LEAD INDUSTRIES ASSOCIATION

292 MADISON AVENUE

NEW YORK 17, N. Y.

November 22, 1961

To: Dr. L. L. Carrick
Mr. M. E. Elmore
Mr. R. P. Bates
Mr. Paul Whitford
Mr. E. K. Zimmermann

SUBJECT: PIGMENTS MANUAL - SECTION FROM E. H. BUTZOW

Attached please find a copy of the section "Trade Sales Paints - Solvent Type" prepared by E. H. Butzow, Esmond Lead Products, Inc., for inclusion in our "Pigments Manual."

I would appreciate your reviewing this section, making whatever changes or additions you deem advisable and returning it to me at your earliest convenience.

The sections and authors, as decided at the meeting on March 30, and the status is as follows:

SECTION	AUTHOR	RECEIVED BY SECRETARY	SUBMITTED TO COMMITTEE
Industrial Paint, Solvent Type	E.K.Zimmermann R.P.Bates	No	
Industrial Paint, Water Thinnable Type	Paul Whitford	No	
Industrial Maintenance Paints, Solvent Type	E.K. Zimmermann R.P. Bates	No	
Industrial Maintenance Paints, Water Thinnable Type	Paul Whitford	No	
Trade Sales, Solvent Type	E. H. Butzow	Yes	Yes
Trade Sales, Water Thinnable Type	Paul Whitford	No	
Materials Handling	D.M. Borsina	No	
Lead Pearlescent Paints	Not Selected		

N 311

SUBJECT: PIGMENTS MANUAL
SECTION FROM E.E.BUTZOW

November 22, 1961

-2-

All sections, as agreed at the March 30, 1961 meeting should include for the compounds discussed in each section such data as:

1. The properties imparted by lead compounds.
2. Lead compounds and their properties.
3. Formulating factors.
4. Compatibility with vehicles.

I would appreciate receiving a draft of the sections assigned you as soon as possible so that I can distribute them to the other members of the committee.

Sincerely yours,

David M. Borsina

David M. Borsina
Secretary
Lead Pigments Technical Committee

DMB:EM

[illegible]

[illegible]

The use of [illegible] in [illegible] paints of the [illegible] type is now [illegible] home [illegible]. These [illegible] pigments, [illegible], and [illegible] paints and in certain types of [illegible].

[illegible] house paint [illegible] exceed those of any other type [illegible]. For many years [illegible] used with [illegible] pigment, basic carbonate white lead, and one vehicle, linseed oil. The painter himself thinned the white lead paste with additional oil and turpentine, added a drier or driers and used the resultant paint for primer, intermediate, and topcoat.

[illegible] oil paint [illegible] basic raw material [illegible] paint formulation but new pigments and new vehicles have been developed and are now in common use. The standard formulation for a first grade house paint today consists of some combination of lead, zinc, and titanium pigment, with or without extender pigments.

The advent of the titanium pigments with their tremendous hiding power and relatively high [illegible] have contributed to revolutionary changes in house paint [illegible].

In the [illegible] white lead [illegible] in the [illegible] and [illegible].

[illegible] much

of the [illegible] paint [illegible] [illegible] like ready mix-

[illegible] [illegible] many of the new

formulations [illegible] [illegible] and dollar

[illegible] durability, [illegible] original.

[illegible] the new [illegible] [illegible] proposed

systems.

[illegible] the paint manufacturing industry [illegible] recognized the necessity for a [illegible] it had failed to acknowledge [illegible] the performance of any paint system [illegible] largely subordinate to the performance of the prime coat. When two coat systems became the vogue the importance of the primer as a foundation for an exterior coating was emphasized and has received [illegible] belated recognition.

There is no doubt that in the haste to realize economic advantages there were numerous instances in which quality suffered and dependable performance was unwittingly sacrificed. Much of this result can be attributed directly to omission of lead pigments from house paint formulations, particularly from house paint primers. The manufacturers who continued the use of lead in primers were spared much of the misfortune experienced by others.

[illegible] basic carbonate white lead [illegible]

Historically, basic carbonate white lead is the oldest of all white pigments. Its long history dates back to the Old Dutch process which is still known and used by the Netherlands, Sweden, and Germany. Methods for making white lead from metallic lead and vinegar or sour wine are described in the literature of the times. The Old Dutch process by which the pigment was made for hundreds of years is essentially the same in principle as the methods used by the ancients.

Modern methods of manufacture have replaced the Old Dutch process which required from 90 to 120 days for conversion from metal to pigment. The conversion period is now reduced to 12 days or less. Instead of formation through a long corrosive process, the pigment is precipitated from solutions of lead acetate by conversion current from carbon dioxide gas. The lead acetate solutions are prepared either directly from metallic lead or from lead that has previously been converted to lead oxide. In modern processes it is possible to control composition and other characteristics within much closer limits than was ever possible by the corrosion method.

The composition of basic carbonate white lead is usually indicated by the formula $2\,PbCO_3 \cdot Pb(OH)_2$ which corresponds to a combined lead carbonate content of 80 percent. The actual [illegible] commercial white lead is from 61 to 75 percent lead carbonate. Actually there are three separate chemical compounds which make up the commercial basic carbonate white lead

(1) [illegible]

(2) [illegible]

(3) [illegible]

[illegible] white lead may be present in the amount of a [illegible]. At [illegible] the composition is more closely approximated by one normal member only. Virtually all paint grades of white lead are very close to the composition of stoichiometric basic lead carbonate. If the carbonate content exceeds 13% the quality of the pigment declines and the compound $PbCO_3$ is indicated, which compound in itself is a poor paint pigment.

For many years white lead was used as a single pigment in exterior house paints. It served the dual purpose of providing opacity or hiding power to the coating while contributing several other protective or service features to the [illegible].

More recently the opacity function of white lead has been relegated to the background by titanium dioxide or its diluted versions of the titanium pigment. In many formulations white lead was replaced entirely by titanium and extender pigments. It was [illegible] many paint chemists emphasized the necessity for a reactive pigment such as white lead that the latter is being returned to the [illegible].

It is [illegible] recognized that a house paint primer must establish a [illegible], strongly adherent, [illegible] and [illegible] the substrate and [illegible] penetration of the coating by [illegible] the primer

[illegible] The primary film must be [illegible] and must [illegible] provide a base to establish a good [illegible] for the finish coat. The ability of the [illegible] to [illegible] the [illegible] is [illegible], and to [illegible] [illegible] of all [illegible], [illegible] may [illegible] contribute so [illegible] to the effectiveness of a [illegible] paint system. The [illegible] must [illegible] [illegible] and [illegible] because [illegible] is also [illegible] the greatest single cause of paint flattening and peeling, the most [illegible] recommended paint [illegible].

[illegible] characteristic of [illegible] is [illegible] chemical affinity for paint vehicles. It becomes an integral part of the paint film and actually strengthens the paint, resulting in a tough flexible film, [illegible] resistant to [illegible].

Waxes used, being chemically inert, provide with vehicle fatty acids to produce [illegible] generally referred to as "soaps". Microscopic examination reveals that lead soaps are distinctive in their form and in their effect. They consist of [illegible] crystals with an array of spiney projections radiating from a central core. By interlocking and interweaving the spiney crystals form a felted mat-type structure which [illegible] reinforces a paint film. Other pigments form metallic soaps which [illegible] but which lack [illegible] and [illegible] properties of the [illegible] lead soaps. It has also been proved that the development of [illegible] in a paint film accelerates the [illegible].

[illegible] and prevent [illegible] pigments in lead soaps is accomplished

[illegible]

[illegible] be the formula Pb_3O_4. [illegible]

[illegible]

The two fume processes are [illegible] the raw material used. In one, the pigment is [illegible] a basic [illegible] type furnace by feeding lead sulphide (galena) [illegible] fumes discharge into the furnace. The lead and sulphur [illegible] the gaseous state and [illegible] form basic lead sulphate. The gases and fume are cooled, depositing the pigment as a fine powder [illegible] a bag house.

In the other fume process [illegible] basic lead sulphate is heated in the presence of air [illegible].

In the [illegible] is added to a [illegible] (5%) slurry, [illegible].

[illegible]

[illegible]

[illegible] of lead pigments. [illegible]

[illegible] Carolina Sea Islands. [illegible] is found [illegible] silica sand.

Lead silicate is recognized as a reactive pigment contributing substantially to film integrity, [illegible] and general durability of paint films.

Lead silicate pigments may be used with titanium dioxide, zinc oxide, and extender pigments such as calcium carbonate and talc. Its low specific gravity will permit a relatively high volume loading of active lead pigment with corresponding reduction in cost over pigments of comparable film properties. Lead silicate improves durability and corrosion resistance of paint films.

[illegible]

[illegible] as [illegible]

[illegible]

[illegible]

Blended [illegible] are dry mixtures of [illegible] and zinc oxide, separately produced. Proportions can be [illegible] as desired, the most popular [illegible] types.

The oil absorption of the blended pigments can be [illegible] by using [illegible] oil absorption [illegible] of zinc oxide. Low, medium, and high oil absorption types are available whereas all [illegible] products are low in oil absorption.

The blended pigments have [illegible] color [illegible] but do not disperse quite as [illegible] as the co-fumed. Specific gravity and [illegible] value are approximately the same although the blended types [illegible].

Blended [illegible] as they provide a [illegible] to small [illegible].

[illegible]

All are chemical pigments which [illegible] materials such as [illegible]

They [illegible] in that all [illegible] forms of lead chromate [illegible] thereof, also in combinations with lead sulphate and other chemical compounds.

Chrome Orange

Chrome orange pigments are basic lead chromates made by precipitating from lead [illegible] or lead nitrate solutions by sodium or potassium dichromate.

By varying the conditions, particularly the [illegible] it is possible to produce a wide range of colors. They are generally made available in five depths of shade running from extra light orange through the very red deep shade which is referred to as International Orange.

These pigments are the most popular orange pigments used in paints and enamels. They are high in specific gravity and have the lowest oil absorption of any common chromate pigments. They possess excellent light fastness and durability and may be used in [illegible] exterior finishes. The [illegible] and [illegible] are lighter than those of Chrome Yellows but weathering properties are better, with less tendency to chalk both in reduction and in tint.

Zinc Lead [illegible] possess [illegible] and corrosion and rust inhibitive properties and is [illegible]

[illegible]

[illegible]

[illegible] chromates, [illegible] lead [illegible]

[illegible]

[illegible] [illegible] is opacity and hiding strength. [illegible] ease of dispersion and [illegible] properties are similar to those of [illegible] chrome yellows. [illegible] used [illegible] [illegible] types of machinery.

__Chrome Yellows__

Chrome yellow pigments are precipitates of lead chromate, the lighter hues being co-precipitates of lead chromate and lead sulfate.

They are the most versatile and most widely used [illegible] of bright yellow pigments. Referred to as C. P. Yellows, the name does not indicate any degree of chemical purity except that the color is full strength and free from any inert extenders.

This class [illegible] a wide range of hue from a greenish primrose yellow [illegible] and medium [illegible].

They are [illegible] opaque pigments, with low oil absorption, easily dispersed in oil or [illegible] [illegible] to produce ivory, cream, [illegible]. They are not [illegible] fast and should not be used in [illegible] for application on alkaline surfaces.

[illegible]

[illegible] precipitates of chrome yellow and iron blue. [illegible] a wide range of hues running from yellow greens to deep bluish greens. By the choice of yellow, the shade of green can also be modified. They are available in C. P. and in Reduced Grades. The latter are mixing colorants such as barytes and/or china clay.

C. P. Chrome green pigments are bright in color, have excellent opacity, good light fastness and excellent weathering properties at moderate cost. The light fast tone used to fade.

Oil absorption and ease of grind will vary according to depth of color. [illegible] the oil absorption of iron blue is higher than that of chrome yellow. The oil absorption of chrome green will increase with depth of blue used. Iron blue is somewhat more difficult to disperse than chrome yellow, therefore the [illegible]

[illegible] chrome green pigments will have good [illegible] can be said to possess a very [illegible]