CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

Demonstration of Rejuvaseal™
West Second Road, DaQing, Heilongjiang, Peoples Republic of China

August 2002

TS^2 Consulting Inc.
Lamma, Hong Kong

TS^2 CONSULTING INC. <

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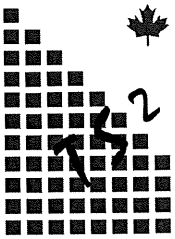

September 8th, 2002

Crown Capital Enterprise Limited
B5, Centre Point Building
181 – 185 Gloucestor Road,
Wanchai, Hong Kong.
Attn: Charence Chiang
General Manager

Dear Charence

Re: Demonstration of RejuvaSeal™ on West Second Road, DaQing.
This is the final report on the demonstration of RejuvaSeal™ on the West Second Road in DaQing. This demonstration was undertaken during an extended period from August 11 thru September 6 and encompassed a 3.65 kilometre of this two lane road. The principal interest of the municipality was extension of the life of this aged road, which presumably is greater than 20 years old. The asphalt pavement overlies a concrete base and at each joint, reflective cracks occur. A significant number of other lateral cracks were encountered, principally due to the differential expansion of the asphalt pavement and underlying concrete base. These lateral cracks were to be repaired with hot tar, following the RejuvaSeal™ Application. Inspection of the road on September 6, upon completion, showed that RejuvaSeal™ had penetrated the asphalt pavement to a depth of at least 5 mm in the initial portions treated in mid-August.
And the immediate surface was now pliable.

Yours Sincerely

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

Crown Capital Enterprise Limited.
RejuvaSeal Demo
Daqing - West Second Road

Demo Date	11-Aug-02
Prepared by	A.G. Speed
Updated by	A.G. Speed
Updated	6-Feb-03

Assumptions

Panel Length	20.0	Metres
Panel Width	4.50	Metres
Panel Area	90.0	Sq Metres
One Panel	19.0	Kgs of RejuvaSeal

Weather Conditions

Temperature	24 Celsius
Humidity	40%
Cloud Cover	Cloudy

Conversion Factors

US Gallon=	3.78	Litres
Sq Metre=	10.76	Sq Feet
Sq Metre=	1.20	Sq Yds
One Litre	1.10	kgs
One Full Drum	208	Litres
One Full Drum	55	US Gallon
90% full drum	50	US Gallon

Crew Consist	No
Labourers	32
Truck Driver	2
Mixer	1
Compressor Op	1
Supervisor	2
Total	38

Work Schedule	Work Time	No. of Panels	Test Length	Total Area m^2	Total Area	RejuvaSeal Applied			Application Rate				38 Man Crew	
am/pm	(hrs)		(m)		yd^2	US gals	litres	kilograms	USGal /yd^2	Litres/m^2	m^2 /Litre	m^2/Kg	m^2 /man hr	yd^2 /man hr
11-Aug-02	4.50	33.0	660.0	2,970	3,550	151	570	627	**0.042**	**0.19**	**5.21**	**4.74**	17.4	20.8
12-Aug-02	3.50	50.0	1,000.0	4,500	5,379	228	864	950	**0.042**	**0.19**	**5.21**	**4.74**	33.8	40.4
Aug13-Aug 25	7.00	99.5	1,990.0	8,955	10,705	395	1,495	1,645	**0.037**	**0.17**	**5.99**	**5.45**	33.7	40.2
Aug 26 - Sept 6	14.00	182.5	3,650.0	16,425	19,634	726	2,744	3,018	**0.037**	**0.17**	**5.99**	**5.44**	30.9	36.9
Totals	29.00	365.0	7,300.0	32,850.0	39,268.2	1500	5673	6240	**0.038**	**0.17**	**5.79**	**5.26**	29.8	35.6
						30	Drums (90% full)							

Test Patches
Daqing - West Second Road
Shanghai

Test Patch Date
15-Jul-02

Test Patch Number	Patch Width (m)	Patch Length (m)	Total Area m^2	Total Area ft^2 approx	RejuvaSeal Applied			Application Rate			
					US gals	litres	kilograms	USGal/yd^2	Litres/m^2	m^2 /Litre	m^2/Kg
One	1.00	1.10	1.10	12	0.07	0.25	0.28	**0.006**	**0.23**	**4.40**	**4.00**

FlowMeter Readings	Time (sec)	Location
August 10, 2002	**Time**	**Location**
Untreated	**32**	West Shoulder
Untreated	**6**	Centre
Untreated	**10**	East Shoulder

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal
West Second Road, DaQing, Heilongjiang,
Peoples Republic of China

August 2002

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CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal
West Second Road, DaQing, Heilongjiang,
Peoples Republic of China

August 2002

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B	Rejuvaseal Descriptive Literature
C	Kunming Copper Slag – Technical Data

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Lamma, Hong Kong

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal™
West Second Road, DaQing, Heilongjiang
Peoples Republic of China

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1.0 INTRODUCTION

Crown Capital Enterprise Limited of Hong Kong entered into an arrangement with the Highway Administration Department of Heilongjiang Province, China in July 2002. This arrangement calls for the analysis of the performance of RejuvaSeal™, a sealer/rejuvenator for asphalt pavement on highways within Heilongjiang Province.

Heilongjiang Province is situated in the extreme northeast corner of China, and is bounded by Russian (Siberia), North Korea and Mongolia as well as Jilin Province to the south. The capital city of Heilongjiang Province is Harbin with a population of approximately 3 million. Harbin and DaQing have a different architectural appearance when compared to cities in southern China, and this is attributable to the fact that Russia occupied this part of China for many years and had the southern terminus of its' Manchurian Railroad in Harbin. After the 1917 Russian Revolution, the population of Harbin swelled as refugees fled to China In recent years, Heilongjiang has seen a major growth in the highway system, due to a government drive to build national highways linking Harbin and DaQing with major cities in the adjoining provinces. Oil was discovered in the DaQing area in 1959, which led to significant petroleum developments in the area. Some nine refineries exist in the immediate area and are a major force in driving the development of the area. The majority of the area lies at 150 metres in elevation, on the extensive plain that straddles the SongHua Jiang River that flows to the northeast and eventually into the Heilong Jiang (Amur) River.. The regions' latitude (45 degrees north), mean that there are four seasons, with temperatures ranging from 45 Celsius in the long, hot summer to minus 25 Celsius in the short winter. Their is no rainy season per-se, just thunderstorms and these occur primarily in June thru August, but can extend into September. See figure 1.0 for a map showing the location of Harbin, DaQing and Heilongjiang Province.

In the immediate DaQing area, a significant sedimentary sequence predominates and this is due to the site adjoining the delta of the SongHua River. The predominant feature of the area is brackish swamps. Drainage channels feeding into the Songhua River also afford no opportunities to see the bedrock. The asphalt in the area is manufactured from imported materials, which is comprised of crushed and screened sandstone and diorites hauled in from quarries elsewhere in Heilongjiang Province, as well as washed gravels from the various rivers. The bitumen binder for the asphalt is probably sourced from refineries located in DaQing.

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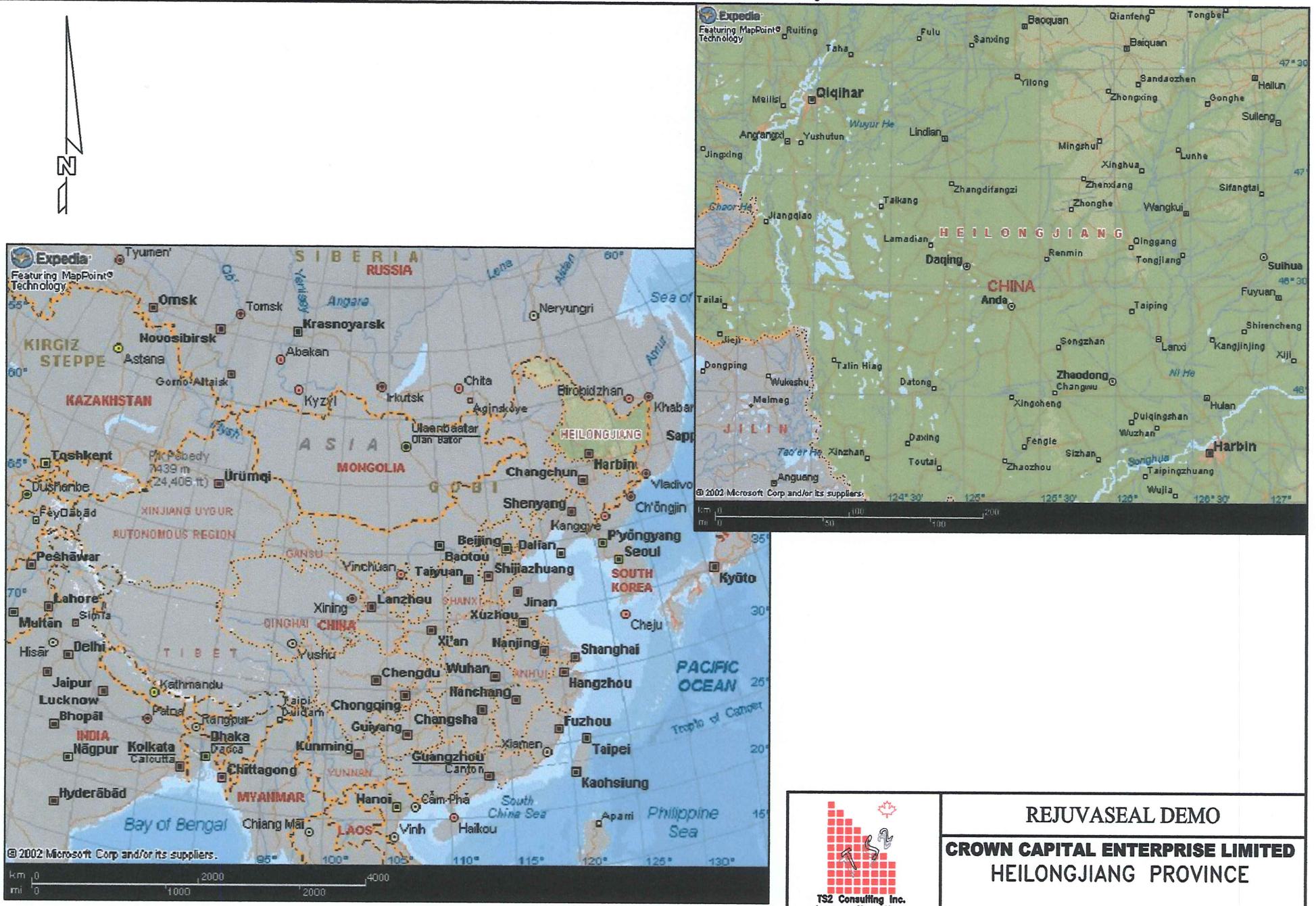

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DESIGNED BY	TS2	02/08/20	SCALE: As Shown	
DRAWN BY	Bb	02/08/20	PROJECT NO. B0231	

REJUVASEAL DEMO

CROWN CAPITAL ENTERPRISE LIMITED

HEILONGJIANG PROVINCE

GENERAL LOCATION MAP

DRAWING NO. FIGURE 1.0

REV. A

2.0 CO-OPERATIVE PROGRAM

The intent of the arrangement with Heilongjiang Province is to demonstrate RejuvaSeal™ at different locations selected by the Highways Administration Bureau. The demonstration will subsequently allow analysis of the performance of Rejuvaseal™ on a variety of asphalt surfaces. A demonstration was undertaken on West Second Road, just northwest of the city of DaQing, commencing on August 11 and working intermittently thru to Sept 6, 2002. The portion of the highway that was treated was composed of asphalt pavement, nominally 10 centimetres thick, which overlays a concrete sub-grade. The immediate soil, beneath the concrete is a silty sand. The age of the asphalt pavement is not known, but is in excess of 10 years, so is suspected to be of late 1980's or early 1990's vintage.. The surface of the asphalt is quite smooth and concern had been expressed about hydroplaning during heavy rains and also water percolating through cracks in the asphalt pavement and concrete underlay, thus softening the sub-grade. Furthermore, this asphalt pavement is approaching the end of its useful life and keen interest was expressed in having the life extended.

3.0 REJUVASEAL™

RejuvaSeal™ is a proprietary product that is supplied by Crown Capital Enterprise Limited of Wanchai, Hong Kong. Rejuvaseal™ has been proven in numerous applications in North and South America to rejuvenate asphalt pavement at various stages of its life and economically extend the life of the pavement. Rejuvaseal™ 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 provided to participants at a seminar held in DaQing in September 2002. This outlines the experience with Rejuvaseal™ at various locations in North America and South America. Further information is available from Crown Capital Enterprise Limited. Rejuvaseal™ has been used at numerous airports in North and South America, as well as highways in Alberta, Canada; Cearo State, Brazil and North Dakota and Texas, as well as other locations in the U.S.A.

4.0 TEST PROGRAM

Since Heilongjiang Province is located in a northern climate (Latitude: 43 to 53 North) at a low altitude (150 to 200 metres), it's a demanding setting for asphalt, given the year round warm climate (extremes of 45 Celsius in summer and minus 45 Celsius in the winter) and intense exposure to ultraviolet radiation, all which contribute to the oxidation and breakdown of the asphalt binder.

Heilongjiang has a significant concentration of highways in China, with some 5,000 kms of National and Provincial highway. The City of DaQing is responsible for 600 kilometres of National Highway, and 700 kilometres of Provincial Highway, within it's jurisdiction (distances as of year-end 2000) and approximately 300 kms of streets in DaQing and other communities

In view of this extensive network of roads and the relatively short life of the asphalt surface, Heilongjiang is definitely interested in determining how to economically extend the life of the asphalt road surface. To this end, Heilongjiang has agreed to try RejuvaSeal™ on West Second Road, adjacent to the city of DaQing. The arrangement led to a committee being struck to suggest appropriate locations for the testing of RejuvaSeal™. See Figure 4.0, showing the location of this street with respect to DaQing and Heilongjiang

On July 15, 2002 a test patch in the northbound lane of West Second Road (two lane highway with no paved shoulders) was treated with RejuvaSeal™. The test patch was at the following geographic location:

Table 4.1	**Geographic Location of Test Patch Site**	
System	**Northing**	**Easting**
Geographic (deg, min)	46^0 40.307'	124^0 55.113'
Universal Transverse Mercator Grid (50S) (metres)	0646749	5170497

See Figure No 4.1 for a photo showing the test patch as implemented. Particulars of the test patch are as follows:

Table 4.2				**Particulars of the test patch**						
Test Patch Number	**Patch Width (m)**	**Patch Length (m)**	**Total Area m^2**	**Total Area ft^2 approx**	**RejuvaSeal™ Applied**		**Application Rate**			
					US gals	**Litres**	**US Gal /yd^2**	**Litres /m^2**	**m^2 /Litre**	**m^2 /Kg**
One	1.00	1.10	1.10	12	0.07	0.25	0.006	0.23	4.44	4.00

Subsequent inspection of the test patches on August 9, showed that the application rate of 4.0 m^2/kg was more than adequate for the asphalt

pavement at this location and a slightly lower application rate of 4.76 metres/kg was selected.

The 3.65 kilometre long demonstration section on West Second Road is located some 2 kilometres north of the City of DaQing. This strip is entirely asphalt pavement. See figure 4.0, which follows, for a location of the general locale. The location of the test patch with respect to the demonstration portion of the road is graphically shown in figure 4.1, which follows.

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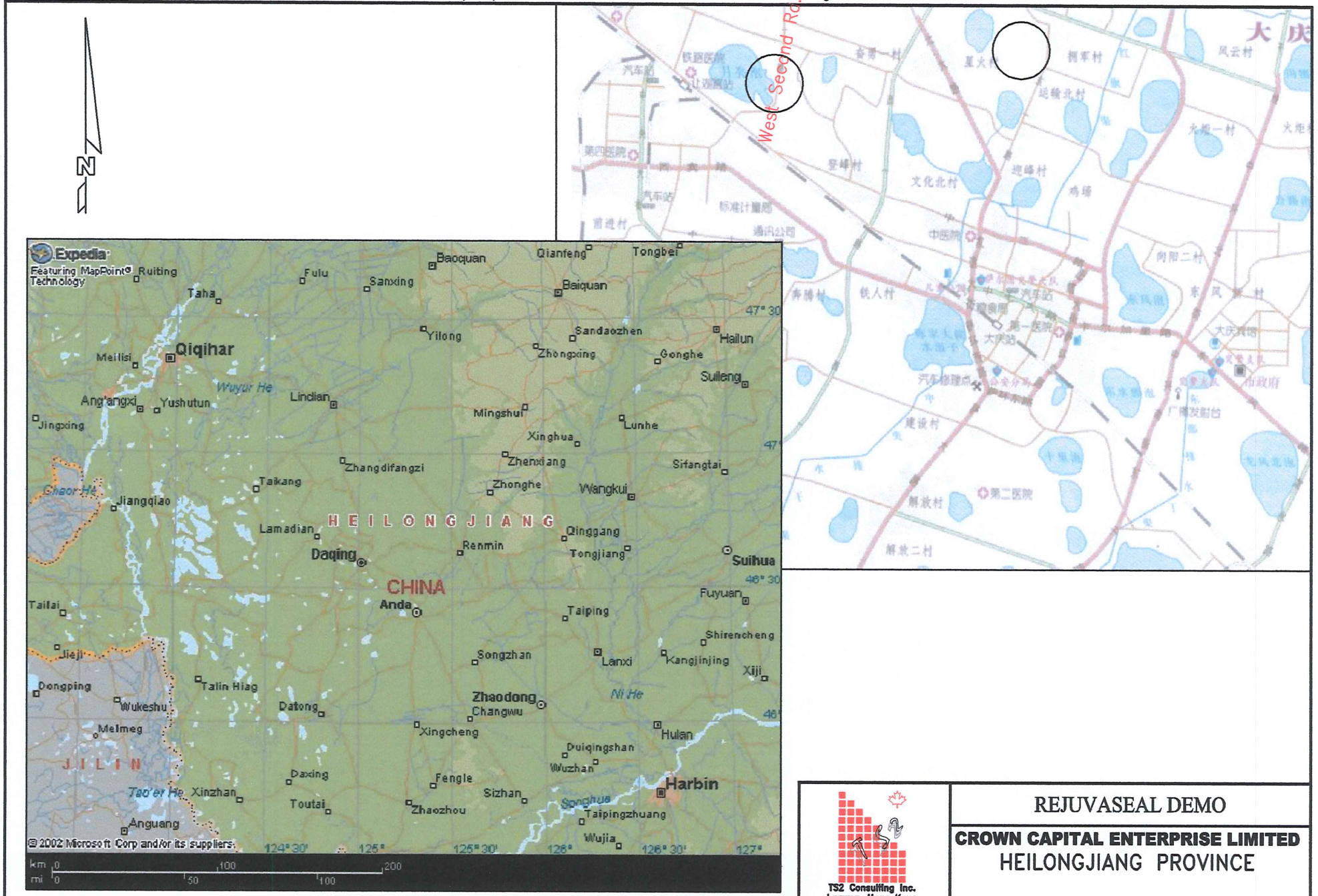

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DRAWN BY	Bb	02/08/20	PROJECT NO. B0231	

REJUVASEAL DEMO

CROWN CAPITAL ENTERPRISE LIMITED

HEILONGJIANG PROVINCE

DETAILED LOCATION MAP

DRAWING NO. FIGURE 4.0

REV. A

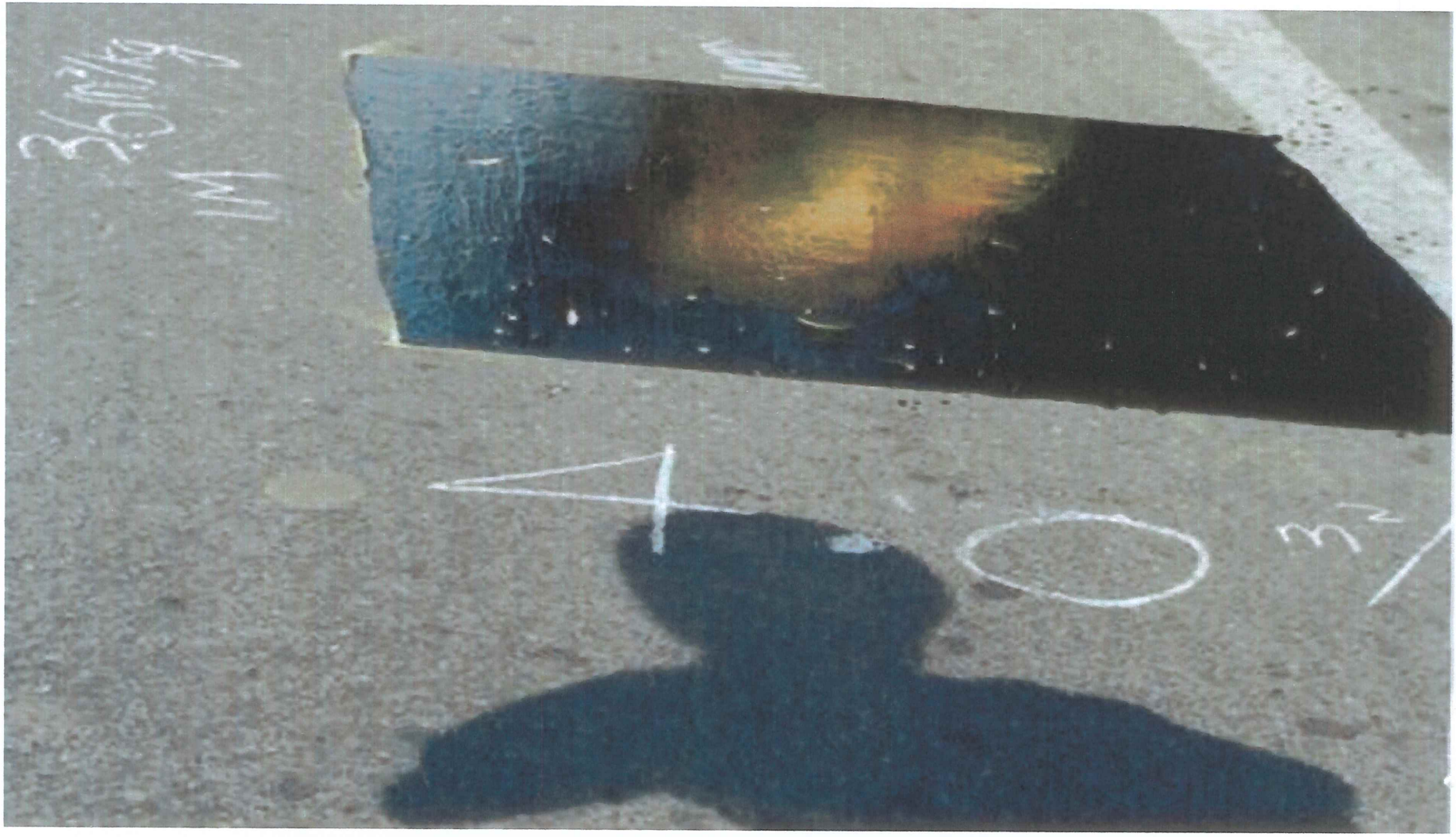

Figure 4.1 Test Patch at Demonstration Site.

The demonstration section, on West Second Road was selected by the DaQing City Highway Management and is geographically located as follows:

Table 4.3	Location of Demo Site	
System	**Northing**	**Easting**
Geographic (deg, min)	46^0 40.307'	124^0 55.113'
Universal Transverse Mercator Grid (metres) 50S	0646749	5170497

This is at the same location as the test patch. Refer to Figure 4.0 for the location. Work commenced on the demonstration section at 6:00 am on August 11, on a warm, sunny day, where the mid-day temperature reached 27 Celsius. A strip, 600 metres long, on the northbound lanes of this two-lane highway was treated. The width of the lane is 4.5 metres between the painted centre line and the shoulder, with an unpaved shoulder of approximately 1.5 metres. Panels some 20 metres in length were marked off and a pail which holds19 kilograms of RejuvaSeal™ was assigned to each panel. The RejuvaSeal™ was applied to each of the panels, using paint rollers to ensure uniformity in the application The test section is located on a straight level section. There is a slight camber to the road, which causes water to run off toward the shoulder, rather than puddle on the road. 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. There were longitudinal cracks, and also some lateral cracks. The entire portion of the treated asphalt pavement section overlies a concrete sub-grade, which rests on a compacted silty-clay, sub-grade

On the morning of August 12, work recommenced on the demonstration section at 6:00 am on a further 1100 metres of the northbound lane. Panels were again marked off in 20 metre increments. A pail which holds19 kilograms of RejuvaSeal™ was assigned to each panel. The RejuvaSeal™ was applied to each of the panels, using paint rollers to ensure uniformity in the application. Further application of RejuvaSeal on the remainder of the 3.65 kilometre test section were undertaken over the next three weeks, culminating in completion of both the north bound lane and the south bound lane. A site visit on September 6 was made to check to entire test section and evaluate the penetration of the RejuvaSeal. This is graphically shown in Figure 4.4 that follows.

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

Table 4.4				Details on RejuvaSeal™ Demonstration Section on West Second Road						
Work Schedule	Work Time (hrs)	No. of Panels	Test Length (m)	Total Area m^2	Total Area yd^2	RejuvaSeal™ Applied		Application Rate		
						US gals	litres	US Gal /yd2	m2/litre	M2 /kg
August 11	4.5	33	660	2,970	3,550	151	570	0.042	5.21	4.74
August 12	3.5	50	1000	4,500	5,379	228	864	0.042	5.21	4.74
August 13-25	7.0	100	1990	8,955	10,705	395	1495	0.037	5.99	5.44
August 26-Sept 6	14.0	183	3650	16,425	19,634	726	2744	0.037	5.99	5.44
Totals	29.0	366	7300	32,850	39,268	1500	2,418	0.042	5.21	474

Ambient temperatures at the time of the application on August 12 were in the 26 to 31 degree Celsius range, with humidity in the 55% range. Photos showing the test application of RejuvaSeal™ follow in figures 4.2, 4.3 and 4.4. on the following pages.

The site was visited on August 13 around 7:00 am and a difference was readily perceived between the RejuvaSeal™ treated section and the adjoining untreated lanes. A screwdriver was used to dig two small holes in the asphalt pavement, to a depth of 3 centimetres, some 700 metres north of the extreme south end of the demonstration section, to determine the penetration of the RejuvaSeal™. This was one day after the application of RejuvaSeal™ and at these two locations the newly rejuvenated surface was evident, by the black resilient surface layer, which was now approximately 1 millimetre thick. Below that depth, the grey, oxidized layer of asphalt was evident.

Figure 4.2 Typical Application Procedure.

Figure 4.3 Finished Surface.

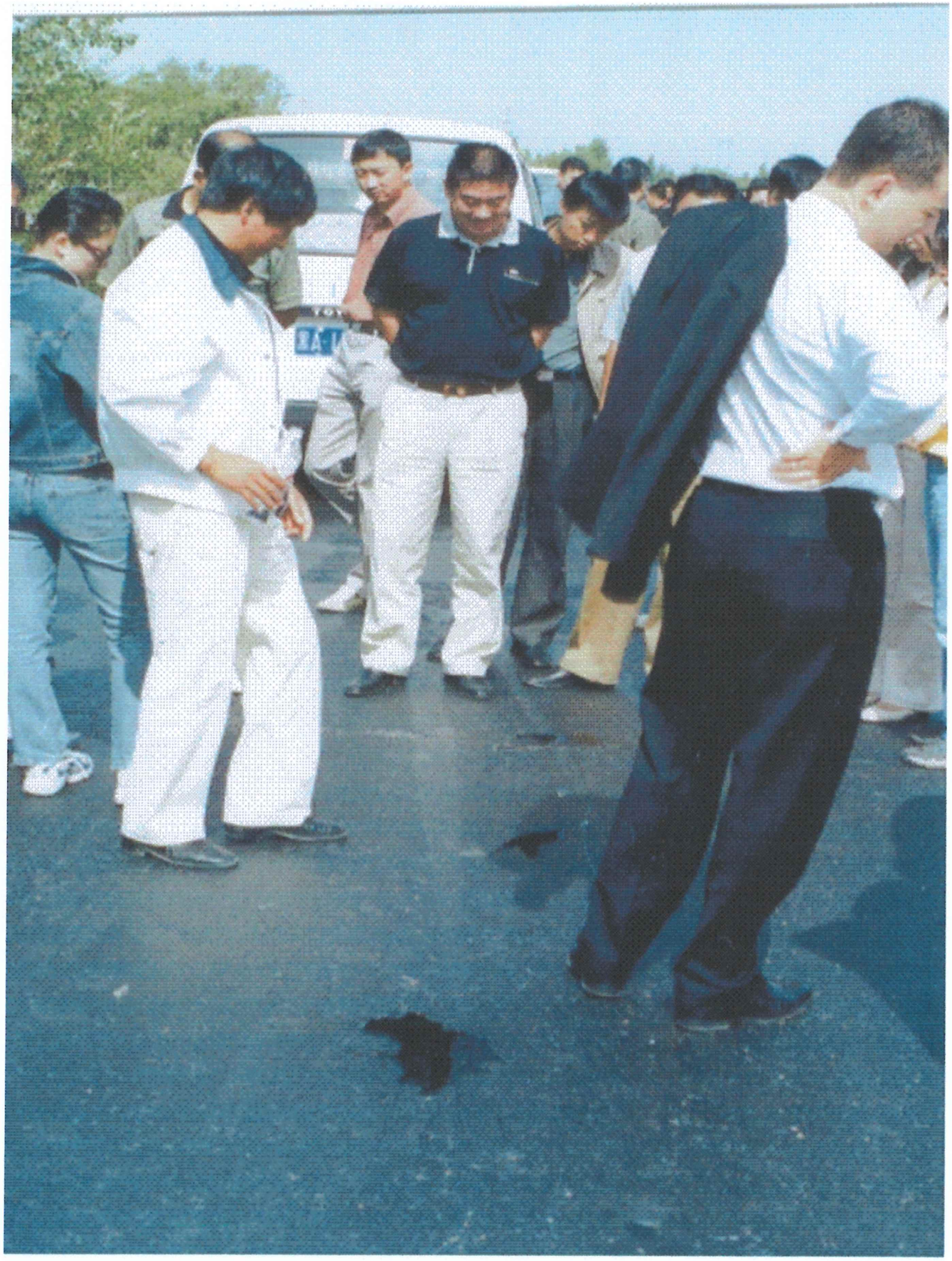

Figure 4.4 Site visit - One Month following application

4.1 RejuvaSeal™ Testing

To date the comparison of the asphalt treated with Rejuvaseal™ has been compared on a subjective basis over a very short period at the test site on the West Second Road. Testing equipment brought to the site for comparison on a more disciplined, objective basis solely consisted of an Outflow meter manufactured by Humble Equipment Co. of Reston, Louisiana, U.S.A. This was to establish the Water Dissipation (Hydroplaning Comparison).

Testing equipment will be brought to the site for comparison on a more disciplined, objective basis in the future, and to this end, the following tests will be undertaken.

- Fuel Resistance Comparison
- Elasticity/Ductility Testing

4.2 Water Dissipation

An "Outflow Meter" manufactured in the U.S.A. by Humble Equipment Company of Ruston, Louisiana and sold under the trademark "Outflow Meter" (see figure 4.5) was used to measure the asphalt pavement's capability to dissipate water, as concern has been expressed about hydroplaning on the RejuvaSeal™ treated surface, versus the untreated surface. 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 surface, if hydroplaning is to be minimized. Initially readings were taken with this aforesaid Outflow Meter at four locations on the portion of the highway selected for the test, in proximity to the test patch. These initial readings were taken at 8:00 am on August 11.

The results are shown in the table that follows:

Table 4.5		**Outflow Meter Readings**		
Test Date	Location relative to highway centerline	Location relative to south end of test section	Before RejuvaSeal™ (secs)	After RejuvaSeal™ (secs)
Aug 11	2.6m w of centre	50 m north	32	n/a
Aug 11	center	50 m north	6	n/a
Aug 11	2.6m e of center	50 m north	10	n/a

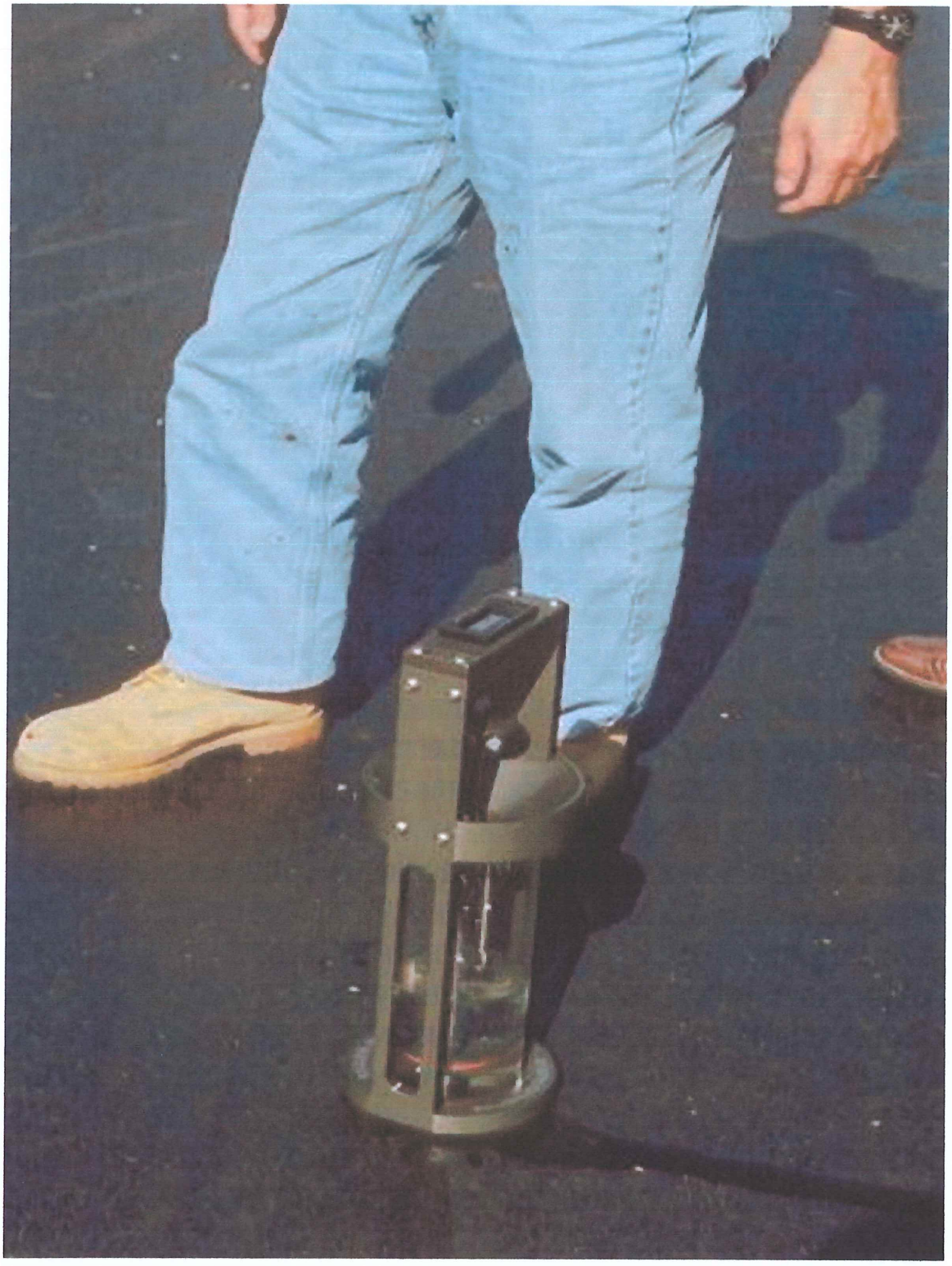

Figure 4.5
Humble Equipment Co. Outflow Meter

4.3 Fuel Resistance Comparison

Fuel Resistance Comparison will be undertaken on several sections of the untreated and RejuvaSeal™ treated sections in close proximity to the Outflow meter tests in the near future. This comparison will consist of pouring about a cupful of diesel fuel onto the road surface and then later checking the penetration of the fuel. If the fuel readily penetrated the asphalt pavement surface, then resistance to this form of chemical attack was presumed to be lower than if the fuel pooled on the surface of the asphalt pavement and slowly evaporated.

4.4 Elasticity/Ductility Testing

This aspect of the testing is beyond the capabilities of the field equipment available to both Crown Capital Enterprise Limited and RejuvaSeal™ personnel and as such, external assistance has been sought from outside experts in the field of Asphalt Testing. To this end, the City of DaQing has retained an independent testing company to conduct tests on the treated section. This will be reported separately.

5.0 Test Completion Schedule

The technicians from the HeilongJiang testing laboratory, retained by the City of DaQing will be dispatched to undertake further testing on the trial section in the near future. The projected completion of this testing is scheduled as shown in the following chart.

Figure 5.0 Project Completion Schedule

CROWN CAPITAL ENTERPRISE LIMITED

WANCHAI, HONG KONG

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August 2002

APPENDICES

No.	Description
A	Rejuvaseal™ – Technical Seminar, Ping-Gu (Beijing) China, August, 2001
B	Rejuvaseal™ Descriptive Literature
C	Kunming Copper Slag - Technical Data

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Appendix A

Rejuvaseal[tm] – Technical Seminar, Beijing, Peoples Republic of China, August 2001

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Appendix B

Rejuvaseal™ Descriptive Literature

TS^2 Consulting Inc.
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Appendix C

Kunming Copper Slag

Technical Data

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