ANSWERS TO QUESTIONS ON NOTICE

AGENCY: GEOSCIENCE AUSTRALIA

INQUIRY: Joint Standing Committee on the National Capital and External Territories: Australia's Antarctic Territory

REFERENCE: Question on Notice (Hansard, 19 October 2017, pages 13- 19)

QUESTION 1:

CHAIR: I understand, for example, there are nations that are there understanding the geology and the availability of resources in the territory. Is there a requirement for them to share that information with you so you can also benefit from their activity within our territory and so you can map or quantify the resource that other nations are inquiring into?
Dr Minchin: I would probably prefer to get the exact details for you and take that on notice, if that's possible.
CHAIR: Yes, you're welcome to.

ANSWER:

The Antarctic Treaty provides a framework and governing philosophy for the work of nations in the Antarctic and stipulates, among other things, that:

- there shall be complete freedom to undertake scientific investigations; and
- scientific data shall be shared among Treaty nations and made readily available.

The data sharing philosophy of the Antarctic Treaty is not enforced and it is up to individual nations active in Antarctica to ensure scientific data is shared. The sharing of scientific data is encouraged by the Scientific Committee on Antarctic Research (SCAR). The SCAR Data Policy urges nations affiliated with SCAR to establish a National Antarctic Data Centre. Certain countries, including Australia, the United Kingdom, Germany and the USA, have well-established Antarctic data centres which enable public access to all scientific data collected in Antarctica.

The Australian Antarctic Program (AAP) Data Policy ensures all data and samples generated as part of Australian research projects are lodged with the Australian Antarctic Data Centre (AADC) or an approved alternative repository, and are made public. Geoscience Australia adheres to the Antarctic Treaty framework and AAP Data Policy and ensures all geological data and samples generated in Antarctica are publicly available as soon as possible following data collection.

Our experience has shown that most nations are willing to share their data once scientific relationships have been established. However, not all nations have the necessary digital infrastructure to make their data easily discoverable or accessible. In these cases, ad-hoc data sharing often occurs at the scientist-to-scientist level following discussions on topics of mutual interest, or by establishing strategic collaborative projects.

In some cases, there are nations undertaking geoscientific research where we have no access to the data and little or no information on what studies are being undertaken. Our experience has shown that the most effective way to establish contact with scientists in these countries and gain access to scientific data that is not publicly available is through engagement with the international scientific community at conferences and workshops.

Scientists from Geoscience Australia regularly attend international conferences on Antarctic research, including the SCAR Open Science conference (multidisciplinary Antarctic conference held every two years) and the International Symposium on Antarctic Earth Sciences (Antarctic geological conference held every 4 years) to learn about the latest Antarctic geoscience research and to engage with international Antarctic scientists.

Further, our scientists are engaged in the Scientific Committee for Antarctic Research (SCAR) as Australian representatives or members of various Working Groups and Action Groups.

QUESTION 2:

Mr COULTON: How stable is the continent? Is there seismic activity, thermal activity? I'm wondering whether at Geoscience Australia you're there monitoring earth movements and things like that. Or is it fairly stable?
Dr Johnson: Well, undoubtedly there will be some level of seismicity. I'd need to take it on notice to provide accurate information.

ANSWER:

Volcanism: Volcanism in Antarctica is more extensive than previously thought. A recent study by UK scientists used ice-penetrating radar to detect sub-glacial volcanoes on the Antarctic continent. They documented 138 volcanoes, of which 91 were previously unknown, including the largest volcano on Earth. It is unknown how active these volcanoes are. The volcanoes mostly occur in West Antarctica, outside of Australia's Antarctic Territory. An extinct volcano, named Gaussberg, is located in the Australian Antarctic Territory on the coast between Casey and Davis stations.

Seismicity: Earthquakes do occur in Antarctica. However, the seismicity observed on the Antarctic continent is very low in comparison with other continental intraplate regions (such as Australia). It is hypothesised that the weight of the Antarctic ice sheet suppresses earthquake faulting. Most of the Antarctic seismicity is located on the opposite side of the continent from the Australian Antarctic Territory (near the Antarctic Peninsula).

Monitoring: Previously held notions that Antarctica is aseismic have been disproven based on data collected at seismic stations in Antarctica. Geoscience Australia operates a seismograph at Mawson station, and a Global Navigation Satellite System (GNSS) station at each of Australia's Antarctic stations. Geoscience Australia uses data from the Mawson seismograph to help detect, locate and characterise earthquakes that occur in Antarctica, Australia, New Zealand and the Southern Ocean, and can use data from the GNSS network to further characterise the earthquakes (though this is not the primary purpose of the GNSS).
From Wilkes Land to Enderby Land, where the Australian Antarctic stations are located, the lack of coastal seismicity is notable. However:

- In 1997, a Magnitude 5.7 earthquake occurred approx. 100 km from Casey station. This is the largest continental Antarctic earthquake on record in eastern Antarctica.
- There is significant intraplate seismicity in the Balleny Island's region (approx. 2000 km west of Casey station and 1000 km south of Macquarie Island).
- The largest earthquake on record for the Antarctic Plate, M8.1m occurred west of Balleny Islands on 25 March 1998.
- In the last 20 years, there have been 24 earthquakes of Magnitude 5+ in the Balleny Islands region.

- The sparse seismic recording capabilities in Antarctica limit both the number and size of earthquakes that can be routinely detected. Most agencies that locate earthquakes on a global scale only concentrate on moderate to large earthquakes (~Magnitude 4.0 and larger) that seldom occur in Antarctica.,
- Melting permafrost owing to global warming may trigger small (~M 1.0) seasonal "frost quakes" at shallow depths due to phase changes of groundwater. These events are usually not damaging, but can be felt and may affect surface infrastructure.

QUESTION 3:

Senator McCARTHY: I want to go to parts of your submission, on pages 15, 16 and 17, following on from the deputy chair's questions around marine geoscience. You say there that the expedition for the RV *Investigator* has had its time cut from 300 days to 180 days per year, limiting opportunities available. Can you explain to the committee why that's happened?
Dr Minchin: I believe it's probably not exactly correct. It hasn't been cut; it was never funded for the full 300 days. There is spare capacity on the *Investigator* that could be used for a range of marine survey purposes, but the Marine National Facility has funding to support operations only for around half its available capacity.
Senator McCARTHY: So were there 300 days of travel at some point?
Dr Minchin: I don't believe so.
Senator McCARTHY: Would you like to take that question on notice?
Dr Minchin: Yes.
Dr Smith: My understanding is that it was designed to be at sea for 300 days. The remaining days of the year were for maintenance at port. So it's capable of being at sea for 300 days but it's funded for only 180 days.
Senator McCARTHY: So at some point it was at sea for 300 days?
Dr Minchin: No.
Senator McCARTHY: So how do we interpret that sentence? You say there that it is cut from 300 to 180 days. Is that incorrect?
Dr Minchin: Look, I think that's poor English that you've picked up. It wasn't cut; it was always the hope that with a 300-day vessel it would be available for 300 days. That is not currently the case. It was probably reflecting the scientists'—
CHAIR: There's unmet capacity.
Dr Minchin: Yes, absolutely.
Senator McCARTHY: Okay.
ANSWER:

In May 2014, the Australian Government allocated AU$65.7 million over the next four years to operate the RV *Investigator*. The Commonwealth Scientific and Industrial Research Organisation (CSIRO) owns and operates the RV *Investigator* as the Marine National Facility (MNF), which is governed by an independent steering committee appointed by the CSIRO board.

The *Investigator* is designed for operation at sea up to 300 days per year; however, it currently operates at sea for approximately 240 days per year, of which 180 days are Government funded. The MNF can provide additional days through User Funded Voyages.
http://mnf.csiro.au/~/media/Files/Policies/Principles%20of%20Access-FINAL%2020170220.ashx

The RV *Investigator* is available for multidisciplinary research in oceans and seas around Australia, including the Southern Ocean and enables research to be carried out to the Antarctic ice-edge. The 180 government-funded days per year are shared between expeditions all around Australia. Ship time is allocated through a competitive process based on scientific merit and national benefit.

QUESTION 4:

Senator McCARTHY: Okay. The *Wyatt Earp* is scheduled to be decommissioned in 2020. Is that on track?
Dr Minchin: I'd have to take that on notice. The *Wyatt Earp* is a very small vessel, a local work boat for localised survey around the bases themselves. It is a small vessel and it's not something I've been briefed on.
Senator McCARTHY: So you'd like to take that question on notice?
Dr Minchin: Sure, absolutely.
Senator McCARTHY: Okay. Perhaps you can let the committee know just what the status of the *Wyatt Earp* is and whether it is on schedule for decommissioning.

ANSWER:

The ASV *Wyatt Earp* is an Australian Hydrographic Service (Department of Defence) asset so detailed questions about its activities and decommissioning schedule should be directed to the Department of Defence.

Based on information we have, the vessel's end-of-life date is 2020.

It is important to note the new icebreaker (RSV *Nuyina*) will be fitted with a science tender (a small watercraft for scientific operations) which will be able to perform the same activities as the *Wyatt Earp,* and more. The science tender includes an A-frame, small winch and multibeam echosounder, to enable studies of inshore areas, including shallow uncharted areas where it is dangerous to send the icebreaker. As it is being designed and built as a workboat for the new icebreaker, it will have greater flexibility for deployment in the Australian Antarctic marine jurisdiction.
QUESTION 5:

Senator McCARTHY: What are the names of the two surveys?
Dr Minchin: We would have to take that on notice.
Dr Smith: We'll take that on notice.
Senator McCARTHY: You might want to take this on notice as well, Dr Smith: have the surveys been done completely as Australian surveys or have they also been done in partnership with other countries?
Dr Smith: I don't know. I'd have to take that on notice.

ANSWER:

The RV *Aurora Australis* has only acquired marine *geoscience* information (i.e. information on the seabed) on two surveys in the last 10 years. These two surveys were both to George V Land near the Mertz Glacier.

Season	Name	Marine Geoscience Data Type	Research Organisations
2007/2008	CEAMARC/CASO Collaborative East Antarctic Marine Census/Climate of Southern Ocean	Sediment samples Benthic imagery	17 Australian 4 International

2010/2011	Marine Science SR3 Transect and Mertz Glacier	Benthic imagery	7 Australian

Information acquired during these marine surveys, together with the bathymetry data, permits Geoscience Australia to contribute to a better understanding of the physical seafloor environment and biodiversity of the East Antarctic continental shelf. This, in turn, supports development of evidence-based marine environmental management protocols and ongoing efforts by the Australian Government, in collaboration with other nations active in the Antarctic, to develop a system of Antarctic Marine Protected Areas.

A review of the past voyage schedule available on the Australian Antarctic Division website indicates that there were four additional dedicated marine science voyages in the last 10 years. These marine science voyages conducted research across a number of scientific disciplines, including physical and chemical oceanography, biology and sea ice, but did not conduct any *geoscience* activities.

QUESTION 6:

Senator McCARTHY: Dr Johnson, you've mentioned MOUs. How many MOUs would you have?
Dr Johnson: We'd have to take that on notice. It would depend on what period you're talking about.
Senator McCARTHY: Right now.
Dr Johnson: I'd still have to take that on notice. I'd have to go back and look at the time frame for particular MOUs and whether they are still in place.
Senator McCARTHY: The following are questions on notice. How many MOUs do you have currently? How many have you had in the past two years? Who do you have those MOUs with?
Dr Minchin: Are you specifically looking for other countries? Is that the intent? Or other agencies?
Senator McCARTHY: We would certainly like to understand the relationship with other countries, but if your MOUs are internal, please feel free to provide that information.

ANSWER:

Geoscience Australia currently has 10 MOU's with other agencies to undertake collaborative work in Antarctica. Of these, six are with international organisations including NASA and the Japan Aerospace Exploration Agency. The full list of current MOUs is tabled below.

Current and recent agreements between Geoscience Australia and other agencies

Agency	Type	Dates	Purpose
Comprehensive Nuclear Test Ban Treaty Organisation (CTBTO)	Contract		GA to construct infrasound station at Davis station
Comprehensive Nuclear Test Ban Treaty Organisation (CTBTO)	Contract		Operation and maintenance of the Australian seismic station at Mawson.
National Aeronautics and Space Administration (NASA)	Agreement	Signed 2007 No expiry	To share Geodetic Observation data (does not explicitly mention Antarctic station data but it is widely recognised that GA's network includes 3 stations in East Antarctica and Macquarie Island).
Japan Aerospace Exploration Agency	Agreement	Signed 2013	Concerning the cooperation of Multi-GNSS Monitoring Network (MGM-Net) which

(JAXA)			explicitly mentions Antarctic stations.
National Institute of Polar Research (NIPR)	Statement of Cooperation	Signed 2013 No expiry	To promote collaboration, cooperation and exchange between GA and NIPR in support of their Antarctic programs.
European Union	Cooperation arrangement	Signed 2015 No expiry	To access and use Sentinel satellite constellation data from Antarctica acquired by the Copernicus program
Department of Environment and Energy	NCF Collaborative Head Agreement	Signed 2014 Expires 2019	To streamline cross government collaboration on mutually beneficial areas including (among other things) management of the Australian Antarctic Territory.
Australian Antarctic Division	Project Agreement (under CHA listed above)	Signed 2015	Establishment of the infrasound station at Davis
Australian Antarctic Division	Project Agreements	Annual	Annual project agreements for Australian Antarctic Science projects led by Geoscience Australia. Ensures GA makes all data publicly available, acknowledges the Australian Antarctic Program and meets reporting requirements. GA currently leads 4 projects: #4092 – Geodetic and geophysical monitoring #4320 – Seabed habitats #4392 – Satellite-derived bathymetry #4393 – Landscape vulnerability
Bureau of Meteorology (IPS Radio and Space Services)	Agreement	Expired December 2014 but activities ongoing	GA to provide IPS with near-real-time GNSS and geomagnetic time series data from its observatory network for BOM forecasting services