DCOI Summary Report

REDACTED

April 15, 2021

REDACTED

Redacted Pursuant to Proposed
Modified Protective Order

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Executive Summary

Pentachlorophenol, it is in the process of being phased out of service as wood preservative. As a potential replacement, three blends of DCOI have been evaluated including REDACTED The solid block was DCOI UP-50 which was composed of 50% DCOI, and 50% wax variants. A detailed chemical composition of each blend of DCOI may be observed in Table 1.

Table 1. Summary of the chemical compositions of REDACTED and UP-50 as stated in the SDS information provided by Viance.

DCOI Solution	Chemical Composition	SDS Source
REDACTED		
REDACTED		
UP-50	50% DCOI 25% Paraffin waxes and hydrocarbon waxes 25% Microcrystalline Wax	Company: Viance Product Name: UP-50 Experimental Research Use Only *SDS ID:* VIA - 291

*Chemicals are spelled as per the SDS sheets.

To evaluate REDACTED and UP-50, a pilot scale treatment cycle was completed with Douglas Fir to observe how the preservative behaved over a 30-hour boil under vacuum (BUV) cycle. The recommended treatment cycle for these treatments may be observed in Table 2.

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Table 2. Pilot plant treatment cycle of DCOI, used to treat REDACTED and DCOI-UP50.

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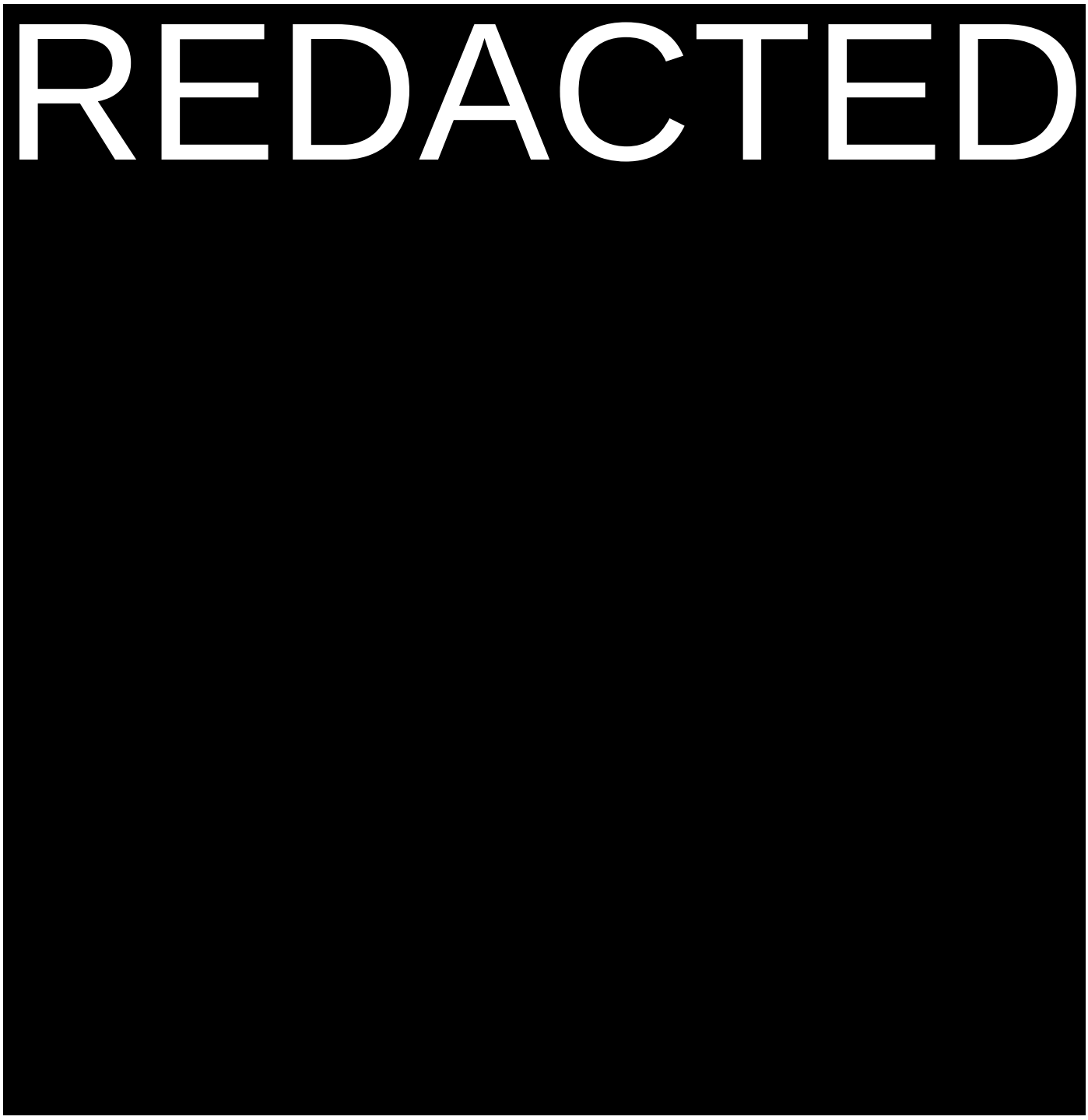
During each treatment cycle, samples were collected initially, and after the treatment cycle was completed. Samples were also collected after 5, 10 20, and 30 hours of BUV. These samples were then examined for gel visually as well as microscopically. In addition to liquid analysis, the inner and outer zones of the core assays from the Douglas Fir were also analyzed. A summary of these results may be observed in Table 3.

Table 3. Summary of when Gel was visible throughout REDACTED and UP-50.

Treatment Solution	Initial Gel observed	Outer zone assay	Inner zone assay
REDACTED			
UP-50	Not applicable due to wax component	Passed: 4 Total: 4	Passed: 4 Total: 4
REDACTED			

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Based on the data provided in Table 2, gel was evident in each of the DCOI solutions tested had gel formation except for UP-50. Based on assay results as well as liquid analysis, it was concluded that REDACTED as well as UP-50 were the optimal wood preservation treating solutions. A more detailed summary of the treating cycles may be observed in Table 4.

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Table 4. Detailed Summary of each DCOI treating solution evaluated.

Treatment Solution	Treatment Number	Solution Strength (% DCOI)	Outer Zone Assay (pcf)	Inner Zone Assay (pcf)	Solution Uptake (kg/m^3)
REDACTED	1	REDACTED			
	2				
	3				
	4				
UP-50	5	2.38	0.482	0.291	30.3
UP-50	6	2.37	0.313	0.162	90.3
UP-50	7	2.40	0.283	0.110	62.1
UP-50	8	2.42	0.381	0.248	145.2
REDACTED	9	REDACTED	REDACTED		
	10				
	11				
	12				
	13				
	14				
	15				
	16				
	17				
	18				
	19				
	20				

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Treatment Solution	Treatment Number	Solution Strength (% DCOI)	Outer Zone Assay (pcf)	Inner Zone Assay (pcf)	Solution Uptake (kg/m^3)
REDACTED	21 22		REDACTED		
	23				
	24				

In conclusion, REDACTED In addition DCOI UP-50 is an acceptable solid block solution as it successfully met all required retentions and gel did not form due to solution matrix. Future research should include the analysis of the REDACTED used in the DCOI solution to determine their compositions and gelling potential.

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Table 5. REDACTED

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Figure 1: REDACTED



Figure 2: REDACTED

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Figure 3: REDACTED

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REDACTED

Table 6. REDACTED

REDACTED



Figure 4: REDACTED

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Figure 5: REDACTED

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Figure 6: REDACTED

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Table 7. REDACTED

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Figure 7: REDACTED

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Figure 8: REDACTED

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Figure 9: REDACTED

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Table 8. REDACTED

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Figure 10: REDACTED



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Figure 12: REDACTED

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Table 9. REDACTED

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Figure 14: REDACTED



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UP-50

Approximately 2.3% UP-50 was blended with west coast blend and stressed for four treatment cycles. After each treatment cycle the concentration of DCOI was calculated to ensure it was equal to or larger than the minimum 2.3% reconcentration requirement stated by Viance. A new Douglas fir pole was treated for each of the four treatment cycles. A summary of the treatment results per pole may be observed in Table 10.

Table 10. Summary of UP-50 assay results

Treatment Number	Solution Strength (%DCOI)	Outer Zone (pcf)	Inner Zone (pcf)	Solution Uptake (kg)	Solution Uptake (L)
5	2.38	0.482	0.291	9.2	11.06
6	2.37	0.313	0.162	29.2	35.22
7	2.40	0.283	0.110	20.0	24.13
8	2.42	0.381	0.248	50.0	60.34

The solution strengths of each DCOI UP-50 treatment were 2.38%, 2.37%, 2.40% and 2.42% for treatments 5- 8 respectively, all above the required 2.3% DCOI retention. Additionally, both inner and outer zone assay retentions were met for each treatment of UP-50, where the retention requirements were 0.1pcf and 0.2pcf for the inner zone and outer zone respectively. Based on this information, DCOI -UP50 would be capable of treating the poles to meet required retentions

Unlike the liquid DCOI solutions analysed, DCOI-UP50 did not have any separation or gel form throughout the analysis. To confirm this observation, samples were collected initially, and then after 5, 10, 20, and 30 hours during the boil under vacuum (BUV) cycle, as well as a final sample at the end of the pressure cycle. The liquid in each of these samples was examined under a microscope before filtration.

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Figure 16: Microscope image of DCOI – UP50 Treatment 5. Unfiltered treating solution collected before treatment began. “Initial”, at 20x magnification

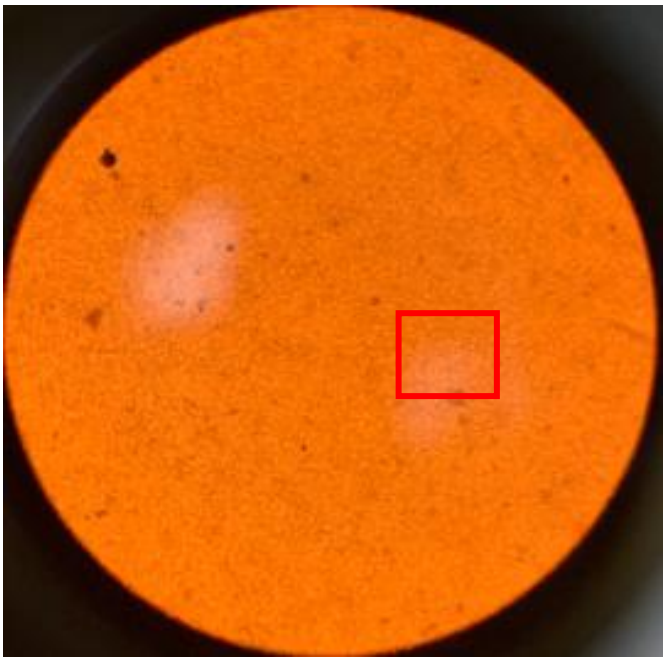


Figure 17: Microscope image of DCOI – UP50 Treatment 6. Unfiltered, treating solution collected directly from pilot plant after 10 hours of BUV. “10 Hours” at 20x magnification. Gel was not observed.

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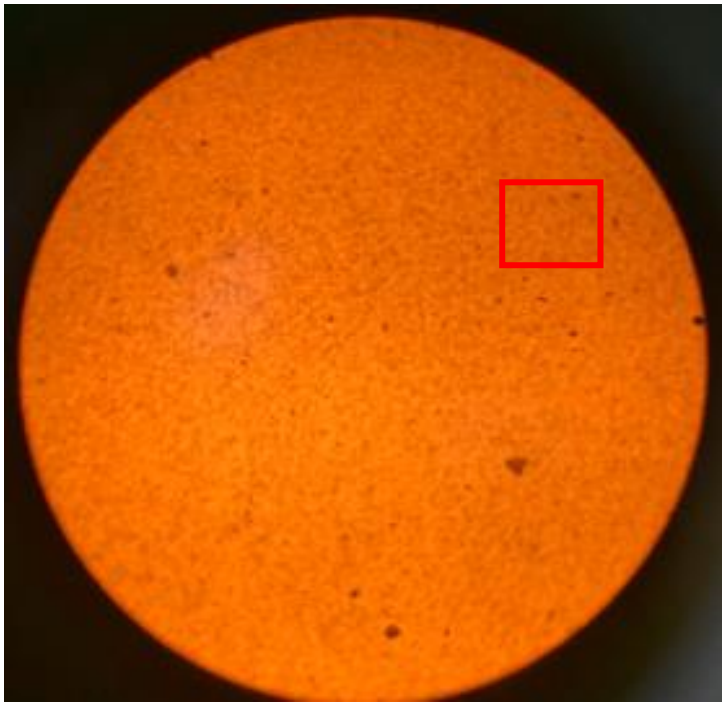


Figure 18: Microscope image of DCOI – UP50 Treatment 7. Unfiltered treating solution collected after final pressure and vacuum cycle. “Final” at 20x magnification. Gel was not observed.

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Table 11. REDACTED





Figure 19: REDACTED

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Figure 20: REDACTED

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Figure 21: REDACTED

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Table 12. REDACTED

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Figure 24: REDACTED

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[redacted]

Table 13. [redacted]

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Figure 27: REDACTED

Conclusion

We have shown that the DCOI solution is compatible with REDACTED in any form tested provided BUV cycles are not required. Carrier oils must meet flashpoint and not degrade solubility or stability of the DCOI. The DF options with BUV are REDACTED and the UP 50. The biodiesel did not appear to be the source of the problem as the gel persisted in REDACTED when it was not used as the carrier oil . The polymer and the gel are linked by the fact that UP 50, which does not contain the polymer does not form the gel with Western Blend oils. REDACTED

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