

WSDJ00128

28th November 2000

Max Boots
Director
Compass Resources NL
Suite 4B
384 Eastern Valley Way
ROSEVILLE NSW 2069

Dear Max,

Subject: Browns Polymetalic Project, Review of Critical Path, Surface Water Issues

1. OVERVIEW

Surface water flow and quality monitoring will be a key component of future environmental impact and feasibility studies for the proposed Browns Project, and surface water hydrologic design will rely heavily on currently available data. Compass Resources NL have commissioned Water Studies Pty Ltd to undertake a review of existing hydrological and meteorological data and provide recommendations on:

- The applicability of existing data to Browns Project surface water hydrology studies, and
- Further data collection and/or modification of the existing monitoring network.

The four hydrological/meteorological data sets required for surface water hydrological studies are:

- Daily rainfall,
- Instantaneous rainfall (pluviometer),
- Daily Evaporation, and
- Stream discharge and water quality.

2. AVAILABLE DATA

Figure 1 shows the location of past and current hydrological and meteorological monitoring stations within four km of the proposed Browns Project.

2.1 Daily Rainfall

Table 1 shows summary details of daily rainfall stations in the study area. Note that Batchelor AWS (DR014272) is the only currently operational station.

2.2 Pluviometer

Table 2 shows summary details of pluviometer stations located in the study area. Note that only three stations (R8150010, R8150205 and R8150332) are currently operational.

2.3 Daily Evaporation

Table 3 shows summary details of daily evaporation stations located in the study area. The following is of note:

- Some stations have a discontinuous record (e.g. Batchelor AWS, E014272); the number of days of available record is provided.
- Evaporation measurement technique varies between stations. The two techniques used are: direct measurement with an evaporation pan and calculation using measured meteorological variables (e.g. maximum and minimum temperature, relative humidity).

2.4 Stream Discharge and Water Quality

Table 4 shows summary details of available stream discharge and water quality monitoring stations in the study area. The following is of note:

- There are a large number of historical stream discharge and water quality monitoring stations in the study area. Many stations were installed for short periods (e.g. 1 - 2 years) as part of the Rum Jungle remediation project.
- Discharge measurements are described, as either 'continuous', where site rating curves were developed and automatic stream height recorders were installed, or 'intermittent', where stream discharge measurements were taken at pre-determined intervals, but no rating curve was developed and no automatic stream height recorder was installed.
- Water quality monitoring was undertaken at all stream discharge monitoring stations.
- Automatic water quality sampling equipment was installed at Stations G8150097, G8150200, G8150212 and G8150213. All other stations were monitored intermittently through manual sampling, which usually coincided with stream discharge measurement.
- Only Station G8150097 is currently operational.

3. DATA SUITABILITY

3.1 Daily Rainfall

The available daily rainfall data is adequate for any future hydrological studies for the Browns Project. Note that pluviometer data from Station R8150205 (Table 2) can be integrated to form a daily data set and be used to augment existing daily rainfall data.

3.2 Pluviometer

Station R8150205 is ideally located and has a reasonable period of record to provide rainfall intensity data for any future hydrological studies for the Browns Project. Further, the Northern Territory Department of Lands, Planning and Environment (DLPE) advise that the station will remain operational for the foreseeable future. We recommend the continuation of this station. Other pluviograph stations may be of some use for filling gaps in the R8150205 record.

3.3 Evaporation

The available daily evaporation data is adequate for any future hydrological studies for the Browns Project. Note that stations with a long period of record are remote from the study area (e.g. Darwin River Dam, E014183). However, evaporation is generally fairly uniform across large distances in inland Northern Territory (unlike rainfall) and data from these stations will adequately represent conditions at the Browns Project site.

3.4 Stream Discharge and Water Quality

3.4a Discharge

Station G8150097 is the principal gauging station in the study area, it has a long period of record and a reliable rating curve. This station provides valuable data for any future hydrological studies for the Browns Project. We recommend the continuation of this station. Note that most other sites, with the exception of G8150200, were short-term sites installed at specific locations to obtain hydrological and geochemical understanding of the Rum Jungle site. These temporary stations are of limited use to the current project.

3.4b Water Quality

A detailed understanding of surface water quality of both the East Finniss River and the Rum Jungle site has been developed over the past 30 years as part of the Rum Jungle Remediation Project. The East Finniss River has been intensively monitored for both chemical and ecological impacts of the Rum Jungle site. The two principal water quality monitoring stations on the East Finniss River during the remediation project were G8150097 and G8150200. Currently, only Station G8150097 is operational.

Drainage from the Rum Jungle site continues to have a high impact on East Finniss River water quality. The current baseline water quality status of the river is adequately monitored by Station 8150097 and further monitoring is not required. If the Browns Project proceeds, it is recommended that two additional water quality monitoring sites be installed immediately upstream and downstream of the point where site runoff enters the East Finniss River, prior to commencement of earthworks. These will be water quality sites only, additional discharge measurement is not required. Note that a reinstated Station G8150200 may serve as an acceptable upstream site.

It is not possible, at this stage, to identify preferred locations for these additional stations. Site selection will need to be undertaken after:

- Development of a water management plan for the Browns Project site to determine where site runoff enters the Finniss River, and
- A site visit to assess adequate monitoring locations.

Monitoring data from 'undisturbed' or 'natural' catchments is often useful in water quality studies to provide 'baseline' data, against which off-site impacts of mining operations may be assessed. It appears that stream discharge and water quality monitoring of an 'undisturbed' catchment has not been undertaken in the vicinity of the Browns Project. DLPE advise that the East Finniss River upstream of the Rum Jungle site (an obvious location for an 'undisturbed' catchment water quality monitoring site) is unsuitable for monitoring as it has a flat topography and is essentially a series of billabongs which link during rainfall. The DLPE also advise that extensive water quality and quantity monitoring is being undertaken on disturbed catchments in the vicinity of Darwin River Dam. This data will be available for use in any water quality studies undertaken as part of the Browns Project.

4. CONCLUSIONS AND RECOMMENDATIONS

Extensive surface water hydrological studies have been undertaken in the vicinity of the Browns deposit as part of the Rum Jungle Remediation Project. As such, there is currently a good understanding of the discharge and water quality behaviour of the East Finniss River. This serves as excellent baseline data for the proposed Browns Project.

- There is adequate available data to undertake surface water hydrological investigations for the proposed Browns Project. Further, current hydrological (water quality and quantity) and meteorological (rainfall and evaporation) data collection is adequate for the project's requirements. It is therefore recommended that current monitoring be continued and that no extra monitoring be undertaken prior to project commencement.
- If the project proceeds, it is recommended that additional stream water quality monitoring stations be installed, both immediately upstream and downstream of the point where site runoff enters the Finniss River, prior to the commencement of earthworks.

Yours faithfully,

SHARMIL MARKAR
PRINCIPAL
WATER STUDIES PTY LTD

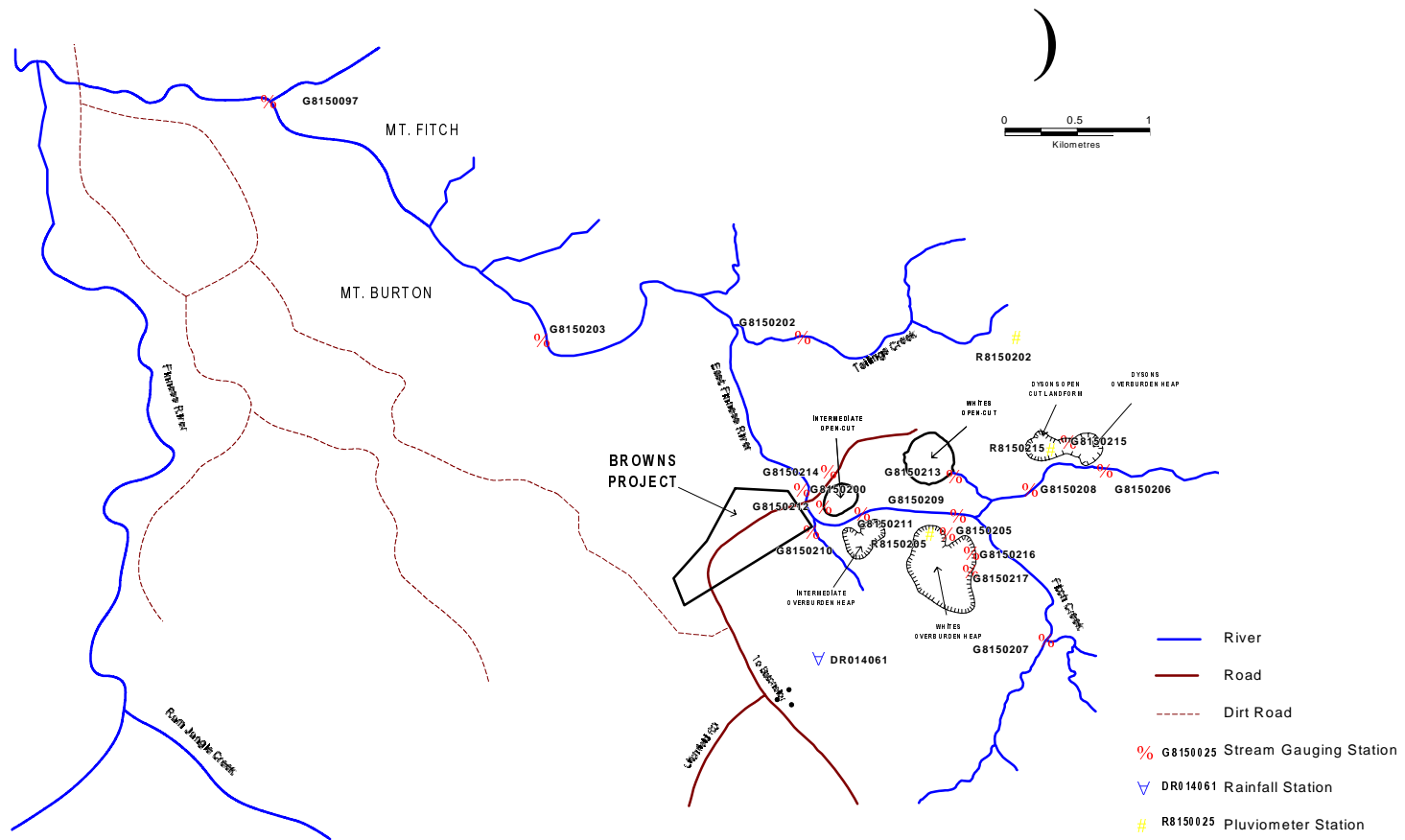


Figure 1 Location of Rainfall, Pluviometer and Stream Gauging Stations with 4 km of the Study Area

Table 1 Available Daily Rainfall Stations

Station		Location		Period of Record	
No	Name	Lat	Long	Start	Finish
DR014061	Batchelor Farm	13° 00' 00" S	131° 00' 00" E	31/01/1912	30/04/1928
DR014138	Batchelor Dam Post Office	13° 03' 00" S	131° 02' 00" E	30/06/1960	31/12/1987
DR014168	Meneling Station	13° 03' 00" S	131° 00' 00" E	31/12/1963	31/12/1977
DR014174	Batchelor (Yarraman)	13° 01' 00" S	130° 57' 00" E	28/02/1966	31/08/1990
DR014272	Batchelor A.W.S.	13° 03' 21" S	131° 01' 27" E	31/08/1994	Current

Table 2 Available Pluviometer Stations

Station		Location		Period of Record	
No	Name	Lat	Long	Start	Finish
R8150010	Upper Finnis River At Stygers Pump	13° 02' 00" S	130° 57' 00" E	01/10/1974	Current
R8150180	Finniss River At Mt Finnis	12° 57' 57" S	130° 45' 06" E	01/10/1974	01/03/1977
R8150181	Finniss River At Tabletop	13° 07' 11" S	130° 42' 57" E	01/11/1974	01/07/1977
R8150202	Tailings Creek At Met. Station U/S Of Tailings Dam	12° 59' 01" S	131° 00' 04" E	01/01/1982	01/07/1988
R8150205	East Finnis River At White's Overburden	12° 59' 36" S	131° 00' 31" E	30/08/1984	Current
R8150215	Dyson's Overburden	12° 59' 13" S	131° 01' 00" E	06/11/1997	22/04/1998
R8150332	Darwin River At West Track	12° 58' 27" S	131° 04' 07" E	18/01/1963	Current
R8150334	Darwin River At Kanyaka	12° 56' 45" S	131° 00' 01" E	07/09/1972	01/07/1977

Table 3 Available Daily Evaporation Stations

Station		Location		Period of Record		No of Days Record
No	Name	Lat	Long	Start	Finish	
E014035	Manton Dam	12° 50' 00"S	131° 08' 00"E	01/01/1965	25/07/1965	125
E014080	Noonamah	13° 07' 11"S	130° 42' 57"E	01/01/1965	20/10/1965	290
E014090	Middle Point	12° 34' 46"S	131° 18' 47"E	1968	1997	10,593
E014109	Tortilla Flats	13° 06' 00"S	131° 14' 00"E	01/01/1965	01/03/1967	537
E014151	Milton Springs	13° 13' 00"S	131° 00' 00"E	01/01/1971	01/05/1974	1,129
E014183	Darwin River Dam	12° 50' 00"S	130° 58' 11"E	1972	Current	10,227
E014272	Batchelor A.W.S.	13° 03' 21"S	131° 01' 27"E	13/08/1992	Current	945
E014908	Wooliana	13° 40' 54"S	130° 38' 12"E	1968	1980	4,384
E014938	Mango Farm	13° 44' 16"S	130° 41' 00"E	1980	Current	7,305
E8210019	Megal Plains at the Outflow	12° 17' 56"S	132° 49' 10"E	11/07/1986	07/02/1990	1,307
E8210306	Megal Plains at West Arm	12° 25' 43"S	132° 48' 23"E	27/11/1985	07/02/1990	1,533

Table 4 Available Stream Discharge and Water Quality Monitoring Stations

Station		Location		Discharge Measurement			Water Quality Measurement		
No	Name	Lat	Long	Start	Finish	Description	Start	Finish	Description
G8150097	East Finniss River At Rum Jungle +Ansto Eb4	12° 58' 00"S	130° 57' 60"E	20/1/1965	Current	Continuous	1967 1988 1991/1992	1988 1996 Current	Weekly Grab Samples Daily Composite Samples Flow Weighted Samples (Approx. Fortnightly)
G8150200	East Finniss River At Rum Jungle Road Crossing + Ansto Eb6	12° 59' 30"S	130° 59' 54"E	7/12/1981 29/11/1991	1/7/1988 1/3/1998	Continuous Continuous	1981 1991 1991/1992	1988 1996 1998	? Daily Composite Samples Flow Weighted Samples (Approx. Fortnightly)
G8150202	Tailings Creek At Downstream Tailings Dam + Ansto Eb51	12° 58' 54"S	131° 00' 03"E	9/12/1981	14/7/1983	Continuous	9/12/1981	14/7/1983	Intermittent
G8150203	East Finniss River At Railway Crossing + Ansto Eb5	13° 01' 05"S	130° 59' 55"E	?	?	?	?	?	?
G8150204	Finniss River At North West Of Mt. Fitch	12° 56' 57"S	130° 56' 21"E	15/12/1981	18/8/1988	Intermittent	15/12/1981	18/8/1988	Intermittent
G8150205	Whites Overburden Drain At Rum Jungle Rehabilitation	12° 59' 42"S	131° 00' 00"E	5/2/1985	1/7/1988	Continuous	5/2/1985	1/7/1988	Intermittent
G8150206	East Finniss River At Upstream Dyson's	12° 59' 06"S	131° 01' 19"E	29/2/1984	7/1/1986	Intermittent	29/2/1984	7/1/1986	Intermittent
G8150207	Fitch Creek At U/S White's Overburden	12° 59' 56"S	131° 00' 53"E	29/2/1984	3/5/1985	Intermittent	29/2/1984	3/5/1985	Intermittent
G8150208	East Finniss River At Downstream Dyson's	12° 59' 22"S	131° 01' 02"E	7/1/1986	24/4/1987	Intermittent	7/1/1986	24/4/1987	Intermittent
G8150209	East Finniss River At U/S White's Overburden Inflow	12° 59' 56"S	131° 00' 59"E	7/1/1986	25/5/1992	Intermittent	7/1/1986	25/5/1992	Intermittent
G8150210	Wandering Creek At Rum Jungle	12° 59' 34"S	131° 00' 01"E	8/1/1986	24/4/1992	Intermittent	8/1/1986	24/4/1992	Intermittent
G8150211	East Finniss River At Site 5	12° 59' 31"S	131° 00' 10"E	12/1/1988	20/5/1992	Intermittent	12/1/1988	20/5/1992	Intermittent
G8150212	East Finniss River At Intermediate Outflow-R.Jungle	12° 59' 33"S	131° 00' 01"E	20/1/1994	4/10/1998	Continuous	20/1/1994	4/10/1998	Flow Weighted Samples
G8150213	East Finniss River At Whites Inflow	12° 59' 30"S	131° 00' 35"E	16/2/1994	20/5/1998	Continuous	16/2/1994 7/12/1995	20/5/1998 18/2/1997	Flow Weighted Samples Continuous Water Temp
G8150214	Copper Creek At Rum Jungle Mine Site	12° 59' 28"S	130° 59' 59"E	19/1/1988	30/4/1991	Intermittent	19/1/1988	30/4/1991	Intermittent
G8150215	Dysons Drain At Site 6	12° 59' 12"S	131° 01' 02"E	18/12/1997	16/6/1998	Continuous	18/12/1997	16/6/1998	Intermittent
G8150216	Whites Seepage At Site 1	12° 59' 38"S	131° 00' 38"E	?	?	Intermittent	?	?	Intermittent
G8150217	Whites Seepage At Site 2	12° 59' 40"S	131° 00' 38"E	31/3/1995	17/3/1997	Continuous	31/3/1995 28/3/1995 28/3/1995	17/3/1997 25/7/1996 25/7/1996	Intermittent Continuous Water Temperature Continuous Conductivity

Notes

1. "?" denotes unknown
2. "continuous" signifies automatic stream depth measurement and/or automatic sample collection
3. "Intermediate" signifies discharge measurements and/or samples taken manually on an infrequent basis