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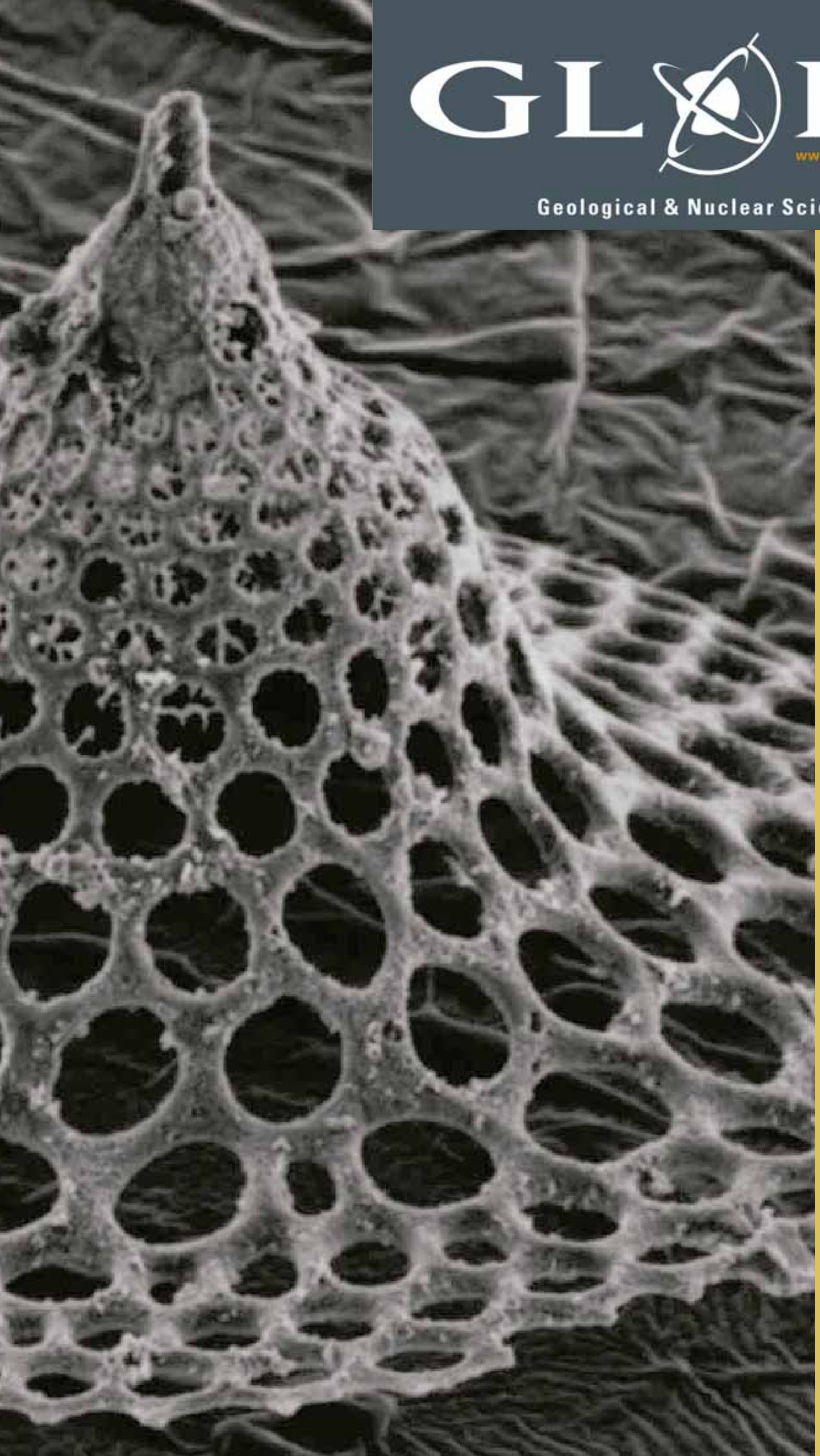
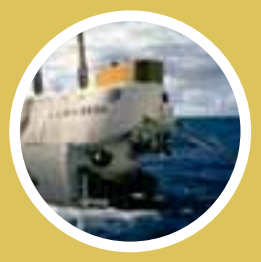
Geological & Nuclear Sciences Newsletter





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JULY 2004

The Institute of Geological & Nuclear Sciences Limited (GNS) is New Zealand's leading provider of earth and isotope scientific research and associated commercial services. GNS is an independent, government-owned company.

GNS publishes *Globe* to publicise the research and consultancy work of the company.

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Production
John Callan (Editor) and
Scenario Communications.

Distribution
Globe is distributed free of charge.
Additional copies may be obtained from
Geological & Nuclear Sciences,
PO Box 30-368, Lower Hutt, New Zealand.
Phone: +64 4 570 1444, Fax: +64 4 570 4600
Internet: www.gns.cri.nz

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Cover image: Scanning electron micrograph of a fossil radiolarian, a group of single-celled marine plankton. Radiolaria are valuable for a wide range of earth science research, from oil and gas exploration to climate and evolution studies. This specimen is about 70 million years old and was recovered from a nodule of dolomite found in a quarry in Wairarapa, New Zealand. This image is one of 40 large-format photos in the *Unseen Worlds – New Dimensions* exhibition.
See story on back cover.
(Note: Chris Hollis, who took this photo, is convening the 11th International Radiolarian Conference in Wellington in 2006.)

ISSN NO: 1172-8922

Guest editorial by Greg Channon and David Harris

Swift Energy New Zealand Ltd

When Swift Energy first came to New Zealand in 1995, one of the first ports of call was GNS. When entering a new basin like Taranaki, it is important to access local knowledge in the same way you might if you were climbing Mount Taranaki for the first time.

The GNS publication *Cretaceous-Cenozoic Geology and Petroleum Systems of the Taranaki Basin* (Monograph 13) and the *Taranaki Atlas* are a benchmark summary of the region's petroleum geology. Being able to access the expertise of the GNS team helped Swift Energy build a strong geological foundation for our exploration platform. Some of our early familiarisation of the region came in the form of world-class field trips to the New Zealand coast led by GNS geoscientists.

During the drilling of Swift's first operated well (Rimu-A1), GNS was present to help with an on-site laboratory. Biostratigraphy at the drilling wellsite can be critical in identifying the age of the sediments we are drilling through. This is especially true when drilling a relatively untested portion of the basin like South Taranaki was in 1999. The assessment of the on-site biostratigrapher can influence the actual drilling operations, including deepening and sidetrack decisions. The call can come any time of the day or night, and GNS biostratigraphers were able to mobilise their laboratory within hours. Their stay at the rig can be long and challenging.

As Swift's exploration and appraisal in the Rimu/Kauri area became more advanced, so did our requests to GNS. Swift routinely seeks GNS expertise in areas such as sedimentology, organic geochemistry and seismic reprocessing, in addition to traditional fields such as biostratigraphy and petrography. In these areas, Swift finds the expertise of the GNS staff complements our growing team of in-house geoscientists.

GNS provides the petroleum industry in New Zealand, and around the world, with a unique blend of local knowledge and international expertise. GNS's Hydrocarbon Group has become savvy and industry wise. This Group actively competes for consulting work in the New Zealand upstream industry, while at the same time remaining academically strong.

Over the years, Swift Energy NZ and GNS have built a strong relationship of trust, understanding and respect. We look forward to a bright and successful future in New Zealand together.

Greg Channon, Manager of Geology,
and David Harris, Manager of Geophysics,
Swift Energy New Zealand Ltd
www.swiftenergy.com

Left: Greg Channon and David Harris, Swift Energy New Zealand Ltd.

Ocean focus

A new section of 15 scientists within GNS will help improve knowledge of New Zealand's offshore territory. The Ocean Exploration Section has been given its own identity so its staff can concentrate on exploring the submerged New Zealand continent.

Led by Ray Wood, the Section consists of geologists, geophysicists, and geochemists. Although their focus is mainly offshore, their work and interests link closely with other GNS activities including oil and gas exploration, minerals exploration, and the study of earthquakes and volcanoes. Ocean surveys often require specialised expertise and equipment, and collaboration with other research organisations is essential to maximise the benefits from the Section's research.

The land area of New Zealand is only the emergent part of the much larger New Zealand continent, which covers about 4,500,000km^2. Ninety-five percent of this continent lies offshore and is largely unexplored, yet knowledge of this vast area is important for several reasons:

- successful management of our marine territory will require understanding of its physical and biological systems
- there is huge potential for economically significant resources
- offshore geology provides unique information for understanding the tectonic processes that control the distribution of onshore hazards and resources.

In addition to their research, staff in the new Section are contributing to discovery of New Zealand's marine territory by helping to lead the Continental Shelf Project. This project will define the extent of New Zealand's continental shelf beyond the 200 nautical mile Exclusive Economic Zone, significantly increasing the size of New Zealand's marine territory.

In summary, the Section will contribute to the the understanding of New Zealand's evolution, and anticipate requirements for management of our ocean territory by:

- mapping the seafloor and the structure of the rocks beneath it
- assessing offshore mineral and hydro-carbon resources
- identifying marine environments and ecosystems
- contributing to improved models of tectonic evolution and present-day geological hazards.

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"Our initial priorities are to focus our research on key gaps in our understanding of New Zealand's resources and evolution. We will also develop technologies and expertise that can contribute to future demands for management of our offshore territory."
Ray Wood

Hydrocarbon signs look strong for offshore Northland

GNS, in association with Crown Minerals and UK-based Spectrum Energy, is preparing a detailed prospectivity report on the Northland Basin, which lies west of Auckland in the Tasman Sea. The under-explored basin has all the elements necessary for large drilling targets. With the area open for licensing this year, the report will enable exploration companies to confidently evaluate the acreage on offer.

The report is based on 9000km of seismic data reprocessed by Spectrum Energy and interpreted by GNS. In addition, information from six offshore wells has been used to ground-truth the interpretation. Kawera-1, near the southern border of the report area, discovered 130 billion cubic feet of gas recently. And although Conoco's Wakanui-1 well, drilled west of Kaipara Harbour in 1999, did not find hydrocarbons, it found a previously unknown petroleum system. Both discoveries point to good prospectivity in Northland Basin.

Overall, the Northland Basin's geology is similar to the adjacent and productive Taranaki Basin. Sediment thickness ranges between 4000m to more than 6000m. Waipawa Black Shale, an oil-prone marine source rock, is present over much of the basin and is mature in parts.

Within the 25,000km^2 part of the basin on offer are more than 50 geological structures capable of trapping hydrocarbons. Five of them are larger than 100km^2.

GNS's prospectivity report will be available for sale from late July as part of the reprocessed seismic package.

Contact: Chris Uruski, Geoscientist, GNS

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Note: GNS conducts investigation and analysis in all of New Zealand's hydrocarbon basins.

GNS joins greenhouse gas technology group

GNS has formed a consortium with coal producer Solid Energy and electricity generator Genesis Power to investigate ways of burying carbon dioxide produced from the use of fossil fuels. The New Zealand consortium will contribute A$1.75 million over the next seven years to the Australian Co-operative Research Centre for Greenhouse Gas Technologies. Under the CRC programme, the Australian government matches research funding dollar-for-dollar.

Capture and storage of carbon dioxide in deep geological formations will reduce greenhouse gas emissions and enable New Zealand industry to meet the New Zealand government's Kyoto Protocol obligations. The technology involves capturing carbon dioxide from power plants, compressing it into a liquid and injecting it deep underground where it can remain safely for many thousands of years.

The aim of the Australian programme is to investigate CO_2 capture and storage and develop innovative technologies that will allow industry to reduce CO_2 emissions in an environmentally sustainable way that is also economic. The programme also aims to develop new commercial energy options, such as hydrogen energy.

As well as involving Australian and New Zealand researchers, the CRC programme will link to parallel research programmes in Canada, Japan, the Netherlands, Britain and the US. Support from industry is extensive and includes Shell, BP, ChevronTexaco, Woodside, Rio Tinto, and BHP Billiton.

Genesis Power is considering trialling a new filter system to capture carbon dioxide at its Huntly Power Station. The captured CO_2 may then be stored deep underground. New Zealand's storage potential is vast. As well as depleted oil and gas fields, there are deep saline aquifers and unmineable coal seams. Carbon dioxide storage may even lead to enhanced oil and gas production from depleting hydrocarbon fields. The oil and gas exploration industry has, for many decades, used injection of liquid carbon dioxide as a way of maintaining pressure in depleting fields.

GNS researchers will contribute new skills to the CRC, including expertise in complex petroleum reservoirs, active faulting, and risk assessment. In turn, the New Zealand investment will be enormously leveraged to resolve issues such as identifying the best sites for subsurface storage in New Zealand's complex geological environment.

Globally, CO_2 sequestration is one of the hottest topics in earth sciences. GNS's involvement in this rapidly developing field is an exciting development that has the potential to deliver significant benefits for New Zealand.

For more information visit: www.co2crc.com.au

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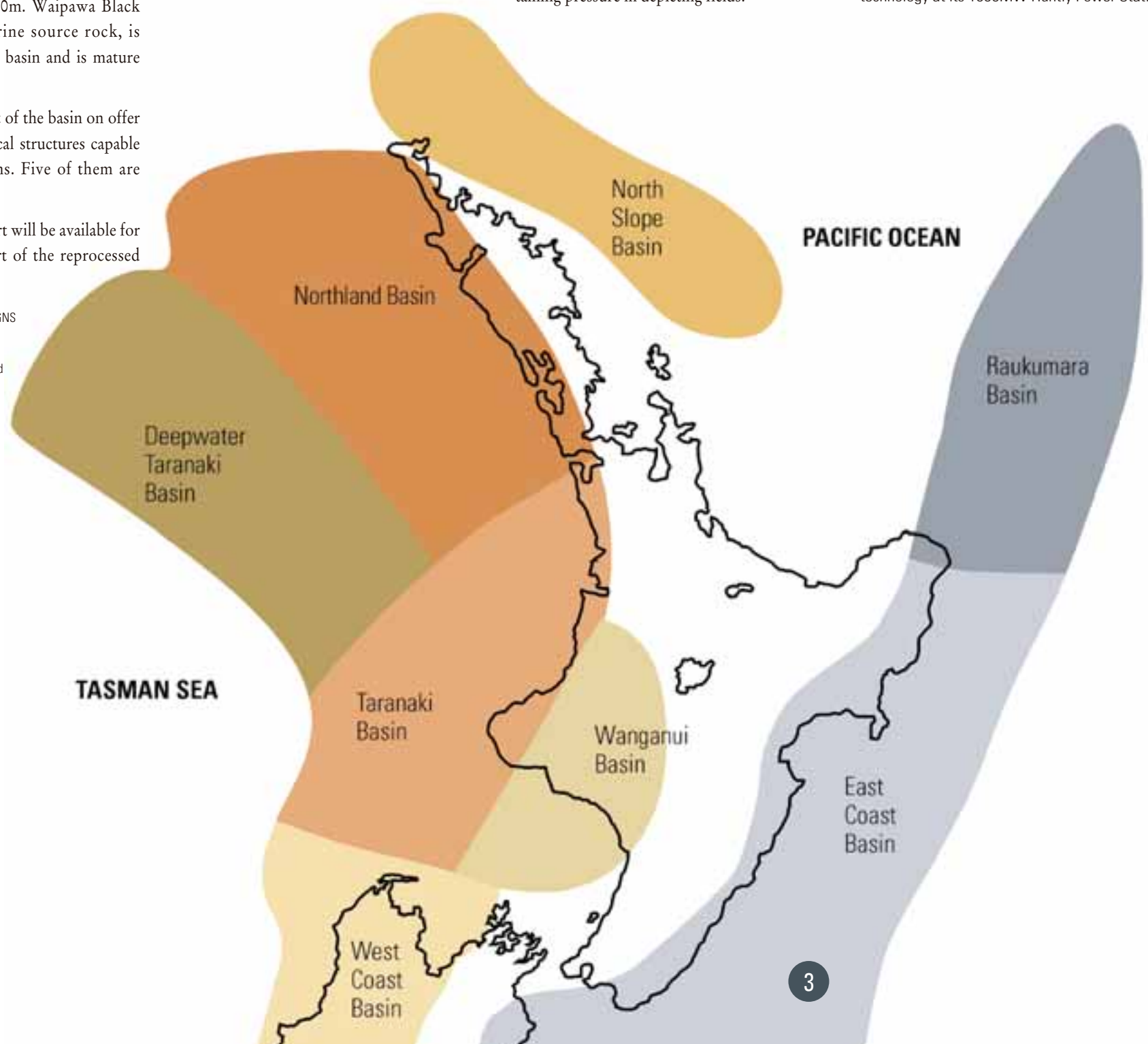
Genesis Energy may trial new CO_2 separation technology at its 1000MW Huntly Power Station.



World's deepest-diving submersible coming to New Zealand

Scientists from New Zealand and Japan will later this year explore submarine volcanoes and seafloor hot springs off New Zealand's northeast coast in the world's deepest-diving submersible. The Japanese-owned ***Shinkai 6500****, with a crew of three, will make up to six dives along the Kermadec Arc, 350km northeast of Whakatane.*

The 17-day project will give us our first close-up look at seafloor hot springs, rare deepsea organisms, and spectacular geological formations on the seafloor within New Zealand's Exclusive Economic Zone. The cost of the project, starting in Auckland on 25 October 2004, is being met by the Japanese government as part of an ongoing relationship between Japanese and New Zealand science organisations.

The project is being jointly led by two GNS scientists – marine geologist Cornel de Ronde and marine geochemist Gary Massoth. Both have made previous dives in deep-diving submersibles, including *Shinkai 6500*.

The Japan Marine Science and Technology Centre (JAMSTEC) owns and operates *Shinkai 6500*, which is capable of taking three people to a maximum depth of 6.5km for nine hours at a time.

Diving to depths approaching 2km, the scientists plan to capture video footage and new knowledge about the geology, mineral resources, and marine life along the Kermadec Arc. Information obtained from surface ships during the past six years suggests a rich harvest of scientific discovery awaits them.

The joint Japanese-New Zealand project will focus on two of the many active submarine volcanoes in the Kermadec Arc. The main target will be Brothers volcano which is three times the size of White Island and sits in 1850m of water. Brothers is the most active of New Zealand's many offshore volcanoes, with a thick plume rising from its large bowl-like crater. The other dive target is Healy volcano, similar in size and activity to the nearby Brothers volcano.

Seafloor hydrothermal vents in the Kermadec region are home to thriving communities of unusual marine organisms, some of which are likely to be new to science. Scientists believe that some deepsea organisms may have potential applications in a range of areas, including pharmaceuticals. GNS scientists will characterise the physical and chemical environments in which the hot spring organisms live.

The project marks the first visit to New Zealand by a submersible capable of diving to the bottom of the world's deepest oceans. It also signals the start of a new era in off-shore exploration and scientific discovery for New Zealand.

For more information on JAMSTEC and the *Shinkai 6500*, visit: www.jamstec.go.jp

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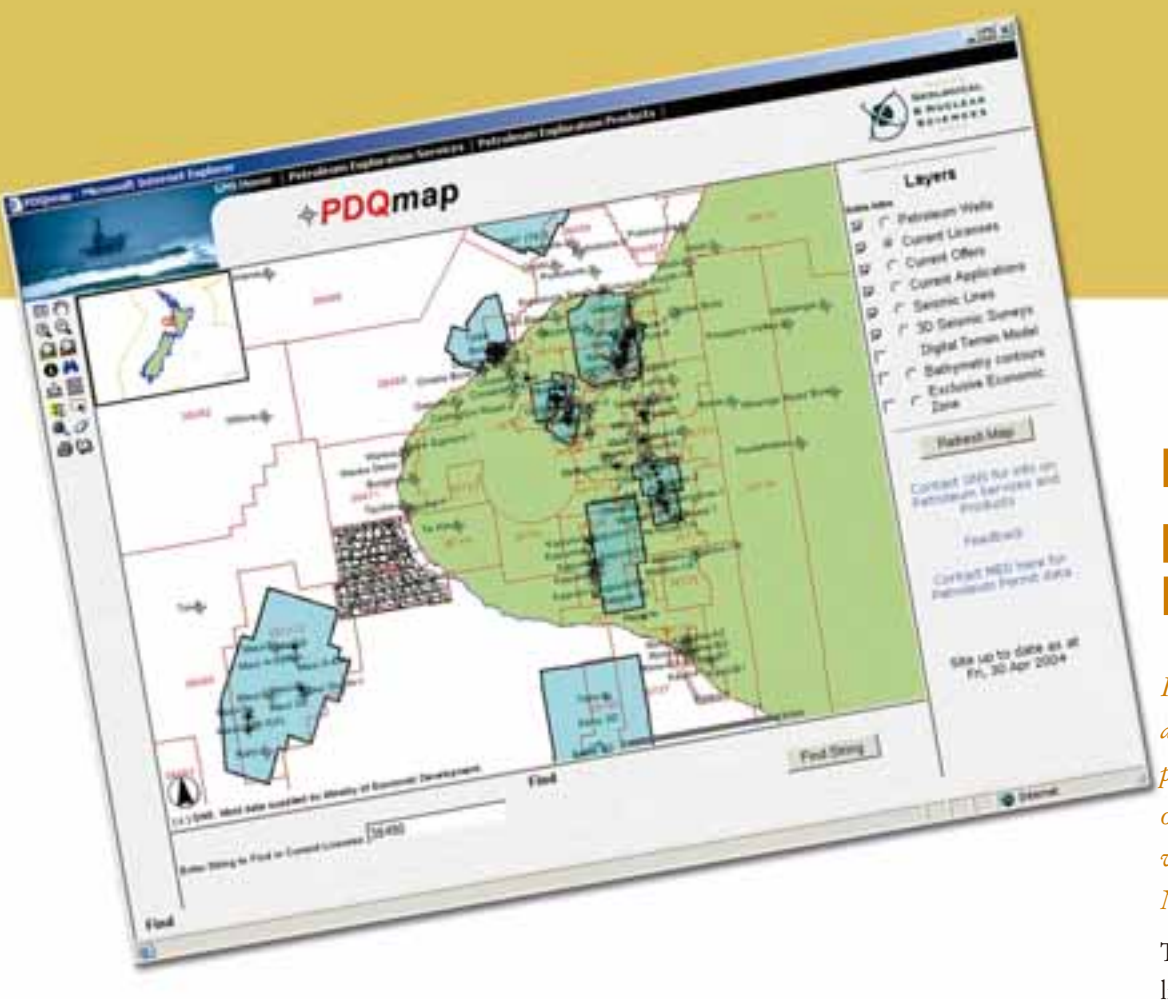

Minerals CD promotes New Zealand

In partnership with the government agency, Crown Minerals, GNS has produced a digital information package on gold deposits associated with volcanic and geothermal areas in the North Island.

The attractively packaged CD-Rom highlights prospective, under-explored areas that potentially contain undiscovered gold deposits. It is aimed at attracting increased investment in mineral exploration, particularly from overseas companies.

The areas covered in the CD are the Taupo Volcanic Zone, Coromandel, Great Barrier Island, and eastern Northland.

Included on the CD is information on geology, structure, geochemistry, topography, tenement information, geophysical images and interpretation, known epithermal gold deposits, and mineral potential maps. Information is supplied in ESRI GIS format with pre-built ArcMap, ArcView, and ArcExplorer projects. Information is presented in more than 110 different themes or layers that can be viewed in any combination.

Users can also zoom in on an area to find out about a wide variety of information. As well as specialist mapping software, the CD can be accessed by other mainstream database software. The CD also contains PDF-format reports on the North Island's epithermal deposits and on prospectivity modelling.

It shows potential for new world-class gold discoveries in the Coromandel region, and favourable gold areas in Northland and the Taupo Volcanic Zone. It ranks areas according to their prospectivity and identifies land administered by the Department of Conservation.

Information on the CD comes from a wide variety of sources including mining company reports, numerous GNS databases, university research, and independent geological studies. The CD marks the first time much of this information has been available in digital format.

The CD was conceived and paid for by Crown Minerals to attract new exploration investment to New Zealand. It was extremely popular with delegates at a minerals trade show in Canada in early 2004. It is a companion to an earlier CD focusing on mesothermal gold.

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or Mark Aliprantis, Manager, Petroleum and Minerals Investment Unit, Ministry of Economic Development

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New online service for oil and gas exploration industry

GNS has developed an internet-based information service for the oil and gas exploration industry. It offers a huge range of information about petroleum fields and licence areas at the click of a mouse.

The first online petroleum information service to cover the whole of New Zealand, it enables a user to zoom in on a petroleum licence block to find out about the licence holder's plan of work.

Users can also obtain information about wells drilled in the licence block and seismic data acquired. The free facility is aimed particularly at new entrants to the New Zealand scene. It will also be valuable for existing players who want to know more about neighbouring plays. GNS has plans to develop the facility and offer a greater range of information. It is available through the main GNS website.

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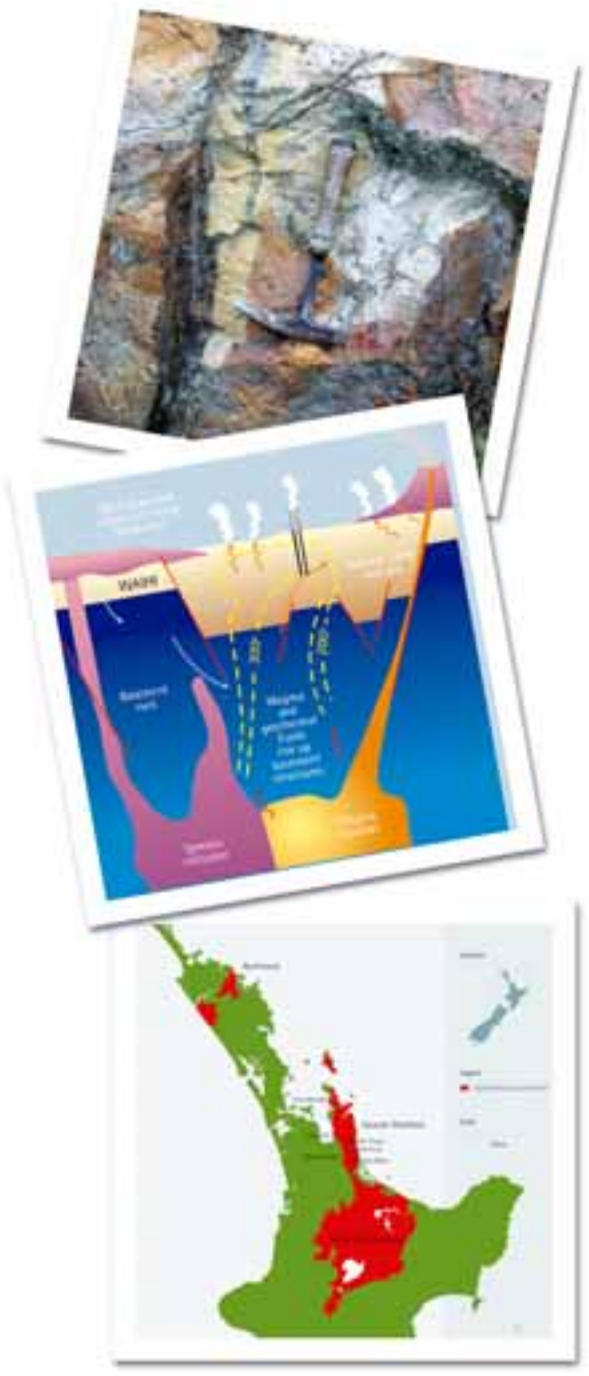
The *Shinkai 6500* (above) is coming to New Zealand in October to dive on two submarine volcanoes northeast of Whakatane. The submersible and its mother ship *Yokosuka* will spend several days in Auckland preparing for the 17-day expedition. The joint Japanese-New Zealand project is part of GNS's programme to gain new knowledge and improved understanding of New Zealand's offshore territory.



An eye for international partnerships

New marketing manager with GNS's Natural Hazards Group, Noel Trustrum, has extensive experience in natural hazards and watershed management. A geomorphologist by training, the former Landcare Research scientist has 30 years' experience in environmental science in New Zealand and internationally.

As well as New Zealand, Noel has worked in Australia, Japan, Vietnam, Spain, Hawaii, Indonesia, and the Solomon Islands. A career highlight was working in the northern Pacific island of Pohnpei, part of the Federated States of Micronesia. Over several years he contributed to a community-driven programme to develop a management plan to help stop deforestation of the island. It involved raising community awareness of the damage that forest removal was doing to the soil, and the way it was increasing vulnerability to drought and imperilling the standard of living on the island.

Noel is a strong advocate of using research achievements that are internationally recognised as a platform for securing consultancy work in New Zealand and overseas. He sees the development of internationally significant partnerships, especially those with inter-governmental agencies such as the South Pacific Applied Geosciences Commission (SOPAC), as one of the key roles of his new position.

He believes there are international opportunities for GNS in loss modelling for the insurance industry, training in hazards management, and land stability issues. Other international prospects include consultancy and training in areas such as mitigating the effects of earthquakes and preparing for a volcanic crisis.

An early observation on joining GNS was that modelling of damage and losses for earthquakes is considerably more advanced than modelling of landslides and sediment loss.

"At GNS the modelling of earthquake ground-shaking, seismic attenuation, and effects on buildings and other structures is impressively advanced."

Noel also believes the devastating floods in the Manawatu and Wanganui regions in early 2004 have produced a reawakening about the importance of landslides, sediment loss and the use of erosion-prone land.

He believes research in this area should be stepped up to address mitigation issues that have remained unresolved since Cyclone Bola in 1988.

"Sixteen years on and we haven't learned the lessons about the relationship between appropriate land use in our catchment headwaters and the sedimentation effects on people and infrastructure downstream."

Noel has a DSc in geomorphology and environmental science from Victoria University of Wellington. His awards and honours include being a recipient of the French-New Zealand Cooperative programme in 2002 and 2003 and a professional associate of the East-West Center, Hawaii. He was also awarded fellowships with Sumitomo Science Foundation and the Nissan Science Foundation, both involving research in Japan.

He is co-chairman of the New Zealand Natural Hazards Cluster, a group of 30 organisations that specialise in the management of natural hazards.

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Workshop participants look on as GNS scientist Bill Trompetter demonstrates the use of an ion microprobe for analysing geological samples.

Isotope workshop over-subscribed

Learning how to get the most out of isotope analytical techniques was the theme of a recent workshop at GNS's National Isotope Centre (NIC). The inaugural Quaternary Techniques Workshop attracted earth science lecturers and post-graduate students from New Zealand and Australian universities.

Choosing the most appropriate isotope analytical technique is essential in obtaining useful information in any earth science research. There are many pitfalls for the unwary when dating geological samples and interpreting data. The workshop covered geochemical and geochronological techniques available to scientists studying earth processes during the past 250,000 years.

Major areas covered included radiocarbon dating, stable isotope analysis, silicon-32 dating, groundwater dating, surface exposure dating, and ion beam analysis. The workshop fills an important niche in the New Zealand earth sciences sector. Nowhere else can scientists get a combination of seminars and hands-on laboratory demonstrations covering such a wide range of isotope techniques.

The fact that the workshop was over-subscribed indicates there is a strong demand for knowledge in isotope analytical techniques.

The NIC is a national facility available to New Zealand universities and other research organisations. It is hoped the workshop will promote more interaction, particularly with young New Zealand scientists. A follow-up workshop is planned for 2005.

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Full steam ahead for nanotechnology programme

GNS's nanotechnology programme has moved into top gear with the installation of world-class equipment. New ion implanter equipment will enable GNS to make nanostructures in-house from late 2004.

Previously GNS's nanostructures were manufactured in Germany with turnaround times of up to three months. The new equipment at GNS's National Isotope Centre in Lower Hutt will sharply reduce production times and speed up the programme significantly.

The two low-energy implanters will be able to simultaneously implant ions from two different sources in a single substrate, usually a wafer of silicon. This increases the range of nanostructures GNS can fabricate.

Having two implanters means ions can be implanted at varying depths in a substrate, from atomic distances to several tens of nanometres. This will enable GNS to customise nanostructure surfaces to produce a range of properties.

The new facility, believed to be the only one of its type in the Southern Hemisphere, is so versatile it can theoretically implant ions from any element in the Periodic Table. However, GNS concentrates on implanting silicon, aluminium, oxygen, nitrogen, and carbon ions. Under discussion are hydrogen, helium, zinc, and magnetic ions.

In simple terms, making a nanostructure is a two-stage process taking less than 60 minutes. The first stage involves firing ions at a silicon wafer to implant them. The wafer is then heated to about 1000degC for a few seconds – a process called rapid thermal annealing. Both processes take place in a vacuum chamber to control the ambient gas temperature.

Once fabricated, nanostructures are examined under an atomic force microscope and then tested for their electrical, mechanical, chemical, and optical properties.

Nanostructures have potential applications in the electronics industry. GNS started its nanotechnology programme in 2001 and has applied for three provisional patents covering fabrication techniques. Nanostructures have vastly superior electrical, mechanical, chemical, and optical properties compared to conventional materials. These changes result from the way individual atoms are forced to assemble and interact.

Discoveries and innovations from the GNS nanotechnology programme have already attracted strong interest from the international community of nanotechnology researchers. GNS's nanotechnology programme is designed to understand the properties of nanostructures and develop commercial prototypes for the next generation of electronic and opto-electronic devices. GNS has formed alliances and partnerships with overseas organisations to help in achieving this.

Contact: Andreas Markwitz, Nanotechnology Programme Leader, GNS

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Above: GNS nanotechnology team Andreas Markwitz (left), Steve Johnson, John Kennedy, and Bill Trompetter.

Students and scientists combine for water quality study

Students from Rotorua's Western Heights High School (WHHS) have joined forces with GNS in an innovative science project to monitor water quality in Lake Rotoiti and the Kaituna River, in the Bay of Plenty.

Called the Kaituna Project, it is the brainchild of WHHS science teacher Murray Pearce, who was awarded a Royal Society Teacher Fellowship for 2004 to set up the initiative.

"The project has exceeded my expectations in terms of the benefits to the students. They are absolutely thrilled to be working with professional scientists on a real project that has the potential to deliver long term environmental benefits to the Bay of Plenty," says Mr Pearce.

The project is designed to give students practical experience relevant to Level 3 NCEA subjects of science, geography, chemistry, and biology. The students and scientists collect water samples from 15 sites and analyse them in the field, and later in GNS's laboratories at Wairakei, near Taupo.

Information collected during the project is a valuable resource for scientists and other groups interested in the health of the water. It will be particularly useful in the future as attempts are made to restore water quality in Bay of Plenty waterways.

A good deal of its success comes from the way it seamlessly links real-life issues with the NCEA curriculum. The large hands-on component helps to make science engaging and relevant.

As well as the sampling and analytical work, the students learn about land use, local history, geology, geography, and cultural aspects related to water use.

Support for the project from Environment Bay of Plenty, landowners adjacent to the sample sites, and general public has been tremendous, says GNS Hydrogeologist Stewart Cameron.

"It is rewarding to see the students so enthusiastic about science. We would like to see the project expanded to other areas of science and to other parts of New Zealand."

Both organisations hope the project will not only get more students enthusiastic about pursuing science careers, but also lead to greater community awareness of environmental issues and improvements in the quality of water in Bay of Plenty waterways.

Contact: Murray Pearce, Royal Society Teacher Fellow 2004

or Stewart Cameron, Hydrogeologist, GNS

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Above: Students from Rotorua's Western Heights High School work with GNS scientists to monitor water quality in Bay of Plenty waterways.

GNS works closely with Maori university

GNS is working with a Maori university in Whakatane to help build their capacity in earth and environmental sciences. Te Whare Wananga o Awanuiarangi, opened in 1992, has over 9000 students, and a strong focus on post-graduate science studies.

Chief Executive Raumati (Gary) Hook says the partnership with GNS is an important part of his university's desire to expand its range of science subjects. The university already offers under-graduate and post-graduate degrees in environmental sciences and is in the process of gaining accreditation to provide PhD programmes.

"Our dream is to set up a scientific research institute to train Maori researchers, some of whom aspire to careers in international science. Our partnership with GNS will go a long way to building this dream," Dr Hook says.

The GNS input will consist of teaching, developing short-course programmes, supervision of post-graduate students, and one-off lectures and workshops on topical issues. The two organisations are also exploring the possibility of setting up a research facility to support collaborative research projects.

"Our students and staff will benefit because they will be able to work with a first-class research organisation. It will enable our people to better develop career paths.

"They could head out into the world of science, or they could return to their iwi roots to help Maori with scientific research and debate."

Another of the many benefits is the potential the partnership has to improve the university's credibility, Dr Hook says.

Even before the formal partnership started, GNS staff were giving lectures and seminars on the campus. GNS's long term association with the Bay of Plenty region has been built on 'bread and butter' geology, volcanology, geothermal development, seismology, and mineral wealth.

More recently, GNS's Bay of Plenty portfolio has grown to include extremophiles, specific geological hazard studies, GIS applications, water quality issues, and exploration of the ocean floor.

GNS Chief Executive, Alex Malahoff, sees the partnership embracing all these topics.

"Initially the range of joint projects will be modest, but it will grow. The partnership is an excellent fit with our goal of nurturing the growth of earth and environmental sciences in New Zealand," Dr Malahoff says.

"The university is progressive and well-led. We see a compelling case for working together across a wide range of topics."

GNS found it immensely rewarding to share its knowledge and expertise with an organisation that embraced the future with such enthusiasm.

"The university's location on the Bay of Plenty coast is symbolic for GNS, as it represents a transition point between our land-based research and our ocean studies.

"In the future, we would like to host senior students and staff from the university at our Lower Hutt facility to work with us on earth and ocean science issues of local and national importance."

Dr Malahoff had the honour of having an adjunct professorship bestowed on him at the university's 2004 graduation ceremony.

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or Murray Hemi, Manager, Maori Strategy, GNS
Email: a.malahoff@gns.cri.nz **or** m.hemi@gns.cri.nz

Below: GNS Chief Executive, Dr Alex Malahoff (left), congratulates John Hohapata-Oke on being awarded his Bachelor of Environmental Studies degree at a recent graduation ceremony at Te Whare Wananga o Awanuiarangi in Whakatane, where Dr Malahoff was an invited speaker. *Photo courtesy of Eastern Bay News.*

Above: GNS property manager Brett Gillies and the recently aquired building at Avalon, Lower Hutt.

Building purchase a long term strategy

GNS has bought the former National Film Unit property in Fairway Drive, Avalon, Lower Hutt. The building was designed specifically for the film industry and is currently tenanted by companies in that industry.

GNS's Lower Hutt-based staff will continue to be housed at the existing research campus at Gracefield until space becomes available through expiring lease obligations.

Eventually, the linked two and three-storied buildings on the Avalon campus will provide GNS with the long term home it has lacked. It has the space to allow for expansion and the development of new capabilities, as well as allowing GNS to host more visiting researchers from New Zealand and overseas. On-site conference facilities will enable GNS to stage modest-sized events on the campus.

Contact: Graham Clarke, Chief Financial Officer, GNS

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"As a scientist who has trained almost entirely in New Zealand, I'm excited about broadening my horizons, making overseas contacts, and bringing home fresh ideas."
Ursula Cochran

Science and art collide in new photographic exhibition

Photographs taken by GNS scientists feature in a new exhibition which will tour New Zealand for the next two years. Called Unseen Worlds - New Dimensions, the collection of 40 large-format photographs explores the shared ground between art and science. It is designed to give New Zealanders an opportunity to see the extraordinary images that scientists capture during their everyday work.

As well as images from GNS, the exhibition also features photographs from NIWA and the Malaghan Institute of Medical Research. GNS images were contributed by Ursula Cochran, Duncan Graham, Chris Hollis, Nick Mortimer, Ian Raine, Brad Scott, and Andy Tulloch.

Images in the exhibition reveal some of the remarkable colours and shapes of nature starting at the molecular scale and moving up. Included are images from within the human body, deepsea species, 70 million-year-old microfossils, and intricate crystalline structures inside rocks such as granite.

Also featured are scientists from the three organisations, presented on touch-screen video monitors, talking about their work.

The exhibition starts with a three-month showing at Auckland's War Memorial Museum from early July 2004. It then travels to Wellington for an extended summer season (October 2004 to March 2005) at Museum of Wellington City and Sea. Other venues include Southland Museum of Art & History (Invercargill), the International Science Festival (Dunedin), and Te Manawa, Palmerston North.

The exhibition was developed by Jude Benson of Benson & Associates, and Ian Kennedy of The National Science-Technology Roadshow Trust.

To view the GNS images in the exhibition:

www.gns.cri.nz/news/release/artandscience/index1.htm

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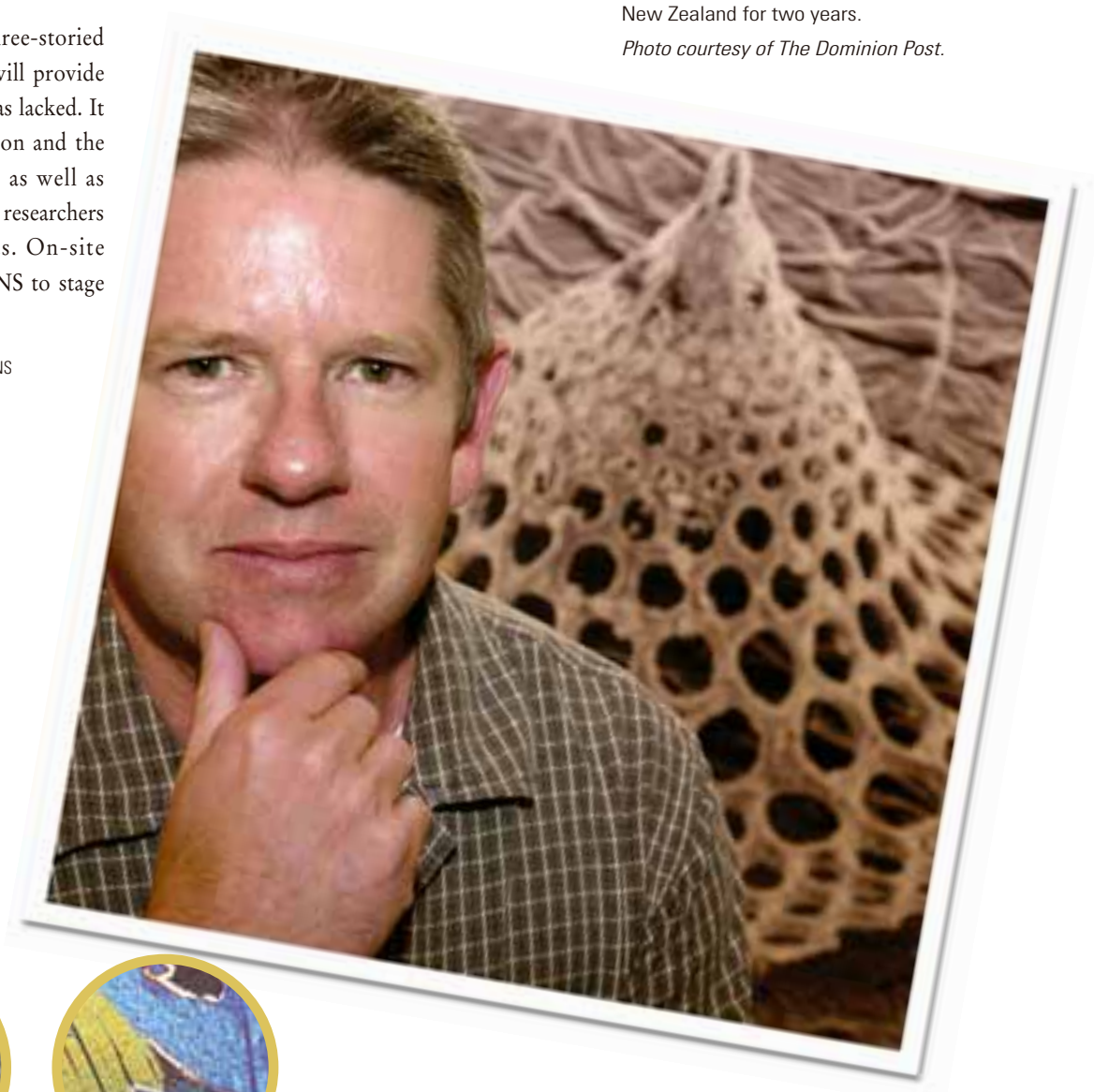
Below: GNS paleontologist Chris Hollis with his large format photo of a fossil radiolarian. The photo is one of 40 striking and unusual images of science in the *Unseen Worlds – New Dimensions* exhibition that will tour New Zealand for two years.
Photo courtesy of The Dominion Post.



Accolade for earthquake scientist

A GNS scientist who searches for "hidden" geological records of great earthquakes and tsunamis has won the 2004 Zonta Science Award.

Ursula Cochran's work takes her to some of the most remote and beautiful parts of New Zealand.

Ursula says she enjoys the challenge of investigating "big picture" questions that span geological time scales so she can produce results that will benefit New Zealanders.

It is not known whether New Zealand is vulnerable to great plate boundary earthquakes such as the magnitude 9.5 quake in Chile in 1960, or the magnitude 9.2 quake in Alaska in 1964. Ursula is part of a team trying to find out if such earthquakes have occurred in New Zealand in the past.

She and her team collect drillhole cores from lagoons and estuaries along the North Island's east coast. She studies diatom microfossils (a type of single-celled algae that produce ornate silica shells) found in sediment. This enables her to detect large changes in the environment, caused by earthquakes.

Sediment dumped on shore by large tsunami waves contains signals that Ursula and her team can decipher. Radiocarbon dating provides estimates of when prehistoric earthquakes and tsunamis occurred.

"By working out how often these events occur and their impact, we will be able to determine if they represent an increased hazard to New Zealand's east coast."

Ursula received her award from the Governor-General Dame Silvia Cartwright at Government House in Wellington. The Zonta Science Award is presented every two years to a woman with a PhD who has excelled in pure or applied science, has excellent communication skills and is a good role model for younger women. Zonta is an international organisation of business and professional women.

The award carries a $5000 cash prize plus return airfares to do research in either Europe or the United States. Ursula will use her award to travel to the west coast of the US later this year to work with specialists in her field and attend a major international conference.

Ursula has BA, BSc (Hons), and PhD degrees. The award is sponsored by Zonta International Club of Wellington, BP Oil New Zealand, and the John Ilott Charitable Trust.

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