

## **APPENDIX 1:**

### **REPORT BY FEATHERSTONE GEOLOGICAL CONSULTANTS**

## **Arthur River Magnesite Project**

### **Location and Tenements**

The Arthur River magnesite deposit and the along strike deposit at the Lyons River are located in the West Takone area of north-western Tasmania roughly 43km west south west of the port of Burnie and 52km by road. They are on the Burnie 1:250,000 map sheet and the Arthur River 1:100,000 map sheet. Outcrops of the magnesite at Arthur River were inspected by the author in July 2005. The Arthur River prospect is secured by Retention Licence RL8718 and the Lyons River prospect is secured by RL8717. The intervening ground is held by Minemakers Exploration Licence EL14/2005.

### **History**

The sparse outcropping portions of the magnesite deposit at Arthur River were discovered by government geologist P.B. Nye (Nye 1925). The magnesite occurs as a white to creamy marble and selected portions would be suitable for use as an architectural or ornamental stone. The presence of old workings suggests that some ornamental stone was extracted.

From 1970 until 1981 Mineral Holdings Australia Pty Ltd (MHA) carried out exploration in the area under a large exploration licence EL43/70. Over these years various joint venture partners including : Anglo Oriental (Australia) Pty Ltd (Anglo Oriental), Osterreichisch Americkanische Magnesite AG (OAMAG), General Refractories Co (European Group) Vienna (GRC), Financial Mining Industrial & Shipping Corp of Scalistiri Concern, Athens (SCA), Minerals Pty Ltd - North West Acid Pty Ltd, Magnesitwerke Company of Austria (MCA), and BHP, conducted drilling, tested samples, or visited the Arthur River deposit. During 1972 surface exploration located a second body of magnesite 5km along strike to the south west which was named the Lyons River magnesite.

From 1982 a 75/25 CRA Ltd (CRAE) and MHA joint venture undertook six years of exploration with the objective of establishing a magnesium chemicals plant with the magnesite being the feedstock for the manufacture of magnesia, magnesium, etc. (refer to list of references at the end of this report). In March 1988 MHA was granted two Retention Licences, each of 25 km<sup>2</sup> (RL8717 & RL8718) covering the deposits at Arthur River and Lyons River. CRAE formally withdrew from the JV in the early 1990's quoting the prevailing metal market price as grounds.

In 1997 Tasmania Magnesite NL (TasMag) through Green Consultants Pty Ltd was granted an option to purchase the Retention Licences from MHA for \$5M plus a royalty of \$0.50/t of ore mined with a grade of above 37.5% MgO and an NSR of 2.5% on all metallic minerals excluding magnesium and calcium. Green Consultants would be paid a transfer fee of \$300,000 satisfied by 10,000,000 ordinary 40c shares in TasMag at a price of 37c and reimbursement of all costs in connection with assessment of the prospects and negotiation of the agreement.

In December 1997 Crest Resources Australia NL (CSA) entered into an option agreement to acquire all the shares in TasMag for \$3,435,000. In April 1998 CSA issued a prospectus to successfully raise \$9 million to finance the purchase and fund development of the project. The raising was closed in May and CSA then acquired the shares in TasMag with the allotment of 32 million fully paid shares and 16 million options exercisable at 50c together with \$875,000 and an option fee of \$80,000.

In May 1998 CSA exercised TasMag's option and acquired the licences from MHA for a consideration of \$4.38 million cash (\$5.2 million total) and CPI-indexed royalty payments of \$0.50/t of ore mined from the licences, or contiguous areas, with a grade of 37.5% MgO or better plus a 2.5% NSR on non-magnesium and non-calcium metallic mineral sales derived from the same areas.

In June 1998 Crest Resources Australia NL (CSA) embarked on pre-feasibility studies and in August 1998 changed its name to Crest Magnesium NL (CSA). CSA engaged BHP Engineering Pty Ltd (BHPE) to conduct a pre feasibility study assisted by Hatch Associates Ltd of Ontario (Hatch). BHPE also had an option to acquire an interest in the project.

In February 1999 CSA entered into a joint venture agreement with Multiplex Constructions Pty Ltd (Multiplex). The Multiplex/CSA (60/40) JV would commence from financial close of the initial stage scheduled for January 2000 after which Multiplex would arrange total funding for the project. Until January 2000 Multiplex would hold a 1% interest and advance \$1.5M in monthly payments of \$185,000 from May 1999. At Close all loans and advances would be extinguished and Crest would receive a lump sum of \$11.6M for reimbursement of Crest's costs. During 1999 Multiplex became disenchanted with the project and CSA wanted to bring in other parties so in October agreement was reached for Multiplex to relinquish its 1% interest in favour of CSA subject to repayment of the project loan and direct costs incurred by Multiplex for a total of \$3.7 million.

In September 1999 Xstrata AG made an offer to purchase the entire project for \$105 million but Crest rejected it.

In November 1999 Hatch completed an overview of the magnesium metal project.

In March 2000 Retention Licences 8717 and 8718 were extended to March 2003.

In March 2001 CSA paid \$1.5 million and allotted 30% of its share capital to Multiplex which then relinquished all its rights and interest in the magnesite deposits.

In May 2001 CSA changed its name to Indcor Ltd (ICO)

In 2002 ICO agreed on an option for MHA to purchase the magnesite tenements outright for \$2.5 million cash expiring in October 2002. The option was not exercised.

In January 2003 ICO took over Australian Biofuels Pty Ltd and their Swan Hill Ethanol Project from Multiplex and in December 2004 ICO changed its name to Australian Ethanol Ltd (AAE).

In 2004 AAE sold 20% of its shares in TasMag to MHA for \$50,000 with the option to sell the remaining 80% for \$950,000 before 31/03/2005 otherwise the 20% reverted to AAE at no cost. The option was not exercised therefore 100% ownership reverted to AAE.

Minemakers purchased the Retention Licences RL5817 and RL5818 for five million of its ordinary shares on the 29<sup>th</sup> July 2005, and subsequently purchased EL14/2005 which covers the ground between the licences from MHA.

## Regional Geology

The Arthur River and Lyons River magnesite deposits are located in the north west of Tasmania and occur within a NE-SW trending linear belt of regionally metamorphosed Proterozoic rocks known as the Arthur Lineament and the Arthur Metamorphic Complex (Turner 1990). This extends from Wynyard on the northern Bass Strait coast of Tasmania to Granville Harbour on the western Southern Ocean coast. The belt is 110km long and up to 12km wide. The Savage River iron ore deposit is located 35km SW of the Lyons River and some large bodies of magnesite are present along strike of that iron ore deposit at what may be the same stratigraphic horizon as those at the Lyons/Arthur River deposits. North and northwest of the Arthur River deposits the Proterozoic sequence is overlain by a thin mantle of Permian sediments that is up to 20m thick. A Tertiary basalt overlies and intrudes the northern end of the Lyons River deposit.

## Geology

To date two significant bodies of marble rich in magnesium have been identified at the Arthur River locality and there are some other reported outcrops in the belt outside of the current tenements. (Gee 1977).

The first was discovered in 1925 and is referred to as the Arthur River Prospect and based on exploration to date is a lensoid body of magnesite with a sub-outcrop extending over a strike of 3,500m and a width up to 300m. It is interpreted to dip steeply to the southeast but drilling to date suggests that the margins of the magnesite are not planar or parallel and may be folded and/or faulted. Outcrop of rock is described as sparse and mainly confined to the valley of the Arthur River. Between the Arthur and Keith Rivers the magnesite is covered by up to 20m of poorly sorted unconsolidated alluvium. To the northeast, the hanging wall consists of quartz schists and quartz mica schists of the Keith Schists and to the southwest the footwall is of amphibolite and pelitic metasediments. Current data indicates that the magnesite is likely to extend below a depth of 250m.

The Arthur River prospect is secured by Retention Licence 8718 of 5 km<sup>2</sup>.

The second body was discovered by MHA during early exploration of EL43/70. Again outcrops are few but there are some in the Lyons River valley. The Lyons River Prospect lies along strike from the Arthur River magnesite after a gap of 2,300m however the northeasterly end of this body of magnesite has been intruded by an irregular basalt plug and/or sill.

The Lyons River magnesite has been traced over a total strike of 3,500m but the basalt intruding the northeasterly portions limits the prospective strike to about 2,000m with a thickness up to 400m. In the vicinity of the Lyons River the overburden is thin but there can be weathering of the surface in some areas that extends to depths of more than 20m which, together with local solution weathering, could reduce mineability of the near-surface rock.

The Lyons River magnesite is interpreted to dip steeply to the SE at between 70° and vertical. Current drilling data indicates that the Lyons River deposit is likely to extend below a depth of 250m.

The Lyons River prospect is secured by Retention Licence RL8717 of 5km<sup>2</sup>.

The outcrops of magnesite show large boulder weathering and, in places, the fluted surface weathering pattern typical of a karst terrain. Other karstic features evident in drill holes are solution cavities.

Both Retention Licences are located within State Forest and the Lyons River Prospect is also within the Savage River, Australian Heritage Act, Registered Entry, land category. In 1997 neither of these land categories precluded mining and the status of the tenements with respect to mining is believed to be unchanged in 2005.

A Mining Lease Application 1M/99 covering part of RL 8718 was submitted in 1998/99 but was later withdrawn.

## Previous Exploration

The Arthur River magnesite was discovered in 1925 but no significant work had been undertaken prior to the Exploration Licence EL43/70 being granted to MHA in 1970. The first report on magnesite exploration carried out is dated September 1972 and details the finding and early testing of magnesite marble outcrops at Lyons River and B.A. Creek which were located by MHA prospector Kevin Pinner in March 1972. In the Lyons River the two main outcrops occur in the bed of the river where it flows just east of north immediately upstream to the south of its junction with B.A. Creek. Another outcrop of magnesite was discovered 100m up this creek and a further isolated outcrop of magnesite was located 900m NE. Chip sampling of the outcrops at Lyons River and B.A.Creek returned encouraging analyses indicating that the carbonate was nearly pure magnesite. With these results MHA representatives sought to interest mining and consumer companies in the deposit supplying samples and also collecting bulk samples by blasting during 1974. A bulldozed track was put in to the prospect with some additional access tracks to facilitate this work.

In 1971 Anglo Oriental drilled two vertical PAB drill holes DH1 & DH2. The holes were sampled over 1.5m (5 foot) intervals and magnesium grades determined by AMDEL. The exact position of the holes has not been determined but a sketch map and sections have been used to give approximate locations. DH1 was near the WNW boundary of the magnesite and DH2 near the ESE boundary. Refer to Table XIV for location data. DH1 was 24.4m (80 feet) deep and DH2 15.2m (50 feet). OAMAG subsequently carried out assays for silicon, iron, aluminium, manganese, chromium, calcium, and magnesium, together with loss on ignition. The samples had typically between 3% and 4% Fe<sub>2</sub>O<sub>3</sub> although three samples contained 7.07%, 8.26%, and 16.74%. These high values were not explained.

In 1975 OAMAG completed the drilling of four vertical DC holes out of a planned six. These holes were ARV – A, C, D, and E. The available location data on these holes is presented in Table XIV.

**Table XIV**  
**Early Drilling at Arthur River.**

MRT ID	Drill Hole No.	MGA co-ords $\pm$ 500m		RL (m)	Azimuth (grid north)	Angle	Depth (m)
		Northing (m)	Easting (m)				
-	DH1	5440850	370700	270	360	90	24.4
-	DH2	5440720	370850	245	360	90	15.2
10289	ARV - A	5440900	370700	285	360	90	70.7
10290	ARV - C	5440800	370700	255	360	90	65.2
10291	ARV - D	5440700	370700	175	360	90	69.6
10292	ARV - E	5440900	370800	230	360	90	89.9

In 1982 the CRAE – MHA joint venture commenced drilling with a DC hole at Lyons River and in 1983 drilling continued at Lyons River and also at Arthur River. Data on 1982/84 CRAE holes at Lyons River are presented in Table XV.

**Table XV**  
**Lyons River CRAE Drilling 1982/84**

MRT ID	Drill Hole No.	AMG co-ords $\pm$ 50m		RL (m)	Azimuth (grid north)	Angle	Depth (m)
		Easting (m)	Northing (m)				
10282	DD82LR 1	366425	5435350	232	320.5°	-50°	389
10283	DD83LR 2	366865	5436100	288	301.5°	-46°	418.8
10284	DD83LR 3	365900	5434700	285	310.5°	-46°	367.5
	DD83LR 4	abandoned					
15077	DD83LR 5	366660	5435690	284	300°	-46°	452.45
15078	DD84LR 6	366670	5436200	350	300°	-46°	223
15079	DD84LR 7	366830	5436350	342	300°	-46°	176
15080	DD84LR 8	366770	5436350	323	300°	-46°	59
15081	DD84LR 9	366600	5435940	329	300°	-46°	209
15082	DD84LR 10	366560	5436010	400	300°	-46°	138
16092	DD84LR 11	366656	5436157	342	300°	-46°	128
15850	DD84LR 12	366365	5435410	-			90
15849	DD84LR 13	366325	5435435	-			92

Data on the 1983 CRAE drilling on the Arthur River deposit is presented in Table XVI.

**Table XVI**  
**Arthur River CRAE drilling 1983**

MRT ID	Drill Hole No.	AMG co-ords		RL (m)	Azimuth (grid north)	Angle	Depth (m)
		Easting (m)	Northing (m)				
10285	DD83AR 1	370480	5440600	210	310°	-46°	138
10286	DD83AR 2	369561.60	5439170.30	172.50	330°	-46°	245
10283	DD83AR 3	370010	5439870	165	301.5°	-46°	408
	DD83AR 4	abandoned					
15084	DD83AR 5	370073	5440163	163	300°	-46°	156.2
15085	DD83AR 6	369812.10	5439445.20	174.20	310°	-46°	382
15086	DD83AR 7	369249.10	5439021.30	148.30	330°	-46°	282.9

The co-ordinates of the collars of some of the holes have been surveyed in but the others are estimated from available data. A resource estimate was made based on the accumulated data :-

CRA. Indicated Resource of 29Mt at 42.8% MgO extending over a strike of 400m.

In July 1997 Tasmag mounted a seven hole DC drilling programme of 1,254.3m on the Arthur River deposit. Holes AR2 (check) and AR7 (check) were drilled adjacent to the CRAE holes they were checking. These together with another five holes were confined to an area 600m by 200m to a depth of 150m and were designed to enable an indicated resource estimate to be made. Location data on these holes is presented in Table XVII.

**Table XVII  
Arthur River Tasmag Drilling 1997**

MRT ID	Drill Hole No.	AMG co-ords		RL (m)	Azimuth (grid north)	Angle	Depth (m)
		Easting (m)	Northing (m)				
	DD97AR 2c	369561.60	5439170.30	172.50	330°	-46°	233.5
	DD97AR 7c	369249.10	5439021.30	148.30	330°	-46°	222.0
	DD97AR 8	369195.20	5439112.60	146.00	330°	-46°	169.6
	DD97AR 9	369418.20	5439102.60	169.90	330°	-46°	254.9
	DD97AR 10	369360.70	5439190.00	154.90	330°	-46°	219.5
	DD97AR 11	369550.10	5439263.10	189.90	330°	-46°	99.0
	DD97AR 12	369668.60	5439326.40	202.20	330°	-46°	55.80

Holes AR11 & 12 were drilled entirely in a fine to medium grained mafic intrusive interpreted to be a Proterozoic dolerite dyke.

The data from Tasmag's drilling was combined with earlier data and used to make a new JORC compliant resource estimate for the selected area of the Arthur River magnesite which was :-

Wyatt. 1997. Indicated Resource of 29Mt at 42.8% MgO and 5.3% SiO<sub>2</sub>.

In late 1998 and early 1999 Crest Magnesium NL mounted an in-fill DC drilling programme of fifteen holes for 2759.9m. Data on these holes is presented in Table XVIII.

**Table XVIII**  
**Arthur River Crest Drilling 1998-99**

MRT ID	Drill Hole No.	AMG co-ords		RL (m)	Azimuth (grid north)	Angle	Depth (m)
		Easting (m)	Northing(m)				
	DD98AR 13	369439.5	5439145.7	164.5	330°	-46°	204.3
	DD98AR 14	369382.0	5439252.9	156.4	330°	-46°	124.7
	DD98AR 15	369343.0	5439317.5	151.5	330°	-46°	107.6
	DD98AR 16	369337.4	5439229.0	152.8	330°	-46°	278.6
	DD99AR 17	369312.5	5439270.4	150.6	330°	-46°	182.5
	DD99AR 18	369318.9	5439465.6	151.3	330°	-46°	244.5
	DD99AR 19	369268.5	5439248.8	148.8	330°	-46°	120.5
	DD99AR 20	369328.0	5439058.8	156.0	330°	-46°	256.0
	DD99AR 21	369272.9	5439157.4	149.2	330°	-46°	24.0
	DD99AR 22	369229.8	5439130.2	146.3	330°	-46°	34.2
	DD99AR 22A	369229.7	5439132.0	146.4	330°	-46°	47.0
	DD99AR 22B	369229.7	5439132.0	146.4	330°	-46°	225.3
	DD99AR 23	369232.7	5439129.0	146.4	150°	-46°	205.0
	DD99AR 24	369402.2	5439288.1	157.0	330°	-46°	67.7
	DD99AR 25	369480.7	5439184.6	166.5	330°	-46°	74.6
	DD99AR 26	369322.0	5439162.6	151.3	150°	-46°	260.6

Hole 22B was re-commenced off hole 22A at a depth of 37m after that hole deviated unacceptably after entering a cavity.

This work confirmed the presence of a moderate grade magnesite deposit (>38% MgO) extending to a depth of 140m. The drilling density was now considered sufficient to estimate a JORC compliant Measured Resource : -

Wyatt (1999) Measured Resource 15Mt at 42.9% MgO, 2.4% CaO, 1.25% Fe<sub>2</sub>O<sub>3</sub>, and 4.8% SiO<sub>2</sub>.

Cut off grades used were 38% MgO, 4% CaO, 6% Fe<sub>2</sub>O<sub>3</sub>, 12% SiO<sub>2</sub>.

At the Lyons River deposit, pitting undertaken at the Pinner locality to produce bulk samples for testing had encountered boulders of fresh magnesite set in clay overburden and deeply weathered rock. Additional material was excavated with the hope of exposing a clean wall of magnesite for study but this was unsuccessful. In 1989 a drilling programme was mounted to determine what lay beneath the pit. The first stage consisted of sixteen holes (LR14 – LR29) drilled on three lines 30m apart. The second stage consisted of nine holes (LR30 – LR38) drilled on two lines located to the north and south of the pit. Data on these holes is presented in Table XIX.

**Table XIX**  
**Drilling of the Pinner Locality**

MRT ID	Drill Hole No.	AMG co-ords		RL (m)	Azimuth grid north	Angle	Depth (m)
		Easting (m)	Northing (m)				
	DD89LR 14	366632	5436120		289°	-60°	30
	DD89LR 15	366632	5436120		109°	-45	40
	DD89LR 16	366616	5436101		289°	-60	30
	DD89LR 17	366616	5436101		109°	-50	35
	DD89LR 18	366664	5436067		109°	-55	30
	DD89LR 19	366664	5436067		289°	-55	45
	DD89LR 20	366680	5436083		289°	-65	40
	DD89LR 21	366680	5436083		109°	-45	30
	DD89LR 22	366694	5436122		289°	-60°	35
	DD89LR 23	366694	5436122		109°	-45°	30
	DD89LR 24	366679	5436058		109°	-50°	35
	DD89LR 25	366697	5436069		289°	-60°	40
	DD89LR 26	366724	5436093		289°	-60°	30
	DD89LR 27	366724	5436093		109°	-50°	35
	DD89LR 28	366616	5436101		360°	-90°	20
	DD89LR 29	366631	5436095		360°	-90°	14
	DD89LR 30	366583	5436077		315°	-55°	40.3
	DD89LR 31	366585	5436074		135°	-50°	37
	DD89LR 32	366572	5436099		315°	-55°	43.3
	DD89LR 33	366575	5436092		135°	-55°	30
	DD89LR 34	366655	5436184		270°	-55°	30.8
	DD89LR 35	366655	5436184		270°	-70°	31
	DD89LR 36	366658	5436183		090°	-55	30
	DD89LR 37	366683	5436175		090°	-50	40
	DD89LR 38	366683	5436175		360°	-90	29.3

This drilling failed to produce significant results due to a thick clay overburden. It did confirm that the footwall zone to the west of the pit contains the best magnesite at depth. Near surface magnesite contained high levels of silica which could be the result of weathering processes. Further pitting is not an option at this locality and access to solid magnesite in situ would require a decline drive.

### Planned Work

Minemakers initially intends to assess the potential of the deposits to produce an early cash flow by mining raw magnesite to be used as a feedstock for a calcining operation. Some exploration may be required for this. Minemakers also aims to fund research into commercialisation of new technology being researched within Australia for the production of magnesium metal from these magnesite deposits. Minemakers budget for this project is \$250,000 for Year 1 and \$150,000 for year 2.

## Summary Arthur River Magnesite Project

The exploration carried out to date has established that the Arthur River and associated Lyons River magnesite deposits are substantial deposits containing good quality magnesite. The grade of the rock is not uniform with high grade bands and moderate grade bands being interpreted together with some narrow low grade dolomite bands. More work is required to understand the internal structure of the deposits and also the contacts and contact zones. The main resource study has been carried out over a limited area and it averaged grades over sections with different grades. The feasibility of selective mining has not been adequately studied to date due to the lack of detailed data. Laboratory test work carried out on samples has shown that the grade can be improved and silica content substantially reduced by a single stage flotation technique. This beneficiation would only be required for specific end uses. Preliminary caustic calcination tests were successfully conducted by AMDEL on two samples with more tests on the various varieties of magnesite being recommended. Various studies have been carried out by joint venture partners and interested parties but the difficulties in obtaining large samples of quality magnesite from the surface outcrops has limited the value of work to date.