone's small quakes and changes in geyser activity. Smith suspects not. He believes the Denali quake's waves affected the geysers by changing water pressure in underground conduits or "pipes" that feed the geysers. Such changes – which in some cases would have made hot water "flash" explosively into steam – would have altered the pressure on adjacent faults, triggering small earthquakes nearby. That would explain why the quakes were clustered around geyser basins.

Why did some geysers erupt more often and others less often? The researchers believe that when the Denali quake waves rippled through Yellowstone, they jarred loose minerals that had sealed some underground hot water conduits.

In some cases, that allowed superheated, pressurized water to flow more freely to make geysers erupt more often. In other cases, the rupturing of subterranean mineral seals enlarged the size of the conduits supplying geysers, reducing water pressure so those geysers erupted less often. Smith speculates that yet other geysers remained unchanged because they did not have pent-up gas and water pressure and were not affected by the Denali quake's surface waves.

The Denali quake also generated noticeable water waves in Seattle's Lake Union, Louisiana's Lake Pontchartrain and in swimming pools on the East Coast (seiches – Ed). It also triggered small quakes in California's Geysers geothermal area, which is north of San Francisco, and in eastern California's Long Valley, which, like Yellowstone, is a caldera, or giant volcanic crater created by cataclysmic prehistoric volcanic eruptions.

The Denali quake also triggered a few small quakes in Utah, and Smith says it is possible some of those quakes occurred near little-known hot springs along the Wasatch fault at the base of the Wasatch Range.

Smith says the fact that the Denali quake triggered geyser and hot springs changes at Yellowstone raises an interesting question: Could large earthquakes closer to Yellowstone trigger hydrothermal explosions?

Such steam-and-hot water explosions in prehistoric times blasted out a hole that now is Mary's Bay on Yellowstone Lake. One such explosion has occurred roughly every 1,000 years since the glaciers receded from Yellowstone roughly 14,000 years ago.

Smith says there is no evidence prehistoric quakes triggered those blasts. And such explosions were not triggered by the magnitude 7.5 Hebgen Lake, Montana, quake in 1959 or the magnitude 7.3 Borah Peak, Idaho, quake in 1983.

Nevertheless, a big quake near Yellowstone with its surface waves aimed the right way conceivably might "cause large hydrothermal eruptions," says Smith. "I would hypothesize that is certainly possible."

http://www.utah.edu/unews/releases/04/may/geysers.html

New Method Of Dating Past Earthquakes & Assessing Future Ones Discovered

Jay S. Noller, assistant professor of geology, made the discoveries while studying the Hebgen Lake fault in Montana. His research is featured in the Nov. 6 issue of the journal Science.

Noller and his research partner Marek Zreda of the University of Arizona discovered while studying bedrock formations that the chemical makeup of the bedrock had changed after it was affected by an earthquake. By taking a closer look at the bedrock, they were able to determine how long ago the quake had occurred, how often quakes occur in that area, and the probability of another quake happening.

Earthquake dating and predicting is currently done by studying events that occurred either before or after an earthquake - for example, by looking at rivers that crossed over a fault line. Noller's method looks at what occurred at the very moment an earthquake hit.

"That's what's revolutionary about this," Noller said. "This opens up a new range of potential study sites. Bedrock exposures last tens of thousands of years, but river deposits don't last as long - they get buried or eroded away, so they last only a few thousand years. The longer the track record you have of an area, the better idea you have of how things work. The track record lets us estimate the likelihood of future earthquakes. "

Most of the faults that run through the United States are in bedrock, such as the New Madrid Fault in West Tennessee and faults near New York City. Because there are more bedrock faults and fewer river deposits than in the West, it has been very difficult to assess past, and hence future, seismic action in that area.

"There are some bedrock faults in New Jersey and New York that have bothered geologists for a long time now. They've looked at them and said, 'We don't know how to date when the last time

this fault moved,' because there are no river deposits there."

Noller's research is funded by the U. S. Nuclear Regulatory Commission, with the express purpose of better assessing the activity of faults around the nation's nuclear facilities, which are primarily located in the eastern United States - which is where most bedrock faults are located. Noller's research now provides a tool with which to find answers to how seismically safe the nuclear facilities are, as well as how safe the major metropolitan areas in the East are.

This is how Noller's research works: after a large-magnitude earthquake occurs, the earth's crust is shifted, exposing parts of the earth that had previously never seen daylight. These rocks contain elements such as potassium and calcium, which become chlorine after exposure to cosmic rays. In particular, Noller looks for the isotope ^{36}Cl, which although found in nature, occurs in very small amounts in most rocks. But because of the bedrock's exposure to cosmic rays, ^{36}Cl is found in high numbers in seismically altered bedrock.

After thousands of years and many quakes, more and more of the earth is exposed, creating bands of different colors that Noller describes as looking like "a big piece of bacon," the bands near the top being the oldest. Noller takes samples of the rock and counts the number of atoms of ^{36}Cl found - the longer a piece of rock has been exposed to cosmic rays, the more ^{36}Cl is present.

“You can see exactly how much of the earth moved during these earthquakes," Noller said. "The exposure of rock is directly proportional to the size of the earthquake. It's very clear and plain to see - it's elegant and simple and it tells us the exact time it happened."

The Hebgen Lake Fault was chosen as Noller's base of research because it was the site of a catastrophic 7.5 magnitude earthquake in 1959. During that quake, the ground was raised 7 m - "the largest amount of displacement ever recorded anywhere on the globe."

Noller also discovered while investigating the Hebgen Lake fault that when the 1959 quake occurred, it had an effect on the geysers in nearby areas. Old Faithful in Yellowstone National Park slowed down, new geysers were formed and old ones stopped. "It's interesting to see how it affected the natural history of that area," he said. "This record of earthquakes should shed light on the history of changes in the geyser fields."

This story has been adapted from a news release issued by Vanderbilt University.

JK researchers ‘on-the-ball’ with blast movement monitoring

Team members behind the enhancement of the JKMRC blast movement monitor, from left, are Graham Sheridan, Michael Wortley and Darren Thornton.

In the relatively short period of just under 18 months, the JKMRC has developed a system to enhance the mining industry’s ability to track and monitor the movement of ore and waste material ‘blown up’ and shifted during production scale blasting operations.

The JKMRC responded to the mining industry’s need to have a system which replaces existing methods to track ore and waste movement which were either less accurate or less practical.

Current methods used by the mining industry to monitor muck pile movement include the use of sand bags, poly pipe and chains as displacement markers. Muck piles are the broken fragments of rock resulting from blasting. JKMRC senior researcher Darren Thornton said that mining operations want to be able to track movement within the muck pile so that they know exactly where the ore body moves.

“It is often the case that an ore block moves several metres during blasting,” Darren said. “If the ore is excavated in its original position location, much of this material will actually be waste.”

He said that the mining crew might not know this and inadvertently dig waste material instead of the ore in the wrong place. “A state-of-the-art monitoring system should tell you exactly where to mine after a blast.”

JKMRC researcher Darren Thornton and his colleagues Michael Wortley, Graham Sheridan and David La Rosa came up with the Blast Movement Monitor – or BMM – which is a plastic ball-shaped transmitter placed in holes within a blast area.

Up to fifteen transmitters have been used in each blast. After each blast sequence, the BMMs are quickly located within the muck pile using a detector, and three-dimensional vectors for each transmitter’s movement are available within two hours of the blast.

According to Darren Thornton, the key to the success of the prototype device was the ability of a small transmitter to send signals through at least ten metres of rock after surviving a production blast.

The first trial of the monitors occurred at a Brisbane quarry late in 2002. Encouraged by the results, the research team took the BMMs to a gold mine in Western Australia for a series of trials which began in February 2003. This trial successfully demonstrated

that the electronics in the balls would survive a full scale production blast at a mine site.

Much of the electronics-based gadgetry has been developed by JKMRC PhD researcher Michael Wortley who came up with the robust transmitting system small enough to fit inside a blast hole. The holes vary in size from 80mm to 300mm.

Test work scaled up in June 2003 with the deployment of 15 monitors in two blasts followed by a project in August where 65 BMMs were used to quantify the ore loss and dilution across a whole bench.

Darren Thornton said the use of the BMMs – also known in the mining industry as blast vector indicators – are particularly useful in selective mining operations, such as narrow vein gold mining.

He said BMMs were an obvious choice over current movement monitoring methods as they gave the excavation team the required results before they started digging. "Quick and accurate information from a practical system is the major advantage."

The Society website/email list

Dear AEES Members,
The AEES web site is at www.aees.org.au. Any contribution from you on the following topics is most welcome:

- details of interesting recent publications
- significant research projects in earthquake
- engineering (in Australia?)
- links to other relevant Web sites

Please send your contributions/suggestions via email.
The AEES email list is operated by the Seismology Research Centre, Melbourne. If you would like to register please notify me at vaughan@seis.com.au

Vaughan Wesson

Forthcoming Conferences

• **1 - 6 Aug 2004 13 WCEE** Vancouver Canada. Hosted by the Canadian Association for Earthquake Engineering (Chair Don Anderson).
www.13WCEE.com

• **15 – 19 August 2004** ASEG-PESA 17th Geophysical Conference. Integrated Exploration in a Changing World, Sydney. For more information, please see http://www.aseg-pesa2004.org.au

• 16 - 20 August 2004 Western Pacific Meeting
The 2004 Western Pacific Geophysics Meeting will take place in Hawaii. The session proposal deadline is 6 November 2003. More information will be available on the AGU web site. www.17thagc.gsa.org.au

• **September 12 - 17, 2004** XXIX General Assembly of European Seismological Commission, Potsdam, Germany.

Important Dates:

August 16, 2004 Deadline for payment of registration fee without surcharge.

September 9-12, 2004 Young Seismologists Training Course.

• **18 - 20 October 2004** 4th International Conference on Dam Engineering Nanjing, China.

• 5 - 7 Nov 2004 AEES Conference and Annual General Meeting, Mt Gambier SA.

• **1 - 3 December 2004** The 18th Australasian Conference on the Mechanics of Structures & Materials. Perth, Western Australia.

www.civil.uwa.edu.au/conferences/acmsm18/

• **31 Jan – 4 Feb 2005** Australian Institute of Physics 16th Biennial Congress, "Physics for the Nation".

Held during the World Year of Physics, the congress will celebrate the 100 years since Einstein's discoveries in relativity, quantum theory and Brownian motion and will highlight the contribution of physics to Australia. The occasion will bring together an unusually large and diverse group of scientists from over 15 different Australian discipline groups who share a common interest in physics, including the GSA Specialist Group for Solid Earth Geophysics.

Please note, the final deadline for the submission of abstracts and full papers is 1 October 2004.

The deadline for early bird registration is 19 November 2004. For more information, visit: http://rsphyweb.anu.edu.au/admin/AIPCongress2005/

• **11-14 September 2005** Engineers Australia will be hosting the Australian Structural Engineering Conference 2005 at Newcastle Town Hall. The theme for the conference is "Structural Engineering - Preserving and Building into the Future". A comprehensive program is currently being developed and further information on this can be found on the conference website at www.asec2005.com

New Books

The Seismic Wavefield Volume II by Brian L.N. Kennett, Cambridge University Press, Cambridge, UK; ISBN 0-521-00665-1; 534 pp.; 2003; $55

The first volume provides a general introduction and a development of the general theory; the second volume is primarily devoted to the interpretation of observed seismograms in terms of physical processes, which control their properties, with a strong link to the theoretical development in the first volume (extract from a review by A Zappone).

Col Lynam

(The following letter from the AEES President was inadvertently omitted from the previous newsletter).

Activities, CPD and Goals for 2004

Based on member feedback from our membership questionnaire as well as motions passed at our AGM and discussion in the closing session of our annual technical conference held in Melbourne on 27-28 November 2003, the following activities and goals for the Society in 2004 were agreed. These are listed below with the actions required to make it happen.

1. **CPD.** Implementation of a national Urban Search and Rescue (USAR) training program for Engineers, sponsored and endorsed by our Society and Engineers Australia (EA) and, crucially, endorsed by Emergency Management Australia who is the national coordinator of USAR services and activities. The national executive to approach EA for funding of $7,000 to run a national "roadshow" seminar to introduce and promote the scheme. The training scheme could conceivably be run as a user pays short course under the wing of EA's Engineering Education. Further, the executive must seek EMA endorsement of the course and subsequent certification to ensure uniform national recognition.
2. The Society will again fund at least one $2500 research scholarship for work in the area of earthquake engineering and/or seismology to honours/post-graduate students enrolled at Australian institutions.
3. **CPD.** The Society's annual Technical Conference and AGM will be held in 2004 in a regional location (Mt. Gambier, SA has been nominated) for the first time. This meeting typically attracts 50 – 100 participants every year. The national executive, with Kevin McCue in Canberra, to organise. The conference is to be budget positive without EA subsidy.
4. The Society will implement a register of members (subject to their written approval) on its website listing member professional/technical capabilities and areas of interest. A working party has been formed to draft a "database" format and collection of data.
5. Develop "Memorandum of Understanding" agreements with counterpart organisations overseas. The Earthquake Engineering Research Institute (in the USA) and the New Zealand Society of Earthquake Engineering are being targeted. Draft agreements have been developed and sent to the EERI and NZSEE for their consideration.
6. Membership to continue Standards Australia final drafting, review, promotion and implementation of the revised Australian Earthquake Loading Code, AS 1170, Part 4, and seek a discount for AEES and EA members.
7. National executive to lobby Federal Government and its relevant arms to establish "Risk Mitigation of our National Critical Infrastructure" as a Priority Research Area. While recent attention has been on Security and Man-made hazards, the fundamental issues and strategies for "Securing Australia" are the same as for the broader Risk Mitigation theme which accounts for both Natural and Human hazards.
8. The Society will consider sponsoring individuals from developing countries from our region (i.e. southwest pacific) to attend the 2004 World Conference on Earthquake Engineering in Vancouver BC. Estimated cost, including registration, fares and living expenses could be up to $5000 per person.

Mike Griffith

President, AEES

3 December 2003