FOI 300654 - Document 1

1. General Station Information

1.1 Station Name and Code – ASAR, PS-03

1.2 Sensor Geology

Australia was once part of the enormous landmass Gondwanaland, which earlier formed part of the super continent Pangaea. Much of its geological history is remarkably ancient; the oldest known rock formations date from 3 billion to 4.3 billion years ago. The great plateau of western Australia is underlain by a vast, stable shield of Precambrian metamorphic and igneous rocks, ranging in age from 570 million to 3 billion years old. These form the core of the ancestral continent, which, with Antarctica, had split off from Gondwanaland during the Jurassic Period, less than 200 million years ago, and had begun drifting eastward (*see* Plate Tectonics). Australia began to assume its modern configuration by the Eocene Epoch, some 50 million years ago, when Antarctica broke away and drifted southward. The thick sedimentary rocks of the Great Dividing Range were deposited in a long, broad north-south depression, or geosynclines, during an interval that spanned most of the Paleozoic Era (570 million to 225 million years ago). Compressive forces buckled these rocks at least twice during the era, forming mountain ranges and chains of volcanoes. However, the volcanoes have long since become extinct, and as a result the mountain ranges are extremely eroded.

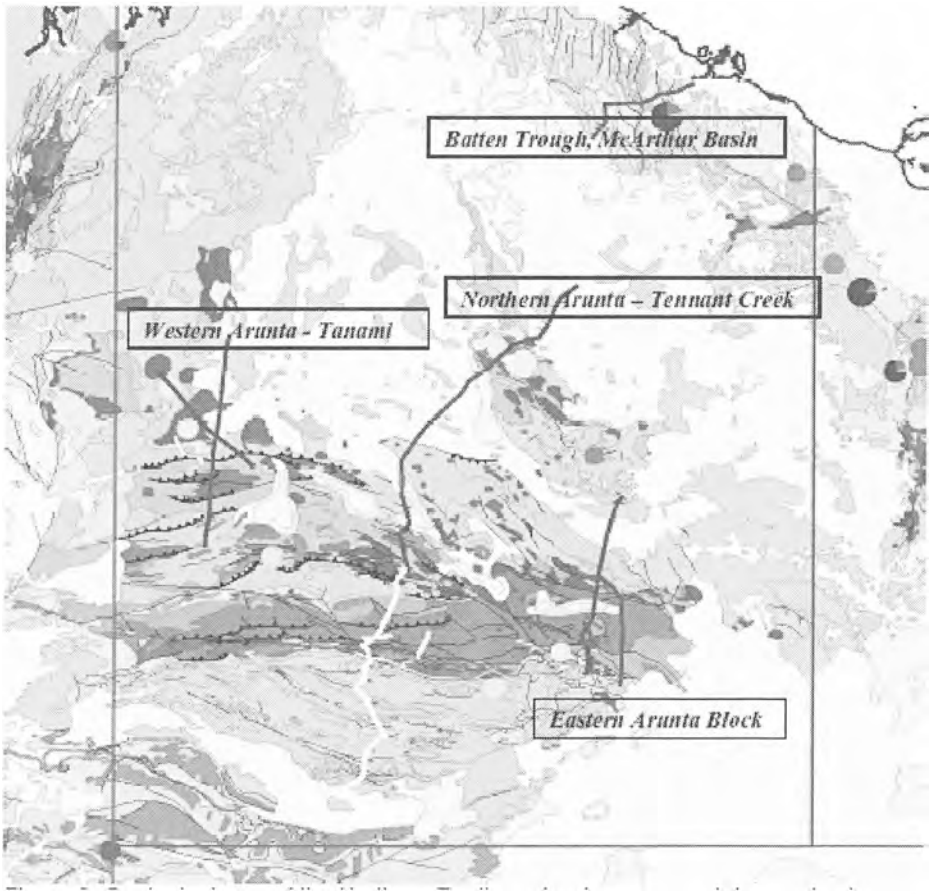


Figure1.2.1: Geological map of Northern Territory showing deep seismic traverses. Colored dots indicate major ore deposits. Gold - yellow, Lead/Zinc - blue/cyan.

FOI 300654 - Document 1

1.3 Station Operator

Administration and Operation
Australian NDC: s22
Geoscience Australia
Canberra, Australia

Physical Address
s22

Local Operators
Detachment 421
Unit 11001
USA APO 96548-0007

Phone: 61-8-8953-0633
FAX: 61-8-8953-0382
Email: det421.dc@octa4.net.au

1.4 Station History

Station opened 2 August 1955 with installation of Benioff 1051 instrument and was jointly manned by US Air Force and RAAF. JM 6480 instrument was added in 1962 and a Geotech 7505A in 1964. In 1968 the station became the Joint Geological and Geophysical Research Station (JGGRS), managed jointly by the United Station Air Force and Bureau of Mineral Resources (renamed to Geoscience Australia in 2001). The station was expanded to a 13-instrument array using Teledyne Geotech 23900 instruments in January 1969. A three-component Teledyne Geotech KS3600 broadband instrument was installed in February 1982. The short period array was upgrade to a 19-instrument array using Geotech 23900 seismometers in June 1986 and the array name changed from SEAL to ASAR, along with some instrument location changes. The broadband instrument was upgraded to Geotech KS 54000s in December 1997. The Broadband was replaced with a Guralp CMG-3TB and the Science Horizon AQUINAS system was installed in June 2005 that includes AIM digitizers, AIMA-PC authenticators, CIM and Station Processor.

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1.6 Land Ownership

The Commonwealth of Australia (represented by Geoscience Australia) owns all real property, which constitutes the central recording facility known as Joint Geological and Geophysical Research Station and all borehole sites.

FOI 300654 - Document 1

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For many elements of the array the Commonwealth has an agreement with the Arrente-Hayes people on the types of activities that can be undertaken. This limits the degree of civil construction that can be performed. Guidance from the Commonwealth needs to be received before any new work is performed.

1.7 Equipment Title and Warranty

The Government of the United State of America owns all seismic instruments and equipment. The US NDC provides maintenance and depot support to mission equipment per memorandum of agreement between the two governments. The Science Horizons Inc. Aquinas system equipment is warranted for one year following delivery or 90 days after repair. The seismic equipment along with the intrasite communications equipment was delivered and installed June 2005 and is in the one-year warranted period.

FOI 300654 - Document 1

2. Site and Infrastructure

2.1 Site Survey

Terrain:

Australia lacks mountains of great height; it is one of the world's flattest landmasses. The average elevation is about 300 m (about 1,000 ft). The interior, referred to as the *outback,* is predominantly a series of great plains, or low plateaus; except for several eroded mountain chains, such as the Macdonnell Ranges in the southern part of the Northern Territory. Stony desert, sand plain, and sand hills cover the bulk of central Australia. Alice Springs is located on the banks of the normally dry Todd River in the MacDonnell Ranges of Central Australia, close to the geographic center of Australia. Refer figure 2.1.1 for map of Australia.



Figure 2.1.1. Map of Australia

Geology:

Northern Territory Geology Summaries: Deformed and metamorphosed Palaeoproterozoic orogenic rocks older than 1800 million years crop out as major tectonic units surrounded by younger rocks and essentially form the recognizable and inferred basement to the North Australian Craton. These Palaeoproterozoic rocks form the Pine Creek Orogen, Tanami Region, northern Arunta Province, and Tennant, Murphy and Arnhem Inliers. They include remnants of Archaean rocks, which have been dated at 2500 million years.

FOI 300654 - Document 1

Largely unmetamorphosed Palaeo to Mesoproterozoic (1800-1400 million years) sedimentary platform covers include the McArthur, South Nicholson and Victoria-Birrindudu Basins and the Ashburton and Davenport Provinces of the Tennant Inlier. Apart from the Davenport Province the successions are generally not strongly deformed.

To the south, the rocks of the North Australian Craton pass into the Central Australian Mobile Belts where crustal deformation and metamorphism continued until about 300 million years ago. These intensely deformed rocks form the Musgrave Block and the Arunta Province. In the southern Arunta Province, episodic igneous activity took place between 1880-1050 million years and deformation included a series of major tectonic events in the Proterozoic and Palaeozoic. The Palaeozoic events also affected the Amadeus Basin succession. The Musgrave Block experienced igneous activity at intervals from 1550-800 million years and major orogenic events at 1200 and 550 million years.

In the Amadeus, Ngalia, Georgina, Wiso, Daly and Ord Basins, which cover a large part of the Northern Territory, sedimentation ceased by the Early Carboniferous (about 330 million years ago). In the Pedirka, Arafura and Bonaparte Basins sedimentation continued well into the Triassic (200 million years). During the Jurassic to Cainozoic period (the past 200 million years) sediments of the Eromanga, Browse, Bonaparte, Money Shoal, Dunmarra and Carpentaria Basins were deposited.

Population Density: Alice Springs is located smack in the centre of mighty Australia and is probably one of the most **remote** population centres in the world with few ways in or out. The nearest city is Adelaide - over 1600 km away. With a population of 30,000, 'The Alice' is a small interesting town in the Outback.

Meteorological Information:
The climate of Australia varies greatly from region to region, with a tropical climate in the north, an arid or semiarid climate in much of the interior, and a temperate climate in the south. Despite these variations, the moderating influence of the surrounding oceans and the absence of extensive high mountain ranges help prevent marked extremes of weather. However, some areas occasionally experience extreme weather conditions, such as tropical cyclones, tornadoes, and severe drought.

Because Australia is in the Southern Hemisphere, its seasons are the reverse of those in the Northern Hemisphere. Seasonal variations, on the whole, are small. In Alice Springs, one of the few population centers in the vast arid interior of the continent, January temperatures average a daily high of 36°C (97°F), and July temperatures average a daily high of 19°C (66°F).

Australia is the driest of the inhabited continents. The arid and semiarid deserts and plains of central and western Australia encompass more than two-thirds of the continent's area. The deserts have an annual rainfall of less than 250 mm (10 in). In most years, extensive portions of the continent experience drought conditions. However, annual rainfall is much greater in the coastal regions of northern, eastern, and southern Australia.

FOI 300654 - Document 1

Seasonal/Wind Speed And Direction
From May-October anticyclones, or high-pressure systems, pass from west to east across the continent and may remain almost stationary over the interior for several days. These anticyclones may be 4,000 km wide and, in the Southern hemisphere, rotate anticlockwise. The other half of the year the anticyclones travel from west to east on a more southerly track across the southern fringes of Australia, directing easterly winds generally over the continent.

Summer (Dec-Feb) - Daytime maximums are generally in the high 30's but never above 45°C. Their dry air and cool nights help to make these temperatures very tolerable. If and when it does become humid, thunderstorms occur and can drop the temperature 15°C to 20°C in 10 minutes providing welcome relief. Monsoon rains occur periodically.
Autumn (Mar-May) - Warm days and cool nights and not much variation.
Winter (Jun-Aug) - Nighttime temperatures can fall below zero degrees Celsius and sometimes thick frost in the morning can look like a carpet of snow. Very pleasant afternoon temperatures usually follow these mornings in the low twenties. When it rains in winter, daytime maximums can be as low as 08°C to 10°C with stratus cloud covering the ranges.
Spring (Sep-Nov) - Big changes in temperature from day to day, thunderstorms, hail and dust storms. It is also the wild flower season, usually peaking in September and early October.

Environmental:

Month	Average Maximum Temperature C/F°	Average Minimum Temperature C/F°	Monthly Precipitation Average (inches)
January	36/97	21/70	1.4
February	35/91	21/70	1.6
March	33/91	18/64	1.5
April	28/82	13/55	0.5
May	23/73	8/46	0.7
June	20/68	5/41	0.6
July	20/68	4/39	0.6
August	22/72	6/43	0.4
September	27/81	10/50	0.3
October	31/88	15/59	0.8
November	34/93	18/64	1.0
December	35/95	20/68	1.4

2.2 Background Noise:

Power spectral density plots for the diurnal background seismic noise at ASAR sites are in Attachment 2-A. The data is representative of daytime (2:00 PM local time) and nighttime (2:00 AM) background noise for all four seasons. Each spectral estimate was established using a 1024-point Welch block averaging method with a Bartlett window using 20 blocks with 50% overlap. The data are plotted in dB relative to the units of acceleration ((1m/sec^2), and for comparison, Peterson's New Low Noise Model and New High Noise Model are also shown.

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FOI 300654 - Document 1



Figure 2.6.4. Typical SP Site

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FOI 300654 - Document 1

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2.10 Power Supply System and Back-up:

Field Sites. DC (24 volts) power provided to all sites via the cable plant and power protection devices within the wellhead termination unit protect the data acquisition components from any power line surges. Power supply assembly within the WHTU interface box converts power from 24 to 12 Vdc. In event of a power failure the station automatically transfers to generator power and an UPS with battery power provides conditioned power during this automatic transfer. The battery banks can supply power for xx minutes. In the event of a power supply problem, our technicians would visit the site. There are spare components.

Station - Central Recording Facility

FOI 300654 - Document 1

Primary - Commercial power is supplied to all of the seismic station equipment operated at the Station through an Uninterruptible Power Supply (UPS) as shown in Figure 2.10.2. The UPS provides conditioned power to the equipment as well as back-up power in the case a commercial power failure until the diesel power generator starts.

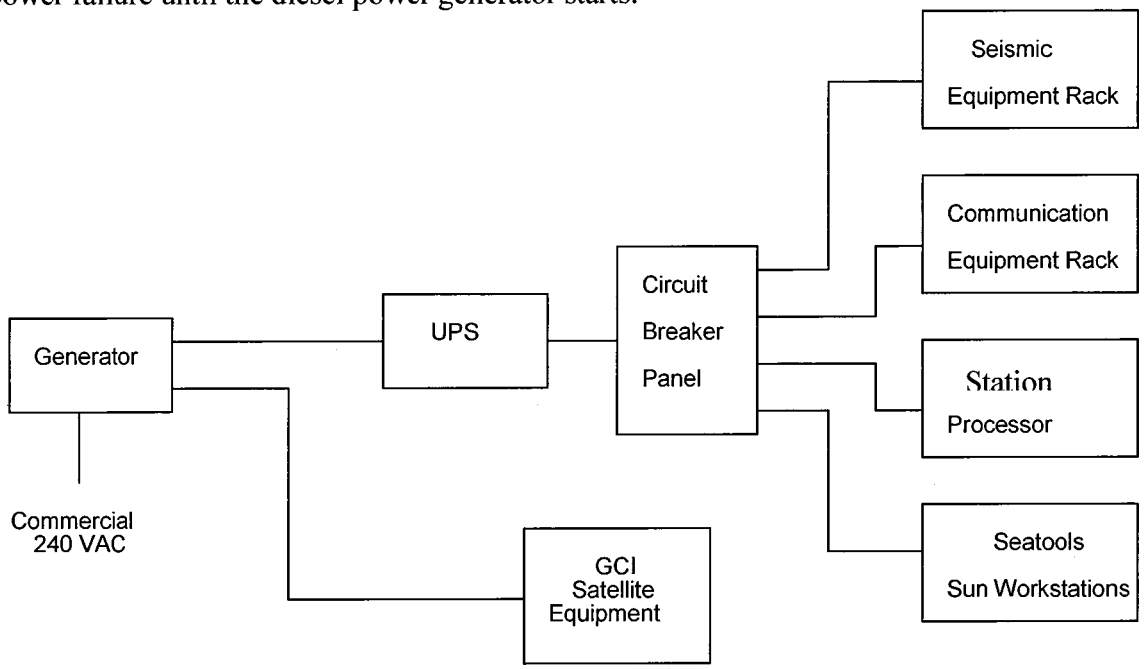


Figure 2.10.2. Power Supply System at Station

Backup Power - During commercial power outages, a 75 KW diesel generator provides backup power through an automatic transfer switch. This generator can operate over xx days with a full tank of fuel with load limits to the technical equipment. The UPS will provide technical power for over xx minutes.

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2.12 Lightning Protection:

Instrument Sites

Lightning protection at the instrument sites consists of a ground grid system at each borehole that is Cadwelded to the borehole casing. Polyphaser (Surge) lightning protectors are installed on the borehole site power and data cables. All lightning protection devices are connected to the site ground.

FOI 300654 - Document 1

Station Facility

Lightning protection at the station consists of a ground grid system that includes a lightning rod, installed at the top of the building and connected to its own ground system. All data cables have shield grounding and (Overvoltage) lightning protectors provided for protection.

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FOI 300654 - Document 1

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Instrument sites

Grounding at all instrument sites utilizes ground buss, which is connected, to the borehole casing. Ground grid ground rods are connected to the borehole ground system and cad welded to borehole casing. Figures 2.13.3-4 shows the grounding scheme of a typical instrument site.