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EDITORIAL

Here at last is the first Southern Caver to be published for many years. In that time the Society has been recovering from a period of strained resources (including active members) but we are now well on the road to recovery. This issue of the Southern Caver will be the first of many.

As time marches on, we as cavers, pursuing a wilderness activity are watching our caves die due to our State Government's anti-wilderness policies. Some of our more popular caving areas lie in controversial forests, e.g. Mt. Weld, Junee-Florentine, Mole Creek, the Cracroft, to name a few.

The delicate environment which, over hundreds of thousands of years, has contributed to the formation of our superb caves is now being destroyed within a few short years. This, in turn, is leading to the rapid degradation of our caves. Such senseless destruction is carried out for superficial short term profit, benefitting few.

Consequently we urge cavers throughout Australia to continue to lobby the Government to implement sensible karst logging guidelines such as those proposed in "Land Use in Karst Areas" written by Kevin Kiernan in 1984. This report was funded by the Forestry Commission and other state bodies.

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A CHEAP, RELIABLE CAVING LIGHT

Currently S.C.S. is flourishing: new members are accummulating at an unprecedented rate. Whilst this is great for the Society it has produced a few problems in relation to the heavy demand placed upon the few aging lights that the Society has ON LOAN. Not so recent new members should really obtain their own lights and so allow the "club lights" to primarily be used by prospective members or visitors.

It is true to say that commercially available electric lights are quite expensive. However, with alittle effort it is possible to satisfactorily solve this problem. This article deals with one option for doing this and is basically ' A how to' for building a reliable, economic electric lighting system based on the maintenance free sealed lead acid battery (commonly referred to as the Gell Cell).

1. A BRIEF INTRODUCTION TO THE GELL CELL

Gell cells (maintenance free recombination electrolyte lead acid batteries) employ similar electrochemistry to the conventional wet cell lead acid battery found in cars, motorcycles etc. The major difference is that the electrolyte (battery acid) is in a gelled form. When conventional wet cell lead acid batteries are charged the voltage gradually increases from a nominal 2 volts per cell to around 2.5 volts As the cell voltage reaches 2.35 volts (around 14 volts for a 6 cell car battery) electrolysis of the electrolyte commences and this produces hydrogen and oxygen gases. This process, called gassing consumes water, hence the need to periodically top up wet cell batteries with distilled water. In the gell cell these gases are recombined within the electrolyte tho reform water, this allows these batteries to be sealed (apart from a safety pressure relief valve) and thereby allows them to be deemed 'maintenace free'.

For those interested, I can recommend "The Sealed Lead Acid Battery Handbook" (1979) produced by the General Electric Company for a very comprehensive treatise on the ins and outs of gell cells.

2. PRACTICAL CONSIDERATIONS IN RELATION TO CAVING

A. BATTERY CAPACITY

Gell cells find a wide application as back up power supplies in security alarms, cash registers and portable electronic equipment. Consequently there is a wide variety of sizes available, for example Exide gell cells come in the following sizes:

6 Volt: 1, 1.2, 2.6, 4,6,8,10 AmpHours

12 Volt: 1.2, 1.9, 2.6, 6, 24, 38, 65 AmpHours.

For use as a caving light power supply 6 Volt is the best choice since 6 Volt globes (as used in torches, bicycle lights) are readily available. For general caving requirements any battery of less than about 4 AmpHour capacity (approximately 8 hours light on high beam) is too small. For example, of my last 40 trips the mean duration underground was about 4 hours, with 20% of trips going for 8 hours or more. These considerations narrow the range of most useful cells down, Table 1 gives some of the specifications of those most suited to everyday caving.

Battery Model	Nominal Capacity AmpHour	Cost May 86 $	Weight kg	Size L*W*H cm	Capacity (note *) Hour
RE6.4 #	4	15.60	0.90	7*5*10	7.2
RE6.6	6	24.00	1.25	15*3*10	11.4
RE6.8	8	26.40	1.65	15*5*10	15.7
RE6.10	10	28.80	2.20	15*5*10	20.0

* in terms of hours of useful light at 0.5A load, this represents typical high beam requirements. In normal caving up to 30% more capacity is obtainable.

\# this battery fits snuggly into Dolphin torches and makes an excellent alternative to a 6Volt Lantern battery.

TABLE 1: Specifications of some Exide Gell cells (extracted from Chloride leaflet see references)

As can be seen the larger capacity cells offer the best value for money, however for the weight conscious the RE6.8 has the highest capacity to weight ratio. The RE6.4 being the smallest cell considered here is nicely sized; it will fit into the top pocket of most overalls and also is the largest cell that fits into a Dolphin torch.

B. BATTERY DURABILITY

In caving the negotiation of squeezes, rockpiles etc. can be quite physically taxing on both caver and equipment. The caving battery is no exception, being worn behind the waist it takes a reasonable amount of punishment. Gell cells come in a fairly fragile case (they were designed for less vigorous activities) and so are susceptible to knocks and abrasion. As a result they need some protective form of encapsulation, for example metal cases (beware of shorting the terminals), plastic boxes, x-army munitions pouches. The latter of these is the cheapest; x-army pouches are available for around $3. Whichever method is used it is wise to pad the battery before inserting it into its holder, portions of padded post bags are excellent for this purpose. Additionally a little care when using the battery will be worthwhile.

Available service life data on the cycling of gell cells is summarised in Table 2. Basically this data says that the battery will last longer if a smaller portion of its capacity is used. In other words by selecting a battery larger than ther required a longer sevice life will be obtained.

I have been using gell cells for 2 years now and have not noticed any deterioration in performance. However, I have heard of others who have had problems with recharging gell cells after they have been completely exhausted. If possible this practice should be avoided.

Depth of discharge	100%	50%	30%
Number of cycles battery delivers more than 60% of rated capacity (C).	170	450	1200

NOTES-test batteries were discharged at 0.17A and charged at 0.09A for 125% of discharge volume (eg. RE6.4, C=4AHr so discharged at 0.72A, charged at 0.36A)

TABLE 2: Gell Cell service life data (extracted from Chloride leaflet-see references)

C. HEADPIECES

The headpiece for a caving light needs to be durable, provide a good light and be equipped with a switch that is easy to use with cold, muddy fingers. I have seen acceptable homemade headpieces, but these tend to be difficult to make as reliable as Oldham or MSA mining light headpieces. In relation to obtaining a reliable headpiece there are several options, the best (apart from a new one) is to procure a second hand one (try mining companies or retired cavers). If that avenue fails then there are quite a few dry cell headlamps available, such as the Petzl Torrent or Petzl Zoom. These types of headpieces are generally designed for voltages other than 6V, (eg. 3V, 4.5V) but can easily be adapted by simply changing the globe.

D. BULBS

As mentioned previously 6V globes are readily available. There are a couple of pitfalls to avoid, firstly beware of getting the blinking variety that seem to abound everywhere! Secondly bulbs for torches using 6V lattern batteries (eg. Dolphin torches) are not suitable. This is because they are actually 4.8V globes, the voltage of lattern batteries in use falls quite quickly from 6V to near 4.8V. Gell cells will provide about 6.2V for many hours and this will burn these globes out after a few (bright) hours.

Table 3 gives a list of all the types of 6V globes and suppliers I could locate in Hobart during May 1986. There is quite a wide choice for high beam globes, possibly the best all round globes being the Eveready 1417 for bayonet mounts or the National MB-60G5E for screw mounts. The choice for low beam is not easy; mining light headpieces will only accept screw mount globes with a small glass envelope, the globes in table 3 that will fit are not of optimal brightness. Ideally a 6V, 0.2A to 0.3A globe would be best. (If anyone locates one of these please let me know).

Before leaving the subject of globes it is worth noting that changing the reflector (mining light headpieces) allows changing from bayonet to screw mount globes, or vice-versa. A new reflector costs around $8.

Globe QH:quartz hal. K:krypton	Operating parameters V	 A	 W	Screw or bayonet	High or low	Best price $A	Hobart suppliers
Thorn QH	6.0	0.4	2.4	B	H	7.80	?
Energiser QH							
HPR51	6.5*	0.7	4.5	B	H	5.15	1,2
HPR36	5.5*	1.0	5.5	B	H	5.15	1,2
Superlux K	6.0	0.5	3.0	S	H	1.35	4,5
Eveready							
1417	6.0	0.5	3.0	B	H	0.70	1,2
1163	6.2	0.3	1.9	S	H	0.70	1,2,7
2454	6.0	0.7	4.2	B	H	1.15	?
National							
MB60G5E	6.0	0.5	3.0	S	H/L!	0.50	3
Bicycle bulbs							
Headlight#	6.0	1.0	6.0	S	H	0.40	4,5
Headlight#	6.0	0.5	3.0	S	H	0.40	4,5
Taillight	6.0	0.08	0.5	S	L%	0.50	4,5
Edison Screw	6.3	0.15	0.9	S	H&	0.46	6
Suppliers out of stock, but worth remembering							8,9,10

<u>Suppliers</u>:-

1-George Harvey Electrics
2-Lawrence and Hanson
3-Myers
4-Ken Self Cycles
5-Bilyards and Kings
6-Dick Smith Electronics
7-Sport and Dive
8-Dickson Clarke
9-Harrys
10-Fitzgeralds
?-Difficult to locate

<u>Notes</u>:-

*-Not optimal V rating
!-Bright low
#-Dimpled glass
%-Dull low
&-Dull high

TABLE 3: Types and suppliers of 6 Volt globes (Hobart-May 1986)

E. CHARGING GELL CELLS

Any rechargeable battery powered system is incomplete without a charger. Gell cells are best charged by the current limited, constant potential method. That is a constant voltage is applied to the battery, this initially causes a large charging current which is limited to prevent damage to the cells. As the battery charges, its voltage approaches that of the charger and the input current slowly decreases to a trickle by the time the cell reaches the fully charged state.

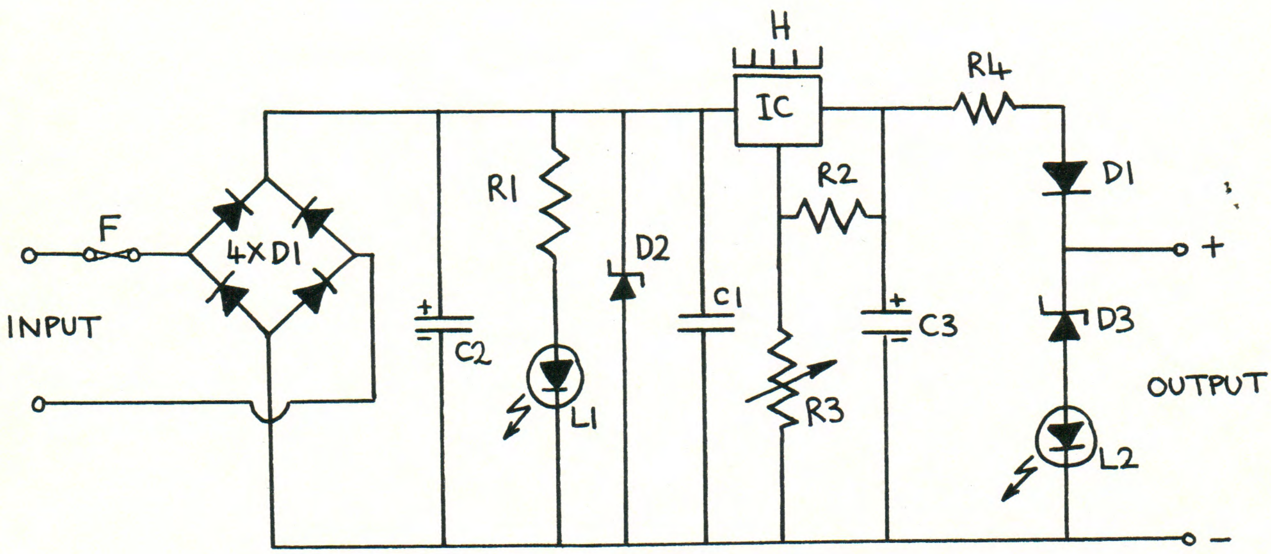
The manufacturers recommend this form of charging and for the Exide range of gell cells suggest that charging be carried out in accordance with the parameters shown in table 4. As far as reasonably priced chargers go I have not seen any. There are various 6 Volt "plug packs" available, however these do not generally control the voltage and so do not reduce the current to a safe trickle when the cell is fully charged. If using this type of charger care is required to prevent over charging, since this will reduce the life of the battery.

Application	Charging voltage for RE6 series (constant potential, current limited)
Cyclic use (battery charged after use)	7.2-7.5 Volts
Floating use (battery left on charger when not in use)	6.75-6.9 Volts

Note:- recommended maximum charging current is (cell capacity)/4, eg. 2A for RE6.8

TABLE 4: Recommended charging procedure for gell cells (Extracted from Chloride leaflet-see reference)

One of the best options is to build your own charger, this is not as difficult as you may think. Integrated circuit voltage regulators are readily available and with the addition of a few external components an excellent charger can be built (even by the novice, with a little help!). A convenient circuit to follow is depicted in figure 1. This circuit was designed to operate from 9 to 15 volts a.c. or d.c., for example from a cars electrical system, or small plug pack transformers (capable of a least 600mA output). This charger would cost approximately $15-20 to build.



Components:-

F=2A fuse and holder	R1=1KΩresistor
D1=IN4002 diode	R2=220Ωresistor
D2=IN4749 Zener (24V) aiode	R3=200Ω trimpot
D3=IN750 Zener (4.7V) diode	R4=1.5Ω (2W) resistor
L1=red light emmitting "	C1=250nF ceramic capacitor
L2=green light " "	C2=470μF electrolytic "
H=heatsink to handle 5W	C3=10μF " "

IC=7805 3 pin voltage regulator (1A max.)
Cigarette lighter socket
Alligator clips
Small piece of circuit board for mounting components
Small box for mounting complete circuit

FIGURE 1: A simple low-cost Constant Potential, Current Limited Battery Charger

Notes:-

All components are readily available (Dick Smith or Tandy)

Notes (cont.):-

R4 is the current limiting resistor. I max.=1.5/R4

The voltage regulator must be attached to a heat sink,

For best operation C1 & C3 are connected as close as possible to the IC,

Accidental shorting of the output leads will not damage the charger,

L1 (red) glows when the charger is on,

L2 (green) glows when the battery is fully charged,

R3 is used to adjust the output voltage (note Table 4)

3. ECONOMICS

As mentioned earlier the gell cell offers an inexpensive alternative to standard miners light batteries. For comparative purposes I have listed approximate prices of the various alternatives for an electrically powered caving light in Table 5. Note that if secondhand components, eg. headpieces are available then costs can be further reduced.

As a point of interest the dry cell lights are certainly cheapest in terms of the initial outlay, however it should be remembered that new batteries will be an on-going cost. At any rate the light from these is much dimmer than the rechargeable battery competitors (about one Watt compared with around three Watts). Doing a quick calculation shows that by the time 8 dry cell batteries have been used the gell cell alternative would have been cheaper.

4. OTHER CONSIDERATIONS

Gell cells also possess a very long shelf life, that is they can be left lying around for about six months and will still possess plenty of charge. Additionally when called upon they can deliver plenty of power, for example the Exide RE6 series of cells are capable of delivering up to 300 Amp peaks, and will maintain short term discharges of around 40A.

	Regular miners light	Ni-Cad cavers light	Modified dry cell headlamp		Gell Cell system
Sample Brands	MSA/ Oldham Spelean	Speleo- technics	Petzl	Torrent Petzl Zoom	Homemade
Battery System	wet cell lead acid	wet cell ni-cad	dry cell alkaline	gell cell lead acid	gell cell lead acid
Headpiece system	2 globe (h/l)	2 globe (h/l)	1 globe	1 globe	2 globe (h/l)
Total weight (kg.)	2.4	1.3	0.5	2.2 (RE6.8)	2.4 (RE6.8)
Approx. Capacity (hours)	16 (at 3W)	10	up to 20 (at 1W)	16 (at 3W)	16 (at 3W)
Approx. Light Cost ($)	197	159	36 + 6 per battery	66	70
Approx. Charger Cost ($)	26 (12V kit)	29 (12V)	--------	18 (12V kit)	18 (12V kit)
Approx. Complete Cost ($)	223	188	36 + 6 per battery	84	88

TABLE 5. Relative costs of new electric caving light systems (May 1986)

These two properties, coupled with the previously mentioned ones make gell cells useful for many functions in the field of speleology.

eg:-powering personal electric caving lights
powering photographic flash guns
powering cave radios

powering magnetic induction survey equipment
powering portable data collecting systems
are just some of the possible applications.

5. SUMMARY

The gell cell has the potential to be an excellent power source for personal electric caving lights. When compared to conventional wet cell electric caving lights it has many advantages and few disadvantages. These advantages are:-

- wide range of cell sizes available
- effectively maintenance free
- long shelf life
- relatively inexpensive
- no acid leakage
- no water penetration
- compact sizes
- works in any orientation, including under water

and the disadvantages are:-

- requires encapsulation of the fragile casing
- requires more care in charging

Despite these disadvantages, if the gell cell is charged correctly and properly protected it has the potential of providing many years of service.

Hopefully speleologists, both old and new will find this information interesting. More importantly I hope that it will prove to be useful in a practical sense!

REFERENCES

General Electric Company (1979)-The Sealed Lead Acid Handbook, Publication BBD-OEM-237

Chloride Australia (1982)-Standby Power Series Leaflet 1681/9/82

Jeff Butt 1986

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EXPLORATION AT MT. WELD

On 13 July 1985, a party of three cavers from S.C.S. set of for Mt. Weld to check out the caving potential. Club records revealed that there had been a few trips to this area in 1977. A 50 metre deep cave was explored at that time and a few other small, muddy holes were noted. The final trip report (completed by a K. Kiernan) suggested that the outcrop was small, the scrub thick, the holes small and the potential very limited. Consequently, the area received little attention.

The reason for the 1985 trip stemmed from the examination of dyeline maps which indicated certain karst like features (eg. streams disappearing) contained in a fairly large area which seemed to be incongruous with the records of the society.

So, on a frosty Saturday morning, the trio set off from the end of the South Weld Road along the walking track to Mt. Weld. About fifty minutes of walking brought them to the Trout Lake outlet creek and after crossing this, the track climbed very steeply up a ridge, at first through a patch of horizontal, and then through thick banksia. Dolomite was seen to outcrop at the base of the ridge and this raised more doubts about the accuracy of the earlier trip reports.

Climbing up the ridge for forty minutes brought the party to a feature known as Crystal Bluff, a large 15 to 20 metre high cliff of dolomite embedded with many beautiful quartz crystals. At the base of this bluff is the previously explored, 50 metre deep, Crystal Chasm cave.

After setting up camp the party set off for a quick scrub bash to the north-west along an obvious outcrop line. As the party traversed over progressively smaller outcrops and through alternatively beautiful rainforest and dense regrowth scunge, enthusiasm waned. It was decided to look just a little further before returning to camp before nightfall.

As the party proggressed further, the ground became steeper, although in the dense forest it was impossible to see whether there was another outcrop or possibly a cliff below them. A rock was lobbed through the trees and the resounding boom indicated a precipice of some height. At the same time, a startled cry from one of the party who had been traversing a little higher also suggested something interesting had been found. Making their way through thick scrub they met up behind a small knoll which obscured the view downhill. The small knoll was ascended and the party expected to look down over a cliff. Instead they found themselves looking from the high side of a doline into a huge black hole. The depths were plumbed with rocks and estimated to be between 50 and 60 metres below and the diameter of the top of the doline was estimated at about 20 to 25 metres.

The party retreated to the campsite, taping a route and returned in the morning to have another look. From the top of the knoll, light could be seen shining into the bottom of the doline underneath a large arch which covered part of the lower side of the doline. The party traversed around the hole to the downhill side and were able to climb down into the doline beneath the arch. The point was about 30 metres lower than the spot from which the hole had first been looked into the previous day. From there, a steep wall dropped down to a large sloping, mossy gully that disappeared into a black railway tunnel entrance, estimated to be 20 metres high, 15 metres wide and 30 metres lower than their vantage point beneath the arch. During the time spent ogling at this large black hole, mist could be seen rising from it! Lacking gear to go further, the party returned to Hobart with tales of a great new find with a 300 metre plus depth potential.

Later in the week, however, Kevin Kiernan was contacted and, dissappointingly, it was learned that he had already discovered the hole in 1977. Kevin said that it was a very nice place but the cave "didn't go". However, it was determined that a return trip to the cave would be worthwhile, it being such a spectacular feature.

So, on the 3rd of August, 1985, a party of four set off to have a closer look. The doline was entered and a 10 metre ladder pitch descended from underneath the arch to the head of the sloping gully. This gully truned out to be quite steep, and two cavers carefully climbed down the slope to the alleged bottom. However, some distance down the slope it became apparent that the cave did not end in a gentle dry sump; there was something of a drop at the base of the slope. A rope was rigged for a hand-line and everyone assembled at the base of the slope on a few large boulders. The lobbing of rocks down the now clearly visible drop suggested a deep shaft of between 45 and 80 metres (later measured as 68 metres). Having insufficient gear because of Kevin's disinformative briefing, a return to Hobart was again the order of the day.

The next trip to the cave did not result in a descent of the "big pitch" but it did result in more exciting discoveries. A climb from the top of the gully leading down to the "big pitch" was made, up to a higher level of the doline. This higher level being directly under the rocky knoll from where the cave was first looked into in July 1985. The area was found to be fairly level in places and sandy; an ideal place for camping. It was from this dry area that the name Arrakis was derived.

Finally, on September 7, 1985 a party of seven fell upon the cave armed with ropes, traces and other helpful devices. The "big pitch" yielded to a four person assault (although not without avenging itself upon a 120 metre rope) and a steeply descended passage, including two small pitches, was explored and surveyed to a depth of approximately 230 metres. The ascent from the bottom was not uneventful. A bad rub point 45 metres above the base of the 68 metre shaft necessitated a frayed rope being tied off by an ascending caver.

On Show Day weekend in October, another trip to the cave saw up to eight people spending comfortable nights in the doline campsite at the base of a 30 metre pitch whilst continuing to explore and survey the cave. Subsequent trips to the cave have resulted in a few more minor passages being discovered.

The current surveyed depth of Arrakis is 236 metres with not much potential to extend deeper, however the dolomite outcrop in the area is very large and the potential for other deep cave systems is quite reasonable. The limiting factor affecting exploration to this date has been the nature of the terrain; steep slopes with patches of horizontal scrub and other nasty plant arrangements, and the need to spend more than one day to have a good look around.

In spite of these things exploration has continued and there is no doubt that more spectacular caves will be found in the region.

NOTE: The basic scope of this article has been to outline the exploration carried out at Mt. Weld since winter 1985, especially focussing on Arrakis. It is hoped that an article will appear in the not too distant future giving details of the original discovery of the cave in 1977 and the mystery surrounding that occasion.

Russell Fulton

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1986 AREA REPORTS

Fifty-one trips were recorded in the Club Minutes for 1986. A summary of the work in each area follows:

MOLE CREEK

Aside from visits to the perennials; Kubla Khan, Herberts Pot and a Search and Rescue weekend (during which Rathole was enjoyed), exploration continued in the Sassafrass area. During March the sump in Sassafrass 1 was dry and an additional 500 metres of passage was surveyed (giving a total length of around 1000 metres). The long lost Sassafrass 2 was found to be a side entrance of this extension. An attempt to link Cyclops and My Cave (by pushing the dry Cyclops sump) was unsuccessful after 50 to 60 metres of grovelly passage. An as yet un-numbered and un-named cave in this area (discovered in August 1985) was explored for about 600 metres with further leads, but awaits drier conditions for surveying.

IDA BAY

Entrance (3 trips) and Exit (6 trips) were popular, with trips going off the usual tourist trails; in Exit areas such as 'The Lost-Squeeze', 'Western Passages' and 'Conference Concourse' were visited. Milk Run (5 trips), Big Tree Pot, Midnight Hole, Revelation Cave were also enjoyed. A Mini-Martin-Skyhook Pot exchange trip with the TCC was a major vertical outing. Several days were spent exploring some of Arthur Clarke's new finds (eg. IB 94,-99,100,103) and the 'real' Machette Pot was located (and the namesake retreived). IB 113 was discovered in early November and over three visits to this sporting hole pushed it to 70 metres with several promising leads.

FLORENTINE VALLEY

Owl Pot defended by snowfall, flood and trees across the road was bottomed on the third visit. Two further visits were made to this pot whilst the nearby Three Falls Cave was visited three times. During September and October Dwarrowdelf and Khazad-Dum were rigged in conjunction with the TCC; subsequently both caves were visited and the exhiliarating through trip completed. Other caves visited were Growling Swallet, Slaughterhouse Pot and Tassie Pot. A tight, loose draughting lead in Pendant Pot attracted some attention but was abandoned after a general lack of progress. Welcome Stranger provided horizontal relief as did the difficult to locate JF 226 and 228.

MOUNT WELD

The burst of exploration after the discovery of Arrakis has died with only one trip in January. This trip located two further caves, one containing a stream; these remain incompletely explored.

MACKINTOSH

Five cavers visited this area over Easter. Two unenterable resurgences and several caves of less than 20 metres length were found on the western bank of the Mayday river. The lack of success has discouraged further exploration to date.

Andrew Mcneil

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DO YOU HAVE ANY EXIT CAVE SURVEY DATA?

Arthur Clarke would like to hear from anyone who has any survey data (old or new) collected in (or about) Exit Cave at Ida Bay. You can phone Arthur on (002) 981107, or send material to him through S.C.S. via P.O.Box 121, Moonah 7008.

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