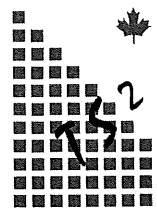


**CROWN CAPITAL ENTERPRISE
LIMITED**

WANCHAI, HONG KONG

**Demonstration of Rejuvaseal™
ChangPing Expressway, ChangChun, Jilin,
Peoples Republic of China**

September 2002



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

CROWN CAPITAL ENTERPRISE LIMITED

Demonstration of RejuvaSeal ChangPing Expressway, ChangChun, Jilin, Peoples Republic of China

September 2002

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APPENDICES

No.	Description
A	Rejuvaseal™ – Technical Seminar, DaQing China, September 2002
B	Rejuvaseal Descriptive Literature



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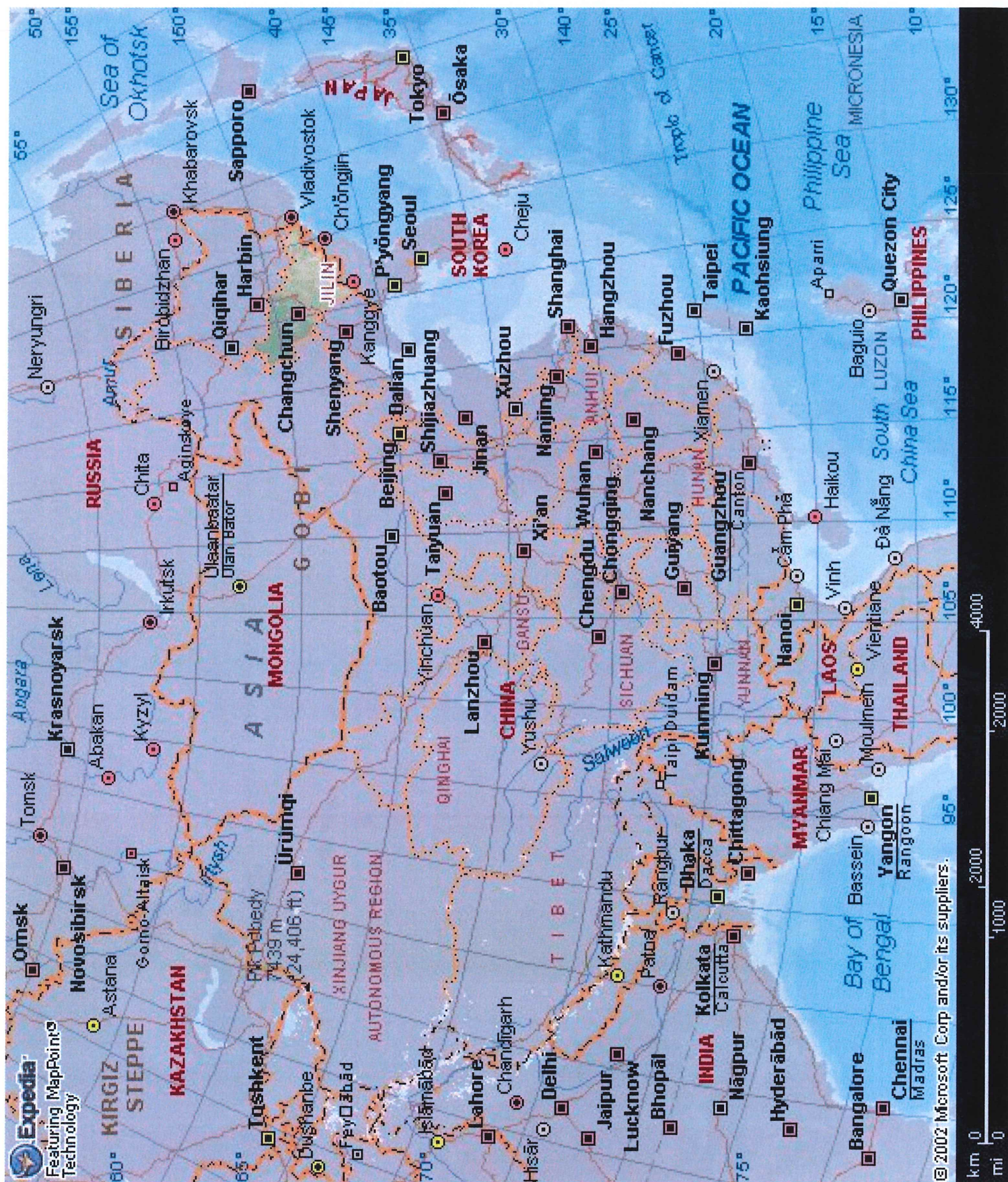
1.0 INTRODUCTION

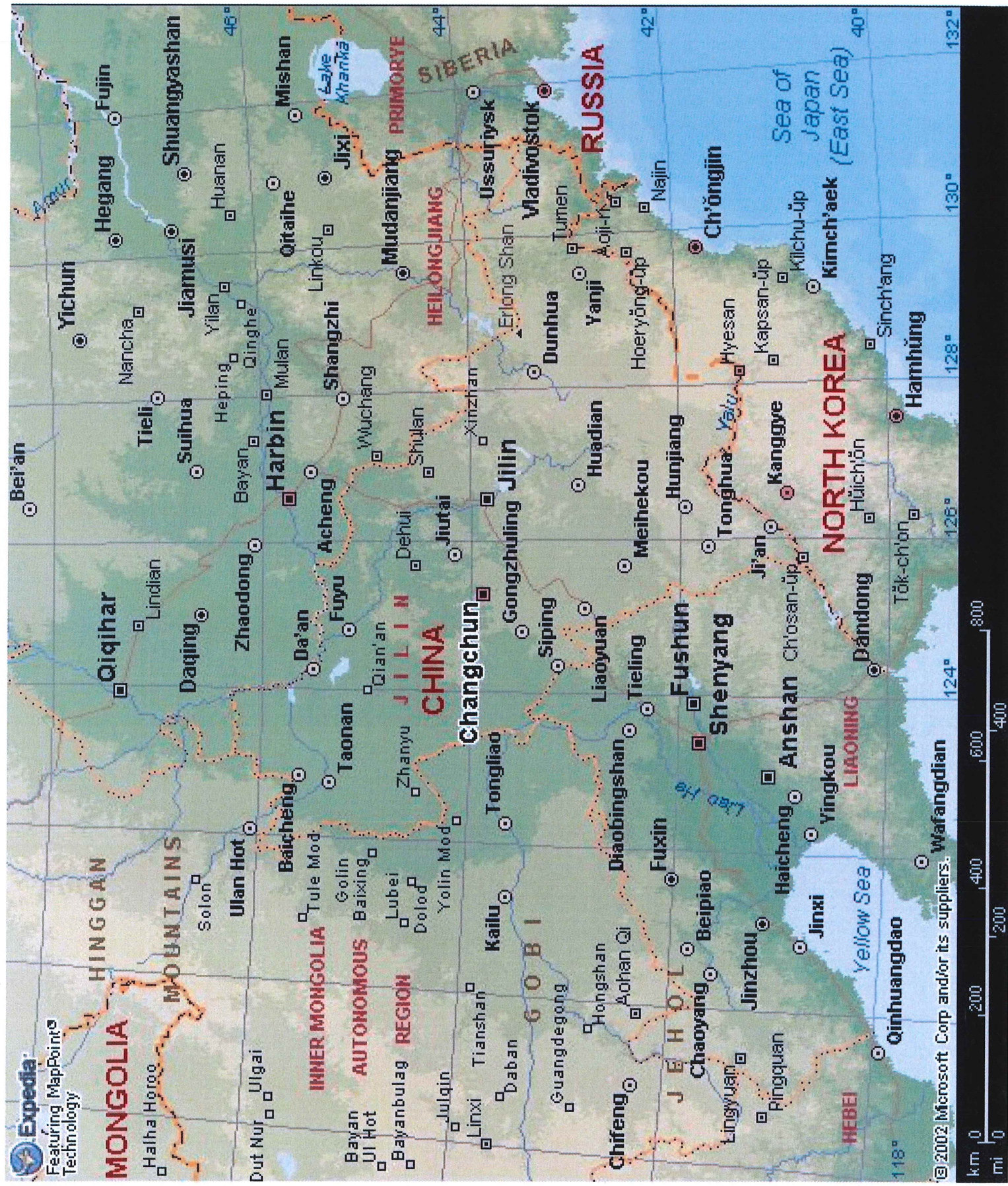
Crown Capital Enterprise Limited of Hong Kong entered into an arrangement with the Communications Bureau, Highways Department of Jilin Province, China in September 2002. This arrangement calls for the analysis of the performance of RejuvaSeal™, a sealer/rejuvenator for asphalt pavement on highways within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

Jilin Province is situated in northeastern China, and is bounded by North Korea and Mongolia as well as Heilongjiang Province to the north and Liaoning Province to the south. The capital city of Jilin Province is Changchun with a population of approximately 5 million. Changchun 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 when it was called Mongolia. The Japanese also occupied the area from 1905 until 1945 and establish the deposed Chinese Emperor Puyi as the puppet Emperor in 1915 in an attempt to solidify their control of the region.

In recent years, Jilin has seen a major growth in the highway system, due to a government drive to build national highways linking Changchun with major cities in the adjoining provinces. Oil was discovered in the Changchun area in the early 1960's, which led to modest petroleum developments in the area. The majority of the area lies at 150 metres in elevation, on an extensive plain. The regions' latitude (44 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 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 Changchun and Jilin Province.

In the immediate Changchun area, a significant sedimentary sequence predominates covered by a veneer of glacial till. The predominant feature of the area is shallow lakes with closed drainage systems aligned along the direction of the retreating continental ice sheet that covered this area. There are very limited 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 Jilin Province, as well as washed gravels from the ancient glacial feed channels. The bitumen binder for the asphalt is probably imported from offshore refineries.





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MONGOLIA

Halha
Horoo

HINGGAN MOUNTAINS

Solon

INNER MONGOLIA

Tule Mod

AUTONOMOUS REGION

Bayan
Ul Hot

Bayanbulag

Lubei
Dolod

Yulin Mod

Linxi
Tianshan

Daban

Guangdegong

Hongshan

Aohan Qi

CHIFENG

Chaoyang

Beipiao

Lingyuan

Pingquan

Jinzhou

Haicheng

Jinxi

Yingkou

Qinhuangdao

Wafangdian

HEBEI

Qiqihar

Lindian

Daqing

Zhaodong

Da'an

Fuyu

Qian'an

Taonan

Changchun

Tongliao

Kailu

Gongzhuling

Jilin

Siping

Liaoyuan

Tieling

Fushun

Shenyang

Diabingshan

Fuxin

Anshan

Ch'osan-üp

Dandong

Yingkou

Qinhuangdao

Wafangdian

LIAONING

NORTH KOREA

Kimch'aek
(East Sea)

Yichun

Hegang

Fujin

Shuangyashan

Huanan

Mishan

Qitaihe

Linkou

Jixi

HEILONGJIANG

Mudanjiang

Ussuriysk

Vladivostok

Tumen

Yanji

Hoeryöng-üp

Najin

Ch'öngjin

Kapsan-üp

Kilchu-üp

Sinch'ang

Hamhung

RUSSIA

SIBERIA

Erilong Shan

Dunhua

Huadian

Meihekou

Hunjiang

Be'an

Nancha

Tieli

Suihua

Heping

Bayan

Harbin

Acheng

Wuchang

Shulan

Dehui

Jiutai

Xinzhai

Gongzhuling

Jilin

Siping

Liaoyuan

Tieling

Fushun

Shenyang

Diabingshan

Fuxin

Anshan

Ch'osan-üp

Dandong

Yingkou

Qinhuangdao

Wafangdian

LIAONING

Ulan Hot

Baicheng

Taonan

Changchun

Tongliao

Kailu

Gongzhuling

Jilin

Siping

Liaoyuan

Tieling

Fushun

Shenyang

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Huanan

Mishan

Qitaihe

Linkou

Jixi

HEILONGJIANG

Mudanjiang

Ussuriysk

Vladivostok

Tumen

Yanji

Hoeryöng-üp

Najin

Ch'öngjin

Kapsan-üp

Kilchu-üp

Sinch'ang

Hamhung

RUSSIA

SIBERIA

Erilong Shan

Dunhua

Huadian

Meihekou

Hunjiang

Be'an

Nancha

Tieli

Suihua

Heping

Bayan

Harbin

Acheng

Wuchang

Shulan

Dehui

Jiutai

Xinzhai

Gongzhuling

Jilin

Siping

Liaoyuan

Tieling

Fushun

Shenyang

Diabingshan

Fuxin

Anshan

Ch'osan-üp

Dandong

Yingkou

Qinhuangdao

Wafangdian

LIAONING

Ulan Hot

Baicheng

Taonan

Changchun

Tongliao

Kailu

Gongzhuling

Jilin

Siping

Liaoyuan

Tieling

Fushun

Shenyang

Diabingshan

Fuxin

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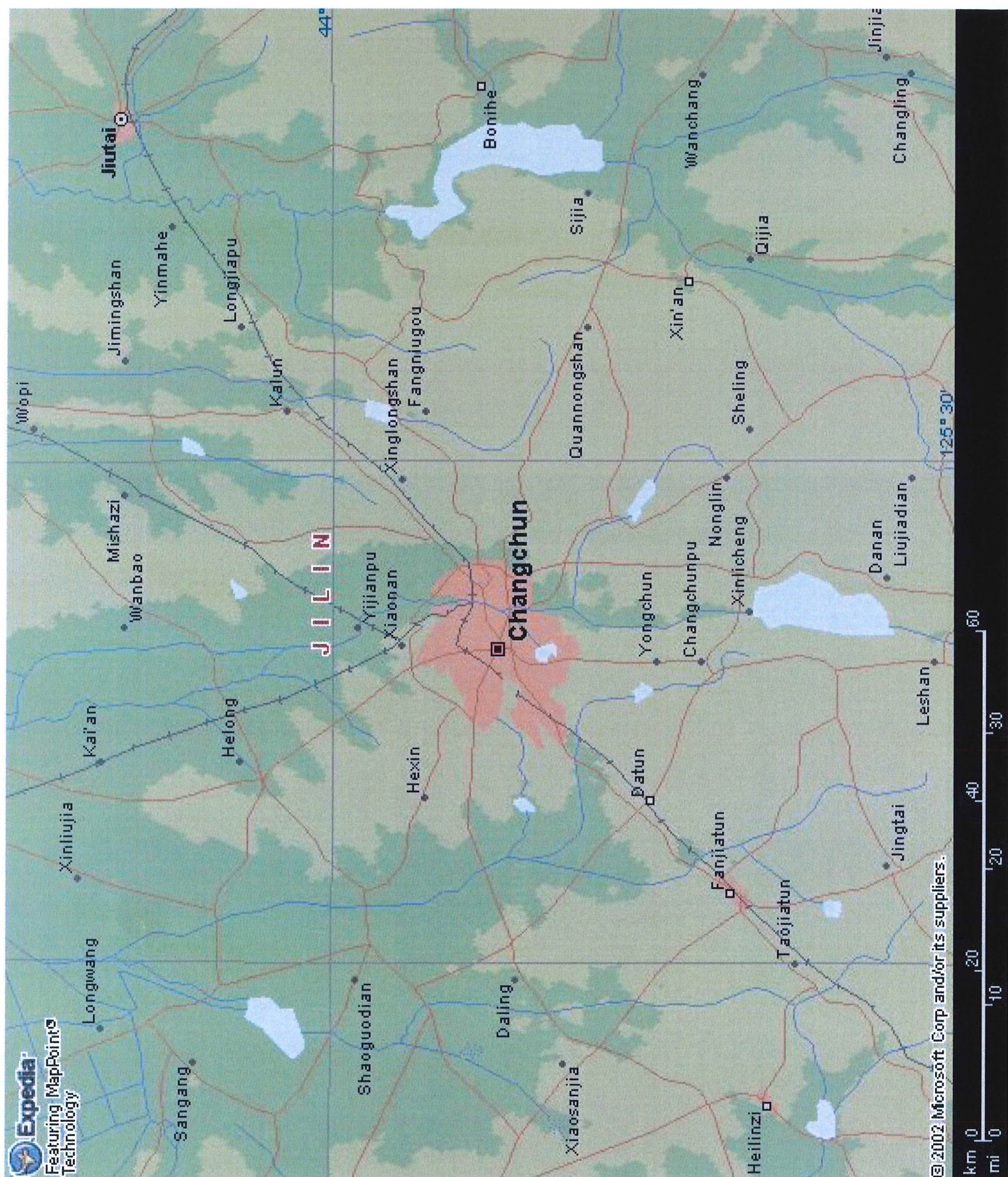
RUSSIA

SIBERIA

Erilong Shan



Month	Number of People
January	100
February	120
March	150
April	180
May	200
June	180
July	150
August	120
September	100
October	80
November	60
December	40



2.0 CO-OPERATIVE PROGRAM

The intent of the arrangement with Jilin 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 ChangPing Expressway, just southwest of the city of Changchun, commencing on September 18, 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 5 years, so is suspected to be of mid 1990's or vintage. Concern had been expressed about 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 presentation held in Changchun in early 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 Jilin Province is located in a northern climate (Latitude: 42 to 45North) 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.

Jilin has a significant concentration of highways in China, with some 4,000 kms of National and Provincial highway. The City of Changchun is responsible for 500 kilometres of National Highway, and 600 kilometres of Provincial Highway, within it's jurisdiction (distances as of year-end 2000) and approximately 300 kms of streets in Changchun and other communities

In view of this extensive network of roads and the relatively short life of the asphalt surface, Jilin is definitely interested in determining how to economically extend the life of the asphalt road surface. To this end, Jilin has agreed to try RejuvaSeal™ on the ChangPing Expressway, adjacent to the city of Changchun. 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 Changchun and Jilin

On September 15, 2002 a test patch in the northbound lane of ChangPing Expressway (four lane divided highway with 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)		43° 45.561'	125° 215.636'
Universal Transverse Mercator Grid (51T) (metres)		0681975	4847646

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	1.27	1.27	14	0.09	0.33	0.057	0.26	3.88	3.53

Subsequent inspection of the test patches on September 16, showed that the application rate of 3.5 m²/kg was more than adequate for the asphalt pavement at this location and a slightly lower application rate of 3.34 m²/kg was selected.

The 96.5 metre long demonstration section on ChangPing Expressway is located some 2 kilometres south of the City of Changchun. 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.

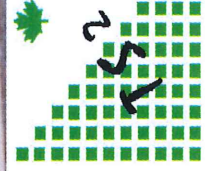


Figure 4.1
Test Patch at Demonstration Site.

The demonstration section, on ChangPing Expressway was selected by the ChangPing Expressway Management Company and is geographically located as follows:

Table 4.3	Location of Demo Site	
System	Northing	Easting
Geographic (deg, min)	43 ⁰ 45.561'	125 ⁰ 215.636'
Universal Transverse Mercator Grid (metres) 51T	0681975	4847646

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 8:00 am on September 16, on a warm, sunny day, where the mid-day temperature reached 28 Celsius. A strip, 96.5 metres long, on the two southbound lanes of this four-lane, divided highway was treated. The width of both lanes combined is 7.2 metres between the painted shoulder lines with a paved shoulder of approximately 1.5 metres. Panels some 11.5 metres in length were marked off and a pail which holds 19 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 compacted silty-clay, sub-grade

A site visit on September 17 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 ChangPing Expressway								
<u>Work Schedule</u>	<u>Work Time</u>	<u>No. of Panels</u>	<u>Test Length</u>	<u>Total Area</u>	<u>Total Area</u>	<u>RejuvaSeal™ Applied</u>			<u>Application Rate</u>		
Sept 16	(hrs)		(m)	<u>m²</u>	<u>yd²</u>	US gals	litres	kgs	US Gal /yd ²	m ² /litre	m ² /kg
8-10 am	2.0	8.3	96.5	695	831	50	189	208	0.060	3.68	3.34
Totals	2.0	8.3	96.5	695	831	50	189	208	0.060	3.68	3.34

Ambient temperatures at the time of the application on September 12 were in the 22 to 26 degree Celsius range, with humidity in the 40% 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 September 17 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 10 metres south of the extreme north 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.

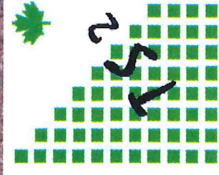


Figure 4.2
Typical Application Procedure.



Figure 4.3 Finished Surface
Both Northbound Lanes

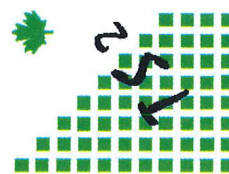
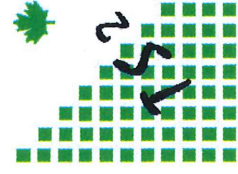




Figure 4.4 British pendulum Test (left)
Water Infusion Test (right)



4.1 RejuvaSeal™ Testing

To date the comparison of the asphalt treated with Rejuvaseal™ has been compared on a very short period at the test site on the ChangPing Expressway. Testing equipment brought to the site by Crown Capital Enterprise Limited 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).

The ChangPing Expressway Management Company brought additional testing equipment to the site on September 16, for comparison on a more disciplined, objective basis and to this end, the following tests were undertaken.

- British Pendulum Test
- Water Infusion Test.

These will be reported separately in a report compiled by the ChangPing Expressway Maintenance Company. See Figure 4.4 that follows, showing the testing equipment utilized by the ChangPing Expressway Maintenance Company.

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 September 16.

The results are shown in the table that follows:

Table 4.5		Outflow Meter Readings		
Test Date	Location relative to highway shoulder	Location relative to test section	Before RejuvaSeal™ (secs)	After RejuvaSea™ (secs)
Sept 16	0.5m west	South end	4	n/a
Sept 16	3.0 m west	South end	4	n/a
Sept 16	5.5 m west	South end	6	n/a
Sept 16	7.5 m west	South end	7	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. This will be reported separately.

5.0 Test Completion Schedule

Technicians from the ChangPing Expressway Maintenance Company were be dispatched to undertake further testing on the trial. The projected completion of this testing is scheduled as shown in the following chart.

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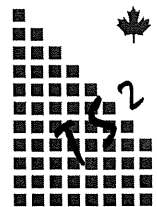
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Appendix A

**Rejuvaseal™ – Technical Seminar,
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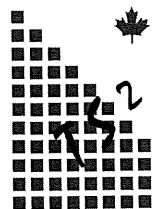
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Appendix B

Rejuvaseal™ Descriptive Literature



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