

LEAD INDUSTRIES ASSOCIATION

480 LEXINGTON AVENUE

NEW YORK 17, N. Y.

RED LEAD DIVISION

April 29, 1948

To Members of the Red Lead Technical Committee:

SUBJECT: RED LEAD TECHNICAL COMMITTEE
MEETING MINUTES - MARCH 18, 19, 20, 1948

Attached please find the minutes of the last Red Lead
Technical Committee meeting held March 18, 19, and 20, 1948.

Very truly yours,

C. E. Vander Valk
C. E. Vander Valk
Technical Director
Red Lead Division



LEAD INDUSTRIES ASSOCIATION

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NEW YORK 17, N. Y.

RED LEAD DIVISION

DRAFT

CONFIDENTIAL

SUBJECT TO REVISION

RED LEAD TECHNICAL COMMITTEE

New York, N. Y.

March 18, 19, 20, 1948

A meeting of the Red Lead Technical Committee of the Lead Industries Association was held on March 18-19, 1948, at Sayville, New York, and on March 20, 1948, in the offices of the Association. The following persons were in attendance:

Present

Mr. A. C. Coats
Mr. O. F. Shobe
Dr. J. O. Johnstone
Mr. George Diehlman

Representing

Eagle-Picher Co.
Glidden Co.
Hammond Lead Products, Inc.
National Lead Co.

Mr. R. L. Ziegfeld, Secretary, Lead Industries Association
Dr. L. L. Carrick, Director of Red Lead Research, Meeting Chairman
Mr. C. J. Vander Valk, Technical Director

INSPECTION OF L.I.A. PROJECTS AT SAYVILLE

The Committee arrived in Sayville at 10:45 A.M. on March 18, 1948, and proceeded to the Marine Basin to inspect panels exposed to marine atmosphere at approximately two and one-half feet above high tide. These panels were examined by each member of the Committee and were rated for edge and general corrosion, blistering, peeling and chalking or erosion. In addition to the written record attached to these minutes, colored photographs were taken of all of the exposed panels.

Paints for Marine Atmospheric Exposure:

The best of the 93 panels exposed to the atmosphere at the Sayville Marine Basin are listed below with the 48 months ratings and the primer formulations:



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Panel No.	L.I.A. Paint No.	Corrosion Edge	Corr. Con.	Blistering	Chalking	Composition Pigmentation	Composition Vehicle
459A	340	7	9	10	9/	R.L. 55, ZnO 10, Zn. Yel. 10, Iron Oxide 7, Asbest. 10, Dicalite 8, PVe40	Dehydrated castor oil modified glyceryl phthalate alkyd.
413A	30	7	9/	9/	9/	R.L. 70, ZnO 10, Iron Oxide 10, Asbestine 7, Dicalite 3, PV-30	Linseed-Phenolic Varnish (90 gal. length) 3, Ester Gum Varnish (25 gal. length) 3, MIO 1:4.
468A	116	8	10	10	9/	R.L. 56, PbO 14, Micalith 0 30, PV-33	Dehydrated castor oil modified glyceryl phthalate alkyd.
495A	183	8	10	10	9/	R.L. 55, ZnO 10, Zn. Yel 10, Mica 25, PV-33	60% Linseed-Phenolic-cumaron indene varnish (6 gal. length) 40% Linseed modified glyceryl phthalate alkyd. (35% P.A.)
498A	94	7	9	10	9/	R.L. 55, ZnO 10, Zn. Yel. 10, Iron Oxide 7, Asbestine 10 Dicalite 8, PVe40	60% Linseed modified glyceryl phthalate alkyd. (35% P.A.). 40% Linseed Oil-cumaron varnish (8 gal. length)

The Lead Industries Association paint systems contained on structural steel angles and on galvanized iron panels on exposure at the atmospheric exposure station were inspected by the Committee on the afternoon of March 18. Kodachrome pictures were taken of the test specimens to supplement the written records and for use in publications.

Paints for Atmospheric Exposure:

The table on page 3 contains a listing of the best specimens in projects exposed at 45° facing south on the atmospheric test fences.

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Panel No.	L.I.A. Paint No.	1 Primer Coat Corrosion		2 Primer Coat Corrosion		Composition	
		Edge	Con.	Edge	Con.	Pigmentation	Vehicle
4489	3	4	10	9	10	R.L. 45%, ZnO 10% Iron Oxide 30%, Asbestine 10%, Celite 5%.	Linseed-Phenolic Varnish (60 gal. length)
4488	8	5	10	10	10	R.L. 70%, ZnO 10%, Iron Oxide 10%, Asbestine 7%, Celite 3%.	Dehydrated Castor-Fish Oil-Phenolic Varnish (60 gal. length)
4507	21	5	10	10	10	R.L. 45%, ZnO 10%, Iron Oxide 30%, Asbestine 10%, Celite 5%.	28% IV-197, Linseed-Dehydrated Castor-Phenolic Varnish (50 gal. length). 66% Raw Linseed Oil. 6% Bodied Linseed Oil.
4856	37	7	10	10	10	R.L. 55%, ZnO 10% Lead Chrom.(Mono.) 20%, Asbestine 10%, Celite 5%.	Dehydrated castor oil modified glyceryl phthalate alkyl.
4890	35	7	10	10	10	R.L. 55%, ZnO 10%, Zn. Chrom. 10%, Iron Oxide 7%, Asbestine 10%, Celite 8%.	60% Linseed-Phenolic-Cumaron Varnish (6 gal. length) 40% Linseed modified glyceryl phthalate alkyl(35%P.A.)

After careful consideration the Committee concluded that these data indicated:

(a) The presence of a liberal amount of long chain fatty esters in the vehicle in the form of free linseed oil, a long oil oleoresinous varnish, a medium or long alkyl (50 - 65% fatty acids), or combinations of these, is imperative for good performance of primers for atmospheric exposure both on hot rolled structural steel shapes and on hot rolled medium steel flat panels.

(b) When formulated with vehicles meeting the requirements of (a), good performance can be expected with pigmentations containing from 55% to 70% red lead and approximately 10% Iron Oxide when exposed directly to the atmosphere in a two coat system.

(c) The high red lead content paints such as Quick Drying Red Lead Type XIII have performed as well to date as the lower lead content mixed pigment types under good top coat paints. Carbonation with resulting severe chalking has taken place where these primers were exposed directly to the atmosphere for periods in excess of two years. In practice priming paints are generally topcoated well within this period.

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(d) In Project 10 relating to the painting of galvanized panels, the importance of a prior weathering period up to 6 months was clearly indicated. Failure to date, by peeling, was limited almost exclusively to unweathered panels. The chemically pretreated panel areas showed no indication of failure under any of the paint systems at this time (21 months exposure). No conclusions can be drawn on the relative merits of Lithoform or Copper Sulfate treatment.

The usefulness of red lead-zinc dust combinations for galvanized surfaces is also demonstrated in this series.

The results obtained on this project favor red lead over zinc-dust-zinc oxide pigmentations in alkyl vehicles.

Additional results on the systems for galvanized iron will be included in a later report from The Eagle-Picher Test Station at Joplin, Mo., where identical panels are exposed.

The complete record of inspection is attached to these minutes as Exhibit "A".

PANAMA CANAL PROJECT

At the January meeting the Committee agreed to cooperate in projected tests under the auspices of the Special Engineering Division of The Panama Canal. In his letter of January 14, 1948, Colonel Stratton requested recommended paint systems for exposure to the atmosphere, fresh water (total immersion), and sea water (tide range and total immersion).

The Committee selected the systems, shown on the following page, on the basis of results obtained from L.I.A. projects at Sayville and Florida.

It was decided to recommend two coats of primer and two topcoats except for total immersion in fresh water where four coats of TI-P-86a, Type IV comprise the system.

A letter from Colonel Stratton, Special Engineering Division, The Panama Canal, dated March 12, 1948, was next considered. In this letter, ten gallons of a suitable red lead paint were requested for priming under cold application bituminous protective coatings. It was decided to cooperate in this matter after more specific information was obtained by the Technical Director concerning the exact nature of the bituminous paints that are to be used.

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SUGGESTED PAINT SYSTEMS - PANAMA CANAL

Type of Exposure	Surface Preparation or Treatment	Paint No.	Primer Pigmentation	Primer Vehicle	Top coat Pigmentation	Top coat Vehicle
Atmospheric	Wire brushed rusted surfaces. Direct & over WP-1. (A wash primer consisting of polyvinyl butyral vehicle, a low concentration of zinc chromate. Contains phosphoric acid.)	TT-P-86a Type II	TT-P-86a, Type II		White Lead Paste 100 lb. Chrom. Oxide Green 42 lb.	WLO 3 1/2 gal. Drier 1 pt.
Atmospheric	Sandblasted. Direct & over WP-1	94	No. 15 R.L. 55% ZnO 10% Zn Chrom. 10% Iron Ox. 7% Asbestos 10% Dicalite 8%	No. 11 40% G.L. 24% 60% LV-201 (8 gal. castor oil Omar 2 1/2)	Navy Specification 52-P-45 (Darker gray tint)	
Fresh Water Total Immersion	Sandblasted. Direct & over WP-1	TT-P-86a Type IV	TT-P-86a, Type IV		TT-P-86a, Type IV	
Sea Water Tide Range	Sandblasted. Direct & over WP-1	118	No. 27 R.L. 55% ZnO 10% Zn Chrom. 10% Iron Ox. 7% Micalith O 18%	No. 19 60% 6 gal. Linseed-Prenolio-Omar Varnish. 40% Linseed modified glyceryl phthalate alkyl.	Navy Specification 52-P-45	No. 27 Dehydrated castor oil modified glyceryl phthalate alkyl.
Sea Water, Total Immersion	Sandblasted. Direct & over WP-1	316	No. 136 PV40 R.L. 40% Sub. White Lead 30% Mica 15% Mg. Sil. 10% Iron Oxide 5%	No. 19	Maritime Commission 52-M-40 Anti-fouling Paint with addition of 0.5% Aluminum Stearate by weight in pigmentation	

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L.I.A. PAINTS FOR NAVY - NORFOLK

Paints were formulated for this cooperative project on bottom paints at the January, 1948, meeting. These paints are to be applied under the Navy's hot and cold plastic anti-fouling paints at Norfolk. L.I.A. Paints 33, 35 and 137 and two additional formulations now under development are to be furnished by Mr. Diehlman. The vinyl systems decided upon at the January meeting are to be furnished by Mr. Shobe and when finished are to be sent to Mr. Diehlman for shipment to the Navy.

The paint systems selected for this project at the January 29-30, 1948, meeting of the Red Lead Technical Committee are:

L.I.A. Paint No. 33

L.I.A. Pigmentation No. 16

Red Lead (97%)	55%
Zinc Oxide	10%
Zinc Chromate	10%
Iron Oxide	7%
Asbestine	10%
Dicalite	8%

Vehicle No. 26

60% 10 gallon Phenolic (BRO432)-Linseed,
Tung Oil Varnish
40% Medium Linseed Alkyd (35% phthalic anhydride)

L.I.A. Paint No. 35

L.I.A. Pigmentation No. 16

See Above.

Vehicle No. 19

60% 6 gallon Phenolic, Cumarone, Indene-
Linseed Oil Varnish
40% Medium Linseed Alkyd (35% phthalic anhydride)

L.I.A. Paint No. 137

L.I.A. Pigmentation No. 46

Red Lead (97%)	55%
Zinc Oxide	20%
Micolith Q	25%

Vehicle No. 19

See Above.

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The vinyl systems for which Mr. Shobe agreed to prepare the paints consist of:

1. Bakelite's WP-1 wash primer followed by an anticorrosive paint similar to Bakelite's P-10 but with the replacement of 50% by volume of the red lead with magnesium silicate.

2. The Bakelite system consisting of WP-1, P-10 Anticorrosive (straight red lead in a vinyl vehicle) and Bakelite Anti-Fouling Paint applied according to the latest recommended procedures of the Bakelite Corporation.

L.I.A. PAINTS FOR THE NAVY - PHILADELPHIA

It was decided to submit the following ten primers for the Bureau of Ships' projected tide range and atmospheric tests at the Philadelphia Naval Base. In accordance with the request of Mr. F. Van Etten and Mr. W. Cranmer of the Bureau of Ships, these paints are arranged in order of preference:

First Paint - L.I.A. No. 317

L.I.A. Pigmentation No. 199

Red Lead (97% grade)	5%
Zinc Chromate	10%
Zinc Oxide	8%
Raw Sienna	4%
Micalith O	15%
Asbestos	9.7%
Aluminum Stearate	0.3%

Vehicle No. 27

Dehydrated castor oil alkyd, 45% glyceryl
phthalate

Mr. Shobe agreed to furnish this paint.

Second Paint - L.I.A. No. 318

L.I.A. Pigmentation No. 199

See Above.

Vehicle

65% Bureau of Ships Specification S2-R-13a
(Grade II)
35% L.I.A. Vehicle No. 27

Mr. Diehlman agreed to furnish this paint.

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Third Paint - L.I.A. No. 319

L.I.A. Pigmentation No. 159

See Above.

Vehicle

50% L.I.A. Vehicle No. 27
50% L.I.A. Vehicle No. 5 (Simplified to reduce
number of ingredients and prepared with
Amberol 226 if BR296 is not available)

Mr. Shobe agreed to simplify the vehicle formula and furnish this paint.

Fourth Paint - L.I.A. No. 320

L.I.A. Pigmentation No. 160

Red Lead (97% grade)	45%
Lead Chromate (Lemon)	15%
Zinc Oxide	8%
Zinc Chromate	7%
Micaceous pigments	15%
Asbestos	10%

Vehicle

65% 52-R-13a
35% L.I.A. Vehicle No. 27

Mr. Diehlman agreed to furnish this paint.

Fifth Paint - L.I.A. No. 321

L.I.A. Pigmentation No. 159

See Above.

Vehicle

85% L.I.A. Vehicle No. 27 (Solids)
15% Vinylite VACN (Solids)

Mr. Shobe agreed to furnish this paint.

Sixth Paint - L.I.A. No. 322

L.I.A. Pigmentation No. 159

See Above.

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Vehicle

Revised L.I.A. Vehicle No. 5 (see Third Paint)

Mr. Shobe agreed to furnish this paint with the revised vehicle.

Seventh Paint - L.I.A. No. 323

L.I.A. Pigmentation No. 159

See Above,

Vehicle

75% Bureau of Ships Specification 52-B-13a
(Grade II)

25% L.I.A. Vehicle No. 27

Mr. Dishman agreed to furnish this paint.

Eighth Paint - L.I.A. 324

L.I.A. Pigmentation No. 159

See Above,

Vehicle

45% Glyptal 2454 (Medium linseed alkyl,
34% P.A.)

40% L.I.A. Vehicle 27

15% Raw Linseed Oil

Mr. Dishman agreed to furnish this paint.

Ninth Paint - L.I.A. No. 325

L.I.A. Pigmentation No. 161

Red Lead (97% grade)	45%
Titanium Dioxide	10%
Zinc Chromate	10%
Zinc Oxide	10%
Asbestos	10%
Mica/ith 0	15%

Vehicle

65% Bureau of Ships Specification 52-B-13a
(Grade II)

35% L.I.A. Vehicle No. 27

Mr. Dishman agreed to furnish this paint.

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The Committee agreed to a PV of 34-36 for all of the above paints and to a fineness of grind of 4.

Tenth Paint

This paint shall contain an oil vehicle and be designed for application over incompletely cleaned surfaces. Mr. Diehlman agreed to furnish this formulation and prepare the necessary paint samples.

FEDERAL SPECIFICATION TT-P-36a

The Technical Director informed the Committee that he and Mr. Diehlman had called at the National Bureau of Standards on March 4, 1948, concerning the status of proposed revision of red lead paint specification TT-P-36. The reaction of the members of the paint and paint raw materials companies to whom the proposed new specification had been circulated was discussed with Mr. Paul Howard in Mr. E. F. Hickson's prolonged absence because of illness. Mr. Howard stated that the specification was favorably received generally and that most of the criticism was leveled at Paragraph I-12 under "NOTES" calling for a 6 months guarantee of the condition of the paint. Mr. Howard stated that the views of the complainants coincided with those expressed by the Red Lead Technical Committee and Mr. John C. Moore, Director of the Scientific Section of the National Paint, Varnish and Lacquer Association, who took action at the instigation of the Red Lead Technical Committee. Mr. Howard stated that the Specification Board would certainly have to reconsider the contents of this paragraph and requested that the Red Lead Technical Committee submit a revised paragraph for the Specification Board's consideration.

The Committee discussed Mr. Howard's request and agreed that the following paragraph should be changed from:

"Red lead paint, purchased under this specification shall be guaranteed for 6 months from the date of actual receipt by the ordering office. During the period of guaranty, the successful bidders shall replace, without cost to the ordering office, any material which cakes in the container and cannot readily be re-dispersed with a paddle to a smooth homogenous state, curdles, livers, or otherwise becomes unfit for use. Material replaced because of failure shall carry the original guaranty. The material delivered under this specification is to be stored by the purchaser in the original unopened shipping containers, under reasonable office or warehouse conditions, and not subjected to excessive heat."

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"Red Lead paint, purchased under this specification shall be guaranteed for 6 months from date of shipment from the factory of the bidder. During the period of guaranty, the successful bidders shall replace, without cost to the ordering office, any material which cakes in the container and cannot readily be re-dispersed with a paddle to a smooth homogenous state, curdles, livers, or otherwise becomes unfit for use. Material replaced because of failure shall carry the original guaranty. The material delivered under this specification is to be stored by the purchaser in the original unopened shipping containers, under reasonable office or warehouse conditions, and not subjected to excessive heat."

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This suggested change would place the manufacturers of the specification paints in a more favorable position.

It was next proposed that this proposed change be relayed to Mr. Moore of the Scientific Section with the request that he submit it to Mr. Hickson's office in the name of the National Paint, Varnish and Lacquer Association since the clause in question is a direct concern of paint manufacturers. It was so agreed.

TECHNICAL PAPERS FOR PUBLICATION

The Technical Director asked the Committee to reconsider a proposed paper for publication based on results obtained on L.J.A. Project No. 2. This project was initiated in 1943 to investigate and develop improved red lead mixed pigment formulations for use in marine primers.

The first draft of this paper was submitted to the Committee for comment on December 12, 1947. At that time it was agreed that undue stress was placed on the results obtained on the structural angles exposed to the atmosphere containing primers that were designed and intended for marine exposure.

After some discussion it was decided that the revised draft emphasizing the results obtained on the tide range and totally immersed specimens should be read by the Committee members and reconsidered for publication. The Committee and the author also agreed that Project No. 2 was not among the best L.J.A. research projects to describe and discuss before the Paint and Varnish Production Clubs. It was tentatively agreed that an approved revision of this paper might be published in the "Paint, Oil and Chemical Review" or in a marine publication such as "Marine Engineering."

The Committee advised the Technical Director to prepare a paper suitable for presentation to the Paint and Varnish Production Clubs based on the panels exposed to a marine atmosphere at two and one-half feet above high tide at the Sayville Marine Basin (Projects 3, 4 and 7). The Technical Director will prepare a draft of a technical paper based on these results for consideration at the next Red Lead Technical Committee meeting.

During the discussion on red lead publicity it was proposed that a new Red Lead Technical Letter be published in the near future containing a revision of the contents of Technical Letter No. 1. This publication, dated March, 1945, contains suggested formulations for multiple pigment red lead paints for iron and steel surfaces for atmospheric exposure. The Technical Director stated he would prepare a new Technical Letter covering this subject for consideration at the next meeting.

PROJECT NO. 14 - ATMOSPHERIC PROGRAM

The date for exposure of the test specimens was changed from April 1, 1948, to May 15, 1948, when it was learned that the topcoat paints were not yet ready for shipment to the cooperators. A final date, April 1, 1948, was set for shipment of all of the paints in the project to all locations. All of the members furnishing paints agreed on this date.

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The need for publicizing the atmospheric program as proposed at the December 11-12, 1947, meeting was stressed by certain members of the Committee. It was suggested that the members of the Red Lead Technical Committee solicit the views of the executive members of their respective companies to assure complete and wholehearted support of this venture from its inception. It was so agreed. The Technical Director said that he would commence the preparation of a write-up of the atmospheric program for publication very shortly.

To further emphasize the need for publicity for multiple pigment red lead paints for atmospheric exposure, a report was read of a survey of state highway departments which indicated that nearly 50% of the highway bridge engineers expressed an interest in:

1. Priming paints other than those based on 100% red lead, including an alternate specification for pigmentation,
2. A "chromate" type of primer (inferring a zinc chromate base type of primer).

INSPECTION OF LLOYD-BRASILEIRO LINE SHIPS

A letter addressed to the Eagle-Fischer Company from the McIlhenry Paint Company concerning fourteen ships of the Lloyd-Brasileiro Line painted with red lead primer 52-MC-201 was read by Mr. Goets to the Committee. In this letter Mr. McIlhenry requested inspection of these ships when docked in New York. Most of these ships will make calls at the Port of New York.

The Committee approved the carrying out of these inspections by the Technical Director as a Red Lead Technical Committee project. It was suggested that Mr. Goets make the preliminary arrangements with the McIlhenry Paint and Varnish Company and the steamship company. He agreed to do this.

NEXT MEETING

Before adjourning, the Committee set May 6-7, 1948, as the date for the next Red Lead Technical Committee meeting.

The meeting was adjourned at 4:30 P.M. March 20, 1948.

C. J. Vander Velt
C. J. Vander Velt
Technical Director

Live

EXHIBIT "A"
TO MINUTES OF THE
RED LEAD TECHNICAL COMMITTEE MEETING
MARCH 18, 19, 20, 1948

INSPECTION RECORD - ATMOSPHERIC EXPOSURE

4" x 4" x 3/8" Angle Specimens

Wire Brushed - Solvent Cleaned

45° - South Exposure

Project No. 1

Date Exposed 5/9/63

Date Inspected 1/18/66

Elapsed Time 58 months

Panel No.	Paint No.	New		One Coat Primer Area		Two Coat Primer Area		Comments
		P.	V.	Edge	Gen.	Edge	Gen.	
LL89A	3	5	8	6	10	10	10	1st Choice of Series
LL88A	2	6	9	4	10	10	10	2nd Choice of Series
LS07A	21	5	4	5	10	10	10	3rd Choice of Series
LL88AD	2	6	9	7	10	10	10	
LL90A	4	6	8	3	10	7	10	
LL90AD	4	6	8	2	10	7	10	
LL92A	6	6	10	1	9	8	10	
LL92AD	6	6	10	2	9	8	10	
LL94A	8	6	1	1	10	4	10	
LL94AD	8	6	1	1	9	5	10	
LL96A	10	6	2	1	10	6	10	
LL96AD	10	6	2	1	9	7	10	
LL98A	12	6	3	1	10	5	10	
LL98AD	12	6	3	1	10	6	10	
LS02A	16	6	13	0	9	5	9	
LS02AD	16	6	13	0	7	5	9	
LS05A	19	6	4	4	10	9	10	
LS05AD	19	6	4	4	10	8	10	
LS08A	22	6	6	4	10	10	10	
LS08AD	22	6	6	4	10	10	10	
LL87A	1	5	9	3	10	10	10	
LL87AD	1	5	9	4	10	10	10	
LL89AD	3	5	8	6	10	10	10	
LL91A	5	5	10	4	10	10	10	
LL91AD	5	5	10	4	10	10	10	
LL93A	7	5	1	1	10	7	10	

Vehicle #4, M.O., L.O.

Vehicle #4, M.O., F.M.O.

INSPECTION RECORD - ATMOSPHERIC EXPOSURE

4" x 4" x 3/8" Angle Specimens

Wire Brushed - Solvent Cleaned

45° - South Exposure

Project No. 1

Date Exposed 5/9/43

Date Inspected 3/15/48

Elapsed Time 58 months

Panel No.	Paint No.	New		One Coat Primer Area Corrosion		Two Coat Primer Area Corrosion		Comments
		P.	V.	Edge	Cent.	Edge	Cent.	
4493AD	7	5	1	1	10	8	10	
4495A	9	5	2	5	10	9	10	
4495AD	9	5	2	7	10	10	10	
4497A	11	5	3	2	10	7	10	
4497AD	11	5	3	3	10	8	10	
4506A	20	5	4	4	10	10	10	
4506AD	20	5	4	3	10	9	10	
4507AD	21	5	4	5	10	10	10	
4512A	26	5	7	3	9	8	10	
4512AD	26	5	7	2	8	9	10	
4513A	27	5	6	5	10	9	10	
4513AD	27	5	6	5	10	9	10	
4509A	23	6	12	4	5	7	8	Top Coat Cracked
4509AD	23	6	12	5	5	8	9	
4511A	25	6	7	3	9	7	10	
4511AD	25	6	7	4	9	8	10	
4511A	28	6	6	2	10	6	10	
4511AD	28	6	6	3	10	7	10	
4499A	13	(1)	1	0	9	7	10	
4499AD	13	(1)	1	0	9	9	10	
4500A	14	(2)	1	0	9	5	10	
4500AD	14	(2)	1	0	8	6	10	
4501A	15	(3)	1	0	9	4	10	
4501AD	15	(3)	1	0	8	3	10	
4515A	29	OPP.		1	10	7	10	

Vehicle #4, MLO, L-10.

(1) 10% iron oxide in place of ZNO in Fig. 6

(2) 7% Dicalite in place of Ash. in Fig. 6

(3) 7% Ash., 3% Dicalite in place of iron oxide in Fig. 6

INSPECTION RECORD - ATMOSPHERIC EXPOSURE

4" x 4" x 3/8" Angle Specimens

Wire Brushed - Solvent Cleaned

45° - South Exposure

Project No. 1Date Exposed 5/9/43Date Inspected 3/18/44Elapsed Time 58 months

Panel No.	Paint No.	How P.	V.	One Coat Primer Area Corrosion		Two Coat Primer Area Corrosion		Comments
				Edge	Cent.	Edge	Cent.	
4515AD	29	QDR		2	10	6	10	
4503A	17	Navy Bl		4	9	7	10	
4501AD	17	Navy Bl		3	9	6	10	
4504A	18	Navy Bl		3	9	7	10	
4505AD	18	Navy Bl		3	10	6	10	
4510A	24	(4)	6	8	9	10	10	
4510AD	24	(4)	6	8	9	9	10	

(4) 36.8% Fe, 53.3% iron oxide, 9.9% Dicalite

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
2 1/2 Feet Above High Tide
Flat Specimens

Project No. 3
Date Exposed 10/13/44
Date Inspected 3/13/48
Elapsed Time 41 months

Panel No.	Paint No.	New		Corrosion		Blistering	Chalking or Eroding	Comments
		P.	V.	Edge	Gen.			
455A	34e	16	27	7	9	10	9/	1st Choice of Series
413A	30	6	5	7	9/	9/	9/	2nd Choice of Series
442A	45	72	19b	5	8/	10	9/	Top Coat Blistering Slightly
444A	47	72	19d	6	8	10	9/	3rd Choice of Series
460A	37e	13	27	6	8	10	9/	4th Choice of Series
458A	56	20	27	5	9	10	9/	5th Choice of Series
446A	52-A-18 Zn.Chrom. Primer	5	8	5	8	10	9/	6th Choice of Series
414A	33	16	26	2	5		9/	7th Choice of Series
415A	35	16	19	5	8		9/	
416A	33a	16	26	4	7	10	9/	
417A	33b	16	26	4	7	10	9/	
418A	33c	16	26	5	7	10	9/	
419A	33d	16	26	4	7	10	9/	
420A	35a	16	19	2	7	10	9/	
421A	35b	16	19	1	4	10	9/	
422A	35c	16	19	2	5	10	9/	
423A	35d	16	19	4	7	10	9/	
424A	36a	16	28	3	8	10	9/	
425A	36b	16	28	3	7	10	9/	
426A	36c	16	28	4	6	10	9/	
427A	36d	16	28	4	6	10	9/	
428A	40a	20	19	1	3	10	9/	
429A	40b	20	19	2	6	10	9/	
430A	40c	20	19	2	6	10	9/	
431A	40d	20	19	2	5	10	9/	
432A	41a	20	28	4	7	10	9/	
433A	41b	20	28	4	7	10	9/	
434A	41c	20	28	4	7	10	9/	
435A	41d	20	28	4	7	10	9/	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
2 1/2 Feet Above High Tide
Flat Specimens

Page No. 2

Project No. 3
Date Exposed 10/13/44
Date Inspected 3/18/48
Elapsed Time 41 months

Panel No.	Paint No.	How		Corrosion		Blistering	Chalking or Eroding	Comments
		P.	V.	Edge	Gen.			
L36A	42a	20	26	3	7	10	9/	
L37A	42b	20	26	3	5	10	9/	
L38A	42c	20	26	1	5	10	9/	
L39A	42d	20	26	1	6/	10	9/	
L40A	40a	72	19	4	7	10	9/	
L41A	44	72	19a	4	7	10	9/	
L42A	46	72	19a	6	7/	10	9/	
L43A	48	72	19a	2	5	10	9/	
L44A	USMC Class XXII S2-A-1	1	4	4	4	10	9/	
L45A	49	16	19a	2	5	10	9/	
L46A	50	16	19a	0	3	10	9/	
L47A	51	16	19a	0	3	10	9/	
L48A	52	16	19d	3	5	10	9/	
L49A	53	16	27a	2	3	10	9/	
L50A	55	16	26a	3	6	10	9/	
L51A	57	16	26c	1	5	10	9/	
L52A				3	6	10	9/	
L53A				1	6	10	9/	
L54A				2	6/	10	9/	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
2 1/2 Feet Above High Tide
Flat Specimens

Project No. 4
Date Exposed 10/13/41
Date Inspected 3/15/48
Elapsed Time 41 months

Panel No.	Paint No.	New		Corrosion		Blistering	Chalking or Frosting	Comments
		P.	V.	Edge	Gen.			
L66A	116	26	27	8	10	10	9/	1st Choice of Series
L69A	113	36	19	8	10	10	9/	2nd Choice of Series
L68A	132	42	27	7	9/	10	9/	3rd Choice of Series
L90A	138	46	27	7	9/	10	9/	4th Choice of Series
L72A	120	28	27	7	9	10	9/	5th Choice of Series
L69A	117	27	19	6	8	10	9/	
L70A	118	27	27	7	9	10	9/	
L71A	119	28	19	6	8	10	9/	
L73A	121	32	19	5	8	10	9/	
L74A	122	32	27	4	6	10	9/	
L75A	123	33	19	3	4	10	9/	
L76A	124	33	27	5	7	10	9/	
L77A	125	34	19	4	7	10	9/	
L78A	126	34	27	6	7	10	9/	
L79A	127	39	19	2	3	10	9/	
L80A	128	39	27	7	7	10	9/	
L81A	129	41	19	0	2	10	9/	
L82A	130	41	27	7	8/	10	9/	
L83A	131	42	19	3	6	10	9/	
L85A	133	43	19	3	6	10	9/	
L66A	134	43	27	6	8	9	9/	
L87A	135	45	19	7	8	10	9/	
L88A	136	45	27	6	7	10	9/	
L89A	137	46	19	1	5	10	9/	
L91A	139	29	19	4	5	10	9/	
L92A	180	30	19	7	8	10	9/	
L93A	181	31	19	3	5	10	9/	
L94A	182	35	19	2	6	10	9/	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
 2 1/2 Feet Above High Tide. BR 9432 Vs. Typens 13080
 Flat Specimens

Project No. 7a
 Date Exposed 10/13/44
 Date Inspected 3/17/48
 Elapsed Time 41 months

Panel No.	Paint No.	Sow		Edge	Cen.	Blistering	Chalking or Eroding	Comments
		P.	T.					
461A	97	16	15	2	5	10	9%	
462A	98	16	52	2	5	10	9%	
463A	99	71	19	3	6	10	9%	
464A	100	71	52	2	5	10	9%	
465A	101	71	19	2	4	10	9%	
466A	102	16	19	0	3	10	9%	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
 Bakelite Vehicles. Angle Specimens.
 45° - South Exposure

Project No. 70
 Date Exposed 10/13/41
 Date Inspected 3/15/48
 Elapsed Time 41 months

Panel No.	Paint No.	New		One Coat Primer Area Corrosion		Two Coat Primer Area Corrosion		Comments
		P.	V.	Edge	Gen.	Edge	Gen.	
226A	88a	85	24	10	10	10	10	1st Choice of Series
226A	89	85	63	10	10	10	10	2nd Choice of Series
222A	85	88	51	8	10	10	10	3rd Choice of Series
213A	75	88	44	4	10	10	10	
214A	76	88	37	5	10	10	10	
215A	77	88	45	5	10	10	10	
216A	78	88	46	5	10	8	10	
217A	79	88	47	6	10	9	10	
218A	80	89	48	3	10	9	10	
219A	81	88	35	2	10	5	10	
220A	82	88	49	5	10	10	10	
221A	84	88	50	5	10	10	10	
223A	86	88	36	6	10	10	10	
224A	87	85	63	6	10	9	10	
225A	87a	85	63	2	6	5	7	
226A	87b	85	63	6	10	9	10	
227A	89	85	64	5	10	9	10	
229A	88b	85	64	5	10	9	10	
231A	90	85	64	6	10	10	10	
232A	52-MC-29			4	10	10	10	
233A	52-MC-23			3	9	9	10	
234A	52-P-18			6	10	10	10	
235A	6	16	19	4	10	8	10	
236A	4	16	26	3	10	8	10	
237A	37	13	27	4	10	9	10	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
2 1/2 Feet Above High Tide
Flat Specimens

Page No. 2

Project No. 7b
Date Exposed 10/11/54
Date Inspected 2/2/56
Elapsed Time 41 months

Panel No.	Paint No.	Rise		Edge	Cor.	Blistering	Chalking or Eroding	Comments
		P.	V.					
498A	94	16	41	7	9	10	94	Rest Panel of Series
496A	93	16	40	0	4	10	94	
497A	94	16	19	0	4	10	94	
499A	95	16	42	5	8	10	94	
500A	96	16	43	7	9	2	94	Primer Plainly Visible
501A	330	16	40	1	4	10	94	
*502A	USMC XIII S2-A-1	S2-A-1	S2-A-1	2	5	10	94	
*503A	S2-P-18			3	64	10	94	
*504A	S2-MC-23			1	7	10	94	
*505A	S2-MC-29			4	8	10	94	

*Standards for Projects Nos. 3, 4 and 7.

L. I. A. PROJECT NO. 10Painting DiagramGalvanized Iron

6"	6"
6 2 Primer 1 Top Coat	3 1 Primer 1 Top Coat
5 2 Primer	2 1 Primer
4 Chemical Treat. 2 Primer	1 Chemical Treat. 1 Primer
	6"

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
CALVAUTZED IRONPage No. 1

Project No. 10
 Date Exposed 6/25/46
 Date Inspected 3/18/48
 Elapsed Time 21 months

Panel No.	Paint No.	How		Peeling	Comments
		P.	V.		
1622-1	164	88	85	10	Unweathered - Lithoform
1623-1	.	.	.	10	
1623-2	.	.	.	6	
1623-3	.	.	.	10	Lithoform
1623-4	.	.	.	10	
1623-5	.	.	.	10	
1623-6	.	.	.	3	
1623-7	.	.	.	10	Unweathered - Copper Sulfate
1623-8	.	.	.	10	
1623-9	.	.	.	9	
1623-10	.	.	.	10	Copper Sulfate
1623-11	.	.	.	10	
1623-12	.	.	.	10	
1623-13	.	.	.	10	Weathered 6 No. - Lithoform
1623-14	.	.	.	10	
1623-15	.	.	.	10	
1623-16	.	.	.	10	Weathered 6 No. - Lithoform
1623-17	.	.	.	10	
1623-18	.	.	.	10	Weathered 9 No. - Lithoform
1623-19	.	.	.	10	
1623-20	.	.	.	10	
1623-21	.	.	.	10	Lithoform
1623-22	.	.	.	10	
1623-23	.	.	.	10	
1623-24	.	.	.	10	
1623-25	.	.	.	10	
1623-26	165	89	86	10	Unweathered - Lithoform
1623-27	.	.	.	10	
1623-28	.	.	.	10	
1623-29	.	.	.	10	
1623-30	.	.	.	10	
1623-31	.	.	.	10	
1623-32	.	.	.	7	
1623-33	.	.	.	10	Unweathered - Copper Sulfate
1623-34	.	.	.	10	
1623-35	.	.	.	10	
1623-36	.	.	.	10	Copper Sulfate
1623-37	.	.	.	10	
1623-38	.	.	.	10	
1623-39	.	.	.	10	Weathered 6 No. - Lithoform
1623-40	.	.	.	10	
1623-41	.	.	.	10	
1623-42	.	.	.	10	Lithoform
1623-43	.	.	.	10	
1623-44	.	.	.	10	
1623-45	.	.	.	10	Weathered 6 No. - Copper Sulfate
1623-46	.	.	.	10	
1623-47	.	.	.	10	
1623-48	.	.	.	10	
1623-49	.	.	.	10	Copper Sulfate
1623-50	.	.	.	10	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
GALVANIZED IRONPage No. 2

Project No. 10
 Date Exposed 6/25/66
 Date Inspected 3/15/68
 Elapsed Time 21 months

Panel No.	Paint No.	How		Peeling	Comments
		P.	V.		
1630-1	165	89	86	10	Weathered 9 No. - Lithoform
1630-2	"	"	"	10	
1630-3	"	"	"	10	
1630-4	"	"	"	10	Lithoform
1630-5	"	"	"	10	
1630-6	"	"	"	10	
1631-1	"	"	"	10	Weathered 9 No. - Copper Sulfate
1631-2	"	"	"	10	
1631-3	"	"	"	10	
1631-4	"	"	"	10	Copper Sulfate
1631-5	"	"	"	10	
1631-6	"	"	"	10	
1632-1	166	16	8	10	Unweathered - Lithoform
1632-2	"	"	"	10	
1632-3	"	"	"	10	
1632-4	"	"	"	10	Lithoform
1632-5	"	"	"	10	
1632-6	"	"	"	10	
1633-1	"	"	"	10	Unweathered - Copper Sulfate
1633-2	"	"	"	10	
1633-3	"	"	"	10	
1633-4	"	"	"	10	Copper Sulfate
1633-5	"	"	"	10	
1633-6	"	"	"	8	
1634-1	"	"	"	10	Weathered 9 No. - Lithoform
1634-2	"	"	"	10	
1634-3	"	"	"	10	
1634-4	"	"	"	10	Lithoform
1634-5	"	"	"	10	
1634-6	"	"	"	10	
1635-1	167	16	8	10	Unweathered - Lithoform
1635-2	"	"	"	10	
1635-3	"	"	"	7	
1635-4	"	"	"	10	Lithoform
1635-5	"	"	"	8	
1636-1	"	"	"	10	Unweathered - Copper Sulfate
1636-2	"	"	"	10	
1636-3	"	"	"	9	
1636-4	"	"	"	9	Copper Sulfate
1636-5	"	"	"	9	
1637-1	"	"	"	10	Weathered 6 No. - Lithoform
1637-2	"	"	"	10	
1637-3	"	"	"	10	
1637-4	"	"	"	10	
1637-5	"	"	"	10	Lithoform
1637-6	"	"	"	9	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
GALVANIZED IRONPage No. 1

Project No. 10
 Date Exposed 6/25/66
 Date Inspected 3/18/68
 Elapsed Time 21 months

Panel No.	Paint No.	How		Peeling	Comments
		P.	V.		
1638-1	167	16	4	10	Weathered 9 Mo. - Lithoform
1638-2	"	"	"	10	"
1638-3	"	"	"	10	"
1638-4	"	"	"	10	Weathered 9 Mo. - Lithoform
1638-5	"	"	"	10	"
1638-6	"	"	"	10	"
1639-1	168	90	4	10	Unweathered - Lithoform
1639-2	"	"	"	10	"
1639-3	"	"	"	0	Lithoform
1639-4	"	"	"	10	"
1640-1	"	"	"	2	Unweathered - Copper Sulfate
1640-2	"	"	"	10	"
1640-3	"	"	"	1	Copper Sulfate
1640-4	"	"	"	10	"
1641-1	"	"	"	1	Weathered 6 Mo. - Lithoform
1641-2	"	"	"	10	"
1641-3	"	"	"	10	Lithoform
1641-4	"	"	"	10	"
1641-5	"	"	"	10	"
1642-1	"	"	"	10	Weathered 6 Mo. - Copper Sulfate
1642-2	"	"	"	10	"
1642-3	"	"	"	10	Copper Sulfate
1642-4	"	"	"	10	"
1642-5	"	"	"	10	"
1643-1	"	"	"	10	Weathered 9 Mo. - Lithoform
1643-2	"	"	"	10	"
1643-3	"	"	"	10	Lithoform
1643-4	"	"	"	10	"
1643-5	"	"	"	10	"
1644-1	"	"	"	10	Weathered 9 Mo. - Copper Sulfate
1644-2	"	"	"	10	"
1644-3	"	"	"	10	Copper Sulfate
1644-4	"	"	"	10	"
1644-5	"	"	"	10	"
1645-1	170	92	88	10	Unweathered - Lithoform
1645-2	"	"	"	10	"
1645-3	"	"	"	10	"
1645-4	"	"	"	10	Lithoform
1645-5	"	"	"	10	"

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
GALVANIZED IRONPage No. 4

Project No. 10
 Date Exposed 6/25/66
 Date Inspected 3/19/68
 Elapsed Time 21 months

Panel No.	Paint No.	How		Peeling	Comments
P.	V.				
1646-1	170	92	88	10	Unweathered - Copper Sulfate
2	.	.	.	10	
3	.	.	.	10	
4	.	.	.	10	Copper Sulfate
5	.	.	.	10	
6	.	.	.	10	
1647-1	.	.	.	10	Weathered 6 Mo. - Lithoform
2	.	.	.	10	
3	.	.	.	10	
4	.	.	.	10	Lithoform
5	.	.	.	10	
6	.	.	.	10	
1648-1	.	.	.	10	Weathered 9 Mo. - Lithoform
2	.	.	.	10	
3	.	.	.	10	
4	.	.	.	10	Lithoform
5	.	.	.	10	
6	.	.	.	10	
1649-1	171	92	172	10	Unweathered - Lithoform
2	.	.	.	10	
3	.	.	.	10	
4	.	.	.	10	Lithoform
5	.	.	.	10	
6	.	.	.	10	
1650-1	.	.	.	10	Unweathered - Copper Sulfate
2	.	.	.	10	
3	.	.	.	10	
4	.	.	.	10	Copper Sulfate
5	.	.	.	10	
6	.	.	.	10	
1651-1	.	.	.	10	Weathered 6 Mo. - Lithoform
2	.	.	.	10	
3	.	.	.	10	
4	.	.	.	10	Lithoform
5	.	.	.	10	
6	.	.	.	10	
1652-1	.	.	.	10	Weathered 9 Mo. - Lithoform
2	.	.	.	10	
3	.	.	.	10	
4	.	.	.	10	Lithoform
5	.	.	.	10	
6	.	.	.	10	
1653-1	272	138	173	10	Unweathered - Lithoform
2	.	.	.	10	
3	.	.	.	10	
4	.	.	.	10	Lithoform
5	.	.	.	10	
6	.	.	.	10	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
GALVANIZED IRONPage No. 5

Project No. 10
 Date Exposed 6/25/46
 Date Inspected 3/15/48
 Elapsed Time 21 months

Panel No.	Paint No.	How		Peeling	Comments
		P.	V.		
1654-1	272	138	173	10	Unweathered - Copper Sulfate
1654-2	.	.	.	10	
1654-3	.	.	.	10	
1654-4	.	.	.	10	Copper Sulfate
1654-5	.	.	.	10	
1654-6	.	.	.	10	
1655-1	.	.	.	10	Weathered 6 No. - Lithoform
1655-2	.	.	.	10	
1655-3	.	.	.	10	
1655-4	.	.	.	10	Lithoform
1655-5	.	.	.	10	
1655-6	.	.	.	10	
1656-1	.	.	.	10	Weathered 9 No. - Lithoform
1656-2	.	.	.	10	
1656-3	.	.	.	10	
1656-4	.	.	.	10	Lithoform
1656-5	.	.	.	10	
1656-6	.	.	.	10	
1657-1	273	139	174	10	Unweathered - Lithoform
1657-2	.	.	.	10	
1657-3	.	.	.	10	
1657-4	.	.	.	10	Lithoform
1657-5	.	.	.	10	
1657-6	.	.	.	10	
1658-1	.	.	.	10	Unweathered - Copper Sulfate
1658-2	.	.	.	10	
1658-3	.	.	.	10	
1658-4	.	.	.	10	Copper Sulfate
1658-5	.	.	.	10	
1658-6	.	.	.	10	
1659-1	.	.	.	10	Weathered 6 No. - Lithoform
1659-2	.	.	.	10	
1659-3	.	.	.	10	
1659-4	.	.	.	10	Lithoform
1659-5	.	.	.	10	
1659-6	.	.	.	10	
1660-1	.	.	.	10	Weathered 6 No. - Copper Sulfate
1660-2	.	.	.	10	
1660-3	.	.	.	10	
1660-4	.	.	.	10	Copper Sulfate
1660-5	.	.	.	10	
1660-6	.	.	.	10	
1661-1	.	.	.	10	Weathered 9 No. - Lithoform
1661-2	.	.	.	10	
1661-3	.	.	.	10	
1661-4	.	.	.	10	Lithoform
1661-5	.	.	.	10	
1661-6	.	.	.	10	

INSPECTION RECORD - ATMOSPHERIC EXPOSURE
GALVANIZED IRON

Project No. 10
 Date Exposed 6/25/46
 Date Inspected 3/18/48
 Elapsed Time 21 Months

Panel No.	Paint No.	New		Peeling	Comments
P.	V.				
1662-1	273	139	174	10	Weathered 9 Mo. - Copper Sulfate
	.	.	.	10	
	.	.	.	10	
	.	.	.	10	Copper Sulfate
	.	.	.	10	
	.	.	.	10	
1663-1	274	140	175	10	Unweathered - Lithoform
	.	.	.	10	
	.	.	.	10	Lithoform
	.	.	.	10	
	.	.	.	10	
1664-1	.	.	.	10	Unweathered - Copper Sulfate
	.	.	.	10	
	.	.	.	10	Copper Sulfate
	.	.	.	10	
	.	.	.	10	
1665-1	.	.	.	10	Weathered 6 Mo. - Lithoform
	.	.	.	10	
	.	.	.	10	Lithoform
	.	.	.	10	
	.	.	.	10	
1666-1	.	.	.	10	Weathered 9 Mo. - Lithoform
	.	.	.	10	
	.	.	.	10	Lithoform
	.	.	.	10	
	.	.	.	10	
1667-1	Class XIII	QOML	.	10	Unweathered - Lithoform
	.	.	.	10	
	.	.	.	10	Lithoform
	.	.	.	10	
	.	.	.	10	
1668-1	.	.	.	10	Unweathered - Lithoform
	.	.	.	10	
	.	.	.	10	Lithoform
	.	.	.	10	
	.	.	.	10	

*Pig: R.L. 56.5, Mg. 811. 23.4, Fe₂O₃ 1.3, Zn. Yellow 9.9, Mica 8.6,
 Al. Stear. 0.3

Veh: 24.5 G.E. 2529
 36.4 G.E. 2454
 16.8 33 gal. Tang BR1329 Var.
 22.3 Thinner & Driers.