CITY OF FORT SASKATCHEWAN
WATER TOWER
COATING/INSULATION ASSESSMENT

PARK DEROCHIE INC.

GIL ROGERS, BUSINESS DEVELOPMENT

Bus: 780.478.4688 **| Dir:** 780-772-2536 **| Fax:** 780-475-9832

GRogers@ParkDerochie.com

NACE/SSPC Certified Protective Coating Specialist
NACE Level 3 Coating Inspector
NACE CIP Lead Instructor

PARK DEROCHIE

COATINGS
INSULATION
METALIZING
SCAFFOLDING
FIREPROOFING
BLAST CLEANING

WATER TOWER – COATING/INSULATION ASSESSMENT

Prepared for: **City of Fort Saskatchewan**
Attention: **Bradley, McDonald, Manager, Utility Services**
780-992-6259
bmcdonald@fortsask.ca

Prepared by: Park Derochie Inc.
Author: Gil Rogers, Business Development
780-772-2536
GRogers@parkderochie.com

EXECUTIVE SUMMARY

Taking into consideration the condition of the existing coating and the fact that it contains lead; with the exception of the standpipe this report discusses two options for coating remediation. As the coating/steel condition of the standpipe is significantly worse than the rest of the structure; this report recommends complete removal and replacement of the cladding, insulation and existing coating on the standpipe. However, for the other components of the tower, i.e. support structure and the tank, it is possible to overcoat the existing coating after performing remedial surface preparation and touch up of the existing coating, therefore this report discusses both options for these areas. Four options are presented below with the respective budgetary costs in 2017 $:

Table 1 – Remediation Options

OPTION 1 – REMOVE AND REPLACE ALL COATINGS / METALIZE STANDPIPE PRIOR TO RE - INULATION & CLADDING			
ANTICIPATED SERVICE LIFE	**BUDGETARY COSTS**	**COST P/YEAR OF SERVICE**	**COMMENTS**
Thirty (30) years	2,100,000	70,000	Structure will be lead free
OPTION 2 – REMOVE AND REPLACE ALL COATINGS/ COATING STANDPIPE PRIOR TO RE - INULATION & CLADDING			
Avg. - Twenty-Three (23) years (service life of areas of replacement – 25 years; coated standpipe 15 years)	2,050,000	89,130	Structure will be lead free Overall reduced service life results from coating vs. metalizing standpipe.
OPTION # 3 – OVERCOAT ENTIRE STRUCTURE/METALIZE STANDPIPE PRIOR TO RE - INUSLATON & CLADDING			
Avg. - Fifteen (15) years (service life of over coated areas – 10 years; metalized standpipe 25 years)	850,000	56,666	Structure will still have intact lead based paint except on standpipe; cost of eventual removal is simply deferred.
OPTION # 4 – OVERCOAT ENTIRE STRUCTURE/COAT STANDPIPE PRIOR TO RE – INSULATON & CLADDING			
Ten (10) years	800,000	80,000	Structure will still have intact lead based paint except on standpipe; cost of eventual removal is simply deferred.

The significant costs shown above are a direct result of a number of factors:

1. Working at heights
2. This project involves lead abatement, therefore the entire structure must be scaffolded and contained to ensure no escapement of lead containing dusts.
3. Specialized lead abatement procedures must be implemented including but not limited to; worker training, placement and use of a wash car, air monitoring, blood monitoring and disposal of hazardous waste.

BACKGROUND

The city of Fort Saskatchewan retained Park Derochie Inc. (PD) to perform an assessment of the water tower located at 9421 – 101 Street.

The tower was constructed in 1956 by Horton Steel Works, and consists of a 946 m^3 tank supported by six (6) tubular steel columns on concrete footings. The complete structure was repainted in 1995, however the existing underlying coating is believed to be original. The original insulated frost case clads the central standpipe.

SCOPE

The city commissioned PD to complete the following assessment items:

Coating Assessment

1. Identify/verify existing paint composition (e.g. layers, thickness, paint type) as required to assist in determining re-coating options
2. Identify potential damage, including damage from antenna/cable mounting hardware
3. Evaluate condition of existing surface coating
4. Determine whether the mural can be restored (e.g. polished to remove oxidation)

Standpipe Insulation Assessment

1. Identify/verify composition of the cladding (insulation and jacket materials)
2. Inspect and evaluate the condition / weather tightness of the casing on the column
3. Assess whether there is any remaining insulating value in the material
4. Assess the insulation requirements of the standpipe (e.g. required R-value)
5. Evaluate extent and severity of external corrosion under the insulation if feasible OR conduct a risk assessment related to potential corrosion under the insulation
   Hazardous Materials
6. Determine if hazardous materials are present, including asbestos and lead
7. Conduct a risk assessment for any hazardous materials identified

Hazardous Materials

1. Determine if hazardous materials are present, including asbestos and lead
2. Conduct a risk assessment for any hazardous materials identified

PURPOSE

The purpose of this report is to provide the City of Fort Saskatchewan the following information:

1. Possible options c/w budget costs for rehabilitation or replacement of coating
2. Possible options c/w budget costs for mural restoration/renewal
3. Possible options c/w budget costs to mitigate damage from foreign hardware
4. Possible options c/w budget costs to repair or replace standpipe insulation and cladding
5. Possible options c/w budget costs to mitigate or manage corrosion under insulation

ASSESSMENT METHODOLOGY

Access to the standpipe support legs were by man lift and the tank was accessed by use of a lift truck.

Nine access holes were cut into the cladding on the standpipe up to the 80' level. This permitted the inspection of the insulation and coating as well as permitted sampling of the coating. The removed insulation was replaced with new insulation and the cladding replaced and caulked after inspection.

The insulation inspection was performed by Mr. Terry Snell who is an experienced journeyman insulator who works in a supervisory capacity with PD.

The coating inspection was performed by Mr.'s Darrel and Andrew Myles, both of whom are NACE Level 3 Certified Coating Inspectors.

COATING ASSESSMENT

The coating assessment consisted of lead sampling, a visual inspection combined with random Dry Film Thickness (DFT) readings on the Standpipe, Support Legs and the Tank.

The existing coating system is generically described as an alkyd. A minimum of three coats has been applied to the supporting legs and tank; whereas the standpipe has only received one coat of primer.

The assessment of the Standpipe and Support Legs was conducted on October 12, 2016 by Mr. Darrel Myles of FTF Inspections Ltd whose report is shown as Appendix A.

Below are the key elements of the assessment:

A. The coating on the standpipe is severely degraded and the steel is actively corroding. In areas of intact existing coating DFT measurements averaged only 1 mil (1/1000").
B. The condition of the standpipe steel was markedly worse at the lower levels where there is evidence of pitting and associated steel loss. (see pictures in FTF report)
C. The coating on the support legs is largely intact with no evidence of general degradation with the exception of isolated areas including primarily where electronic equipment has been strapped to the legs. In these areas there is localized coating breakdown although for the most part the original primer is intact. (see pictures in FTF report).
D. The average DFT on the support legs is approximately 6.5 mils.

The coating assessment of the tank was completed on October 28, 2016 by Mr. Andrew Myles of PD whose report is shown as Appendix B.

Below are the key elements of the assessment

A. While the coating on the tank is largely intact, it is beginning to show signs of aging and deterioration. The topcoat has worn off in large areas and there is isolated coating breakdown, particularly in weld areas.
B. The average DFT on the tank is approximately 5 mils.

INSULATION ASSESSMENT

The standpipe insulation/cladding assessment was conducted by Mr. Terry Snell from October 11 – 13, 2016. He did not issue a formal report but summarized his inspection as follows:

A. The weather barrier (insulation water cap) at the expansion joint is not weather tight permitting water to enter behind the cladding. As a result, below this point, the insulation is damaged and the standpipe is badly corroded. The insulation below this point appears to contain mold.
B. The insulation system above the expansion joint is in better condition but is still not sealed as evidenced by the corrosion on the standpipe and damaged insulation.
C. At multiple inspection points, the insulation appears to have slipped down and as a result some spots are missing insulation.
D. In view of the condition of the existing insulation and the fact that there is no insulation in isolated locations, the R-value of the standpipe insulation is very inconsistent.

HAZARDOUS MATERIALS

A. Samples of the insulation from the standpipe was analyzed by Enviro-Works Inc. and found to be asbestos free. (see attached report dated August 26, 2016, shown in Appendix C)
B. Samples of existing coating from the standpipe/support legs and tank were analyzed by Enviro-Works and found to contain lead varying from 34,097 – 58,192 mg/kg (see attached reports dated August 25th and November 1, 2016, shown in Appendix D).

MAINTENANCE OPTIONS

In view of the assessment results, the highest priority item is the standpipe, followed by the tank and finally the support legs.

Given the condition of the cladding, insulation and coating on the standpipe, it is prudent to perform remediation as soon as practically possible.

Given the height of the tower and its proximity to the public, this report is written with the assumption that the City of Fort Saskatchewan will require all safety risks to the general public be reduced or eliminated. This requires the work area to be scaffolded and contained. This will serve to protect passerby from any falling objects or fugitive emissions (e.g. lead or nuisance dusts).

Coating Options

For the purposes of this report, PD is providing a high level overview of the available options with budgetary costs and the estimated costs per year until the applied coating would need removal and replacement.

As the structure was last coated in 1995 and the bottom 1/3 of the supports coated again 10 – 15 years ago, the existing topcoats have provided good service, however are now reaching the end of their practical service life. As coatings age they begin to lose flexibility and are more prone to failure and delamination over time. Furthermore, recoating an aged coating can add additional stress to the existing coating and result in pre-mature coating failure of the applied coating. In other words, any new coating is only as good as the existing coating it is applied over.

Regardless of which option is chosen, the cost of access, i.e. scaffold and containment will be incurred. As this represents a significant percentage of the total cost, the decision to remove and replace a coating approaching the end of its service life is the more logical choice. Regardless of the option chosen, remediation of existing lead containing coatings is a high risk activity which requires a site specific safety plan to ensure compliance with OH&S regulations regarding lead abatement. Contractors carrying the SSPC QP 2 certification for removal of hazardous materials are a good choice to perform this work.

The over coating option is less expensive; however, this option has the effect of delaying the cost of lead abatement for 10 years at which point complete removal will be necessary in any case. Given that labour, material and access costs are likely to escalate at a projected 2-5% per year. Future removal and replacement costs could escalate in the range of 20 – 50% depending on when the work is done.

The costing shown in the Executive Summary was prepared with the level of surface preparation and generic candidate coatings shown in Table 2. For the purposes of tendering, the City of Fort Saskatchewan will need to issue a fully developed project specification; therefore, the table below should be viewed as a high level summary document.

Table 2 – Coating Options

OPTION 1 – REMOVE AND REPLACE ALL COATINGS / METALIZE STANDPIPE PRIOR TO RE - INULATION & CLADDING			
AREA	**SURFACE PREPARATION**	**COATING SYSTEM**	**COMMENTS**
Support Legs & Tank	NACE. No. 3/SSPC – SP6 Commercial Blast Cleaning	Zinc Primer/Epoxy Midcoat/Urethane Topcoat	Structure will be lead free with an anticipate service life of 30 years
Standpipe	NACE No. 1/SSPC – SP 5 White Metal Blast Cleaning	Thermal Spray Aluminum (Metallizing)	
OPTION 2 – REMOVE AND REPLACE ALL COATINGS/ COATING STANDPIPE PRIOR TO RE - INULATION & CLADDING			
Support Legs & Tank	NACE No. 3/SSPC SP 6 Commercial Blast Cleaning	Zinc Primer/Epoxy Midcoat/Urethane Topcoat	Structure will be lead free with an average anticipated service life of 23 years
Standpipe	NACE No.2/SSPC – SP 10 Near White Metal Blast Cleaning	Epoxy Phenolic Coating	

OPTION # 3 – OVERCOAT ENTIRE STRUCTURE/METALIZE STANDPIPE PRIOR TO RE - INUSLATON & CLADDING			
Support Legs & Tank	NACE No. 4/SSPC – SP 7 Brush Off Blast Cleaning	Epoxy Spot Primer/ Full Coat Epoxy Penetrating Sealer/Urethane Top Coat	Structure will still have intact lead based paint except on standpipe, with an anticipated service life of 15 years
Standpipe	NACE No. 1/SSPC – SP 5 White Metal Blast Cleaning	Thermal Spray Aluminum (Metallizing)	
OPTION # 4 – OVEROAT ENTIRE STRUCTURE/COAT STANDPIPE PRIOR TO RE – INSULATON & CLADDING			
Support Legs & Tank	NACE No. 4/SSPC – SP 7 Brush Off Blast Cleaning	Epoxy Spot Primer/Epoxy Penetrating Sealer/Urethane Top Coat	Structure will still have intact lead based paint except on standpipe with an anticipated service life of 10 years
Standpipe	NACE No.2/SSPC – SP 10 Near White Metal Blast Cleaning	Epoxy Phenolic coating	

Insulation Options

In view of the age and condition of the existing cladding and insulation the only viable option is to remove and replace.

Scope of Work

A. Strip insulation and cladding off stand pipe
B. Supply & install new insulation materials for stand pipe after blasting and coating activities are completed;

Insulation Material Specification & Application

A. Insulation – 3” Thick Mineral Wool Tank Wrap, 8 LB Density;
B. Cladding – 26 GA Corrugated Steel Cladding. 7/8” Corrugated, Slate Blue or Royal Blue in Color
C. Securement – ¾” x 0.020 Stainless Steel Banding

Clarifications and Exceptions:

1. This report has been prepared by Gil Rogers whose CV is shown in Appendix E

2. This report has been prepared as a guidance document only; for tender purposes the City of Fort Saskatchewan will need to develop a site specific job scope and specification.

Appendix A

FTF Inspection Report by Mr. Daryl Myles

FTF INSPECTIONS LTD.

Head Office
80 Nottingham Road
Sherwood Park, Alberta
T8A 5M5 Canada
Tel: (780) 916-0262
E-mail: dmyleshume@gmail.com

Inspection Report

Project/Client:	FT Sask	Date:	October 12, 2016
Contractor:	Park Derochie Coatings	Coating Supplier Rep:	
Location:	Water Tower	FTF Inspection Rep:	Darrell Myles
Description:	External & Under Insulation	Contractor Rep:	Gil Rodgers
Overview & Work Description:	Coating inspection of the under insulation primer and external coating on the Fort Saskatchewan water tower		

Surface Conditions

☐ New ☐ Maintenance ☑ Previously Painted
☑ Steel ☐ Galvanized ☐ Concrete ☐ Other
☐ Hazards, Specify _____
Degree of Contamination _____
Cl _____ mg/cm2 _____
Condition of Substrate: _____
☐ Scale ☐ Pitting/Holes ☐ Crevices ☐ Sharp Edges
☐ Rough Welds ☐ Moisture ☐ Oils ☐ Others

Surface Preparation

Start Time: 12-Oct Finish Time: 12-Oct Est Sq./ft:
☐ Solvent Clean ☐ Hand Tool Clean ☐ Power Tool Clean
☐ High Pressure Wash ☐ Other
☐ Abrasive Blast Abrasive Type: _____
Blast Hose Size: _____ Nozzle Size/PSI: _____
Air Supply CFM _____ ☐ Air Supply Cleanliness Check (blotter)
☐ Water/Oil Trap Check ☐ Equipment Condition Check

Painted Surface Conditions

Dry To: ☑ Touch ☑ Handle ☐ Recoat
☐ Dry/Over Spray ☐ Runs/Sags ☐ Pinholes ☐ Holidays

Surface Cleanliness & Profile Measurements

Specified Surface Profile: _____ Achieved Surface Profile: _____
Profile Check Method: _____

Ambient Conditions	October	12						
Time: 24hr clock		8:00						
Dry Bulb Temp: °C		1.1°						
Relative Humidity: %		34%						
Surface Temp: °C		-2.5°						
Dew Point Temp: °C		-6.2°						
Wind Direction/Speed: KPH		NW 4kph						
Weather Condition:		sunny						

Application ☐ 1st Coat ☐ 2nd Coat ☐ 3rd Coat ☐ Repair Coat

Start Time _____ Finish Time: _____ Coating Type: _____ Quantity Mixed: _____
☐ Airless Spray ☐ Brush ☐ Roller ☐ Other Manufacturer _____ Product Name ___
Product #_____ Batch #_____ Mix Ratio_____ Color _____ Pot Life_____
Material Temperature: _____ Induction Time ____ Reduce _____ Qty Used _____ % by Vol_____
☐ Air Check ☐ Sep/Trap ☐ Filter ☐ Agitator Pump/Pot_____ Ratio/Size_____ GPM/CFM_____
PSI_____ Spray Gun_____ Hose Dia _____ Hose Lng_____ Tip Size_____

Specified Dry Film Thickness _____ Achieved Dry Film Thickness _____

Inspector Signature: _____ DJh _____ **Coating Supplier Rep Signature:** _____

FTF INSPECTIONS LTD.

Head Office
80 Nottingham Road
Sherwood Park, Alberta
T8A 5M5 Canada
Tel: (780) 916-0262
E-mail: dmyleshome@gmail.com

Inspection Details

1.0 - Oct 12 -Arrived on site at the FT Saskatchewan water tower and met with Park Derochie personnel to review the plan. The tower stand pipe has 4 areas where Park Derochie personnel have removed the metal cladding and insulation to allow inspection of the underlying pipe. Access to theses areas was gained by man lift an a visual inspection has revealed the areas lowest on the pipe exhibit the most corrosion.

1.1 - At the lowest opening visual inspection has revealed class C steel with slight to moderate pitting on the surface. The steel mesh that holds the insulation in place has corroded nearly to dust and is destroyed by touch. Dry film thickness readings were taken on this area with a DeFelsko Positector 6000 DFT gauge sin# 246275 range from a low of 0.60 mils and a high of 1.75 mils with an average of 1.00 mils . (See PosiSoft Reports for complete details). Very little of the original coating remains in this area.

1.2 - The next section was opened approximately 12 ft above the first and visual inspection revealed Class B steel with markedly less pitting on the surface. The corrosion process is on going however to less of a degree that the lowest section. Dry film thickness readings were taken of the second section ranging from a low of 0.40 mils and a high of 3.3 mils with an average of 1.18 mils . (See PosiSoft Reports for complete details). More of the original coating remains in this area.

1.3 - At the highest opening approximately 12 feet above the midway opening is just below the first attachment point of the stiffener rods and Visual inspection has revealed Class A Steel with no visible pitting. Some water staining was observed in this area possibly due to the cracking of the caulk utilized around the stiffener supports. Dry film thickness readings were taken of the upper most section ranging from a low of 0.65 mils and a high of 2.0 mils with an average of 1.28 mils . (See PosiSoft Reports for complete details). most all of the original coating remains in this area.

1.4 - Several areas of missing top coat were observed on the western most support leg and visual inspection revealed that the areas under the foam protective strips have failed reviling the primer coating underneath. Dry film thickness readings were taken of the exposed primer ranging from a low of 0.4 mils and a high of 1.2 mils with an average of 0.75 mils . (See PosiSoft Reports for complete details). most all of the original primer remains in these areas.

1.5 - Dry film thickness readings were taken of the blue top coat on all the legs ranging from a low of 3.7 mils and a high of 11.4 mils with an average of 6.51 mils . (See PosiSoft Reports for complete details).

1.6 - The corrosion damage on the stand pipe occurs below the stiffener rods and the insulation water cap

Areas Of Concern

2.0 -None at this time

FTF INSPECTIONS LTD.

Head Office
80 Nottingham Road
Sherwood Park, Alberta
T8A 5M5 Canada
Tel: (780) 916-0262
E-mail: dmyleshome@gmail.com

Pictures

Stand pipe

Lowest opening

Down view

Lowest opening

Lowest opening

Lowest opening

FTF INSPECTIONS LTD.

Head Office
80 Nottingham Road
Sherwood Park, Alberta
T8A 5M5 Canada
Tel: (780) 916-0262
E-mail: dmyleshome@gmail.com

Pictures

Midway Opening

Midway Opening

Midway Opening

Midway Opening

Upper Opening

Upper Opening

FTF INSPECTIONS LTD.

Head Office
80 Nottingham Road
Sherwood Park, Alberta
T8A 5M5 Canada
Tel: (780) 916-0262
E-mail: dmyleshome@gmail.com

Pictures

Upper Opening

Upper Opening

Support Strut

Calking around the Strut

Top Of The Water Cap

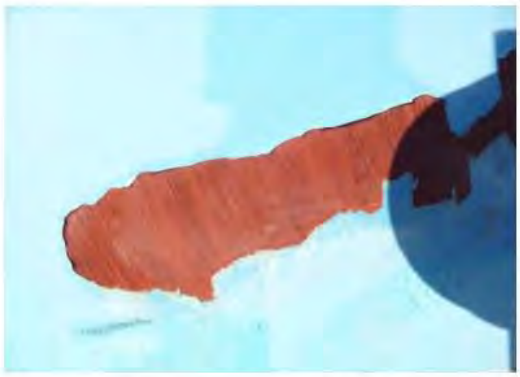
Cable Strap on west Leg

FTF INSPECTIONS LTD.

Head Office
80 Nottingham Road
Sherwood Park, Alberta
T8A 5M5 Canada
Tel: (780) 916-0262
E-mail: dmyleshome@gmail.com

Pictures

Under foam protected cable strap



Under foam protected cable strap

Under foam protected cable strap

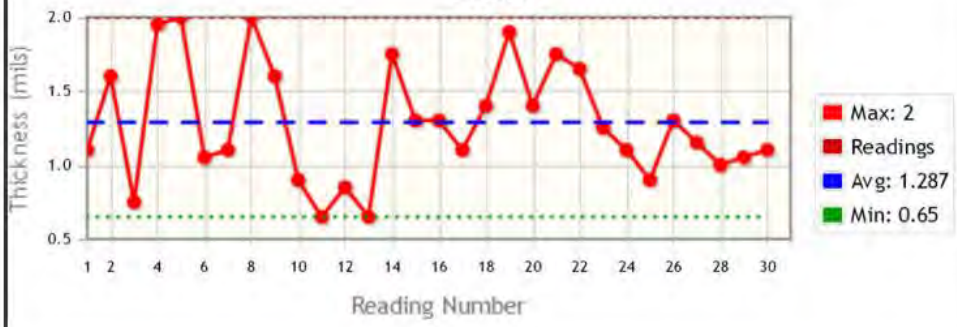
Park Derochie Coatings

Batch Name:	B3	Batch Date:	2016-10-12 09:22:35
Gage S/N:	768236		
Probe Type:	FS	Probe S/N:	246275
Cal:	Cal 1	Substrate:	F
Batch Notes:	Primer - At Support Rods Under Insulation		

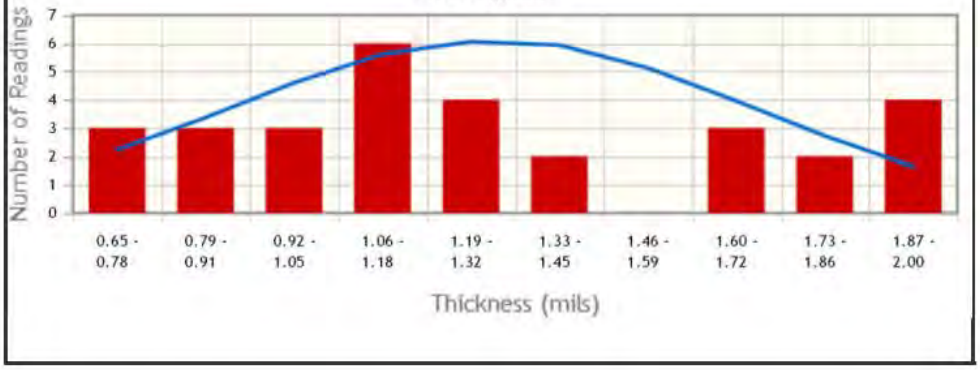
Summary

	#	x̄	σ	↓	↑
B3	30	1.287	0.398	0.65	2.0

Chart



Histogram



Readings

#	Reading mils	Date/Time	Ignore	Notes
1	1.10	2016-10-12 09:22:38	☐	
2	1.60	2016-10-12 09:22:39	☐	
3	0.75	2016-10-12 09:22:41	☐	
4	1.95	2016-10-12 09:22:42	☐	
5	2.0	2016-10-12 09:22:43	☐	
6	1.05	2016-10-12 09:22:46	☐	
7	1.10	2016-10-12 09:22:47	☐	
8	2.0	2016-10-12 09:22:48	☐	
9	1.60	2016-10-12 09:22:49	☐	
10	0.90	2016-10-12 09:22:53	☐	
11	0.65	2016-10-12 09:22:54	☐	
12	0.85	2016-10-12 09:22:56	☐	
13	0.65	2016-10-12 09:22:57	☐	
14	1.75	2016-10-12 09:22:59	☐	
15	1.30	2016-10-12 09:23:00	☐	
16	1.30	2016-10-12 09:23:01	☐	
17	1.10	2016-10-12 09:23:02	☐	
18	1.40	2016-10-12 09:23:03	☐	
19	1.90	2016-10-12 09:23:04	☐	
20	1.40	2016-10-12 09:23:05	☐	
21	1.75	2016-10-12 09:23:06	☐	
22	1.65	2016-10-12 09:23:08	☐	
23	1.25	2016-10-12 09:23:09	☐	
24	1.10	2016-10-12 09:23:10	☐	
25	0.90	2016-10-12 09:23:11	☐	
26	1.30	2016-10-12 09:23:13	☐	
27	1.15	2016-10-12 09:23:14	☐	
28	1.00	2016-10-12 09:23:15	☐	
29	1.05	2016-10-12 09:23:17	☐	
30	1.10	2016-10-12 09:23:18	☐	

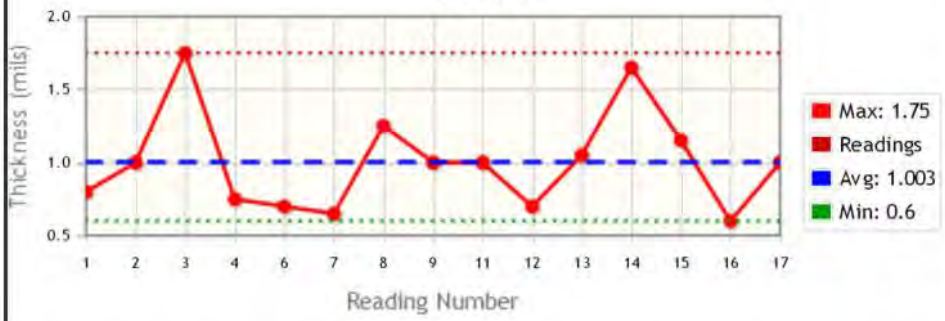
Park Derochie Coatings

Batch Name:	B1	Batch Date:	2016-10-12 09:13:09
Gage S/N:	768236		
Probe Type:	FS	Probe S/N:	246275
Cal:	Cal 1	Substrate:	F
Batch Notes:	Primer - Lowest Opening Under Insulation		

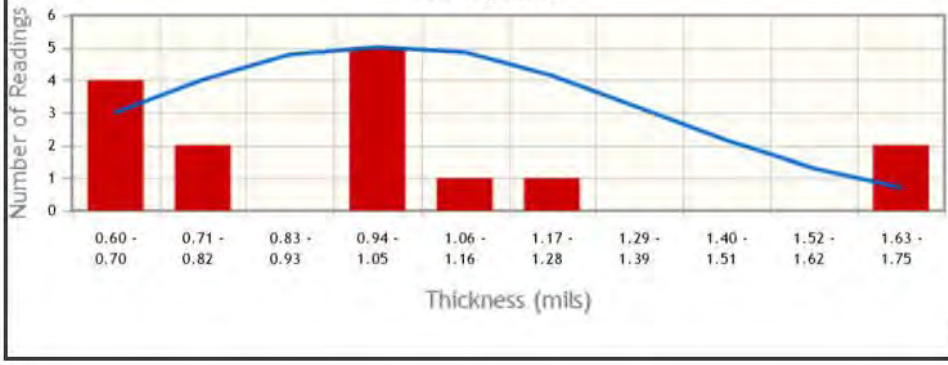
Summary

	#	x̄	σ	↓	↑
B1	15	1.003	0.342	0.60	1.75

Chart



Histogram



Readings

#	Reading mils	Date/Time	Ignore	Notes
1	0.80	2016-10-12 09:14:10	☐	
2	1.00	2016-10-12 09:14:11	☐	
3	1.75	2016-10-12 09:14:13	☐	
4	0.75	2016-10-12 09:14:14	☐	
5	4.1	2016-10-12 09:14:17	☑	
6	0.70	2016-10-12 09:14:18	☐	
7	0.65	2016-10-12 09:14:19	☐	
8	1.25	2016-10-12 09:14:21	☐	
9	1.00	2016-10-12 09:14:22	☐	
10	4.9	2016-10-12 09:14:24	☑	
11	1.00	2016-10-12 09:14:25	☐	
12	0.70	2016-10-12 09:14:26	☐	
13	1.05	2016-10-12 09:14:28	☐	
14	1.65	2016-10-12 09:14:31	☐	
15	1.15	2016-10-12 09:14:32	☐	
16	0.60	2016-10-12 09:14:33	☐	
17	1.00	2016-10-12 09:14:35	☐	

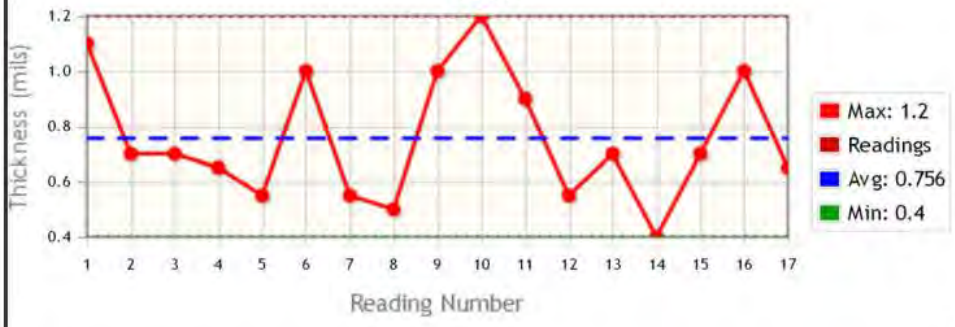
Park Derochie Coatings

Batch Name:	B5	Batch Date:	2016-10-12 09:55:22
Gage S/N:	768236		
Probe Type:	FS	Probe S/N:	246275
Cal:	Cal 1	Substrate:	F
Batch Notes:	Primer Coat - under cable clamps		

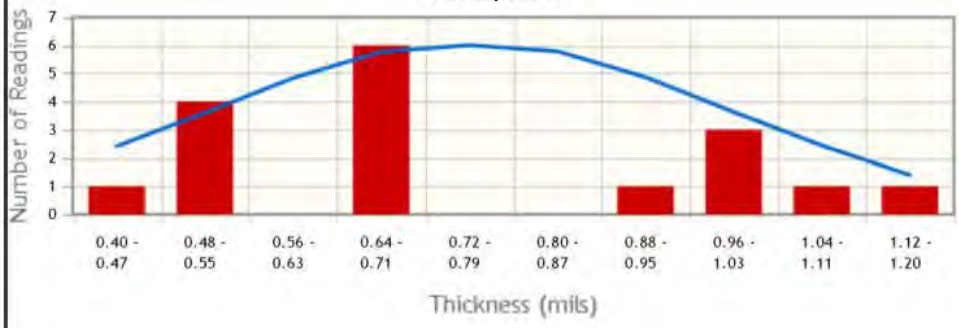
Summary

	#	x̄	σ	↓	↑
B5	17	0.756	0.233	0.40	1.20

Chart



Histogram



Readings

#	Reading mils	Date/Time	Ignore	Notes
1	1.10	2016-10-12 09:55:25	☐	
2	0.70	2016-10-12 09:55:27	☐	
3	0.70	2016-10-12 09:55:28	☐	
4	0.65	2016-10-12 09:55:29	☐	
5	0.55	2016-10-12 09:55:30	☐	
6	1.00	2016-10-12 09:55:31	☐	
7	0.55	2016-10-12 09:55:33	☐	
8	0.50	2016-10-12 09:55:35	☐	
9	1.00	2016-10-12 09:55:36	☐	
10	1.20	2016-10-12 09:55:40	☐	
11	0.90	2016-10-12 09:55:42	☐	
12	0.55	2016-10-12 09:55:43	☐	
13	0.70	2016-10-12 09:55:44	☐	
14	0.40	2016-10-12 09:55:45	☐	
15	0.70	2016-10-12 09:55:46	☐	
16	1.00	2016-10-12 09:55:48	☐	
17	0.65	2016-10-12 09:55:50	☐	

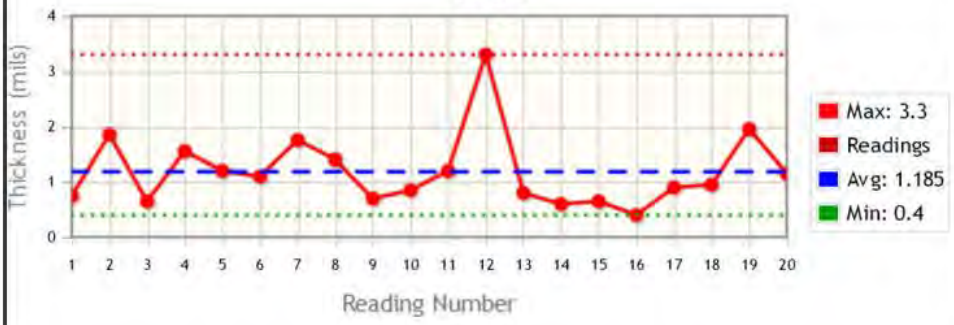
Park Derochie Coatings

Batch Name:	B2	Batch Date:	2016-10-12 09:17:21
Gage S/N:	768236		
Probe Type:	FS	Probe S/N:	246275
Cal:	Cal 1	Substrate:	F
Batch Notes:	Primer - Below Rods Under Insulation		

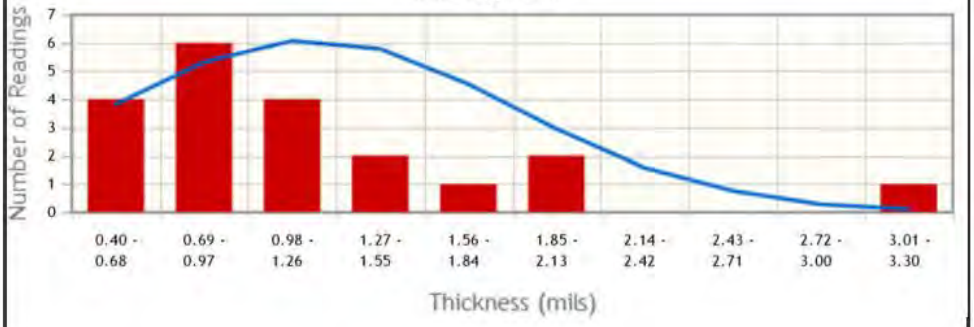
Summary

	#	x̄	σ	↓	↑
B2	20	1.185	0.663	0.40	3.3

Chart



Histogram



Readings

#	Reading mils	Date/Time	Ignore	Notes
1	0.75	2016-10-12 09:17:24	☐	
2	1.85	2016-10-12 09:17:25	☐	
3	0.65	2016-10-12 09:17:26	☐	
4	1.55	2016-10-12 09:17:28	☐	
5	1.20	2016-10-12 09:17:29	☐	
6	1.10	2016-10-12 09:17:31	☐	
7	1.75	2016-10-12 09:17:32	☐	
8	1.40	2016-10-12 09:17:33	☐	
9	0.70	2016-10-12 09:17:35	☐	
10	0.85	2016-10-12 09:17:36	☐	
11	1.20	2016-10-12 09:17:38	☐	
12	3.3	2016-10-12 09:17:39	☐	
13	0.80	2016-10-12 09:17:41	☐	
14	0.60	2016-10-12 09:17:43	☐	
15	0.65	2016-10-12 09:17:44	☐	
16	0.40	2016-10-12 09:17:45	☐	
17	0.90	2016-10-12 09:17:47	☐	
18	0.95	2016-10-12 09:17:49	☐	
19	1.95	2016-10-12 09:17:50	☐	
20	1.15	2016-10-12 09:17:51	☐	

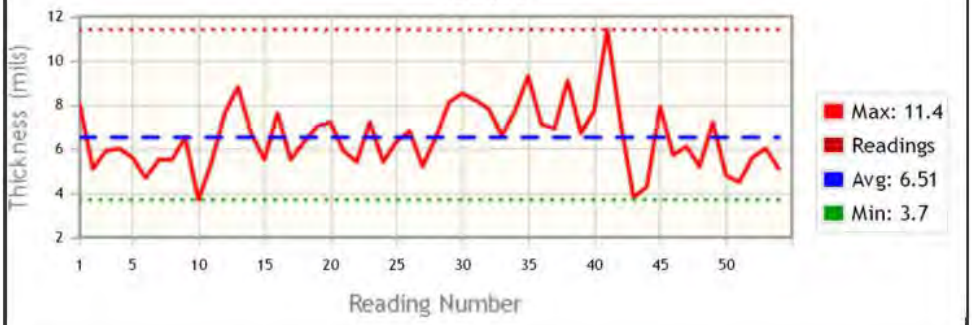
Park Derochie Coatings

Batch Name:	B4	Batch Date:	2016-10-12 09:39:45
Gage S/N:	768236		
Probe Type:	FS	Probe S/N:	246275
Cal:	Cal 1	Substrate:	F
Batch Notes:	Top Coat - Support Legs		

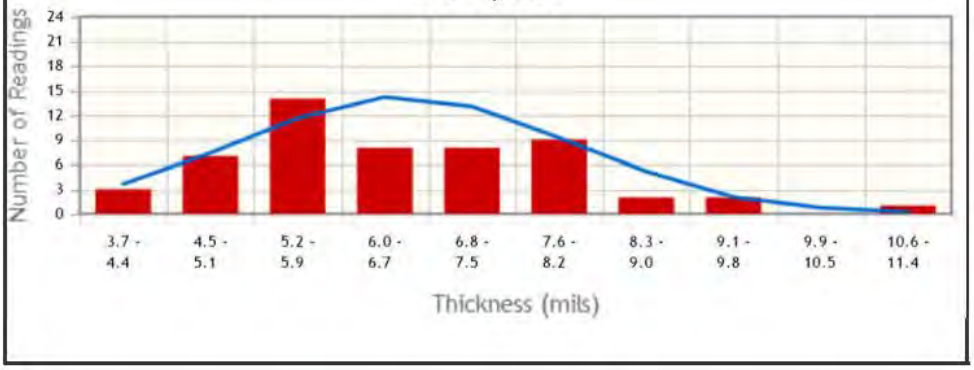
Summary

	#	x̄	σ	↓	↑
B4	54	6.51	1.48	3.7	11.4

Chart



Histogram



Readings

#	Reading mils	Date/Time	Ignore	Notes
1	8.0	2016-10-12 09:39:49	☐	
2	5.1	2016-10-12 09:39:51	☐	
3	5.9	2016-10-12 09:39:52	☐	
4	6.0	2016-10-12 09:39:53	☐	
5	5.6	2016-10-12 09:39:55	☐	
6	4.7	2016-10-12 09:39:56	☐	
7	5.5	2016-10-12 09:39:59	☐	
8	5.5	2016-10-12 09:40:00	☐	
9	6.5	2016-10-12 09:40:03	☐	
10	3.7	2016-10-12 09:40:04	☐	
11	5.4	2016-10-12 09:40:06	☐	
12	7.6	2016-10-12 09:40:21	☐	
13	8.8	2016-10-12 09:40:22	☐	
14	6.7	2016-10-12 09:40:24	☐	
15	5.5	2016-10-12 09:40:25	☐	
16	7.6	2016-10-12 09:40:29	☐	
17	5.5	2016-10-12 09:40:30	☐	
18	6.3	2016-10-12 09:40:31	☐	
19	7.0	2016-10-12 09:40:34	☐	
20	7.2	2016-10-12 09:40:35	☐	
21	5.9	2016-10-12 09:40:36	☐	
22	5.4	2016-10-12 09:40:37	☐	
23	7.2	2016-10-12 09:40:47	☐	
24	5.4	2016-10-12 09:40:49	☐	
25	6.3	2016-10-12 09:40:50	☐	
26	6.8	2016-10-12 09:40:51	☐	
27	5.2	2016-10-12 09:40:54	☐	
28	6.5	2016-10-12 09:40:55	☐	
29	8.1	2016-10-12 09:40:56	☐	
30	8.5	2016-10-12 09:40:58	☐	
31	8.2	2016-10-12 09:41:13	☐	

#	Reading mils	Date/Time	Ignore	Notes
32	7.8	2016-10-12 09:41:14	☐	
33	6.6	2016-10-12 09:41:16	☐	
34	7.7	2016-10-12 09:41:17	☐	
35	9.3	2016-10-12 09:41:18	☐	
36	7.1	2016-10-12 09:41:20	☐	
37	6.9	2016-10-12 09:41:21	☐	
38	9.1	2016-10-12 09:41:23	☐	
39	6.7	2016-10-12 09:41:24	☐	
40	7.7	2016-10-12 09:41:25	☐	
41	11.4	2016-10-12 09:41:26	☐	
42	7.2	2016-10-12 09:41:27	☐	
43	3.8	2016-10-12 09:41:47	☐	
44	4.3	2016-10-12 09:41:48	☐	
45	7.9	2016-10-12 09:41:49	☐	
46	5.7	2016-10-12 09:41:50	☐	
47	6.1	2016-10-12 09:41:53	☐	
48	5.2	2016-10-12 09:41:55	☐	
49	7.2	2016-10-12 09:41:56	☐	
50	4.8	2016-10-12 09:41:58	☐	
51	4.5	2016-10-12 09:42:00	☐	
52	5.6	2016-10-12 09:42:03	☐	
53	6.0	2016-10-12 09:42:04	☐	
54	5.1	2016-10-12 09:42:05	☐	

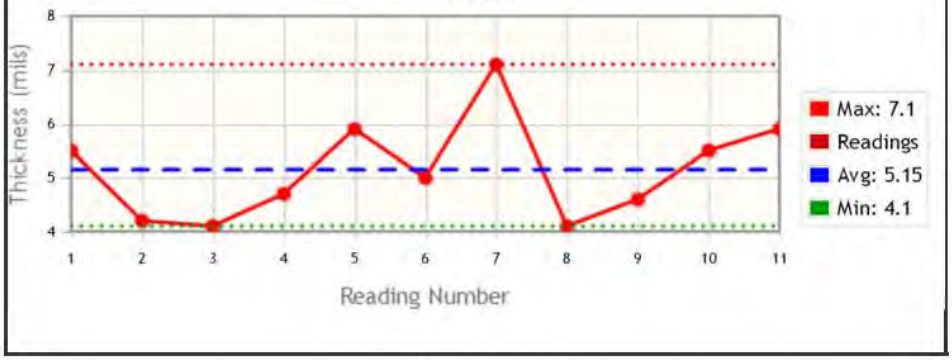
Park Derochie Coatings

Batch Name:	B6	Batch Date:	2016-10-12 09:55:54
Gage S/N:	768236		
Probe Type:	FS	Probe S/N:	246275
Cal:	Cal 1	Substrate:	F
Batch Notes:	Top Coat - under cable clamps		

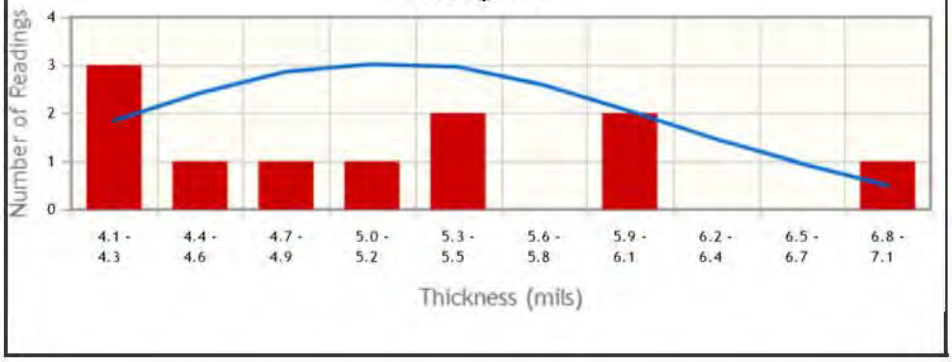
Summary

	#	x̄	σ	↓	↑
B6	11	5.15	0.94	4.1	7.1

Chart



Histogram



Readings

#	Reading mils	Date/Time	Ignore	Notes
1	5.5	2016-10-12 09:55:57	☐	
2	4.2	2016-10-12 09:55:58	☐	
3	4.1	2016-10-12 09:56:00	☐	
4	4.7	2016-10-12 09:56:01	☐	
5	5.9	2016-10-12 09:56:02	☐	
6	5.0	2016-10-12 09:56:04	☐	
7	7.1	2016-10-12 09:56:05	☐	
8	4.1	2016-10-12 09:56:07	☐	
9	4.6	2016-10-12 09:56:11	☐	
10	5.5	2016-10-12 09:56:13	☐	
11	5.9	2016-10-12 09:56:15	☐	

Appendix B

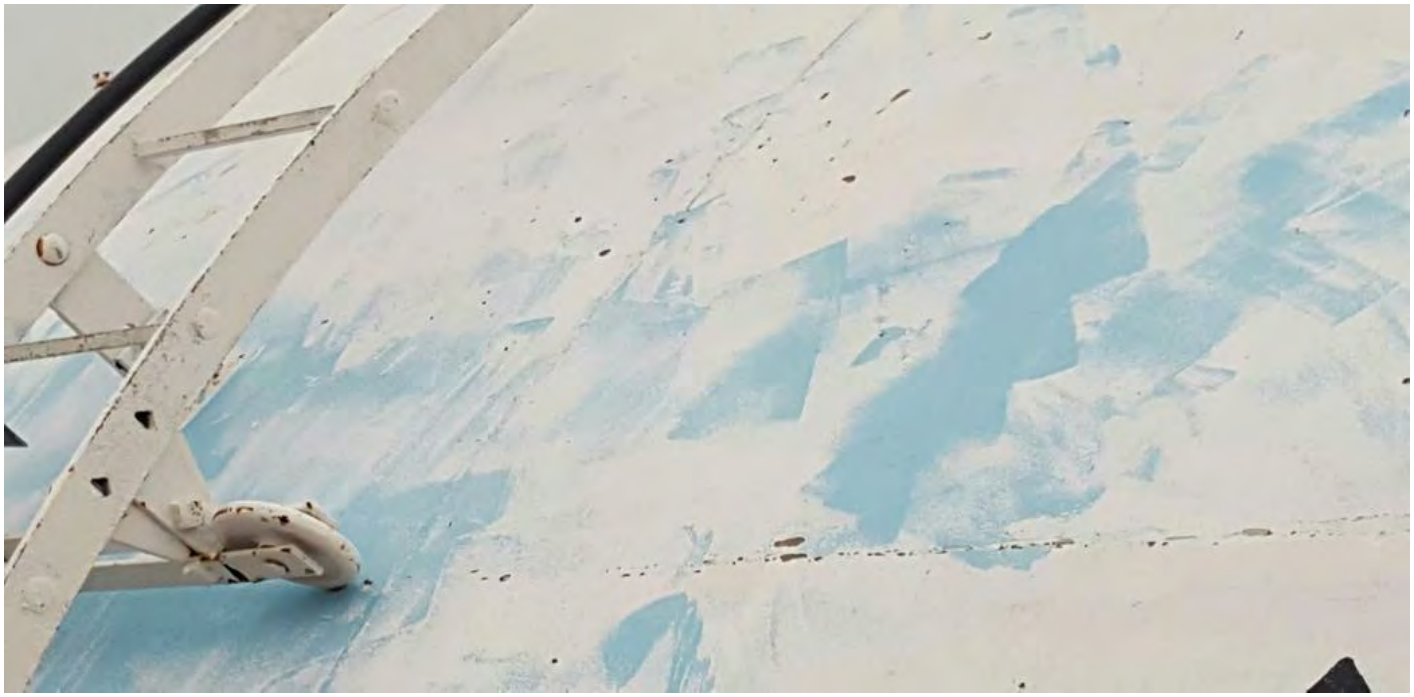
PD Inspection Report Summary by Mr. Andrew Myles

Mr. Myles performed a visual inspection of the tank on October 28, 2016.

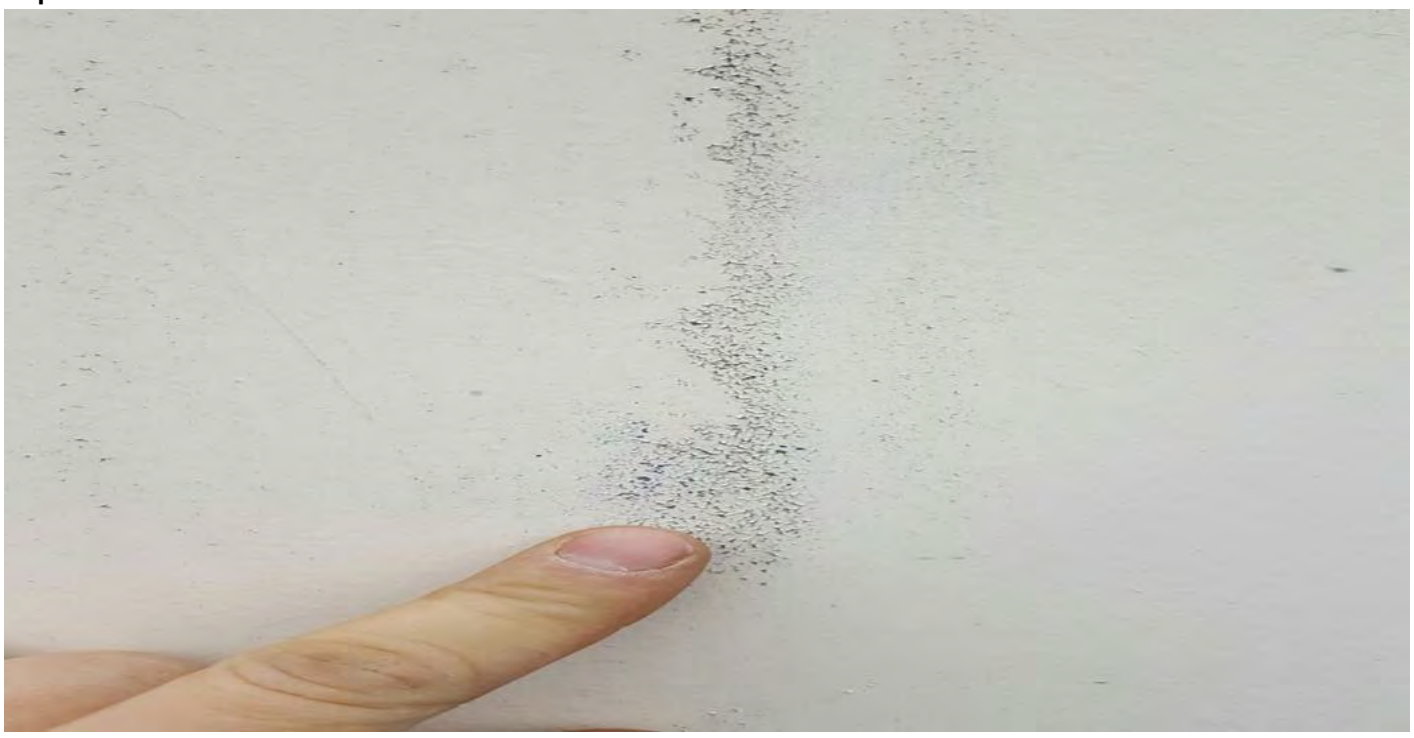
While the majority of the coating remains intact, it has oxidized and is exhibiting a general loss of gloss and is chalking in most areas. In areas of southern exposure, the top coat has largely worn away exposing the mid-coat in large areas. There are areas where the coating has failed, exposing bare metal, particularly along weld seams. The average Dry Film Thickness (DFT) was approximately 6 mils.

Exposed Mid Coat (Blue Colour)

Exposed Mid Coat and small areas of Bare Metal



Top Coat Breakdown



General Coating Condition

General Coating Condition

General Coating Condition

Average Coating Thickness (mils)

Appendix C

Asbestos Analysis by Enviro- Works

ENVIRO-WORKS INC.

Certificate of Analysis

Bulk (ACM) Identification:

Visual ID (Area Estimation) NIOSH 9002 : Issue 2

Revision # : 0

Client:
Residential
Edmonton, Ab

Contact: Connor Churo
COC#: 40330

Report Number:
Fort Sask
Report Date: Friday, August 26, 2016
Samples Collected: Thursday, August 25, 2016
Date Received: Thursday, August 25, 2016
Turn Around Requested: 1-3 days

EWI Log #	Sample #	Client Sample Information	Phases/Color/Fibrous/Non Fibrous/Homogeneity	Asbestos Content Type & %	Other Materials Detected	Analyst
106747-1	*1*	ROOF TOP BUILDING	*100% Brown sheet*	*ND*	*NFM*	*FK*
106747-2	*2*	ROOF TOP BUILDING	*100% Peach mix*	*ND*	*Cellulose, GF, NFM*	*FK*

NFM=Non fibrous material
ND=None detected
VM=Vermiculite & mica
GF=Glass fibre
MW Mineral wool
P=Perlite
SF=Synthetic fibre
*=Estimated percentage of asbestos is <1%

Reviewed By:
Cherie Laplante, B.Sc.
Lab Manager

Enviro-Works Inc. is a proficient Member of the AIHA PAPAT Quality Control Program. Samples will be stored for 90 days after sample submission date. EWI is not responsible for any sample collection or interpretation of results and does not provide any consultation of results. This report only reflects the material submitted and tested at our lab. Enviro-Works Inc. privacy policy includes the limitation that any results will only be discussed with the client listed on this report. All other interested parties must contact the client on the report directly.

Page 1 of 1 8:40 AM 2016-08-26

Appendix D

Lead Analysis by Enviro-Works

ENVIRO-WORKS INC.
18949 111 Ave. NW
Edmonton, Alberta
T5S 2X4
Ph: 780-457-4652
Fax: 1-844-767-7111

Certificate of Analysis

Client: Park Derochie

Project: Fort Sask

Date Sampled: 25-Aug-16

Sample Taken by: Connor Chura

Date Submitted for Laboratory Analysis: 25-Aug-16

Sample type: Paint Chip

Date Completed: 30-Aug-16

Lab ID: 00244

Lab Test Method: ASTM D6785-08 Lead by AAS

Coc: 40330

Sample ID:	Sample #	Description	Lead (mg/kg)
00244-1	1	Roof Top Building	58192

Reviewed By:

Cherie Laplante, B.Sc.
Lab Manager

ENVIRO-WORKS INC.

16949 111 Ave. NW
Edmonton, Alberta
T5S 2X4
Ph: 780-457-4652
Fax: 1-844-767-7111

Certificate of Analysis

Client: Park Derochie

Project: Not Provided

Date Sampled: 01-Nov-16

Sample Taken by: C. Chura

Date Submitted for Laboratory Analysis: 01-Nov-16

Sample type: Paint Chip

Date Completed: 02-Nov-16

Lab ID: 00273

Lab Test Method: ASTM E1613-12 Lead by FAAS

COC: 42110

Sample ID:	Sample #	Description	Lead (mg/kg)
00273-1	1	Paint Chip	34097.2

Enviro-Works Inc. is a Proficient Member of the AIHA-ELCAT Program

Reviewed By:

Cherie Laplante, B.Sc.
Lab Manager

Appendix E

CV - Gilbert A. Rogers
Coatings Business Development & Director of Training

PROFILE

Gil's 40-year career in the coatings industry has qualified him to offer practical consultancy to his clients. An apprenticeship in the painting and decorating trade led to Gil's achieving Journeyman status in 1977. Since then Gil has worked as an Industrial Painter, Foreman, Superintendent, Estimator, Technical Sales Representative, Technical Manager, Inspector, Project Manager, Instructor, Field Manager, Fireproofing Manager, Senior Project Manager, Division Manager, Business Development and Director of Training. Gil is a NACE Certified Coating Inspector, and one of the elite group of coating specialists that carry the Protective Coating Specialist Certification from both NACE and SSPC. As lead instructor in the NACE Coating Inspector Training Program and the NACE Pipeline Applicator Course, Gil travels internationally teaching others and sharing his vast experience. Gil's unique combination of technical training, practical experience and ability to teach has given him the opportunity to effectively liaise at all levels of the coatings industry.

EDUCATION

Grade 12 Diploma Howe Sound Secondary School, Squamish, B.C. – 1971

CERTIFICATION

- Provincial Trades Certification – Painting & Decorating – Province of Saskatchewan – 1977
- Interprovincial Trades Certification in Painting & Decorating – Burnaby, B.C. – 1986
- Certified Coating Inspector, #5045, National Association of Corrosion Engineers (NACE) - 1997
- Society for Protective Coatings (SSPC) Certified Protective Coating Specialist #1017-922-1397 - 2002
- Marine Coating Inspector Endorsement, NACE - 2003
- NACE Certified Protective Coating Specialist #9235 – 2004
- CIP 1 Day Bridge Specialty – 2006

NATIONALITY

Canadian Citizen

LANGUAGES

English

PROFESSIONAL ASSOCIATIONS

- NACE International (NACE)
- Society for Protective Coatings (SSPC)

COUNTRIES WITH WORK EXPERIENCE

Canada, USA, Singapore, Malaysia, Bahrain, South Korea, Nigeria, Columbia, Dubai, Trinidad, India, Thailand, China, United Kingdom

WORK EXPERIENCE

Park Derochie — **Present**
Coatings Business Development & Director of Training

Rogers & Associates — **Nov 2012 - May 2016**
President, Senior Consultant

Park Derochie Inc. — **Aug 2011 - Nov 2012**
Coatings Division Manager

Park Derochie Inc. — **Sept 2010 - Aug 2011**
Senior Project Manager

Altus Energy Services — **2008 - Jul 2010**
Manager, Fireproofing

CSI, Coating Systems (2005) Inc. — **2007 - 2008**
Manager, Field Operations

Rogers & Associates — **2001 - 2007**
President

Clark & Pattison Painting Contractors — **2000 - 2001**
Technical Sales Manager

Cloverdale Paint, Vancouver Island — **1992 - 2001**
Technical Sales Representative

Fletcher Challenge Canada, Crafton Pulp & Paper — **1988 - 1992**
Maintenance Paint & Insulation Foreman

Rogers Painting & Decorating — **1984 - 1986**
Co-owner

Wascana Hospital, Swift Current Sask. — **1979 - 1984**
Painter

Pioneer Maintenance — **1972 - 1977**
Owner

PROJECT EXPERIENCE

The number of projects Gil has worked at over the years makes it impossible to provide a complete list, however the following list is representative of the type of projects he has been involved with in the last fifteen (15) years.

Barrier Coatings
- Set up Quality Management System

Corrodere
- Edit “Train the Painter” course for North American market

Osler, Harcourt
- Expert Witness for a matter in dispute

Alberta Coating Contractors Association
- Contracted as General Manager of the Association with primary focus on Training of Coating Applicators

Coatings Abrasion Solutions Limited
- Coating Condition Assessment – City of Red Deer – Pedestrian Bridge

Canadian Natural Resources Limited
- Audit of thirty (30) Industrial Coating Contractors in Western Canada

International Union of Painters and Allied Trades
- Provide Consultancy on Applicator Training with focus on Girth Weld Coatings for Pipelines

Enbridge Pipelines
- Rewrite – North American Coating Specifications

Teck
- Coatings 101 Training
- Rewrite – Mechanical Coating Specification

Mildred Lake Mine Replacement
- Pipeline Girth Weld Coating

New Edmonton Remand Centre
- 5M Commercial Painting Project

MEG Energy Stonfell Project
- Internal Lining and External Coating – Six (6) 150’ Dia. Tanks

Enbridge Woodlands Expansion
- Internal Lining and External Coating – Two (2) 215’ Dia. Tanks

Shell Scotsford
- Internal Tank Lining – One (1) 50’ Dia. Open Top Tank
- Various other Coating and Lining Projects

Trans Alta
- Fireproofing of Structural Steel Bents

CNRL
- Internal Tank Lining – Two (2) 150’ Dia. Tanks

Kinder Morgan
- Internal Tank Lining – One (1) 150’ Dia. Tanks

Enbridge Pipelines
- Various Tank Lining Projects – Surmount Long Lake
- Internal & External Pipeline Coating – Hardisty Merchant Tank Terminal

Pembina Pipelines
- Various Internal/External Tank Coating Projects

Keyera Energy
- Pipeline Rehabilitation

Trans-Canada Pipeline
- Pipeline Rehabilitation

Alstom Power, Consulting, Coating Inspection
- Diesel Storage Tank Lining, Campbell River, B.C

British Columbia Ferry Service Ltd.; Project Management, Consulting, Coating Inspector
- Bear Cove Terminal, Port Hardy, B.C.
- Sointula Floating Lead, Port Hardy, B.C.
- Denman East Terminal, Denman Island, B.C.
- Denman West Terminal, Denman Island, B.C.
- Alert Bay Terminal, Alert Bay, B.C.
- Buckley Bay Floating Lead, Nanaimo, B.C.
- Campbell River Terminal, Campbell River, B.C.
- Heriot Bay Terminal, Quadra Island, B.C.
- Little River Terminal, Comox, B.C.
- Hornby Terminal, Hornby Island, B.C.
- Port McNeil Terminal, Port McNeil, B.C.
- Westview Terminal, Powell River, B.C.
- Whale Town Terminal, Cortez Island, B.C.

BC Hydro, Consulting, Coating Inspection
- Stoplog Gates, Ladore Facility, Campbell River, B.C.
- Wood Stave Penstock Recoating, John Hart Facility, Campbell River, B.C.
- Steel Penstock Recoating, Jordon River Facility, Jordon River, B.C

Clark & Pattison Painting Contractors; Quality Control Management

- Lions Gate Bridge; Deck Replacement, Seismic Upgrade, Vancouver, B.C.
- HMCS Vancouver, Esquimalt, B.C.
- HMCS Algonquin, Esquimalt, B.C.
- HMCS Protectour, Esquimalt, B.C.
- Recovery Boiler, Steam Plant Stacks, Elk Falls, B.C.

Catalyst Paper; Consulting, Coating Inspection

- Review/Update Catalyst Paper Protective Coating Design Standards, All Sites, B.C.
- Demineralizer Tank Elk Falls, B.C.
- #1 & #2 Paper Machine Press Section Repainting, Crofton, B.C.
- #1 & #2 Paper Machine Structural Steel, Crofton, B.C.
- #4 Paper Machine, Port Alberni, B.C.
- Recoat Design Standard – Paper Machine Press Sections, Elk Falls, B.C.
- Condition Assessments – All Pulp and Paper Machines, Elk Falls, B.C.
- #2 Paper Machine Room – Purlin Repairs, Elk Falls, B.C.

Calpine Canada; Project Management, Consulting, Coating Inspection

- Warranty Repairs Island Co-Generation, Campbell River, B.C.

Carney, Badley, Spellman; Consulting, Expert Witness

- BP Olympic Pipeline Project, Washington State, USA

Defence Construction Canada; Consulting, Coating Inspection

- Fuel Storage Tanks Recoating Project, Comox, B.C.
- Quadra Jump Tower, Comox, B.C.

Fraser, Milner, Casgrain; Consulting, Expert Witness

- Sable Offshore Energy Project; Cape Breton Island, Nova Scotia

Teck Cominco Metals Ltd.; Consulting, Coating Inspection

- Structural Steel Specification, Trail, B.C.
- Electrolytic and Melting Plant, On-going Concrete Repairs, Trail, B.C.
- Electrolytic and Melting Plant, Structural Steel Recoating Projects, Trail, B.C.
- Electrolytic and Melting Plant, Cooling Tower Fan Pedestal Recoating, Trail, B.C.
- Sulphide Leaching Plant – Electrolyte Storage Tank, Trail, B.C.
- Sulphide Leaching Plant – Zinc Pressure Leach Structural Steel Replacement, Trail, B.C.
- Sulphide Leaching Plant – On- going Concrete Repairs, Trail, B.C.
- Cadmium Plant – On-going Concrete Repairs, Trail, B.C

VOLUNTEER EXPERIENCE – PROFESSIONAL

NACE International

- Past Chair – NACE TG 320 – Revise NACE No. 13/SSPC ACS 1
- Board Member – NACE Institute Certification Commission
- Past Vice Chair – NACE CIP Course Quality Sub-Committee
- Past Chair – NACE Industrial Coating Applicator Training Sub-Committee
- Past Member – NACE Industrial Coating Applicator Training Committee

Government of Alberta – Provincial Apprenticeship Committee

- Member

PUBLICATIONS

Rogers, Gilbert A. (2003) .Coating Instrument Series: Test Instruments for Coating Adhesion. *Material Performance* 42(7), pg. 40-44

Rogers, Gilbert A. (2005). How Not to Execute a Tank Lining Project*. CIP Inspect This!* 11(8).

Rogers, Gilbert A. (2005). Los Angeles Sets Example with Sewer Liner. *Material Performance.* 44(9).

Rogers, Gilbert A. (2014). Applicator Training a Vegas Style Gamble. *NACE Eastern Region Conference Paper*