

**CROWN CAPITAL ENTERPRISE  
LIMITED**

**WANCHAI, HONG KONG**

**RJSeal™ Application  
NanSi Street,  
DaQing, HeilongJiang,  
Peoples Republic of China**

**June 2006**



**TS<sup>2</sup> Consulting Inc.  
Lamma, Hong Kong**

# CROWN CAPITAL ENTERPRISE LIMITED

## RJSeal™ Application NanSi Street, DaQing, Heilongjiang, Peoples Republic of China

June 2006

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## **APPENDICES**

<b>No.</b>	<b>Description</b>
A	RJSeal™ Descriptive Literature
B	Desco D200 Sprayer – Technical Data



**TS² Consulting Inc.**  
**Lamma, Hong Kong**

# **CROWN CAPITAL ENTERPRISE LIMITED**

## **Application of RJSeal™ NanSi Street, DaQing, Heilongjiang Peoples Republic of China**

**June 2006**

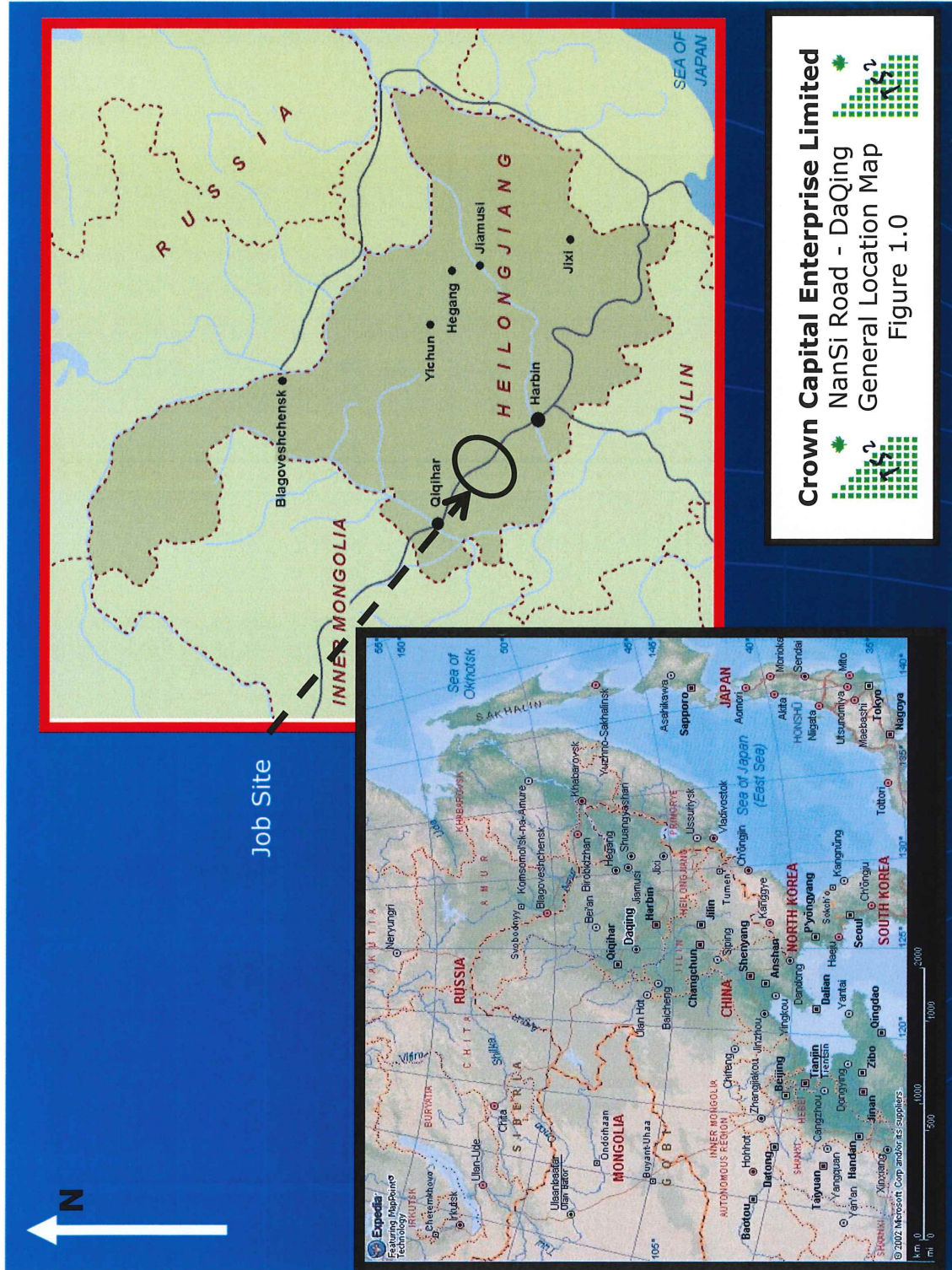
### **1.0 INTRODUCTION**

Crown Capital Enterprise Limited of Hong Kong entered into an arrangement with the China National Petroleum Corporation, which is responsible for the maintenance of the infrastructure of DaQing City, Heilongjiang Province, China in June 2006. This arrangement calls for the application of RJSeal™, a sealer/rejuvenator for asphalt pavement on NanSi Street, DaQing, some 150 kms north-west of Harbin, the Capital City of 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 8 million. Harbin has 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 was the southern terminus of its' Manchurian Railroad in Harbin. DaQing is China's most famous oilfield and was initially explored with help from the Soviet Union. After the Sino Soviet Split, China continued exploration until oil was finally discovered in late 1959. DaQing, originally a series of self-contained villages, is now a well developed city. In recent years, Heilongjiang has seen a major growth in the highway system, due to a government drive to build national highways linking Harbin with major cities in the adjoining provinces.

The majority of the area lies at 150 metres in elevation, on the extensive plain that straddles the SongHuaJiang River that flows to the northEast and eventually into the HeilongJiang (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. There is no rainy season per-se, just summer rain showers and thunderstorms and these occur primarily in May thru September. See figure 1.0 for a map showing the location of DaQing with respect to Harbin and Heilongjiang Province.

The predominant feature of the area is the extensive plains and glacial outwash and moraines from the last glacial period. 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 outside China.



Job Site

**Crown Capital Enterprise Limited**



NanSi Road - DaQing

General Location Map

Figure 1.0

## **2.0 CO-OPERATIVE PROGRAM**

The intent of the arrangement with China National Petroleum Corporation, which is responsible for the maintenance of the NanSi Street, DaQing, is to apply RJSeal™ at a location selected by the Maintenance Division. An application was undertaken on the NanSi Street, DaQing. The work was undertaken on June 6, 2006. The portion of the highway that was treated is composed of asphalt pavement, nominally 12 centimetres thick, which overlays a silty sand.

The age of the asphalt pavement is circa 1998. Keen interest was expressed in having the life of the asphalt pavement extended on this highway as the bitumen binder is now quite inflexible. The asphalt pavement is quite smooth with a extensive lateral and linear cracks. These were sealed with molten road tar earlier in the summer.

### **3.0 RJSeal™**

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 RJSeal™ at various locations in North America and South America as well as China. Further information is available from Crown Capital Enterprise Limited. RJSeal™ 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, RJSeal™ has been demonstrated successfully at over sixty (60) locations in China and sixty five (65) commercial-scale applications have taken place at various locations, including Beijing, Shanghai, Kunming and QinHuangDao, plus Harbin, DaQing and LiuShunTun in Heilongjiang Province.

#### **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 climate (extremes of 45 Celsius in summer and minus 25 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. China National Petroleum Corporation is responsible for the maintenance of the highways, streets and roads in DaQing and surrounding area.

In view of this extensive network of roads, the relatively short life of the asphalt surface, and a tight maintenance budget, the road maintenance department is definitely interested in economically extending the life of the asphalt road surface. To this end, they agreed to try RJSeal™ on the NanSi Street, DaQing. See Figure 4.0, showing the location of this highway with respect to DaQing and Heilongjiang

On June 6, 2006, both lanes of the NanSi Street were treated with RJSeal™. The location selected for an application of RJSeal™ was at the following geographic location:

<b>Table 4.1                      Geographic Location of Test Strip on NanSi Street</b>			
<b>RJSeal Strip</b>	<b>System i.e. Geographic or Universal Transverse Mercator (UTM)</b>	<b>Northing</b>	<b>Easting</b>
East End	Geographic (deg, min)	46 <sup>0</sup> 40.30'	124 <sup>0</sup> 55.11'
West End	Geographic (deg, min)	46 <sup>0</sup> 40.30'	124 <sup>0</sup> 55.11'

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. The entire portion of the treated asphalt pavement section overlies a compacted silty-clay, sub-grade. The road has extensive lineal and lateral cracks that had been recently filled with molten road tar.

RJSeal™ was applied, using a Desco D200 Sprayer. See Appendix B for technical information on this unit. This unit can uniformly apply the RJSeal™ in the application.

Ambient temperatures at the time of the application on June 6 were in the 27 degree Celsius range, with humidity in the 55% range.

Particulars of the RJSeal™ Application are shown in the table that follows:

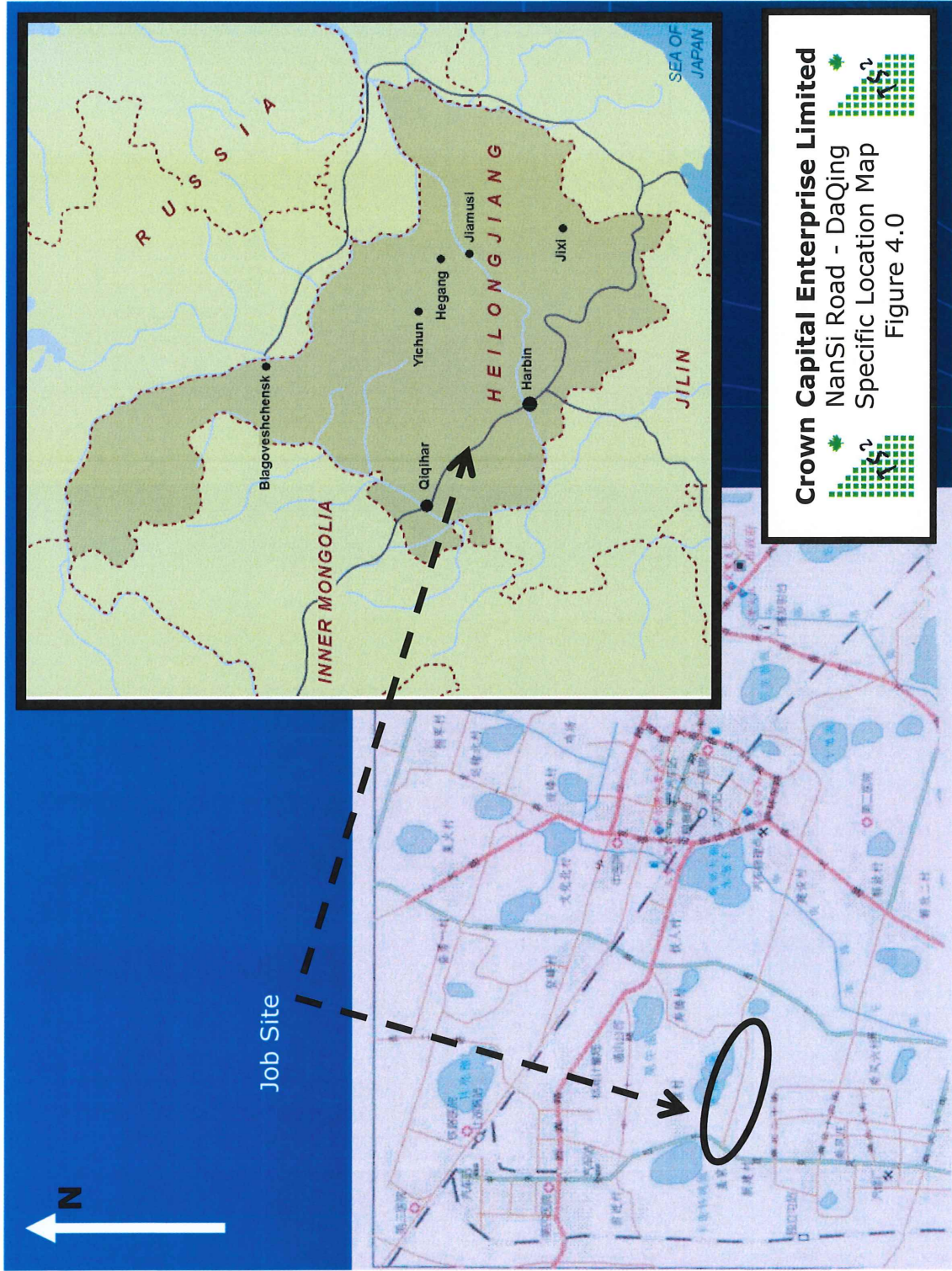


Table 4.2			Particulars of the application on NanSi Street							
Date	Work Time (hrs)	Total Area (m <sup>2</sup> )	Total Area (yd <sup>2</sup> )	RJSeal™ Applied			RJSeal™ Application Rate			
				US gals	Litres	Kgs	US Gal /yd <sup>2</sup>	Litre/m <sup>2</sup>	m <sup>2</sup> /Litre	m <sup>2</sup> /Kg
June 6	7.5	24,000	28,700	19,970	5,283	5,600	0.696	0.22	4.54	4.29

Subsequent inspection, showed that the application rate of 4.3 m<sup>2</sup>/kg was adequate for the asphalt pavement at this location

The 4 kilometre long application section on the NanSi Street is comprised entirely of asphalt pavement. The location with respect to DaQing is graphically shown in figure 4.0.

Photos showing the application of RJSeal™ follow in figures 4.1, 4.2, and 4.3 on the following pages.



#### **4.1 RJSeal™ Testing**

To date the comparison of the asphalt treated with RJSeal™ has been compared on a subjective basis over a very short period on NanSi Street in DaQing. 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 Skid Resistance**

A British Pendulum (ASTM Standard E303-93 OR China Standard T 0964-95) was employed to determine the skid resistance of the road surface prior to the application of RJSeal™ and also after the application.

Test Results from the British Pendulum Testing are contained in the table that follows:

<b>Table 4.3</b>			<b>Results from the British Pendulum Tests</b>			
Street	Loc'n	Date	Lane	Wheel Path	British Pendulum #	
					Before RJSeal™	After RJSeal™
NanSi	K	June 6	Eastbound	Left	40	42
NanSi	K	June 6	Eastbound	Left	42	45

The test results from the British Pendulum are not directly correlatable with the sand patch test. A BPN of 42 is indicative of an acceptable road surface from a skid resistance point of view.

See figure 4.4 for a photo of the British Pendulum testing at the demonstration site

### **4.3 Water Penetration**

Water Penetration Tests (China Testing Standard T 0730-2000) were undertaken at several locations on the untreated portion of the street, in close proximity to the test strip and later on the RJSeal™ treated section, in close proximity to the British Pendulum tests.

<b>Table 4.4</b>			<b>Results from the Water Penetration Tests</b>			
Street	Loc'n	Date	Lane	Wheel Path	Water Inflow ml/min	
					Before RJSeal™	After RJSeal™
NanSi	K	June 6	Eastbound	Left	10	0
NanSi	K	June 6	Eastbound	Left	5	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 RJSeal™ treated sections. The results of the testing are documented in the table that follows:

<b>Table 4.5</b>			<b>Results from the Sand Patch Tests</b>			
Street	Loc'n	Date	Lane	Wheel Path	Depth of Structure (mm)	
					Before RJSeal™	After RJSeal™
NanSi	K	June 6	Eastbound	Left	0.39	0.36
NanSi	K	June 6	Eastbound	Left	0.58	0.48

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

#### **4.5 Ductility/Viscosity/Penetration Testing**

This aspect of the testing is beyond the capabilities Crown Capital Enterprise Limited personnel and external assistance has been sought from outside experts in the field of Asphalt Testing. To this end, the China National Petroleum Corporation will retain 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 testing laboratory, retained by the China National Petroleum Corporation 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.

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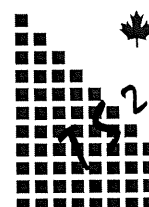
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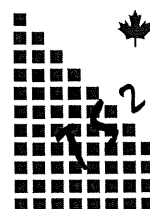
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**Appendix A**

**RJSeal™ Descriptive Literature**



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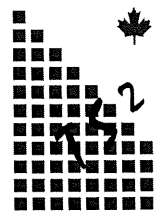
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**Appendix B**

**Desco D200 Sprayer**

**Technical Data**



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