

LEAD INDUSTRIES ASSOCIATION

480 LEXINGTON AVENUE

NEW YORK 17, N. Y.

RED LEAD DIVISION

CONFIDENTIAL - FOR COMMITTEE USE ONLYSUBJECT TO REVISIONRED LEAD TECHNICAL COMMITTEE

New York, N. Y.

December 7, 1944

A meeting of the members of the Red Lead Technical Committee of the Lead Industries Association was held in the Association's office on Thursday, December 7, 1944. The following were present:

Committee

A.C. Coats
O.P. Shobe
J.O. Johnston
G. Diehlman
A.J. Riekhoff

Representing

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

F.E. Hornsner Secretary

L.L. Carriak, Director of Red Lead Research

The meeting was called to order at 10:00 A.M. with Dr. Carriak presiding.

SURFACE TREATMENT & PRIMER PAINTS DESIGNED FOR USE ON GALVANIZED IRONLocation of Tests

Spangled galvanized iron panels were secured from one source and distributed to:

Eagle-Picher Lead Co.
Glidden Company
National Lead Co.

Joplin, Mo.
Cleveland, Ohio
New York

for test in each of their laboratories.

Application

The paint system under test is to be applied to each side of the panel. Two panels for each primer and top coat system are to be exposed as follows:

The paint system for one panel consists of one coat of primer followed by one coat of aluminum top coats



Red Lead Technical Committee -2-
Meeting Minutes

December 7, 1944

The paint system for the second panel consists of two coats of primer followed by one coat of aluminum top coat.

Method of Exposure

The panels are to be exposed to the atmosphere at a 45° angle to the horizontal facing due south.

The inspection should be at regular intervals.

The first inspection should be 30 days after exposure. Subsequent inspections should be at 6 month intervals or oftener if the extent of failure warrants more frequent inspection.

Surface Treatment

The following types of surfaces are to constitute the base for each paint test system:

1. Allow the galvanized panel to weather three months before application of the test paint system.
2. Allow the galvanized paint to weather six months before application of the test paint system.
3. Wash the panel with mineral spirits and apply the paint test system at once.
4. Treat the surface with Lithoform, a proprietary solution sold by the American Chemical Paint Co., Ambler, Pa., for treating zinc and cadmium surfaces to insure adhesion of paint. Apply as recommended by the manufacturer.
5. Treat the surface with a common etching solution of copper sulfate (3 oz. per gal. of water). (The National Bureau of Standards NBS page 6 employed 8 ounces per gal.)
6. Treat the surface with _____, a proprietary solution sold by the _____ for testing zinc surfaces.

Primer Formulations

1. Red Lead-Linseed oil conforming to TT-P-88, Sept. 9, 1939.
2. Red Lead-Linseed oil conforming to TT-P-88, Amend. 1, Dec. 1, 1943.
3. Pigment J (New L.I.A. No. P-16) in Vehicle 4 (New L.I.A. V-4) PV = 23
4. Pigment J (New L.I.A. No. P-16) in Vehicle 6 (New L.I.A. V-4) PV = 23
5. Pigmentation
 40% Red Lead, 97% grade
 40% Iron Oxide, CEN #872
 10% Diatomaceous silica
 Vehicle 6 (New L.I.A. V-4), PV = 43

Red Lead Technical Committee
Meeting Minutes

December 7, 1944

6. Red Lead-Zinc Dust — submitted by Mr. George Dickman in his letter of Jan. 4, 1948, as follows:

The Red Lead-Zinc Dust paint primer which we used for steel surfaces had the following composition:

81.7% Pigment	18.3% Vehicle
71.7% Zinc Dust	100% Maktite Varnish XV10348
28.3% Red Lead (97% grade)	
PV — 80.8%	
Wt./gal — 27.8 lbs.	

7. Federal Specification TT-P-641, April 20, 1939, Type I vehicle, a Zinc Dust-Zinc Oxide-Linseed oil specification.

8. New Jersey Zinc Company's Galvanized Iron Primer as submitted by Mr. O.F. Shobe in his letter of Dec. 19, 1944, as follows:

The New Jersey Zinc Company's formula for Galvanized Iron Primer is their paint "D", composed of 84% pigment and 16% vehicle. The pigment analysis is

IX-80 Zinc Oxide	80%
Iron Oxide	18%
Zinc Dust	2%

The vehicle analysis is

Glyptal #2468 solution	84.34%
Mineral spirits	12.20%
Rosin Manganese (4% Mn)	0.7%

Weight per gallon — 16.7 lbs.

Solids in paint by volume — 52.2%

Volatile in paint by weight — 19.4%

Pigment to non-volatile vehicle by volume — 60.8%

Pigment to non-volatile vehicle by weight — 61.2%

This material is reported to have been reduced for spraying and brushing with 23 parts of paint and 7 parts of thinner by weight. I presume the thinner was Mineral Spirits or V.M. & P. Naphtha. The material is used full body for roller coating applications.

Top Coat

Aluminum Paint

Pigmentation, conforming to TT-4468, Type I, March 6, 1943.

Vehicle, conforming to TT-V-61, Type I, Oct. 2, 1939, Amend. 2, Sept. 16, 1943.

Red Lead Technical Committee
Meeting Minutes

December 1, 1944

MISSISSIPPI RIVER VALLEY DAM PRIMER PROJECT

It was decided to submit to Mr. Sol Glasser, Prin. Eng., Upper Mississippi Valley Authority, some of the better red lead-multiple pigment formulations which have shown promise on our Sayville test, and which were submitted for test on the Montgomery Dam Gates Ohio River Test project.

The formulations recommended are:

1. Pigmentation J (L.I.A. P-16) in vehicle 18 (L.I.A. V-18) as used in old L.I.A. primer 6 (New L.I.A. No. 35).
2. Pigmentation J (L.I.A. P-16) in vehicle TT-V-51, Dec. 1933.
3. The formulations submitted to the Montgomery Dam project, Mr. Diehlman's letter, Jan. 4, 1944, are as follows:

"Red Lead Primer M3388"

70.48% Pigment	29.52% Vehicle
91.7% Red Lead (97% grade)	91.4% Bakelite Varnish XV10248
8.0% Cellite #431	8.0% Hi Flash Naphtha
.5% Aluminum stearate	
PV -- 40.0%	
Wt/Gal -- 19.4%	

"Red Lead-Zinc Yellow Primer - M3387"

This conforms with Lead Manufacturers Association Primer No. 40.

"White Lead Finish Coat Paint - M331A"

87.4% Pigment	12.6% Vehicle
84.3% Basic Carbonate White Lead	87.4% Bakelite Varnish XV10248
14.9% Zinc Oxide	17.6% Thinner
.5% Aluminum Stearate	
.5% New Sienna	
Wt/gal -- 17.8 lbs.	

LOW-COST MULTIPLE RED LEAD PIGMENTATION FOR
U.S. MARINE COMMISSION

These low-cost multiple red lead primers were placed on test, August 6, 1944, at the North Florida Test Service, Daytona Beach, Fla. The material cost of these paints ranged from \$1.10 to \$1.25 per gallon.

These primers have been on test for five (5) months.

These tests will be discussed at our regular Technical Committee meeting in January. The complete data to date in so far as available is attached as Exhibit A.

Red Lead Technical Committee
Meeting Minutes

-6-

December 7, 1944

OIL STORAGE TANK PAINTS

Paints have been formulated for this test. The location of a suitable test tank is still under consideration. Mr. O.F. Shobe will try and arrange for a test location near Cleveland or Chicago.

PRIMER RECOMMENDATION TO BUREAU OF SHIPS

The Bureau of Ships is inaugurating a practical primer test program. It is to be conducted upon 8 ships in the Atlantic Ocean and 8 ships in the Pacific Ocean.

The tests are to be inspected periodically. The Bureau of Ships is to have full control of the repainting of these ships.

The Lead Industries Association was to have submitted two primers for the test.

As a standard of comparison of the drying time Navy red lead formulation No. 1, 100% red lead dispersed in linseed oil, is to be the standard of comparison. If sufficient time is not allowed for the drying of Navy No. 1 then it should not be used at all.

The multiple red lead low cost pigmentation recommended are:

1. Pigmentation J (L.I.A. P-16) dispersed in Vehicle 20 (L.I.A. V-26). This is old L.I.A. primer No. 4 (Now L.I.A. No. 33). It was rated first after 15 months exposure at Bayville, L.I.

2. This is L.I.A. primer No. 111 which is Pigmentation P-79 in Vehicle V-69. This is a low cost primer formulation which is better than the standards after 4 months exposure at the North Florida Test Service.

This program was shelved in accordance with my letter of December 22, 1944, to each member of the Technical Committee.

The meeting adjourned at 8:00 P.M.

L. L. Carrick

L. L. Carrick

SUMMARY OF LOW-COST MULTIPLE RED LEAD PRIMERS TO DATE

EXHIBIT A

The statements below are subject to change upon completion of the exposure.

At the present, we find for Tide-Range exposures the following:

Panel No. 4, L.I.A. Paint No. 111, which is a red lead multiple pigmentation in a phthalic anhydride vehicle conforming to that used by the U.S.M.C. in their zinc chromate primer SZ-MC-29, Sept. 21, 1943, is the most outstanding low-cost primer of this series. This primer has a better exposure record than the following standards:

1. Panel No. 11 - Zinc Chromate Primer UMC SZ-MC-29, Sept. 21, 1943.
2. Panel No. 12 - Red Lead Primer UMC SZ-MC-23, Aug. 28, 1943, and
3. Panel No. 13 - Zinc Chromate Primer, Navy SZ-P-18, Oct. 15, 1943.

The formulation of this paint is as follows:

PIGMENTATION

Red Lead	80%
Zinc Chromate	10%
Iron Oxide	5%
Magnesium Silicate	2%
Mica	10%

VEHICLE

An alkyl Resin Solution (SZ-MC-29)	72.4%
Mineral Spirits	20.5%
Hi-Flash Naphtha	6.0%
Cobalt Naphthenate	.5%

The material cost per gallon is \$1.22.

Panel No. 5, L.I.A. Paint No. 108, which is a red lead multiple pigmentation in a vehicle of dehydrated castor oil, cottonseed oil, containing SZ2943, is the close second to Panel No. 4, L.I.A. Paint No. 111.

The formulation of this paint is as follows:

PIGMENTATION

Red Lead	80%
Zinc Chromate	10%
Iron Oxide	10%
Magnesium Silicate	5%
Diatomaceous Silica	10%

VEHICLE

Dehydrated Castor Oil	50.7%
Cottonseed Oil	3.3%
Ethylate Resin SZ2943	18.9%
Mineral Spirits	40.5%
Hi-Flash Naphtha	4.8%
Dipentene	8.3%
Naphthenate	1.0%

The material cost per gallon is \$1.21.

For Total Submersion in salt water the five month exposure of the red lead multiple pigmentation, old L.I.A. No. 5 in Vehicle No. 13 (old No. 1) is the most outstanding formulation. It is outstanding and superior to any of the standards or to any of the other low-cost multiple pigmentations considered.

EXHIBIT ADETAILED REPORTLOW-COST MULTIPLE RED LEAD PIGMENTATION PRIMERSUNITED STATES MARITIME COMMISSIONPURPOSE

These low material cost red lead multiple pigmentation primers were developed to meet a low material cost range of \$1.10 to \$1.24 per gallon. This cost range will compete with the present Navy 52-P-18 and the U.S.M.C. 52-MC-29, Zinc Chromate primers.

INTRODUCTION

Ten low material cost red lead multiple pigmentation primers and five standard primers were prepared and placed on total submersion in sea water and tide-range exposure at the North Florida Test Service, Daytona Beach, Fla.

Three primer paints 48-B-1, 48-B-1 and 80-B-1 were prepared by the Eagle-Picher Lead Co.

Three primer paints, M3226, M3228, and M3227 were prepared by the National Lead Co.

Four primer paints, GL51076, GL51077, GL51078 and GL51079 were prepared by the Glidden Co.

Five primer paints were used as standards of comparison. They are --

GL50641 (U.S.M.C. 52-MC-29), Sept. 21, 1943
M-2566 (U.S.M.C. 52-MC-23), August 28, 1943
GL44-Y-79 (Navy 52-P-18), October 13, 1943
L.I.A. No. 1 (New No. 20)
L.I.A. No. 6 (New No. 23)

PREPARATION OF TEST PANELSPanels

The panels were 14 gauge, hot rolled steel, 6" by 12".

Paint Systems

Tide-Range -- each panel received two coats of the primer and one top coat of U.S.M.C. low visibility gray (52-M-6), March 9, 1945.

Total Submersion -- each panel received two coats of the primer and one coat of U.S.M.C. anti-fouling paint MC-52-B-1 Class II, August 28, 1943.

EXHIBIT A

FORMULATIONS

THE EAGLE-PICTER LEAD COMPANY

The Composition Data - Pounds Required for 100 Gallons of Paint

Leads Designation	108	109	110
Paint No.	P-72	P-73	P-74
Pigmentation Mtd	V-43	V-43	V-43
Vehicle No.			
Manufacturer's No.	E-P 80-B-1	E-P 45-B-1	E-P 45-B-1
	Lbs. Percent	Lbs. Percent	Lbs. Percent
Red Lead (97% grade)	877.08 50%	837.37 50%	853.82 50%
Zinc Chromate (KC-2810)	75.42 10%		
Zinc Oxide (52-MC-8)	75.42 10%	119.89 14%	75.76 10%
Iron Oxide (MC-469)			75.76 10%
Magnesium Silicate (3x)	180.43 20%	180.73 20%	183.33 20%
Discontinuous Silicate (Dicalite L)	75.42 10%	75.87 10%	75.76 10%
Total Pigment	754.17 100%	796.87 100%	787.83 100%
Dehydrated Castor Oil (Isoline)	194.22 22.7%	194.92 24.7%	194.80 22.7%
Oiticila Oil	20.23 2.36%	20.23 2.36%	20.23 2.36%
Makelite BR2968	83.72 13.92%	83.73 13.92%	83.71 13.92%
Mineral Spirits	240.71 40.00%	240.73 40.00%	240.70 40.00%
Hi Flash Naphtha	27.00 4.52%	27.00 4.52%	27.00 4.52%
Dipentene	20.30 3.37%	20.30 3.37%	20.30 3.37%
Pb Naphthenate-34%	8.43 .90%	8.43 .90%	8.43 .90%
Mn Naphthenate-6%	3.62 .00%	3.62 .00%	3.62 .00%
Ce Naphthenate-4%	1.81 .50%	1.81 .50%	1.81 .50%
Total Vehicle	601.74 100%	601.77 100%	601.70 100%
Total Pig. & Vehicle	1355.91	1400.64	1389.54
Raw Material Cost/Gallon	\$1.21	\$1.19	\$1.18
Wt/Gallon	13.56 lbs.	14.00 lbs.	13.89 lbs.
TV	20%	20%	20%
% Pigment	55.82	57.08	56.08
% Vehicle	44.18	42.92	43.92

EXHIBIT A

NATIONAL LEAD COMPANY

The Composition Data - Pounds Required for 100 Gallons of Paint

Label Designation Paint No. Pigmentation No. Vehicle No. Manufacturer's No.	111 P-79 V-60 M-3225	112 P-79 V-60 M-3226	113 P-80 V-60 M-3227
	Lbs. Percent	Lbs. Percent	Lbs. Percent
Red Lead (97% grade)	417. 55%	434. 56%	434. 56.0%
Zinc Chromate (HC2618A)	78. 10%	79. 10%	79. 10.5%
Indian Red (CK No. 8098)	15. 2%	16. 2%	16. 2.5%
Magnesium Silicate	178. 23%	182. 23%	182. 23.0%
Diatomaceous Silica	-- --	-- --	84. 7.8%
Mica (325 mesh)	78. 10%	78. 10%	-- --
Totals	758. 100.0%	780. 100.0%	767. 100%
Alkyd resin (82-MC-21)	445. 72.4	-- --	-- --
Linseed oil (22 viscosity)	-- --	147. 28%	147. 28%
Varnish: LV-297	-- --	278. 47.4%	278. 47.4%
Mineral Spirits	128.0 20.8%	114. 19.4%	108.0 17.8%
High Flash Naphtha	42.0 6.3%	44. 7.6%	52.0 8.9%
Lead Naphthenate (14%)	-- --	3.5 0.6%	3.5 0.6%
Cobalt Naphthenate (4%)	1.9. .3%	1.0 0.2%	1.0 0.2%
	100%	100%	100%
Raw Material Cost Per Gal:	\$1.28	\$1.17	\$1.14
Wt/Gal:	12.74 lbs.	13.78	13.87
TV	33.3	34.71	34.71
% Pigment	66.8	67.5	66.8
% Vehicle	44.8	42.9	43.4

EXHIBIT A

Panel designation and details of the weight of paint applied to each square foot of panel surface.

WIDE-RANGE PANELS

Exposure Panel No.	Manufacturers Primer Paint No.	L.I.L. Paint No.	Wt. in Gal. of Base Paint	Wt. in Gal. of 1st coat of Primer	Wt. in Gal. of 2nd coat of Primer	Wt. in Gal. of 52-MC-8
1	48-B-1	110	998	13.0	17.0	7.0
2	49-B-1	109	985	11.0	12.0	7.0
3	50-B-1	108	986	12.8	12.8	7.0
4	M-3228	111	981	12.8	9.8	7.0
5	M-3228	112	988	15.0	15.0	7.0
6	M-3227	113	988	12.8	11.0	7.0
7	GLS1078	108	989	10.8	8.0	7.0
8	GLS1077	104	1008	9.0	8.8	7.0
9	GLS1078	108	988	8.0	8.0	7.0
10	GLS1079	108	1025	8.8	7.0	7.0
11	GL-50641	52-MC-29	998	8.8	8.0	7.0
12	M-2508	52-MC-13	980	18.0	14	7.0
13	GL-44-Y-79	52-P-1C	988	9.8	7.8	7.0
14	L.I.L. No. 1 (old No)	5C (new No)	997	7.8	6.0	7.0
15	(L.I.L. No. 8 (old No) M-5108	53 (new No)	978	17.0	18	7.0

Date applied

July 27, 1944 July 31, 1944 July 31, 1944

NOTE: This is essentially old L.I.L. Primer No. 8 except some 52-Flash Naphtin was added to improve the painting characteristics.

TOTAL-DIMENSION PANELS

Exposure Panel No.	Manufacturers Primer Paint No.	L.I.L. Paint No.	Wt. in Gal. of Base Paint	Wt. in Gal. of 1st coat of Primer	Wt. in Gal. of 2nd coat of Primer	Wt. in Gal. of 52-MC-8
16	48-B-1	110	998	13.0	17.0	8.0
17	49-B-1	109	970	11.0	12.0	8.0
18	50-B-1	108	986	12.8	12.8	8.0
19	M-3228	111	982	12.8	9.8	8.0
20	M-3228	112	987	15.0	15.0	8.0
21	M-3227	113	981	12.8	11.0	8.0
22	GLS1078	108	990	10.8	8.0	8.0
23	GLS1077	104	981	9.0	8.8	8.0
24	GLS1078	108	980	8.0	8.0	8.0
25	GLS1079	108	986	8.8	7.0	8.0
26	GL50641	52-MC-29	974	8.8	8.0	8.0
27	M-2508	52-MC-13	985	18.0	14.0	8.0
28	GL-44-Y-79	52-P-1B	992	9.8	7.8	8.0
29	L.I.L. No. 1 (old No)	5C (new No)	1008	7.8	6.0	8.0
30	(L.I.L. No. 8 (old No) M-5108	53 (new No)	982	17.0	18.0	8.0

Date applied

July 27, 1944 July 31, 1944 July 31, 1944

See NOTE under WIDE-RANGE PANELS.

EXHIBIT A

The standard primers included with these tests have an approximate raw material cost per gallon as follows:

Designation of Standard	Raw Material Cost/Gal.
62-P-18	\$1.30
62-MC-28	1.24
62-MC-23	1.68
L.I.L. No. 1 (New No. 30)	1.60 (or over)
L.I.L. No. 6 (New No. 36)	1.58
EXPOSURE	

The panels for tide-range and total submersion in salt water were placed on exposure August 6, 1944, at the North Florida Test Service, Daytona Beach, Florida. Inspection of the Panels by the Test Service were made on the 6th of each succeeding month of exposure. The inspection by months are attached.

CODE WAFER 9-2
DATE PLACED ON TEST 8/6/44
DATE THIS INSPECTION 9/4/44

NORTH FLORIDA TEST SERVICE
DAYTONA BEACH, FLA.

		TIDE-RANGE					AVERAGE WATER TEMP. F. 70°					
PANEL NO.	PAINT NO.	PEELING					EROD-ING or		CHLOR-IDE	CHLOR-IDE	% AREA	
		SCUM	BLISTERING	Inter- To	Corrosion	CHLOR-IDE	ING	ING			Topcoat	Primer
		SILI	Edge	Wet. Dis	coat Metal	EDGE	Wet.	Wet.				
1	EP48-B-1	10	8	10	P	10	8	10	10	10	99	99
2	EP42-B-1	10	8	9P	P-1/2	10	8	10	10	10	98	98
3	EP50-B-1	10	7	10	P-1/16	10	8	9/	10	10	98	98
4	M-3225	10	9	10	P	10	9/	10	10	10	100	100
5	M-3226	10	9	10	P-1/4	10	10	9/	10	10	99	99
6	M-3227	10	8	10	"	edge	8	10	10	10	97	97
7	GL51078	10	8	9P	P-1/8	10	8	10	10	10	94	94
8	GL51077	10	8	9P	P-1/2	10	8	10	10	10	100	100
9	GL51078	10	8	9P	P-1/2	10	8	10	10	10	98	98
10	GL51079	10	8	9P	P-1/4	10	8	10	10	10	98	98
11	GL5041	10	7	9	P-1/16	10	8	10	10	10	100	100
12	M-3544	10	8	10	"	10	9/	9/	10	10	99	99
13	GL44778 (52-P-18)	10	10	10	"	10	9/	10	10	10	100	100
14	LIA #1 (old No.)	10	8	8	P-1/2	10	7	8	10	10	94	94
15	M-3102 (LIA 6)	10	9	10	P	10	9/	10	10	10	100	100
	Mi-Flash Naphtol											

NOTES: #2, 7, 8, 9, 10-Blistering is working in from edges.

#3 - Beginning to lose adhesion along edge near bottom.

#6 - Beginning to lose adhesion along edge near bottom and peel here.

#12 - Corrosion breaking through on face around heavy particles of pigment.

#14 - Losing adhesion along edges. Blistering working in from edges. Pinpoint corrosion breaking through coating.

CODE NUMBER 9-2
DATE PLACED ON TEST 8/6/44
DATE OF THIS INSPECTION 10/6/44

NORTH FLORIDA TEST SERVICE
DAYTONA BEACH, FLA.

TIDE-RANGE

AVERAGE WATER TEMP. F. 85°

PANEL NO.	PANEL SIZE	MOLASSES	ALGAE	BLISTERING	Inter- To coat Metal	CORROSION	CHECK-CHALK-CHECK-Top	% AREA COATING INTACT
10	9 to 1/8	10	9	9	10	7	10	98
20	9	10	9	9	10	6	10	97
30	9	10	9	9	10	7	9	97
4	9	10	9	9	10	9	10	98
5	9	10	9	9	10	8	9	97
6	9	10	9	9	10	8	10	96
70	9	10	9	9	10	8	10	97
80	9	10	9	9	10	7	9	96
9	9	10	9	9	10	8	10	96
100	9	10	9	9	10	8	10	95
110	9	10	9	9	10	8	9	95
12	9	10	9	9	10	7	9	97
130	9	10	9	9	10	7	10	99
140	9	10	9	9	10	8	9	90
15	9	10	9	9	10	8	10	99

- NOTES: #1, 2, 3 - Blistering working in from edge.
#7 - Coating losing adhesion for about 1" in from one edge.
#8 - Sealing working in from edge.
#10 - Blistering working in from edge.
#11 - Blistering working in from edge. May be losing adhesion along lower edge of panel.
#13 - Blistering working in from edge.
#14 - Blistering and sealing working in from edges. Coating losing adhesion. Corrosion breaking through blisters on face.

CODE NUMBER 9-3
DATE PLACED ON TEST 2/6/44
DATE OF THIS INSPECTION 11/6/44

NORTH FLORIDA TEST SERVICE
DAVISON BEACH, FLA.

TIDE-LOGS

AVERAGE WATER TEMP. F. 72.8

PANEL NO.	P. H. H. C. L. E. S.	MOLLUSKS	ALGAE	BLISTERING		SCALING		CORROSION	CHECK-ING OR	S. L. E. L.	
				Green	Scud	Edge	Con.			CHALK-ING	CRACK-ING
10	1/2	10	6	7	6	7	10	10	10	10	10
1	8	10	6	7	6	7	10	10	10	10	10
2	8	10	6	7	6	7	10	10	10	10	10
3	8	10	6	7	6	7	10	10	10	10	10
4	8	10	6	7	6	7	10	10	10	10	10
5	8	10	6	7	6	7	10	10	10	10	10
6	8	10	6	7	6	7	10	10	10	10	10
7	8	10	6	7	6	7	10	10	10	10	10
8	8	10	6	7	6	7	10	10	10	10	10
9	8	10	6	7	6	7	10	10	10	10	10
10	8	10	6	7	6	7	10	10	10	10	10
11	8	10	6	7	6	7	10	10	10	10	10
12	8	10	6	7	6	7	10	10	10	10	10
13	8	10	6	7	6	7	10	10	10	10	10
14	8	10	6	7	6	7	10	10	10	10	10
15	8	10	6	7	6	7	10	10	10	10	10

NOTES: GENERAL NOTE: Generally, faces and backs of these panels show little if any difference in breakdown. Breakdown is more pronounced toward bottom of panels, which are, of course, immersed for longer periods.

#1 - Coating losing adhesion on spot or two near bottom. Blistering and scaling working in from edge.

#7 - Blistering, scaling and corrosion working in from edge.

#10 - Scaling over the lower half of panel.

#12 - Scaling working in from edge along bottom.

#15 - Coating losing adhesion in spots along edge. Scaling working away from these spots.

CODE NUMBER 9-2
 DATE PLACED ON TEST 8/8/44
 DATE OF THE INSPECTION 12/4/44

NORTH FLORIDA TEST SERVICE
 DAYTONA BEACH, FLA.

TIME-RANGE

AVERAGE WATER TEMP. F. 67

PANEL NO.	BARNACLES	MOLLUSKS	ALGAE	SCUM	SILT	BLISTERING	CORROSION	CRACKS	COATING	IMPACT
1	1/8"	10	8	8	8	8	8	8	8	8
2	8	8	8	8	8	8	8	8	8	8
3	7	10	8	7	8	8	8	8	8	8
4	8	8	8	8	8	8	8	8	8	8
5	8	8	8	8	8	8	8	8	8	8
6	8	8	8	8	8	8	8	8	8	8
7	8	8	8	8	8	8	8	8	8	8
8	8	8	8	8	8	8	8	8	8	8
9	8	8	8	8	8	8	8	8	8	8
10	8	8	8	8	8	8	8	8	8	8
11	8	8	8	8	8	8	8	8	8	8
12	8	8	8	8	8	8	8	8	8	8
13	8	8	8	8	8	8	8	8	8	8
14	8	8	8	8	8	8	8	8	8	8
15	8	8	8	8	8	8	8	8	8	8

NOTES: GENERAL NOTE: Fouling is mainly on lower half of panel, which is immersed for longest period.

- #1 - Primer running out slightly along edge. Barnacles causing loss of adhesion along bottom section.
- #2 - Sealing to metal beginning to work in from edges.
- #3 - Barnacles causing some damage to coating along bottom section.
- #4 - Barnacles causing slight damage to coating along bottom section.
- #5 - Barnacles causing loss of adhesion and some peeling along bottom section. Blistering and sealing beginning to work in from edges.
- #6 & #7 - Barnacles causing loss of adhesion and some peeling along bottom section.
- #8 & #9 - Barnacles causing loss of adhesion and some peeling along bottom section. Blistering, sealing and rust working in from edges.
- #10 - Blistering and rust working in from edges and in several spots over panel. Barnacles causing some damage.
- #11 - Blistering is occurring generally over panel. Heaviest sealing occurring over lower half. Barnacles do not appear to be damaging coating.
- #12 - Barnacles causing loss of adhesion and some sealing.
- #13 - Barnacles are under-cutting along edge.
- #14 - Blistering, sealing and corrosion has worked in, leaving only a small section in upper center intact.
- #15 - Coating has lost adhesion for about 1" to 1 1/2" along sides and bottom. Sealing working in from edges. Barnacles causing slight peeling, but mainly where coating had lost adhesion.

CODE NUMBER 9-2
DATE PLACED ON TEST 8/6/44
DATE THIS INSPECTION 1/4/48

NORTH FLORIDA TEST SERVICE
DAYTONA BEACH, FLA.

TIDE-RANGE

AVERAGE WATER TEMP. F. 60°

PANEL NO.	TIDEWATER		MOLLUSKS	ALGAE Green	SCUM BRY	BLISTERING			SCALING & FLAKING		CORROSION		CRACKING	% AREA COATING IN CONTACT	
	HT.	SLID				Edge	Gen.	Side	Inter- coat	To metal	Edge	Gen.		Topcoat	Primer
1*	6	1/8-1/4	10	7	8	4	8	P-1/8	9	9	4	8	7	93	96
2*	6	"	9 1/2	8	8	4	7	"		4Edge	4	8	7	90	90
3	6	"	9 3/8	8	8	8	8	"		SEdge	6	9	10	94	94
4*	6	"	9 1/2	8	8	7	10	"		"	6	10	10	98	98
5*	6	"	9 1/2	8	8	4	8	P-1/8	Pocking	7	4	7	8	80	84
6*	6	"	8 1/2	8	8	4	8	P-1/8	8	7	4	8	7	80	82
7*	6	"	8	8	8	2	8	P-1/8		6	8	8	7	80	80
8*	6	"	10	8	8	-	7	"		4	2	8	7	78	78
9*	6	"	9	8	8	-	7	"		4	2	8	7	78	78
10*	6	"	10	8	8	-	8	"		3	3	4	7	80	80
11	6	"	9	8	8	-	3	P-1/2		1	3	4	8	83	85
12	6	"	9	8	8	8	8	1/8-1/4		8	4	8	9	78	78
13*	8	1/8-1/4	9 1/4-1/2	8	7	-	8	P-1/8		SEdge	6	10	8	96	96
14	-	"	-	-	-	-	-	-		0	1	2	-	8	8
15	6	"	9	8	7	-	9	1/8		8	3	7	10	78	78

- NOTES: #1, #2 - Coating cracking near edges and rust breaking through.
 #4 - One or two bronzes have undercut coating near bottom of panel.
 #5 - Coating scaling to metal on upper section of panel, but is cracking and pooling to primer along lower section, taking part of primer with topcoat. Rust breaking through remaining primer.
 #6 - Upper section of panel in relatively good condition.
 #7, #8, #9 - Flaking and scaling working in from edges and along lower section of panel. Upper section in relatively good condition.
 #10 - Flaking and scaling working in from edges and along lower section of panel.
 #13 - Coating is losing adhesion for about 1/2" along edge.

CODE NUMBER 9-1
DATE PLACED ON TEST 8/6/64
DATE THIS INSPECTION 9/6/64

NORTH FLORIDA TEST SERVICE
DAYTONA BEACH, FLA.

TOTAL SUBMERSION

AVERAGE WATER TEMP. F. 79

PANEL NO.	PAINT NO.		SCUM	BLISTERING			FADING		CORROSION	CRACK-CHALKING		CRACK-ING	% AREA COATING INTACT	
				SILT	Edge	Center	Inter-coat	To Metal		Edge	Web	ING	Topcoat	Primer
16	KP48-B-1	10	0	0	0	0	10	10	10	10	0	10	100	100
17	KP49-B-1	Fouling on	0	0	0	0	10	10	10	10	0	10	100	100
18	KP50-B-1	any of these	0	0	0	0	10	10	10	10	0	10	100	100
19	M-3228	Parale	0	0	0	0	10	10	10	10	0	10	99	100
20	M-3228		0	0	0	0	10	10	10	10	0	10	99	100
21	M-3229		0	0	0	0	10	10	10	10	0	10	99	100
22	GL51078		0	0	0	0	10	10	10	10	0	10	99	99
23	GL51079		0	0	0	0	10	10	10	10	0	10	99	99
24	GL51078		0	0	0	0	10	10	10	10	0	10	99	99
25	GL51079		0	0	0	0	10	10	10	10	0	10	99	99
26	GL50641 (GL51079)		0	0	0	0	10	10	10	10	0	10	99	99
27	M-3268 (GL51079)		0	0	0	0	10	10	10	10	0	10	99	100
28	GL44779 (GL51079)		0	0	0	0	10	10	10	10	0	10	99	100
29	LIA #1 (old 100)		0	0	0	0	10	10	10	10	0	10	99	100
30	M-3268 (LIA #1)		0	0	0	0	10	10	10	10	0	10	99	100

- NOTES: #17, 18 - Blistering working in from edges.
 #19 - Chalking to undercoat on blisters.
 #22 - Blistering working in from edges. Losing adhesion along edges.
 #23 - Primer running out through breaks in blisters. Coating losing adhesion over panel.
 #24 - Chalking to undercoat on blisters.
 #25 - Chalking to undercoat on blisters.
 #26 - Chalking to undercoat on blisters.
 #27 - Chalking to undercoat on blisters.
 #28 - Chalking or eroding to undercoat on blisters.
 #29 - Coating losing adhesion and peeling within check lines. Primer washing off where topcoat has peeled.
 #30 - No indication of blistering, but coating may be losing adhesion along edge.

CODE NUMBER 9-1
DATE PLACED ON TEST 8/8/64
DATE OF THIS INSPECTION 10/6/64

NORTH FLORIDA TEST SERVICE
LANTANA BEACH, FLA.

TOTAL SUBMERSION

AVERAGE WATER TEMP. P. 82°

PANEL NO.	BARNACLES	ANNEALING	SCUM	BLISTERING	PEELING	CORROSION	CHECK	ERODING OR	CHALKING	CRACKING	% AREA COATING INTACT	
											Top Coat	Primer
16	9 to 1/8	9/ 1/2	8	3 7 (Coat-P-1/2)	10	9	10	10	8	10	98	99
17	9/ Seed	10	8	2 4	8	9	9	10	8	10	96	97
18	9/ "	10	8	2 4	8	9	9	10	8	10	98	99
19	6 "	10	6	1 6 (Coat-P-3/8)	7 Edge	7	10	10	7	10	96	96
20	9 to 1/8	10	8	3 8 P-3/8 (P)	7	10	9	10	8	7	96	98
21	9 Seed	10	8	3 7 P-1/2	7	10	9	10	8	8	96	99
22	9 to 1/8	10	6	2 4 " P-1/4	8	7	7	10	7	10	96	98
23	9 to 1/4	9/ 1/2	7	4 4 P-1/2	8	7	7	10	4	7	88	88
24	9 to 1/8	10	4	3 4 P-1/2	9	7	8	10	7	10	93	96
25	9 to 1/4	10	4	4 4 P-1	8	8	9	10	8	10	97	97
26	9 "	10	4	0 0 P-1/4	8	8	9	10	7	10	96	97
27	10	10	3	2 2 P-1/2	8	9	8	10	10	7	10	96
28	8 to 1/8	10	4	3 7 P-1/2	7	10	10	10	4	10	90	97
29	8 to 1/4	10	4	7 8 1/8-1/2	6	8	9	2	8	9	94	97
30	9 Seed	10	8	10	8 Edge	10	7	9	10	98	98	98

NOTES: GENERAL NOTES: The rating was 10 for all panels under the following headings: MOLLUSKS, HYDROIDS, BRYOZOA (scorusting and filamentous), and ALGAE (Brown and Green).

Barnacles and annelids tight along edges and on undercut.

#20 - Primer running out slightly.

#22 - Coating seems to have little adhesion.

#25 - 1/4 coating barnacles have undercut along edge.

#28 - Topcoat chalking and eroding to yellow undercoat in spots. Some barnacles dropping off, taking topcoat, and some taking coating to metal.

#29 - Larger barnacles undercutting.

CODE NUMBER 9-1
DATE PLACED ON EXHIBIT 8/6/44
DATE OF THIS INSPECTION 11/6/44

NORTH FLORIDA TEST SERVICE
DAYTON, BEACH, FLA.

TOTAL SUBMERSION

AVERAGE WATER TEMP. F. 72.5

PANEL NO.	BARNACLES		MOLLUSKS		HYDROLYSIS		SILT		BLISTERING		PRELIM		CORROSION		CHECK-CHALK		CRACK-Top		% AREA	
	Fig.	Size	Fig.	Size	Fig.	Size	Fig.	Size	Fig.	Size	Fig.	Size	Fig.	Size	Fig.	Size	Fig.	Size	Fig.	Size
16	9	to 1/8	9/	1/8	9/	1/2	10	8	3	7	1/8-1/2	4	7	9	9	10	7	10	80	86
17	9	"	"	"	9	1	10	7	2	4	"	4	7	8	8	10	7	10	80	93
18	9	to 1/4	"	"	9/	1/2	10	7	2	3	1/8-1	5	4	7	7	10	7	10	78	80
19	8	"	9 1/2-1	9	1/2	1	10	4	1	4	1/8-1/2	3	8	7	10	6	10	70	70	
20	9	to 1/8	10	"	10	"	10	7	3	3	1/8-1/2	2	9	8	10	3	7	10	80	97
21	8	"	9/	1/8	10	"	10	7	3	6	"	2	8	8	8	2	7	10	80	96
22	-	-	-	-	-	-	-	-	-	-	-	-	9	4	4	-	-	-	25	28
23	7	to 1/4	9 1/8-3/8	6	1/2-1	4	10	7	-	-	-	2	8	8	10	4	-	25	28	
24	8	to 1/8	9	1/8	9	"	10	7	3	4	P-1/2	4	8	8	10	4	10	80	80	
25	7	to 1/2	9	"	9	1/4	10	7	4	4	P-1	3	7	7	10	5	10	78	78	
26	8	to 1/4	10	"	9/	1/2	10	7	0	0	P-1/4	3	7	8	10	5	10	70	70	
27	8	"	10	"	10	"	10	8	1	1	1/8-1/4	2	8	7	10	5	10	80	80	
28	7	to 1/8	8 1/8-3/8	9	1/2	1	10	7	3	4	P-1/2	5	8	7	8	10	1	10	80	80
29	8	to 1/2	9	"	8	1/2	10	8	7	5	1/8-1/2	5	8	8	8	2	6	9	80	86
30	8	to 1/4	9	1/8	9	1/4	10	7	8	8	1/8	6	9	10	7	6	10	90	90	

NOTES: GENERAL NOTES: All the panels under ANTIMONY were rated 10 except the following: #17 was rated 9/ with Size 1/8; #19 was rated 9/ with Size 1/2; #23 was rated 9 with Size 1/2-1; #24 was rated 9/ with Size 1/2; #26 was rated 9 with Size 1/2 and #29 was rated 8 with Size 1/2-1. #28 was not rated.

Under HYDROLYSIS all were rated 10 except #23 was rated 9 with Size 1/2; #27 was rated 9/ with Size 1/2; and #28 was rated 8 with Size 1/2. #22 was not rated.

Under MOLLUSKS (Brown and Green) all rated 10 except #22 - was not rated.

- #16 - Topcoating seems to have poor adhesion to undercoat. Blistering is mainly of topcoat only.
- #17 - Blistering is partly of topcoat only and partly topcoat and primer.
- #18 - Poor adhesion of topcoat to primer. Primer has poor adhesion to metal where topcoat has peeled.
- #19 - Larger barnacles have undercut. Coating losing adhesion over panel.
- #20 - Topcoat peeling in long strips from primer. Very poor adhesion of topcoat to primer.
- #21 - Same as #20. Beginning to foul on primer also.
- #22 - Dashes indicate that no rating can be determined due to severe peeling of coating. Balance of coating has little or no adhesion.
- #23 - Coating remaining has lost all adhesion except in one or two spots.
- #24 - Coating losing adhesion around spots where blisters have broken.
- #25 - Coating losing adhesion and peeling around spots where blisters have broken.
- #26 - Coating losing adhesion over balance of panel. #27 - Coating losing adhesion over most of balance of panel.
- #28 - Corrosion pitting along edge. Blistering seems to have been of topcoat only.
- #29 - Arrow barnacles undercutting. Coating appears to have little adhesion around spots where peeled.

NORTH FLORIDA TEST SERVICE
DAYTONA BEACH, FLA.

CODE NUMBER 9-1
D.I.E PLACED ON EXPLOSIVE 8/6/44
D.I.E OF THIS INSPECTION 12/6/44

TUT:1 SUBMISSION

AVERAGE WATER TEMP. F. 67°

P.N.	EXTRA				PEELING				KNOWING OR				CHECK-OR		CHECK-OR		CHECK-OR	
	NO.	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size	Size
18	9	2-1/2	9	1/8-1	10	9	1/8	8	1/8	7	10	6	8	10	4	10	50	75
17	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
16	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
15	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
14	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
13	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
12	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
11	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
10	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
9	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
8	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
7	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
6	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
5	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
4	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
3	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
2	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	
1	9	1/8	9	1/8	9	1/8	8	1/8	7	10	6	8	10	4	10	60	80	

NOTES, GENERAL NOTES: All panels under MYOZOL (Filamentous) were rated 10 except #20, #21, #22 which were not rated at all.

All panels under ALICE (Brown and Green) were rated 10, except #16, which was rated Brown - 9 and Green - 9; #20, #21, #22 were not rated at all, and #23 was rated Brown - 9 and Green-8.

Dash in rating column indicates that no rating can be determined because of break-

down in eating.

- #16 - Primer running out and top coat losing adhesion in many spots. Exposed primer chalking.
- #17 - Primer running out and coating losing adhesion. Exposed primer chalking.
- #18 - Pooling more severe on back, chalking more severe on face. Exposed primer chalking.
- #20 - Pooling generally has started from edges and worked over panel. Exposed primer chalking.
- #21 - Exposed primer chalking.
- #22 - Topcoat has chalked to primer over most of panel. Pooling to metal where blisters are breaking.
- #23 - Primer running out.

FROM FORTY-THREE SERVICE
LAWSON, FLEM, FLL

TOTAL SUBMISSIONS AVERAGE WATER TEST P. 80°

CODE NUMBER 9-1
DATE PLACED ON TEST 1/4/44
DATE THIS INSPECTION 1/4/44

PANEL NUMBER	MO.	HYDROLYSIS	ARALIDS	HYDROLYSIS	EXCHANGING TONS	ALGAE	SCUM	MISTERS	Inter- to	CORROSION CHECK	CRACK- CHALL	COAT TOU TRACT	% AREA
NO.	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
160	9	2/3	7	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
170	7	7	7	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
180	0	0	0	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
190	7	7	7	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
20	Slight fouling on top coat, remaining. Becoming heavier on primer, and barnacles undercutting primer.												
21	Same as No. 20.												
22	Very slight fouling on topcoat, remaining. Becoming heavier on metal.												
230	6	1/2	7	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
240	7	2/3	7	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
250	7	1/2	7	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
26	8	1/4	8	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
270	7	2/3	7	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
28	8	1/2	8	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
290	4	1/2	4	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
300	8	2/3	8	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2

NOTE: #16, #17, #18, #19 #23 - Barnacles are undercutting coating to primer and to metal.

also, #18 - Blistering appears to have been mainly to primer.

#24 - Barnacles undercutting coating in spots.

#25 - Some fouling coming off, taking coating to primer and to metal in spots.

#27 - Corrosion pitting.

#29 - Some fouling dropping off and taking coating to intercoat.

#30 - " " and to metal in spots.