WANCHAI, HONG KONG

Demonstration of RJSeal[™] Federal Highway Route No. 2, Shah Alam, Selangor, Malaysia

May 8, 2006



Demonstration of RJSeal Federal Highway Route No. 2, Shah Alam, Selangor, Malaysia

May 8, 2006

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С	Lab Tests on Core Samples from RJSeal [™] Test Strip



Crown Capital Er	nterprise Limited.			Assumptions				Conversion Fa	actors						<u>(</u>	Crew Consist	No
RJSeal Applicati	on			Slow (shoulder) Lane	50.0	Metres		US Gallon=	3.78	Litres						Labourers	3
Batu Tiga - Fede	eral Highway -route	#2 - Kuala Lur	npur	Driving Lane width	3.65	Metres		Sq Metre=	10.76	Sq Feet						Conscripts	2
Near Shah Alam				Area - Slow lane	182.5	Sq Metres		Sq Metre=	1.20	Sq Yds						Supervisor	1
Appl. Date	08-May-06			Slag Applied	50.00	kgs		RejuvaSeal	1.06	S.G.						Total	6
Prepared by	Anthony G. Speed			RJSeal - Can #1	27.0	Kgs		Metre	3.28	Feet							
Updated by	Anthony G. Speed			RJSeal - Can #2	12.0	Kgs		One Can	22	Kgs							
Updated	15-May-06			RJSeal Applied	39.0	Kgs		Kg	2.204	Lbs							
	08-May																
Pavement Temp - C				Note Can #Two had 1	5 Kgs left inside afte	er demo.											
Air Temperature - C																	
Relative Humidity	75%		<u> </u>		T		0 1 4						1			-	
Work Schedule		Work Time	Comments	Total Area	Total Area	Reji	uvaSeal Ap	pplied		Application	n Rate		Slag A	pplied		6 Mar	Crew
		(hrs)		2	2	US gals	litres	kilograms	USGal	Litres /m ²	m ² /Litre	m² /Ka	Kg	Lbs		m²	yd ²
Date	am/pm	. ,		m²	yd²	Ũ		Ũ	/yd ²	2.0.007.11		,	/sq metre	/sq yard		/man hr	/man hr
08-May	21:30 - 21:40	0.17	Preparation	-	-	-	-	-	•	-	•	-	-	-		-	-
	21:40 - 22:20	0.67	Rolling RJS	183	218	10	37	39	0.045	0.20	4.96	4.68	-	-		45.6	54.5

-

37

-

-

39

-

•

0.045

.

•

0.20

.

-

4.96

0.3

-

0.3

.

.

4.68

0.5

0.5

-

-

20.3

-

-

24.2

	The North South

22:20 - 22:40

22:40 - 23:00

Totals

Expressway Central Link near Shah Alam, traverse southwards towards the Kuala Lumpur Intaernational Airport

0.33

0.33

1.50

<u>Finish</u> KLTES2

Chronology of

Events	

08-May 9:00 PM Arrive at jobsite. Carrying out preparation works including, taping white lines, mixing barrels of RJSeal

-

218

Shoulder

n/a

-

10

<u>Area</u> 187.5

9:20 PM Traffic Diverted from Slow Lane with Cones, Apply tape to White Line

-

183

9:40 PM Start rolling RJSeal onto the shoulder lane

Driving Lane

3.75

10:20 PM Finish rolling RJSeal onto the above section, commence Copper Slag Application

10:40 PM Finish applying Copper Slag

Slag Applic

Clean-Up

11:00 PM Complete removing tape & testing & clean-up

12:25 PM Return and Conduct Testing on completed test strip 5:00 AM Road Open to Traffic

Re-Stating Calculations Test Section <u>Start</u> KLTES1

Slow Lane

Length 50 _____

Item	Description	Km Marker	GPS #	47 N Grid Latitude	Longitude			UTM 50Q N		Diff N	Diff E	Distance	Distance x Distance	
	1 Start of RJSeal Strip		KLTES1	03 ⁰ 04.948 '	101 34.440'		KLTES1	341055	786107					
	2 Finish of RJSeal Strip		KLTES2	03 ⁰ 04.949 '	101 34.466'		KLTES2	341057	786156	-2	-49	2404.9216	2405	
Testing Location		Outflow			Sand Pa	tch Test				British				
KM Marker	Water Penetration	Meter	D1	D2	D3	D4	Avg dia	Area	Depth of Structure	Pendulum				
KLTES1	<u>ml/min</u>	seconds	mm's	<u>mm's</u>	<u>n/a</u>	<u>n/a</u>	mm's	<u>sq mm</u>	<u>mm</u>	BP#	Comments			
-0.6 metres	0	5	250	260	255	240	251.3	49,554	0.504	n/a	Before RJSeal			
+0.6 metres	0	5	245	230	230	240	236.3	43,814	0.571	n/a	After RJSeal			

25000

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1.0 INTRODUCTION

"Crown Capital Enterprise Limited of Hong Kong through its agent Kalvani International Limited of Singapore and its exclusive agent Viva Anggun Sendirian Berhad in Malaysia entered into arrangement with Projek Lebuhraya Utara Selatan (PLUS) and Projek Penyelenggaraan Lebuhraya Berhad (PROPEL) Kuala Lumpur, it's highway / expressway maintenance company on 8 May 2006". This arrangement calls for the analysis of the performance of RJSealTM, a sealer/rejuvenator for asphalt pavement on Federal Highway Route No. 2 near Shah Alam, Selangor, Malaysia.

Malaysia is located in the tropics, comprising the southern portion of the Malaysian Peninsular, immediately south of Thailand, plus Sarawak and Sabbah on the north coast of Borneo. The majority of the country is positioned just north of the equator. Malaysia is separated from Singapore by the Straits of Johor and from Sumatra, the largest island of Indonesian Archipelago, by the Straits of Malacca. Malaysia has an extensive history, relating to the fact it's located on the Straits of Malacca, a significant maritime trading route between South East Asia, the Middle East and East African States.

Malaysia has a major north-south highway system on the Malaysian Peninsula, linking the major cities of Kuala Lumpur, with Georgetown (Penang) and eventually Hat Yai in the north and south with Jahor Bhatu that is linked to Singapore via two causeways. Furthermore there is a major east-west highway connecting Kuala Lumpur with Port Kelang. See figure 1.0 for a map showing the location of Malaysia with respect to its Indonesian, Thai and Singapore neighbours. The capital city is Kuala Lumpur, which lies at 20 to 100 metres in elevation, with suburbs now sprawling out for a distance of some 20 kilometres from the city centre. Malaysia enjoys a tropical climate with temperatures ranging from 40 Celsius to a more moderate 25 Celsius in the late evenings. Thunderstorms occur almost on a daily basis.

In the immediate Kuala Lumpur area, there are minimal exposures of the sedimentary rock sequence. Drainage channels afford limited opportunities to see the bedrock. The asphalt in the area is manufactured from imported materials, which is comprised of crushed and screened granites and diorites hauled in from quarries, as well as washed sand and gravel from the various rivers. The bitumen binder for the asphalt is sourced from various locations offshore and refineries, principally Singapore.



2.0 CO-OPERATIVE PROGRAM

The intent of the arrangement with PROPEL of Kuala Lumpur is to demonstrate RJSeal^T and subsequently allow analysis of the performance of RJSeal[™] on a variety of asphalt surfaces. A demonstration was undertaken on May 8, on Federal Highway Route No. 2, near Shah Alam, Selangor, some 20 kilometres south west of the city centre of Kuala Lumpur, Malaysia. This highway leads to Port Kelang. The portion of the road that was treated was composed of asphalt pavement of mid-1993 vintage that had been milled and an overlay applied in 2003. The thickness of the overlay and base are not known. No details are known about the subgrade, but inspection of the shoulders show a sandy-silty material. Knowing construction techniques in roads in general, minimal gravel would be used for an immediate coarse base, beneath the asphalt pavement. The surface of the asphalt has a fairly coarse texture and no concern had been expressed about hydroplaning during heavy rains. Keen interest was expressed in having the life of the asphalt pavement extended.

3.0 <u>RJSeal</u>™

RJSeal[™] is a proprietary product that is supplied by Crown Capital Enterprise Limited of Wanchai, Hong Kong. RJSeal[™] has been proven in numerous applications in North and South America and recently in China to rejuvenate asphalt pavement at various stages of its life and economically extend the life of the pavement. RJSeal[™] is a three component, asphalt sealer rejuvenator that is comprised of Coal Tar, Coal Tar Oils and Petroleum Solvents.

3.1 PRIOR EXPERIENCE

Refer to Appendix A for a copy of the brochure that outlines the experience with RJSealTM at various locations in North America and South America as well as China. Further information is available from Crown Capital Enterprise Limited. RJSealTM has been used at numerous airports in North and South America, as well as highways in Alberta, Canada; Cearo State, Brazil and other locations in the U.S.A. Since 2000, RJSealTM has been demonstrated successfully at over fifty (50) locations in China and fifty eight (58) commercial-scale applications have taken place at various locations, such as Beijing, Shanghai, ShenYang, ChangChun, Harbin and Xi'an. Within the last 6 months, demonstrations have also been undertaken in Singapore at Changi Airport and also on several streets.

4.0 TEST PROGRAM

Since Malaysia is located in a tropical climate (Latitude: 1 degree North to 7 degrees north) at a low altitude, it's a demanding setting for asphalt, given the year round warm climate (extremes of 40 Celsius and overnight lows in the 25 Celsius range) and intense exposure to ultraviolet radiation, all which contribute to the oxidation and breakdown of the asphalt binder.

PROPEL, is responsible for operating approximately 200 kms of Toll Highway and Expressway. PROPEL is a subsidiary of United Engineers Malaysia, a publicly listed company, which is partially owned (37.1%) by Renong Bhd, a publicly listed conglomerate. PROPEL has agreed to try RJSeal[™] at Km. 848 Federal Highway Route No. 2, Shah Alam, Selangor, which is owned by PLUS, a wholly owned subsidiary of Renong Bhd. See Figure 4.0, showing the location of this Toll Highway with respect to Kuala Lumpur.

Work commenced on the demonstration section at 9:30 pm on May 8, on a warm evening, where the temperature was approximately 27 degrees Celsius. There is a slight camber to the road, which causes water to run off toward the shoulder, rather than puddle on the road. The asphalt surface on Federal Highway Route No. 2, was reputedly 3 years old (mid-2003 vintage), being an asphalt overlay following milling of the original surface. No information was available as to the thickness of the overlay, however the original pavement was laid in 1993. No significant oil spills were observed, just the occasional drop of transmission oil, crankcase oil or hydraulic fluid. The asphalt pavement surface was not appreciably worn with no rutting due to traffic wear. There was aging and oxidation of the bitumen, which extended to a depth of several millimetres. The entire portion of the treated road was composed of asphalt pavement that was purportedly 15 centimetres thick and underlain by a gravel base, which was on a compacted silty-clay, sub-grade. The 50 metre long portion of Federal Highway Route No. 2 that had RJSeal[™] applied was at the following geographic location:

Table 4.1		Geographic Location of Test Strip							
Loc'n	System		Northing	Easting					
West End	Geographic		03 ⁰ 04.948 '	101 [°] 34.440'					
	Universal T	ransverse Mercator Grid (47N) metres	341055	786107					
East End	Geographic	(deg, min)	03 ⁰ 04.949 '	101 [°] 34.466'					
	Universal T	ransverse Mercator Grid (47N) metres	341057	786156					

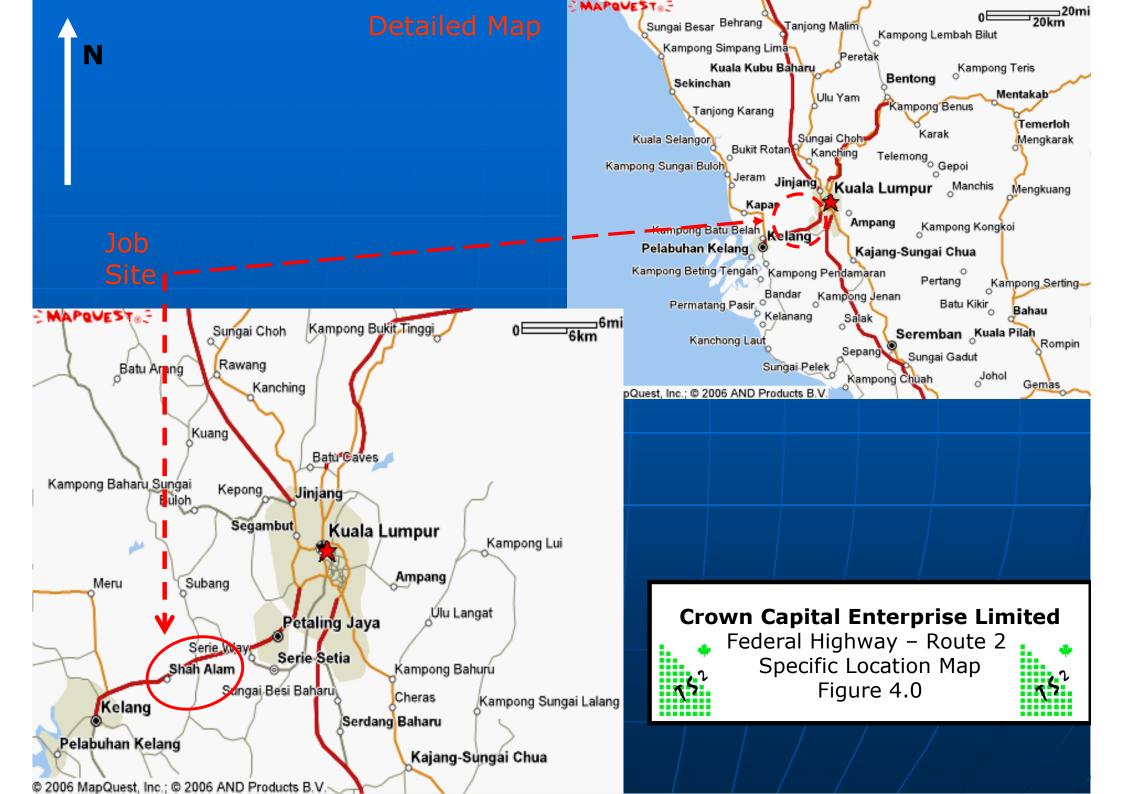


Table 4.2		Details on RJSeal [™] Application on Federal Highway - Route No. 2								
Work Schedule (am/pm)	Work Time (hrs)	Total Area m ²	Total Area yd ²	RJSeal Applied			Application Rate			
	(113)		yu	US gals	litres	Kgs	USGal /yd²	Litres /m ²	m² /Litre	m²/Kg
21:30 - 21:40	0.17	Prepa	ration	-	-	-	-	-	-	-
21:40 - 22:20	0.67	183	218	10	37	39	0.045	0.20	4.96	4.68
22:20 - 22:40	0.33	SI Applio	•	-	-	-	-	-	-	-
22:40 - 23:00	0.33	Clea	ın-Up			-	-	-	-	-
Totals	1.50	183	218	10	37	39	0.045	0.20	4.96	4.68

Details of the application are summarized in the table that follows:

Ambient temperatures were 27 degrees Celsius at the commencement of work at 9:30 pm pm, with humidity in the 80% range. The application of RJSeal[™] was undertaken on the eastbound shoulder (slow) lane. The work area was treated with copper slag at an application rate of 0.3 kgs/square metre, immediately after the application of RJSeal[™]. The intent was to see if the copper slag improved the skid resistance of the eastbound lane. Photos showing the application of RJSeal[™] follow in figures 4.1 and 4.2 on the following pages.

The site was visited on May 9 around 10:30 am and a difference was readily perceived between the RJSeal[™] treated section and the adjoining untreated portions. See figure 4.3



Figure 4.1 Typical Application Procedure





Figure 4.2 Copper Slag Application





Figure 4.3 Finished Surface



4.1 <u>RJSeal[™] Testing</u>

To date the comparison of the asphalt treated with RJSeal[™] has been compared on a subjective basis over a very short period on Federal Highway Route No. 2, Shah Alam, Selangor, Malaysia. Testing equipment was brought to the site for comparison on a more disciplined, objective basis included the following tests.

- Skid Resistance
- Water Penetration
- Macrotexture (Depth of Texture)

At a later date, cores will be acquired from the asphalt pavement for laboratory testing and the following properties of the asphalt pavement will be determined:

- Viscosity
- Ductility
- Penetration
- Softening Point

4.2 HydroPlaning Potential

An "Outflow Meter" manufactured in the U.S.A. by Humble Equipment Company of Ruston, Louisiana and sold under the trademark "Outflow Meter" was used to measure the asphalt pavement's macrotexture, to ascertain the hydroplaning potential on the RJSealTM treated surface, versus the untreated surface. The procedure is documented in the ASTM Testing Standard E2380. The Outflow Meter gives readings in seconds for the dissipation of a known quantity of water. It is suggested that any readings between 3 and 10 seconds are satisfactory results for an asphalt pavement surface, if hydroplaning is to be minimized. Results of the testing are shown in the table below:

Tab	ole 4.3	Outflow Meter Testing						
Testing Locat	cation Particulars of Testing Location Outflow F					Readings		
Latitude Longitude		Distance from west end of test strip	Lane	Location (wheelpath)	Before seconds	After seconds		
03 ⁰ 04.948 '	101 ⁰ 34.440'	-0.6 metres	Eastbound	Left	5	n/a		
03 ⁰ 04.948 '	101 ⁰ 34.440'	+0.6 metres	Eastbound	Left	n/a	5		



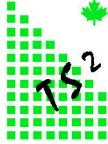


Figure 4.4 Outflow Meter

4.3 Water Penetration

Water Penetration Tests (China Testing Standard T 0730-2000) were undertaken at several locations on the untreated portion of the road, in close proximity to the test strip and later on the RJSealTM treated section. Particulars of the tests are shown in the table that follows

Tab	le 4.4 Water Penetration Testing					
Testing Locat	tion (Lat/Long)	Particula	Particulars of Testing Location Water penetration			
	Distance from Location		Location	Before	After	
Latitude	Longitude	west end of test strip	Lane	(wheelpath)	ml/min	ml/min
03 ⁰ 04.948 '	101 ⁰ 34.440'	-0.6 metres	Eastbound	Left	0	n/a
03 ⁰ 04.948 '	101 ⁰ 34.440'	+0.6 metres	Eastbound	Left	n/a	0

See Figure 4.5 that follows for a pictorial presentation of the Water Penetration Meter.

4.4 Macrotexture (Depth of Texture)

The sand patch test (ASTM Standard E965-96 OR China Standard T 0961-95) was used to ascertain the Pavement Macrotexture Depth. Comparison was undertaken at several locations on both the untreated and RJSealTM treated sections. The results of the testing are documented in the table that follows:

Tab	le 4.5	Sand Patch Testing					
Testing Locat	ion	Particulars of Testing Location Depth of					
		Distance from		Location	Before	After	
Latitude	Longitude	west end of test strip	Lane	(wheelpath)	mm	mm	
03 ⁰ 04.948 '	101 ⁰ 34.440'	-0.6 metres	Eastbound	Left	0.504	n/a	
03 ⁰ 04.948 '	101 ⁰ 34.440'	+0.6 metres	Eastbound	Left	n/a	0.571	

The results from the sand patch testing indicate that the depth of texture of road surface is adequate. The application of copper slag on the eastbound lane to improve the skid resistance was not essential, but undertaken for demonstration purposes.

See Figure 4.6 which follows, showing the sand patch testing procedure.



Figure 4.5 Water Penetration Meter



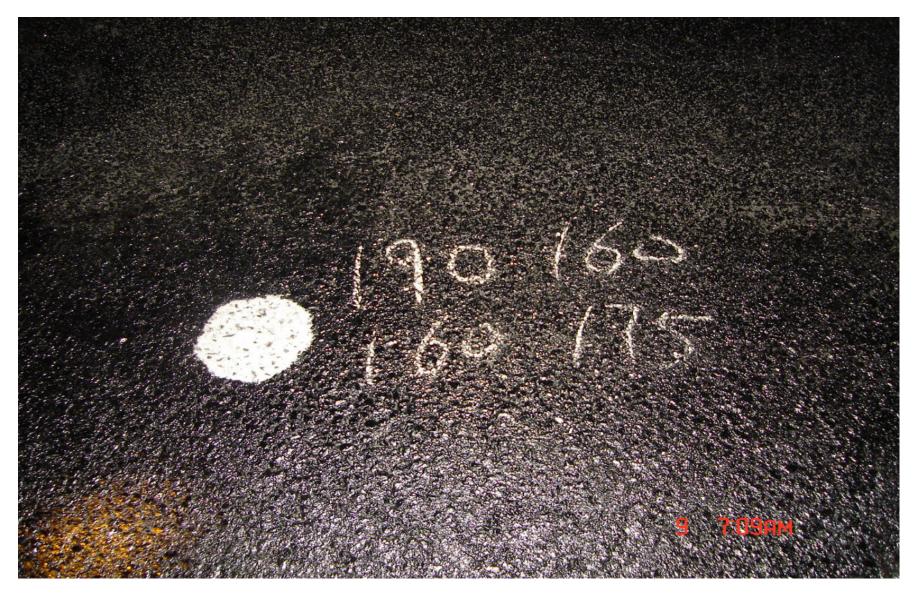


Figure 4.6 Sand Patch Test



4.5 Skid Resistance Tests

This aspect of the testing was conducted by IKRAM Engineering Services Sdn. Bhd (Pavement Research Section) for Soil Centralab Sdn Bhd. (wholly owned subsidiary of PROPEL on June 30, 2006. This is some 7 weeks after the actual application of the RJSealTM (May 8, 2006)

The Skid Resistance testing was undertaken with a British Pendulum as prescribed in ASTM testing Procedure E303 and the results are as follows:

	Table 4.6		British Pendulum Tests						
Sample ID	Temp of Test Surface	Measured Corrected SRV at SRV 35 deg C							
		1	2	3	4	5	MEAN		
point 1	33.0	57	60	65	62	63	60		
point 2	33.0	55	56	57	57	58	56		
point 3	32.0	56	58	59	58	57	56		
point 4	33.0	60	61	62	63	63	61		
					Average		58		

These results are acceptable to PROPEL, who require a minimum of 55 for highways.

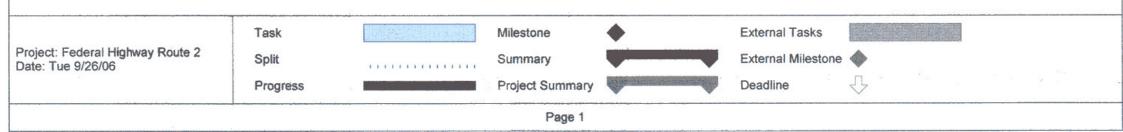
4.6 <u>Ductility/Softening Point/Penetration Testing</u>

This aspect of the testing is beyond the capabilities Crown Capital Enterprise Limited and Kalvani International personnel and its exclusive agent Viva Anggun Sendirian Berhad in Malaysia has been sought from outside experts in the field of Asphalt Testing. To this end, PROPEL have retained IKRAM Engineering Services Sdn. Bhd. of Selangor (pavement material & QA/QC), which has appropriate testing facilities for asphalt cement to conduct tests on core samples from the RJSeal[™] treated section. This is reported separately in Appendix C to this report.

5.0 <u>Test Completion Schedule</u>

Technicians from IKRAM Engineering Services Sdn. Bhd, will undertake testing on the trial section. The projected completion of this testing is scheduled as shown in the following chart.

ID		Task Name	Duration	Start	Finish							
	0				-	Mar	2nd Quarter Apr	May	Jun	3rd Quarte Jul	Aug	Sep
1		Negotiate Agreement	25 days	Mon 4/3/06	Thu 5/4/06	TETAL	1.41					
2		Confirm Agreement	1 day	Fri 5/5/06	Fri 5/5/06			ĥ				
3		Site Inspection	1 day	Wed 4/5/06	Wed 4/5/06		h	в				
4		Hiatus	18 days	Thu 4/6/06	Fri 4/28/06							
5		Application	1 day	Mon 5/8/06	Mon 5/8/06							
6		Inspection & Field Test	1 day	Tue 5/9/06	Tue 5/9/06			Ĩ.				- are like to a
7		Draft Technical Report	5 days	Wed 5/10/06	Tue 5/16/06							
8		Hiatus	37 days	Wed 5/10/06	Thu 6/29/06					1		
9	-	Core Sample Acquire	1 day	Fri 6/30/06	Fri 6/30/06							
10		Hiatus	50 days	Mon 7/3/06	Fri 9/8/06							
11		Core Tests in Lab	2 days	Mon 9/11/06	Tue 9/12/06							6
12	-	Report on Lab Tests	4 days	Wed 9/13/06	Mon 9/18/06							Th.
13		Hiatus	7 days	Tue 9/19/06	Wed 9/27/06				1			
14		Final Technical Report	2 days	Thu 9/28/06	Fri 9/29/06							



6.0 **Qualifications**

STATEMENT OF QUALIFICATIONS

I, Anthony G. Speed of Hong Kong in the Special Administrative Region of China, DO HEREBY CERTIFY.

- I. THAT I am a Consulting Engineer, with offices at 2/F, 81 Po Wah Yuen, Lamma Island, Hong Kong
- II. THAT I am a 1968 graduate of the University of Saskatchewan, Canada with a Bachelor of Science Degree in Mining Engineering.
- III. THAT I am currently registered and in good standing as a Professional Engineer with the Association of Professional Engineers of Ontario, and New Brunswick, Canada. I am a member with the Hong Kong Institute of Engineers as a Civil Engineer.
- IV. THAT my 37 years of continuous experience in mining, major civil engineering works (earth moving, highway and mining construction) has exposed me to a broad knowledge of mining and heavy civil engineering construction and allowed considerable familiarization with road construction and asphalt pavement.
- V. THAT this report is based on my visit to Malaysia in April 2006 to inspect roads in the area and again in May to attend the RJSeal[™] demonstration as described in this report.

Dated at Hong Kong, this _____day of September, 2006

Anthony G. Speed, P.Eng. (Canada), MHKIE

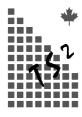
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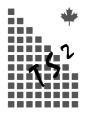
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Appendix A

RJSeal[™] Descriptive Literature



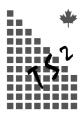
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Appendix B

Copper Slag – Technical Specifications



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Appendix C

Lab Tests on Core Samples from RJSeal[™] Test Strip prepared by IKRAM Engineering Service Sdn. Bhd Kuala Lumpur

