Engineering Approach to a CHEMICAL PLANT COATING PROGRAM*

(Parts 1 and 2 were published in the January issue)

Part 3 – Some Coatings Systems and What Was Learned About Them

Abstract

Specifications of some of the coatings systems used at a seacoast chemical plant are given. Some results accomplished with these coatings in the environment are described. Coatings include vinyls, epoxies, oil base, materials, zinc-silicones, aluminum metallizing. 5.4.6

IN ORIGINAL design of and later in planning new construction of the Union Carbide Chemicals Company's Seadrift, Texas plant, specifications for several corrosion control systems were prepared. Among these the protective coating systems were planned to give long time protection to all exposed metal surfaces and at the same time to evaluate different materials by field test.

Specifications called for nearly all surfaces to be 100 percent sand blasted. A schedule of these specifications is given in Table 1.

TABLE 1—Coating Specifications Schedule

Exterior Specifications

1. Structural Steel, Piping and Tanks
   - A. 1 Coat Modified Vinyl Primer
     - 2 Coats Vinyl
     - 4½ Mils Minimum Thickness
   - B. 1 Coat Modified Vinyl Primer
     - 2 Coats Vinyl Hot Sprayed
     - 6 Mils Minimum Thickness
   - C. 1 Coat Zinc Silicate Formulation
     - 1 Coat Modified Vinyl Primer
     - 1 Coat Vinyl Hot Sprayed
     - 6 Mils Minimum Thickness
2. Tanks White
   - A. 1 Coat Vinyl Wash Primer
     - 1 Coat Vinyl Intermediate
     - 1 Coat Vinyl Grey
     - 1 Coat Vinyl White
     - 4½ Mils Minimum Thickness
   - B. 1 Coat Modified Vinyl Primer
     - 1 Coat Vinyl Hot Sprayed
     - 2 Coats Vinyl White
     - 6 Mils Minimum Thickness
3. Tanks Special Test
   - A. 1 Coat Epoxy Ester Primer
     - 2 Coats Epox Ester White
     - 4½ Mils Minimum Thickness
   - B. 1 Coat Vinyl Wash Primer
     - 2 Coats Epoxy Ester White
     - 4½ Mils Minimum Thickness
   - C. Pickling and Phosphate Treatment for Steel Not Blasted
     - 1 Coat Oil Base Primer
     - 2 Coats Alkyd Resin Formulations
     - 4½ Mils Minimum Thickness

Interior Specifications

4. Structural Steel, Piping and Tanks
   - A. Prime Coat Oil Base
     - Finish Coat Oil Base

Hot Surfaces Specifications

5. Temperatures 140F to 1000F
   - A. One Coat Zinc Silicone Formulation
6. Temperatures 140F to 500F
   - A. 2½ Mil maximum thickness zinc silicate formulation sprayed on cold surface and treated or sprayed directly on hot surfaces with treatment not necessary.
7. Temperatures to 1400F
   - A. 3 to 5 mils hot sprayed aluminum metallizing
     - Stack to be coated should be preheated to 150F-1180F
     - Sprayed with aluminum metallizing wire
     - Coated with silicate of soda
     - Baked at 400F for four hours

★ Presented under the title "Field Experience With Corrosion Resistant Coatings," by Newell D. Casdorph, Union Carbide Chemicals Corp., Port Lavaca, Texas, at the 15th Annual Conference of the National Association of Corrosion Engineers, Chicago, Ill., March 16-20, 1959.

While the protective coating exposure of the Seadrift Plant is considered mild from a chemical manufacturing company standpoint, a major factor in the corrosion control problem is its location in the hot, humid Gulf Coast area.

Some Experience with Vinyls

Statements concerning performance of generic materials in this article are based on observation made on a limited number of manufacturers products. Formulation of these materials by other companies may show entirely different corrosion resistant qualities.

Careful application of the 1A Vinyl System gives good corrosion protection. It is difficult for some applicators to build the materials up to 4½ mils minimum thickness with three coats cold sprayed and the irregular surfaces which need the most protection usually are not well covered.

When the coating is applied less than the specified mil thickness, rust will appear on flat surfaces and sharp edges in a few month's time.

The 1B Vinyl System is similar to 1A except the vinyl coats are hot sprayed, bringing the total thickness to a minimum of 6 mils. Hot spraying tends to build up over rough surfaces and corners. The average spray man can make this application easily so when this system is used corrosion problems for several years should be limited to touching up mechanical damage, field welds which were not properly cleaned, etc.

A zinc silicate formulation on the sandblasted steel (System 1C) with vinyl overcoating offers the cheapest cost per square foot per year approach to a long range protective coating system. Mechanical damage to the coatings is of little concern because the zinc prevents the steel from rusting. Follow up cost should be limited for several years to touching up field welds which may have not been properly prepared for coating and spot repairs to the vinyl coatings which have been mechanically damaged.

White Vinyl System 2A gives good protection of flat surfaces. The remarks under 1A concerning irregular surfaces apply to this system.

Remarks under 1B generally apply to the 2B system. One color vinyl coat is hot sprayed in order to build up the mil thickness, get good sharp edge build-up and the two final white coats are cold sprayed to get good coverage.

Uses for Epoxy Esters

3A and 3B Epoxy Ester system coated tanks were very well protected on the flat surfaces. As with other systems, trouble occured on irregular surfaces in a few months' time. Compared to other systems considerable chalking occured. Some difficulty was experienced in making spot repairs due to the material flaking off. Epoxy materials are being used to an advantage where resistance to solvents is needed.

Alkyd Coating System 3C after three years' exposure to the weather is giving good service. The side exposed to prevailing winds contaminated by alkalies from the water cooling tower is now beginning to fail.

Oil Base 4A System gives very good service on interior surfaces free from moisture. This coating deteriorates rapidly in the Gulf Coast area climate when used below floor levels, under roof overhang and locations which are exposed to moisture.

Zinc Silicone Formulation System 5A has limited life expectancy in the 140—400F range at the Seadrift Plant.

Zinc Silicate System 6A appears to have long life expectancy in the lower temperature range and after two years' exposure in 400F service seems very promising.

System 7A in service at temperature ranging up to 1400F has proved satisfactory. No flaking off of coating has occurred. Some discoloration caused by rusting due to pin holes or porosity has taken place. This is being corrected by light brush blasting and overcoating with a high temperature aluminum silicone formulation seal coat.

Part 4 – Investigating Sandblasting and Coating Application Hazards

Abstract

Tests are described in which an effort was made to ignite gases from solvents commonly found in coatings. In no case was it possible to ignite the solvents with the sand particles. Sandblast streams played on burning solvents extinguished them. Means are described to prevent sandblasting from causing damage to adjacent operations and to reduce objections by operating personnel to sandblasting. 5.9.3

EXTENSIVE EXPERIMENTATION has been carried out using several highly inflammable liquids and/or gases trying to ignite them by sparks produced by sandblasting. An iron table (Figure 1) with high backstop, forced liquid material feed bottles (Figure 2) and conventional sandblasting equipment were used in carrying out these tests.

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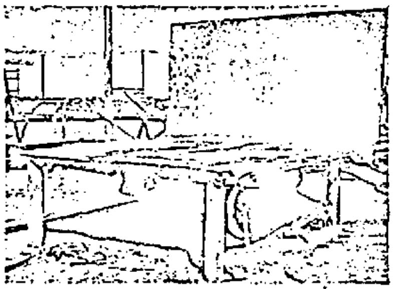

Figure 1—Iron table with backstop, forced liquid material feed bottles and conventional sandblasting equipment used in tests.

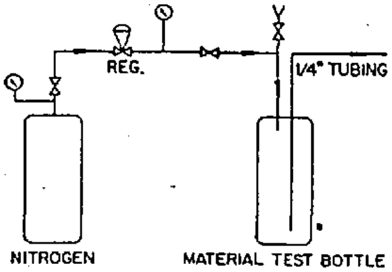

Figure 2—Diagram of forced material feed for sandblasting hazards investigation.

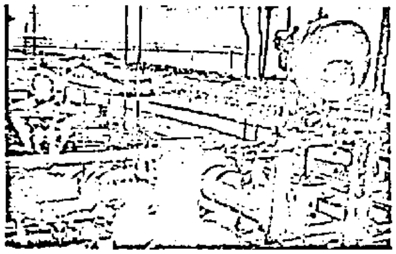

Figure 3—Transparent plastic film used to protect instruments, pneumatic motor valves and other equipment from sandblasting dust.

Engineering Approach—

(Continued From Page 20)

Table 1 shows several common materials some of which were used in the testing program.

Acetaldehyde, kerosene and gasoline include in a representative way extremes of low ignition temperatures, low flash points, low boiling points, low explosive limits and wide explosive ranges. The series of tests listed below were carried out with these three materials. (Note: table top and back plate were preheated to vaporize kerosene.)

With the sandblasting operation going on, liquids were fed into the air stream from the sandblast nozzle to the surface of the steel being blasted and to the table top under the blast area. Blasting was carried out at right angles to the back plate, at a 45 degree angle slanting up and rotated thru a 180 degree arc to a slanting down position. Materials used in these tests were never ignited by sandblasting.

The next step in the test program was to wet the back plate and the table top with liquid, ignite and keep squirting material into the blaze until it was burning vigorously and then turn the sandblast unit on while still adding fuel. The blasting operation rapidly extinguished the fire while the liquid was still evaporating and/or boiling. No re-ignition occured with any of the materials used.

The large volume of expanding air from the nozzle makes it extremely unlikely an explosive mixture concentration will be reached in the sand blasting area. This would indicate there is little danger in working where there may be small gas leaks present.

The particles material made incandescent by friction (not hot enough to be seen in daylight) are very small and are carried by the expanding air flow until at the time they reach the surrounding atmosphere their temperature has dropped below the point at which they will ignite any material.

The experiment mentioned above, blasting with the nozzle slanted up with evaporating or boiling materials a few inches below further indicate the hot particles are light enough to be carried by the air flow. Any large particles of rust or scale which may be heavy enough to fall out of the air blast stream have so much volume the energy in the blast sand particles is not great enough to heat them to a dangerous temperature.

However, it should be emphasized that sandblasting should never be carried out where flammable liquids are spilled or leaking or large gas leaks are present.

A large semi-portable fan should be used to change the air where gas concentrations may occur. The area then should be checked with a flammable material gas analyzer prior to sand blasting.

Spray Painting Fire Hazards

Most corrosion resistant coating formulations will burn under proper conditions. Table 1 gave the flash and ignition point of representative materials. No solvents or coatings have lower flash, boiling or ignition points than materials listed or tested.

Ignition and flash-back tests were carried out by spraying coating materials and solvents commonly used directly into a hot controlled kerosene fire. Regardless of material used no flash back or burning of sprayed mixture occured less than 24 inches from the spray gun head.

The only time the flame approached the nozzle was when the material was sprayed on the surface between the burning kerosene and the spray nozzle. As the solvent evaporated flash-back would occur, although at no time did the operator seem to be in danger.

Only a very limited hazard exists when spraying near furnaces or hot lines provided simple precautions are taken. For example, in open or outside areas the operator should always spray downwind. Closed buildings or places where very little air movement is present should be ventilated or the air should be changed by portable fans to prevent possible explosive mixtures of solvents and air from occuring.

The spray nozzle should be grounded to prevent static electrical discharges from the spray head to the steel being coated.

Equipment Damage From Sand Blasting

The human element, aggravated by the nuisance value of having sand flying around and underfoot causes resistance to sandblasting out of proportion to actual damage it does. A realistic approach must be made to the operating people responsible for an area in which work is to be done. They must be sold on the idea an all-out effort will be made to keep sand or dust from settling on any type of equipment which may be damaged or have its operation affected.

In doing touch up work sandblasting should be held to the minimum amount necessary to get good surface preparation. The amount of sand used can be reduced by equipping all blasting units with fast shut off type remote controls. To further reduce use of sand, vacuum feed type blasting guns should be used for all light work.

Each day after blasting is finished all sand should be cleaned up and hauled away. Good housekeeping will reduce the nuisance and resistance to the work will be much less.

Instrument tubing and insulation adjacent to spots to be blasted can be protected by using old rubber inner tubes. Transparent plastic film (Figure 3) is ideal for sealing instruments, pneumatic motor valves and other equipment from sand or dust.

Work should be planned to take advantage of wind direction. By careful timing work can be done on high columns or structures with the sand and dust carried away by the wind where no damage will be done. Polyester film shrouds will cause the sand to drop straight down and prevent it spreading it over large areas.

Motor driven centrifugal pumps and other rotating equipment can be adequately protected by covering them with sisal kraft weather resistant paper.

Under some conditions large semi-portable fans can be used to keep sand or dust away from equipment. Again ad-

(Continued on Page 24)

TABLE 1—Characteristics of Flammable Materials Used in Painting

No.	Material	Degrees			Explosive Limits % By Volume	
		Flash Point	Ign. Temp.	Boil Point	Lower	Upper
1.	Ethyl Ether	—49	356	95	1.9	48.0
2.	Acetaldehyde	—36	365	70	4.1	55.0
3.	Kerosene	100	490	304/574	0.7	5.0
4.	Gasolene	—45	536/800	100/400	1.4	7.6
5.	Ethylene Oxide	0	804	51	3.0	80.0
6.	Methyl Ethyl Keytone	30	960	176	1.81	10.0
7.	Acetone	0	1000	134	2.6	12.0

Trifluorochlorethylene—

(Continued From Page 18)

Fluorocarbon Film Applications

Fluorocarbon films can be readily heat sealed by thermal pulse or radio frequency techniques.

Some possible applications of these resins include film for specialized packaging, fuel cells (especially for oxidants), expellent bladders, hose liners (especially for strong acids and oxidants) and optically clear face shields, sight glasses, etc., where exposure to strong acids and oxidants is required.

Fluorocarbon Grease

Fluorocarbon grease is the product of several years' research directed toward formulation of a true polychlorotrifluoroethylene grease with outstanding lubricity, chemical resistance and thermal stability. This material has shown good resistance to attack by the reagents listed in Table 6.

This grease has been used successfully as a lubricant for glass joints or stopcocks at temperatures from 150 to 170 C (300 to 340 F), and as a lubricant and sealent of bearings, valves, packings and shafts in equipment handling halogens, corrosive chemicals or strong acids.

The fluorocarbon products discussed possess excellent chemical inertness, dimensional stability over a wide temperature range and good mechanical properties. They have proven excellent and highly valuable to the chemical industry for coatings, lining, gaskets and packings.

TABLE 6—Reagents Resisted by Fluorocarbon Grease

Oxidizing Agents	Halogens
Fuming Nitric Acid	Fluorine
Hydrogen Peroxide	Chlorine
Oxygen	Bromine
Chromyl Chloride	Iodine Monochloride
Chromyl Nitrate	Bromine Trifluoride
Potassium Permanganate	
Strong Acids and Corrosive Chemicals	**Miscellaneous Chemicals & Solvents**
Concentrated Sulfuric Acid	Aqueous Acids and Bases
Hydrogen Fluoride	Alcohol
Hydrogen Chloride	Ether
Chlorosulfonic Acid	Hydrocarbon Solvents
Antimony Trichloride	Chlorinated Hydrocarbons
Phosphorous Oxychloride	Fatty Acids
Aluminum Chloride	Silanes
Trifluoromethyl Hypofluorite	Furanes
Nitrogen Oxyfluoride	
Nitroxyl Fluoride	

Technical Topics Scheduled for March

Oil-Soluble Inhibitors for Controlling Corrosion in Tankers and Pipe Lines, by W. S. Quimby

Use of Polyester and Epoxy Resins for Chemical Plant Repairs, by Walter A. Szymanski

Accelerated Corrosion in Aluminum-Silver Alloys, by H. H. Stadelmaier and E. M. Whitener

Relationship of Microstructure and Stress Corrosion Cracking of Type 410 Stainless Steel, by P. S. Trozzo and R. F. McCartney

Rubber and Synthetic Linings Give Good Sea Water Service*

RUBBER AND synthetic rubber linings have been in sea water service for 10 years with no visible change in the compound. Synthetic fuel oil delivery hose normally lasts eight years or more. Generally, the hose must be replaced because of external abrasion rather than breaking down of the rubber. Hard rubber pipe and fittings subjected to salt water and underground use have been in service for over 50 years.

If rubber lining for steel is damaged or torn in service, the lining usually can be patched by the applicator and quickly returned to service.

The price of lining, including steel preparations, is approximately $2.50 to $4 per square foot, based on flat surfaces. The price would be higher for more complicated shapes and tanks which would include a large number of steel bars, channels, supports, etc.

In marine applications where salt water corrosion is a primary concern, the cost of lined steel and/or plastic pipe and linings will be higher in installation cost than heavy gauge galvanized steel. Properly used, however, they are almost certain to give longer trouble free life than steel pipe where corrosion is a factor.

DISCUSSION

Questions by A. V. Morrison, California Oil Company, Perth Amboy, New Jersey:

1. What has been your experience in coating pump impellers?

2. Would you favor a relatively hard coating such as epoxy or a relatively soft coating such as plastisol or rubber?

3. A number of our vendors favor natural rubber rather than synthetic for sea water applications. Any comment?

Reply by J. A. Thompsen:

1. Generally speaking, we mold hard rubber coating over a metal face on the impeller shaft end. This has been satisfactory and in use for 15 or 20 years in pumps ranging from ½ to 10 horsepower at speeds from 750 to 3400 rpm. On some applications where abrasion is involved, soft rubber had been used satisfactorily, but this is usually only at 1750 rpm speeds.

2. We believe that a hard rubber coating is the best all-around preparation. At high speed operation with abrasive conditions, we have coated hard rubber impellers and volute cases with epoxy or soft rubber lining in the relatively few applications over a period of about two years. These appear satisfactorily, but we do not have long term results. We do not use plastisol coating for impellers based on problems of absorption and porosity.

3. We definitely favor natural rubber over synthetic rubber for sea water applications for reasons of moisture absorption. Natural rubber compounds are usually considerably lower in moisture absorption than synthetic compounds, so that in a molded impeller the product is superior.

In the case of hard rubber compound impellers, we would favor natural rubber over synthetic rubber because of lower moisture absorption and better adhesion of steel.

★ Revision of a paper titled "Controlling Marine Corrosion With Rubber and Plastics" by J. A. Thompsen, American Hard Rubber Co., New York City, presented at the 16th Annual Conference, National Association of Corrosion Engineers, March 16-20, 1959, Chicago, Ill.

Engineering Approach—

(Continued From Page 22)

vantage should be taken of the wind direction in conjunction with fans.

Figure 4 shows a 3 hp motor located in the sand blasting yard, connected to a small gear reducer drive unit by a falk coupling. Eccentric drive on the gear unit is connected to a reciprocating pump shaft type rod by a connecting rod. The shaft is sealed on one end by using seal type packing and the opposite end is running through a brass sleeve with center section of sleeve assembly being used as an oil reservoir.

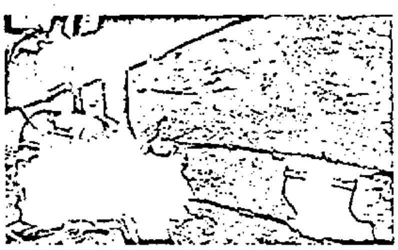

Figure 4—Electric motor and drive assembly exposed to sandblasting dust for several weeks indicate that sandblasting residues are relatively harmless to rotating equipment.

Sand shown around this installation accumulated in one week's time. The motor was run continuously and no effort was made to protect the assembly from the sand.

An installation like this can be used very effectively when interested persons are invited to inspect it. They will be amazed by what they see. Motor, Coupling and gear box are running along smoothly after weeks of exposure with no apparent damage. The shaft will have a highly polished appearance with very little evidence of wear.

The motor, coupling and gear box can be protected adequately by placing something over the top and keeping it in place. The eccentric connecting rod and shaft should be completely enclosed to keep them free of dust.

References

1. Gasoline Resistant Tank Coatings. By W. W. Crammer., CORROSION, Vol. 8, 195-204 (1952) June.

PROPOSAL

To CONTINENTAL OIL COMPANY Date May 24, 1973

Attention: Larry N. West
Box 605
Westlake, La. 70669

Dear Sir:

Having carefully examined the Instructions to Bidders, all conditions of Contract form 4-13-PB and the Basis of Bids for painting piping and equipment, Block II, VCM Plant, Westlake, La.

as well as the premises and the conditions affecting the work, the undersigned proposes to furnish all necessary materials, labor, equipment, tools, transportation, services, etc., for completion of the work in accordance with above documents for the sum of:

Seventy-eight thousand six hundred sixty DOLLARS ($78,660.00).

If notified of the acceptance of this proposal within thirty (30) days of the time set for receiving the bids, the undersigned agrees to execute a contract on the accompanying contract forms and the conditions thereof.

The estimated number of calendar days to complete this project is 120 days.

The undersigned is registered as a federal and state employer, with employer's registratio.. numbers as follows:

Federal 74 1536492 State 102956

Very truly yours,

MAILING ADDRESS:

P. O. Box 1527
Beaumont, Texas 77004

Title President

Company INDUSTRIAL COATINGS OF BEAUMONT INC.

Corporation
(Designate as Corporation, Partnership or Individual)

ALTERNATES Breakdown:

Alternate I	Area 1- Piping		(a)	$ 9,720.00
		"	(b)	9,870.00
	Area 2- Oxychl.		(a)	9,460.00
Alternate II		"	(b)	7,370.00
		"	(c)	8,800.00
		"	(d)	9,220.00
Alternate III	Area 3- HCl.			8,800.00
	Area 4- Quench		(a)	8,240.00
Alternate IV		"	(b)	7,180.00
	Total			$78,660.00

CWH 000006346

4-14-PB
REV. 3-1-66

CERTIFICATION OF NONSEGREGATED FACILITIES

The undersigned certifies to Continental Oil Company and the appropriate agencies of the United States government that it does not and will not maintain or provide for its employees any segregated facilities at any of its establishments and that it does not and will not permit its employees to perform their services at any location, under its control, where segregated facilities are maintained. The undersigned agrees that a breach of this certification is a violation of the Equal Opportunity clause required by Executive Order 11246 of September 24, 1965.

As used in this certification, the term "segregated facilities" includes facilities which are segregated by explicit direction or are in fact segregated on the basis of race, creed, color or national origin, because of habit, local custom or otherwise.

The undersigned further agrees and understands that a breach of the assurances contained herein subjects it to the provisions of the Order of the Secretary of Labor at 41 CFR Chapter 60, dated May 28, 1968, and the provisions of the equal opportunity clause enumerated in contracts between the United States of America and Continental Oil Company, or in subcontracts held by Continental Oil Company from a third party or parties who contract with the United States of America.

The undersigned further agrees that (except where it has obtained identical certifications from proposed subcontractors for specific time periods) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the Equal Opportunity clause; that it will retain such certification in its files.

(NOTE: Whoever knowingly and willfully makes any false, fictitous or fraudulent representation may be liable to criminal prosecution under 18 U.S.C. Section 1001.)

This certification will be valid for the life of the contract covering

Painting Piping and Equipment, Block II, VCM Plant

______________________ at Lake Charles, La.

______________________ with Continental Oil Company.

INDUSTRIAL COATINGS OF BEAUMONT INC.
CONTRACTOR

By L. W. Henslee
L. W. Henslee

Title President

Date May 24, 1973

CWH 000006347

4-65 PC
REV. 8-1-68

10-30, 1973

TO: JRH LNW

FROM: LAW

For your info, attached is the test run by Merle Hutchison. The Napko 5802 gray was 10% low on ~~volitals~~ volatiles.

You probably should keep this on file

Jim

CONOCO

Interoffice Communication

To Larry West, VCM Plant, Lake Charles, Louisiana

From Merle Hutchison, Maintenance Engineering, Ponca City

Date October 23, 1973

Subject Napko Paint Epoxy 5802

As we discussed by telephone recently, we have obtained infra-red data on epoxy samples from Lake Charles and compared these with the control samples retained in Ponca City, Oklahoma. There was no significant difference in the Lake Charles and Napko 5800 converter samples. There is a significant difference between the Lake Charles and Ponca City Napko 5802 epoxy samples.

Attached are the curves obtained from the samples submitted for analysis. We have contacted Napko and have discussed these results with Messrs. Frank Tvrdik and Fred Sharron. They agreed that the sample submitted from Lake Charles was off-specifications and were willing to work with Continental personnel to solve any problems that are encountered while using Napko materials.

Merle Hutchison

Merle Hutchison
Coatings and Corrosion Specialist
Corrosion and Metallurgy Division

bak
Enc
CC:
JDG:JFL

CWH 000006349

IRID

ANALYSIS REPORT

SPECTROSCOPY GROUP

Name Merle Hutchison

Analysis No. 3-51949 thru 51954-3

Sample No. See Below

Notebook No. IR Log #4

Spectrum, Film or Plate No. 4-627, -628, -629, -631, -632, -635-73

Type of Study Requested: (a) Infrared, (b) Ultraviolet, (c) X-ray Diffraction
(d) X-ray Fluorescence, (e) Atomic Absorption
(f) Electron Microprobe, (g) Emission Spectroscopy

Sample	Description
#1	NAPKO 5800 Converter; Batch 18917 (Lake Charles)
#2	NAPKO 5802 Epoxycote; Batch 18482 (Lake Charles)
#3	NAPKO 5800 Converter (Ponca City)
#4	NAPKO 5802 Epoxycote (Ponca City)
#5	Mixture of one part #1 with two parts #2
#6	Mixture of one part #3 with two parts #4

Fractions of the above six samples were dried to constant weight in a vacuum oven at 90°C. The following results were obtained:

Sample	Wt % non-volatiles
#1	76.4
#2	79.6
#3	75.6
#4	69.5
#5	78.0
#6	75.1

The attached infrared spectra were completed for the non-volatile fractions from the six samples. These spectra and the wt % non-volatile data yielded the following conclusions:

1. There is no significant difference in the Lake Charles and Ponca City NAPKO 5800 Converter samples (samples #1 and #3).

Signed TMF

Date 10/9/73

ANALYSIS REPORT

SPECTROSCOPY GROUP

Name Merle Hutchison Analysis No. 3-51949 thru 51954-3

Sample No. See Below Notebook No. IR Log #4

Spectrum, Film or Plate No. 4-627, -628, -629, -631, -632, -635-3

Type of Study Requested: (a) Infrared, (b) Ultraviolet, (c) X-ray Diffraction
(d) X-ray Fluorescence, (e) Atomic Absorption
(f) Electron Microprobe, (g) Emission Spectroscopy

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2. There is a significant difference between the Lake Charles and Ponca City NAPKO 5802 Epoxycote samples. This difference is shown by the lower % non-volatiles for the Ponca City sample. Since the IR spectra for both of the non-volatile fractions are experimentally identical, it was concluded that the Lake Charles Epoxycote contains less solvent than the Ponca City sample.

3. The IR spectra show no significant differences for the non-volatile fractions from samples #5 and #6. The apparent differences in the solvent content for sample #2 as compared to sample #4 is reflected in the wt % non-volatile data for samples #5 and #6.

Please contact me if you need additional information.

Signed TMK

Date 10/9/73