LEAD INDUSTRIES ASSOCIATION

420 LEXINGTON AVENUE

NEW YORK 17, N. Y.

RED LEAD DIVISION

CONFIDENTIAL - FOR COMMITTEE USE ONLY

SUBJECT TO REVISION

RED LEAD TECHNICAL COMMITTEE

New York, N. Y. August 25-26, 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 Friday and Saturday, August 25-26, 1944. The following were present:

Committee	Representing
A.C. Coats	Eagle-Picher Lead Co.
O.F. Shobe	Glidden Co.
G. Dieblman	National Lead Co.

F.E. Wormser, Secretary
L.L. Carrick, Director of Red Lead Research

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

MINUTES OF PREVIOUS MEETING

The minutes for the previous meeting were approved as written with the two following corrections:

(1) Page 11, Discussion of Vehicles Submitted by Bakelite Corporation should read as follows:

"Dr. Carrick said before the committee was appointed he visited the Bakelite Corporation and obtained a series of vehicles which they recommend for red lead primers. Mr. Shobe does not think they will work [illegible] of the Eagle-Picher Laboratories [illegible] has not worked out with red lead pigments in high viscosity vehicles but with the lower viscosity as C, it does work in red lead pigmentations."

(2) Page 11, Discussion of Red Lead Primers for Atmospheric Exposures, 2nd Paragraph, First line, should be changed to read as follows:

"Mr. Shobe said that he is positive that soybean alkyd products [illegible] in some instances, they have proved superior to linseed alkyd products."

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STATUS OF TOP COAT REQUIREMENTS OF THE NAVY

Mr. Diehlman presented the top coat formulation which the National Lead Company recommended to the Bureau of Ships for application to ships which were to be placed in inactive status. This formulation is attached as Exhibit A.

DISCUSSION OF ARTICLE APPEARING IN "OFFICIAL DIGEST OF THE FEDERATION OF PAINT & VARNISH PRODUCTION CLUBS NO. 238

The chairman is to prepare a short statement and submit it to the members of the committee for their suggestions. It is attached as Exhibit B.

MULTIPLE PIGMENT POLICY

Before promoting the red lead base multiple pigmentations to the trade it was decided to prepare a report of the findings of the red lead technical committee to date and submit it to the Executive Committee for their review and recommendation. This report was sent out to Members of the Red Lead Division. A copy is attached as Exhibit C.

STANDARDIZATION OF FORMULATIONS DATA TO BE USED IN THE MINUTES

The form in which formulation data is to be submitted hereafter may be found as Exhibit D. This Exhibit shows the method of arranging and presenting the data pertaining to L.L.A. Paint No. 93 which was found in the minutes of the July 21, 1944 meeting.

In the future, it is requested that formulation data submitted to the L.L.A. be arranged in this form. (Should price data be included, Chairman).

RESEARCH PROJECT NO. 4 AS FOUND IN THE JULY 21, 1944 MEETING MINUTES

Mr. Coats thought it advisable to increase the number of formulations in this Research Project so that it will be more comprehensive and show the advantages and disadvantages of Micalith-G in comparison with other inerts. This opinion was approved by other members of the Committee. Formulations were recommended for inclusion in Research Project No. 4. These paints were to be prepared by Mr. Shobe of the Glidden Company. The approved formulations are given in Exhibit E.

LOW-COST PRIMER FOR U.S.N.C.

The 12 low-cost primers ranging in cost from $1.10 to $1.26 per gallon were placed on exposure, August 6, 1944 at the North Florida Test Service, Daytona Beach, Florida. The U.S.M.C. has placed 8 of these formulations on test at their Solomons Island Test Station. The first report should be available for consideration at the September 28, 1944 meeting of the Committee.

DISCUSSION OF VEHICLES SUBMITTED BY BAKELITE CORP.

It was decided to request Mr. McCullough of the Bakelite Corporation to submit part of each of the samples of primer which he had prepared from the 14 vehicles which he submitted, and to send them to Mr. Dichlman so that we may have comparative exposure tests upon these vehicles. The Bakelite Corp. is exposing these paints on steel panels to the atmosphere.

MEANING OF NAME "MONOBASIC LEAD CHROMATE"

It was decided when referring to Monobasic lead chromate" or when "monobasic lead chromate" is to be used, to use as a standard, Imperial Paper and Color Corporation's CP Medium Orange A-6354 which contains 40% lead oxide and 60% lead chromate.

GAS HOLDERS

The formulations appearing in the July 21, 1944 meeting minutes of the Technical Committee, Pages 13-14, relative to gas holders were reviewed. Nine different formulations were approved. These are given in Exhibit F.

Two formulations, Nos. 4 and 8 appearing on Page 24 of the July 21, 1944 meeting minutes of the Technical Committee are to be deleted.

OIL STORAGE TANKS

The formulations found on Pages 14 and 15 of the July 21, 1944 meeting minutes were reviewed and amended to read as shown in Exhibit G.

The suggestions following Mr. Dichlman's name in the July 21, 1944 meeting minutes on Page 15 are withdrawn from consideration at this time.

CONSERVATION LINSEED OIL VEHICLE
TT-P-86, Amendment-1, Sept. 1, 1943

Mr. Coats displayed panels prepared under the TT-P-86 specification and TT-P-86, Amendment-1, Sept. 1, 1943. These panels did not show any great difference in gloss. A greater difference in gloss was expected owing to the reduction of the linseed oil contained in TT-P-86, Amendment-1, primers. In the discussion that followed it was decided to reserve comments on the question of gloss until the Committee can inspect the National Lead Company test fence at Bayville and discuss at that time the effect of pigmentation and flatting agents upon the gloss of paints prepared from this vehicle. The National Lead Company's exposures have been out for two years and will afford an excellent basis for the discussion of vehicles required to produce red lead primer films which will dry flat.

PURE RED LEAD RESEARCH

The development of a pure red lead pigment research program was postponed until the next meeting. At that time various members of the Committee are to submit data that they have on hand pertaining to the topics shown in Exhibit E.

PROTECTIVE COATINGS FOR GALVANIZED IRON

No decision was reached upon this topic. It was decided to contact Mr. Dan Critchfield to see what the conditions are in the field. If these conditions warrant then either a test program could be formulated or recommendations made from existing data.

NEXT MEETING OF THE TECHNICAL COMMITTEE

The next meeting of the Technical Committee will be held on September 28, 1944.

The members of the Committee are requested to meet at the gate leading to the 9:03 A.M. Long Island train, Pennsylvania Station, lower level, so we may go to Bayville to inspect the panels that are on exposure.

L. L. Carrick

L. L. Carrick, Director
Red Lead Research

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RED LEAD TECHNICAL COMMITTEE
MEETING MINUTES

EXHIBIT A.

FORMULA RECOMMENDED TO THE BUREAU OF SHIPS
FOR SHIPS PLACED ON INACTIVE STATUS

	Pounds Non-Volatile	Total Pounds	Gallons
"Titanox"-L		200.0	3.29
Basic Carbonate White Lead (N.P.S.)		200.0	8.45
Asbestine X		200.0	12.64
*Raw or Refined Linseed Oil (Acid Value 2-8)	220.0	220.0	41.20
**Heat Bodied Linseed Oil (2-6 Visc.-Acid Value-10-12)	80.0	80.0	10.00
***16% Lead Naolate		9.4	1.12
****Lead-Manganese-Cobalt Drier		10.0	1.31
Kerosene		42.0	6.25
Mineral Spirits		107.0	16.45
	400.0	1568.4	101.07

Pigment - 63.8% Vehicle - 36.2%

P.V.C. - 38.4% Non-Volatile - 70.8%

Weight per Gallon - 15.5 pounds
Pigment per Gallon Vehicle - 13.1 pounds
Pigment per Gallon Paint - 8.9 pounds

Body - 7S. K.U.

*National Lead Co. No. 1 or No. 37.
**National Lead Co. No. 57.
***3 lb. of Litharge may be substituted for this drier by addition to the pigment grind.
****The drier in the above paint contained 8% lead, .1% manganese and .2% cobalt calculated as metals.

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REPLY TO MR. THUESEN'S ARTICLE IN THE "OFFICIAL DIGEST" OF THE Federation of Paint & Varnish Production Clubs, No. 239

In the "Official Digest" of the Federation of Paint and Varnish Production Clubs, No. 239, June 1944, Page 839, there appears a discussion by Dr. D.J. Thuesen, Western New York Club, of an abstract of an article entitled, "The Use of Chromates in Rust-Inhibitive Pigments" by Hans Wagner, published in Farben-Zeitung, Vol. 47, Pgs. 177-179; 187-189, 1943. Mr. Thuesen expresses surprise at the "unusual" report of the highly satisfactory behavior of red lead as a rust-preventative pigment, and that "red lead gave the best results throughout", expressing the opinion that these statements about the behavior of red lead "should give rise to deeper scrutiny of the materials and methods employed in testing by the German author". The methods employed by the German author were very much the same and orthodox in nature, as compared with methods used in this country.

Quoting directly from the article, a comparison of "those paints in which only the straight pigments, without chromate addition, reveal the fact that red lead and an extended red lead performed best. However, the ratings, not only for red lead, but also for the iron oxide, show considerable differences, regardless where they were compared on the basis of the one or two coat systems, or the average of these, or on the basis of the vehicle, or on the basis of performance after 2, 3, 4 or 8 years' exposure, one factor only remained constant, "The certainty of the superior behavior of red lead pigments."

Near the close of the article these words appear: "Red lead and extended red lead are regarded as such good rust-inhibitive pigments that improvement in them appears unnecessary."

Summing up his work on lead chromates, "Chromates are effective in-so-far as they are able to passivate the surface of the iron and in-so-far as they as soap-formers, set up conditions in the film similar to those produced by red lead."

From a careful study of the original articles by Hans Wagner the statement that "Red lead gives the best results throughout" is not astonishing in the light of the general use and behavior of red lead.

The findings of the Research Association of the British Paint Colour and Varnish Manufacturers corroborates the work of Wagner--that red lead gives better performance in atmospheric exposures than any other anti-corrosive pigment, and is not susceptible to deleterious reaction in acid environments as is zinc chromate.

A 1944 survey of the painting practices of 42 railroads, operating 106,000 miles of track established the fact that 93.8% of these railroads use red lead as an anti-corrosive pigment in structural steel primers.

In a recent survey of the painting practice of State Highway Departments it has been established that all except four of the forty-eight states and the District of Columbia, specify 100% red lead for the pigmentation to be used in structural steel primers. The remaining four states require a shop coat of red lead which is followed by either one or two field coats of a multiple pigment red lead primer.

LIA08181

Many ships are being extensively painted with red lead. Those who use red lead on ships find that it has better anti-corrosive properties than other paints that have been tried. English ships, Norwegian ships and many government and privately owned American ships are preserved from corrosion by the use of red lead primers.

Practically all structural steel, where paint is applied, is coated with one or more coats of red lead primer paint.

These statements are made to call attention to the general practices and the wide extent of the use of red lead paint. Red lead is as good today as it has been in the past. Some difficulties in the use of red lead have been experienced because of improper methods of formulations. It is essential, as in the case of zinc chromate or other pigmentations, to select a compatible vehicle. Experience has shown that such vehicles are now available.

EXHIBIT C

SEPTEMBER 22, 1944

RED LEAD DIVISION
PROGRESS REPORT

LEAD INDUSTRIES ASSOCIATION
F.E. Worner, Secretary

PROGRESS REPORT OF
THE RED LEAD RESEARCH PROGRAM

Technical Committee

This report covers the program from date of inception to September 15, 1944.

A. INCEPTION

B. ORGANIZATION

C. OBJECTIVES

1. Immediate

2. Ultimate

D. HOW THE WORK IS DONE

E. PROGRAMS UNDERWAY

F. WHAT HAS BEEN ACCOMPLISHED

G. MATTERS FOR POLICY GROUP TO CONSIDER AND ADVISE FOR FUTURE GUIDANCE

LIA08183

A. INCEPTION

The work was brought about by a realization of the threatened position of red lead as a rust-inhibiting pigment owing to the:

1. discontinuance of the use of red lead in paints for Navy ships,
2. impending action of U.S.M.C. to prohibit red lead in U.S.M.C. paints - (actually in April, 1944, U.S.M.C. issued a directive making the use of a zinc chromate primer optional to red lead primers, but with emphasis on the use of a zinc chromate primer),
3. actual use of zinc chromate primers to an almost exclusive degree in Army paints for ferrous surfaces, and
4. the tremendous amount of zinc chromate used in primers [illegible] 13,000 tons in 1943 - equivalent at four pounds per gallon to 6,500,000 gals. of primer which is equivalent to 48,750 tons of red lead at 15 pounds of red lead per gallon of paints.

B. ORGANIZATION

Organized work was started on January 11-12, 1943, by many technical representatives of the red lead manufacturers, by outlining programs and making panel tests in salt water, and atmosphere, of paints developed by the group.

On October 1, 1943, Dr. Carrick joined the group as Director.

Subsequently on Jan. 24, 1944, a technical advisory committee was organized, the membership of which is:

A.C. Coats - Eagle-Picher Lead Co.
C.F. Shobe - Glidden Co.
J.C. Johnstone - Hammond Lead Products, Inc.
G. Dieblman - National Lead Co.

This advisory committee has a combined background of experience and interest in:

1. all lead and zinc pigments, also titanium pigments,
2. developing and testing metal protective paints, and
3. presentation of technical data to the trade, specification writers and large paint buyers.

LIA08184

The group meets, at regular monthly meetings - to which representatives of all members are welcome to advise and suggest on current and future work in intimate detail.

C. OBJECTIVES

1. Immediate

The first objectives are:

a. to hold red lead in U.S.M.C. specifications, and

b. be based on experience;

(1) to work with the Navy Department to reinstate red lead as a primer pigment for Navy ships, and

(2) to settle the toxicity question so as to remove an excuse for not using red lead on certain government construction projects.

2. Ultimate

Other objectives are:

Longer range studies of primers for:

(a) painting oil storage tanks,
(b) painting of gas holders,
(c) painting of structural steel bridges, etc.,
(d) painting of railway rolling stock,
(e) painting of galvanized iron, and
(f) painting of government dams and locks.

The above studies are not superseding the original objectives, but are to meet competitive conditions and are being given study now as paint for such uses requires at least four years for test, whereas marine primer tests are a matter of a few months.

D. HOW THE WORK IS DONE

At the monthly meetings after a program is established, the work is parcelled out to laboratories of the group. The work has been done mostly by the laboratories of

1. The Eagle-Picher Lead Co.,
2. The Gliddon Co., and
3. The National Lead Co.,

LIA08185

with exposures made by the laboratories of the National Lead Co. at their Marine Test Basin, Bayville, L.I. and at the North Florida Test Service, Daytona Beach, Florida.

Periodic inspection of the exposures --

1. Continuous submersion in salt water.
2. Tide Range - alternate exposure to salt water and to the air as the tide changes.
3. Atmospheric exposures.
4. Package characteristics, durability, etc.

B. PROGRAMS UNDERWAY

1. Total immersion, tide range and atmospheric exposures at the National Lead Company's Bayville Marine and Test Fence Farms.
   a. Twenty-five primer paints formulated at the Jan. 11, 1943 meeting held at the Eagle-Picher Research Laboratories, Joplin, Mo.
   b. Twelve primer paints formulated at the August 9, 1943 meeting held at Pittsburgh, Pa. These twelve primers have also been tested by the U.S.M.C. at their Solomon Island, Md., Test Stations.
   c. Forty-three primer paints were approved by the Technical Committee, June 23, 1944 and are now on exposure tests.
2. Twelve low-cost primers which were placed on total immersion and tide-range exposure, August 8, 1944, at the North Florida Test Station, Daytona Beach, Florida. These are also on test by the U.S.M.C. at their Solomon Island Test Stations.
3. The Bakelite Co. has prepared 16 vehicles and ground them into 24% red lead multiple pigmentation primers. These primers are on test at the Bayville Test Station of the National Lead Co. and also by the Bakelite Co. at their own test Stations.

LIA08186

with exposures made by the laboratories of the National Lead Co. at their Marine Test Basin, Bayville, L.I. and at the North Florida Test Service, Daytona Beach, Florida.

Periodic inspection of the exposures --

1. Continuous submersion in salt water.

2. Tide Range - alternate exposure to salt water and to the air as the tide changes.

3. Atmospheric exposures.

4. Package characteristics, durability, etc.

B. PROGRAMS UNDERWAY

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c. Forty-three primer paints were approved by the Technical Committee, June 22, 1944 and are now on exposure tests.

2. Twelve low-cost primers which were placed on total immersion and tide-range exposure, August 8, 1944, at the North Florida Test Station, Daytona Beach, Florida. These are also on test by the U.S.M.C. at their Solomon Island Test Stations.

3. The Bakelite Co. has prepared 14 vehicles and ground them into 80% Red lead multiple pigmentation primers. These primers are on test at the Bayville Test Station of the National Lead Co. and also by the Bakelite Co. at their own test Stations.

LIA08187

4. Twenty-eight red lead multiple pigmentations containing inerts as micalith, mica and magnesium silicate are being tested to determine the effect of inerts on red lead primers. These have just been placed on test.

5. The Sherwin-Williams Co. has submitted a group of six primers to try and determine the effect on a red lead base multiple pigment primer of replacing Cumar V-2-½ with Dyphene 13080.

6. A technical handbook on the use of red lead as a pigment is in course of preparation.

F. WHAT HAS BEEN ACCOMPLISHED

In general --

1. Zinc chromate primers for marine primers as typified by Navy primers and the U.S.M.C. 52-MC-29 primer do not perform as well as multiple pigment red lead primers.

2. For atmospheric exposure - no definite data has been established but indications are that red lead multiple pigmentations at a cost equal to zinc chromate primers perform at least as well as the zinc chromate primers, probably better.

The active cooperation of the U.S.M.C. was effected a year ago and several sets of samples have been and are under test by the U.S.M.C.

The Navy Bureau of ships has expressed an interest in this work and has promised to check any good points established as a result of the cooperative work with the U.S.M.C.

It was necessary to run several elimination series during the past year and it is hoped now that the present series at the U.S.M.C. laboratories will prove of enough interest to warrant actual tests on ships, which tests we have been promised. A report on the last series started on August 6, 1944 should be available by June 1, 1945.

It must be remembered that the U.S.M.C. has not used primers under ship bottom paints for some time. We now have the double task of (1) establishing a primer for the painting specifications, and (2) having the primer of the

LIA08188

red lead type.

The data obtained from these tests will also be used for work on merchant ships during normal times when it is expected U.S.M.C. specifications will not be used or will be at most an optional matter.

Multiple pigmentations in a compatible vehicle perform better than straight red lead pigmentations. Two pigmentations of great promise are:

	I	II
Red Lead	70%	60%
Zinc Oxide	10%	10%
Zinc Chromate	-	10%
Iron Oxide	10%	5%
Asbestine	5%	10%
Diatomaceous silica	5%	5%
	100%	100%

The number II pigmentation or lower red lead content appears better in performance.

There being no known vehicle satisfactory for red lead pigmentations when this work was started, the matter of establishing a satisfactory vehicle was a problem in itself.

An enormous volume of work has been necessary to establish the formulation which to date seems promising.

Number of pigmentations tested	80
Number of vehicles tested	60
Number of paints tested	142

The paints in the current tests (report expected June 1, 1945) are formulated at approximately the same raw material cost as the low-cost $1.30-$1.40, zinc chromate primers used by the U.S.M.C.

The best red lead base multiple pigmentation developed to date is receiving a total submersion test on a 6 x 10 ft. area of the hull of the St. John Guild Hospital ship in the New York Harbor area. No data is available to date.

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8. MATTERS FOR POLICY GROUP TO CONSIDER AND ADVISE FOR FUTURE GUIDANCE

Multiple red lead pigmentations have been shown in general to give better performance than straight red lead pigmentations in marine primers.

Multiple red lead pigmentations have been shown by the work of others (and progress of our own work to date appears to confirm this work) to give satisfactory performance for general atmospheric protection of ferrous surfaces at a lower cost per gallon of paint.

The use of red lead in the order of 80% and zinc chromate in the order of 10% in multiple pigmentations, would still offer approximately the same tonnage for zinc chromate as the current zinc chromate low-cost type of pigmentations.

In order to maintain and improve the position of red lead, it is necessary to benefit by the results of our development work in the field.

In all of this work, the question arises as to whether the straight red lead or multiple red lead pigmentation should be publicized and developed. To guide the group in its work an expression of policy on the matter of straight red lead vs. multiple red lead pigmentations is requested.

Respectfully submitted,

L. L. Carrick

L. L. Carrick, Director
Red Lead Research

LIA08190

RED LEAD TECHNICAL COMMITTEE
MEETING MINUTES

EXHIBIT D

STANDARDIZED FORMULATION DATA FORM

U.S.A. DESIGNATION	Paint No.	93
	Pigmentation	P-16
	Vehicle	V-40
Manufacturers No.:		M-2787

	No.	Per Cent
Red Lead (97% grade)	330	54.7
Zinc Oxide	61	10.1
Zinc Chromate	61	10.1
Indian Red	42	7.0
Magnesium Silicate (Asbestine SK)	61	10.1
Diatomaceous Silica (Celite No. 280)	48	8.0
Total	603	100.0%
GE No. 3454	109	16.6
*LV-266	440	67.3
Cobalt-Naphthenate (6%)	1.4	0.2
Lead-Naphthenate (24%)	4.	0.6
Thinner (Solvesso No. 2)	100	15.3
	654.4	100.0%
Wt/gallon		12.6
PV		28.4
% Pigment		47.9%
% Vehicle		52.1%

*10 gal. (80% linseed oil-20% castor oil) B29432; 60% volatile by weight.

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RED LEAD TECHNICAL COMMITTEE
MEETING MINUTES

EXHIBIT B

RESEARCH PROJECT NO. 4

The following approved formulations are to be added to Research Project No. 4:

(1) Replace the Asbestine of L.I.A. Paint No. 117 with Micalith-G.

(2) Replace the Micalith-G in L.I.A. Paint No. 117 with the 325 mesh mica as sold on the market.

(3) Replace the Micalith-G of L.I.A. Paint No. 117 with micronized mica.

(4) Replace Micalith-G in L.I.A. Paint No. 117 with iron oxide of 80% grade such as C. K. Williams 60%.

(5) Replace the Micalith in L.I.A. Paint No. 119 by using 325 mesh mica.

These paints are to be formulated with a PV of 35 and viscosity to conform with those of the other 24 paints of Research Project No. 4. The viscosity to be adjusted by Mr. Shebo before they are sent to Mr. Diehlman. Mr. Diehlman is holding up the application of the 24 paints of Research Project No. 4 until the receipt of the paints mentioned above.

RED LEAD TECHNICAL COMMITTEE
MEETING MINUTES

EXHIBIT F

GAS HOLDER FORMULATIONS

The paints are to be made with a PV of 35 or whatever pigmentation will be required to give a surface that will dry flat.

A one quart sample of each of these paints is to be prepared by the company whose name appears at the close of each proposed formulation.

Test Formulation No. 1

Pigmentation

Red Lead 17 lb. (96% grade)
Litharge 4 lb. 3 oz. (The litharge to be added just before the paint is applied.)

Vehicle

Raw Linseed oil 7-1/3 pts.
Lead-manganese cooked drier (Glidden) 1/4 pt.
Turpentine 5/8 pt.

The red lead should be ground into the raw linseed oil and the drier and turpentine added. The litharge should be added just prior to application of the paint.

To be prepared by the Glidden Company - Attention of Mr. Shobe.

Test Formulation No. 2

Pigmentation

Red Lead 13 lb. 9½ oz. (96% grade)
Micalith 1 lb. 2 oz.
Litharge 4 lb. 4 oz. (to be added just prior to application of paint.)

Vehicle

Raw Linseed Oil 7-1/3 pts.
Lead-manganese cooked drier 1/4 pt.
Turpentine 5/8 pt.

The red lead and micalith should be ground into the raw linseed oil and the drier and turpentine added. The litharge is added just before the paint is applied.

To be prepared by the Glidden Company - Attention of Mr. Shobe.

Test Formulation No. 3

Pigmentation

Red Lead 47% (96% grade)
Zinc Oxide 8%
Zinc Chromate 8%
Iron Oxide 16%
Asbestine 10%
Diatomaceous silica 8%
Litharge 1-3/4 oz. per gallon of Paint (or 0.18%)

Vehicle

L.I.A. Vehicle V-11, which is --
23.18% LV-197 or L.I.A. V-8.
80.18% Raw Linseed oil.
6.71% Pale heat bodied linseed oil, ZZ
1.82% Liquid drier (8% Pb; 0.08% Mn; 0.08% Co)
7.81% Sovasol #5 (TT-T-291)

To be prepared by Eagle-Picher Lead Company - Attention Mr. Coots.

Test Formulation No. 4

Pigmentation

23 lbs. dry red lead (90% grade)
2 lbs. finely powdered litharge.

Vehicle

5 pts. Dutch Boy boiled linseed oil
1-1/2 pts. turpentine

This is the primer paint recommended on Pg. 89 of the "Structural Metal Paint" handbook.
This paint is to be prepared by the Glidden Company - Attention Mr. Shobe.

Test Formulation No. 5

This is the National Lead Paint No. N-1977 or L.I.A. Paint No. 19.

Pigmentation 3 or L.I.A. P-6

57.7% by wt.
Red Lead 70%
Zinc Oxide 10%
Iron Oxide 10%
Asbestine 7%
Celite 3%

Vehicle 6 or L.I.A. V-8

42.3% by wt.
LV-197 Varnish 88.6%
Sovasol #5 10.0%
Solvesso #2 6.4%
Non-Volatile 66.2%

Wt. per gal. 14.6#

This paint is to be prepared by the National Lead Company - Attention Mr. Dieblemm.

Test Formulation No. 6

This paint is the National Lead Paint No. N-1988 or L.I.A. Paint No. 24.

Pigmentation Special or L.I.A. P-4

82% by wt.
Red Lead 34.8%
Iron Oxide 55.2%
Celite 9.8%

Vehicle 6 or L.I.A. V-4

32% by wt.
LW-196 Varnish 68.4%
Butanol 3.9%
Sovasol #3 13.7%
Non-Volatile 48.8% by wt.
Wt. per gal. 17.1#

This paint is to be prepared by the National Lead Company - Attention Mr. Diehlman.

Test Formulation No. 7

Use the same pigmentation and vehicle as given in Formulation No. 3 above. Just prior to application add 2 lbs. of litharge which has been dispersed in some of the thinner used to thin the paint.

NOTE: It would be advisable to reserve from the corrected formulation of Test Formulation No. 3 sufficient thinner to wet the litharge so after the wetted litharge is added, the viscosity of the product will be the same as that of Test Formulation No. 6.

This paint is to be prepared by the Eagle-Picher Lead Co. - Attention Mr. Coots.

Test Formulation No. 8

This formulation is suggested for the water seal area. One coat of old L.I.A. Paint No. 11 (New L.I.A. Paint No. 37) followed by one coat of L.I.A. Paint No. 6 (New L.I.A. Paint No. 35.) The above paint system to be covered by the usual top coat employed by the company owning the gas holder.

This paint to be prepared by the National Lead Co. - Attention Mr. Diehlman.

Test Formulation No. 9

It was suggested the L.I.A. Pigmentation 3 (P-6) which is

Red Lead 70%
Zinc Oxide 10%
Iron Oxide 10%
Diatomaceous silica 3%
Manganese Silicate 7%

be ground into L.I.A. Vehicle No. 11, See Formulation No. 3.

To be prepared by the Eagle-Picher Lead Co. - Attention Mr. Coots.

RED LEAD TECHNICAL COMMITTEE
MEETING MINUTES

EXHIBIT 6

OIL STORAGE TANK PRIMER FORMULATIONS

The test formulations given below are to be prepared by the company whose name appears at the end of the formulation.

Each paint is to be prepared in two-gallon batches. The PV is to be 35 or whatever will give a flat finish upon drying.

Test Formulation No. 1

The National Lead Co. formulation M-1980 (L.I.A. Paint No. 22) which was exposed as part of Research Project No. 1.
Pigmentation B (LIA P-6)
Vehicle 4 (LIA V-11)

To be prepared by the National Co. - Attention of Mr. Dishlman.

Test Formulation No. 2

The Glidden Co. formulation 8-8-8-2 (LIA Paint No. 11) which was exposed as part of Research Project No. 1.
Pigmentation A (LIA P-5)
Vehicle 5 (LIA V-7)

To be prepared by the Glidden Co. - Attention Mr. Shebe.

Test Formulation No. 3

Mr. Shebe suggested a modified pigmentation J (LIA P-16) in Vehicle 4 (LIA V-11.)

To be prepared by the Eagle-Picher Lead Co. - Attention Mr. Costa.

Test Formulation No. 4

The Glidden Company suggested the trial of 61-81076 test paint (or L.I.A. Paint No. 108.)

To be prepared by the Glidden Co. - Attention Mr. Shebe.

Test Formulation No. 5

Pigmentation - 25 lbs. dry red lead (98% grade) 2 lbs. finely powdered litharge.

Vehicle - 8 pts. Dutch Boy bodied linseed oil; 1-1/2 pts. turpentine.

Same to be prepared by the Glidden Co. - Attention Mr. Shebe.

Test Formulation No. 6

This formulation is to be submitted by the Sumalite Corporation who have been contacted for their specific recommendations.

RED LEAD TECHNICAL COMMITTEE
MEETING MINUTES

EXHIBIT E

PURE RED LEAD RESEARCH

Topics on which information is desired at the next technical committee meeting.

1. The relationship between gloss of primers prepared from pure linseed oil and the Conservation Linseed Oil TT-P-86, Amendment-1.
2. The comparison of the gloss found in TT-P-86, Amendment-1 with the gloss produced by phthalic anhydride vehicles.
3. A comparison of the gloss found in TT-P-86, Amendment-1 with the gloss of red lead primers prepared with phenolic vehicles.
4. The relationship between gloss of TT-P-86, Amendment-1, and primers prepared from litho-oil.
5. Definite data showing the stability of 80%, 92% and 97% red lead in the vehicles mentioned above Nos. 1, 2, 3, and 4.
6. Film hardness of each grade of red lead, 80%, 92%, and 97% in each of the vehicles listed in Nos. 1, 2, 3, and 4 above.
7. The effect of grades of red lead upon film elongation of primers prepared from each of the vehicles in above Nos. 1, 2, 3, and 4.
8. The extent of soap formation in each of the vehicles used in above Nos. 1, 2, 3, and 4.
9. Any electro-potential measurements which will shed light upon the relationship of the litharge present in red lead, and the anti-corrosive characteristics of the red lead.
10. The per cent of reacted lead in linseed oil red lead primers which are prepared from

    (1) 80%
    (2) 92%
    (3) 97% grades of red lead.

    and its effect on anti-corrosive properties of the various red leads.
11. Do other vehicles as phenolic vehicles form lead compounds and what are their effect upon red lead primer films?

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