

CALIFORNIA RESEARCH CORPORATION
RICHMOND, CALIFORNIA

MEETING WITH DR. CHOLAK
ON TOXICITY TESTS OF X-105A

FILE 121.102
JUNE 26, 1959

On June 18, 1959, a meeting was held in San Francisco to discuss the progress of the toxicity test of X-105A with Dr. J. Cholak of the Kettering Laboratory, University of Cincinnati Medical School. The following people attended the meeting:

Du Pont Corporation

J. R. Sabina
Dr. L. A. Gerlach
J. G. Evans
E. H. Kiehn

Ethyl Corporation

J. F. Koehnle
W. V. Hancock

Standard Oil Company of California

Product Engineering Department

H. R. Porter

Medical Department

Dr. L. E. Curtis
J. A. Spence
S. H. Judd

California Research Corporation

J. L. Cooley
J. R. McGregor, Chairman of the meeting
F. A. Christiansen
W. L. Richardson
M. R. Barusch

FILE 121.102
MR. J. L. COOLEY:

Please note.

MRB:bc A. H. BATCHELDER

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Dr. Cholak stated that a report on all of the results of Phase I of the test at the Yellow Cab site has been completed and will be released shortly by Dr. Kehoe. Dr. Cholak presented a summary of the lead-in-air data obtained to date for all three phases of the test. The data presented were as follows:

Phase	No. of Samples	Average Lead Content of Air γ/m^3	Range of Values Obtained
I	36 35 (Discarding Highest Value)	34.3 20	0-530 0-53
II	64	45	0-141
III	19	100	17-212

One gamma per cubic meter equals 1 microgram per cubic meter.
35.3 $\gamma/\text{cubic meter}$ equals 1 microgram per cubic foot.

All of the data shown in the above table were obtained from air samples collected at the island in the garage where the filling pumps are located. This was the only sampling location used during Phase I for obtaining total lead-in-air concentrations. Starting with Phase II, air was collected from several locations in the garage. The lead-in-air results from all locations for Phase II and for Phase III to date were as follows: Phase II 86 samples, 37 $\gamma/\text{cu m}$; Phase III 62 samples, 88.6 $\gamma/\text{cu m}$.

Interpreting these results, Dr. Cholak was most encouraging about the prospects of using X-105A. He stated his belief that this site was one of the worst conditions we could possibly encounter, and he considers these results most encouraging, offering a fairly large safety factor. The environmental conditions in the garage during the test were as follows:

Phase	Mean Temperature °F	Mean Wind Velocity Ft/Min
I	60	90
II	61.5	83
III	61.6	46

Carbon monoxide contents of the air at the island were as follows:

Phase	No. of Samples	Carbon Monoxide ppm
I	15	11
II	24	10.4
III	5	16.0

Probably the increase in carbon monoxide content measured to date during Phase III is due to the reduced ventilation.

The following data compare the organic lead in the atmosphere with the particulate lead filtered from the air.

Phase	No. of Samples	Organic Lead	Particulate Lead	Total Lead	% Particulate Lead
I	11	17.3	5.4	22.7	24.3
II	18	31.5	8.8	40.3	21.8
III	19 (Obtained During First 3 Days)	85.5	15.9	101.4	15.7

The above particulate values were obtained from millipore filters placed ahead of the iodine trap which scrubs organic lead from the air.

Another method is also employed at the test site for determining particulate lead. This method filters air continuously through a filter paper tape. Particulate leads so obtained were shown to correlate with the "COH" value read directly from the tape. The COH value is an empirical number which is based on the visible soil which can be measured on the paper. The term COH is derived from concentration of haze in the atmosphere. The following table summarizes the data obtained. The datum of Phase I is somewhat clouded due to rather frequent power failures during the test which stopped the tape.

Phase	Test Duration, Days	COH Value	Particulate Lead γ /cu m Obtained from Tape
I	16	2.45	5.2
II	22	2.22	6.1

Dr. Cholak stated that measurements were made in city streets in Los Angeles during the smog season of 1954. From August to November of this year, the average concentration of particulate in the city streets was 6.2. Therefore, the above values can be regarded as low.

Dr. Cholak stated that at the loading racks lead-in-air values show the atmosphere to be even safer than at Yellow Cab.

In discussing the interpretation of all the above data, Dr. Cholak stated that the currently accepted threshold limit for lead-in-air is 200 γ /cu m. This is a value that was set about 30 years ago by the Government Industrial Hygienists. Many years ago it was reduced to a value of 150 and then, within the last year or so, was again raised to 200. The Government Industrial Hygienists who set this value have no actual authority by law according to Dr. Cholak; however, he stated that some states accept the recommendations of this group as mandatory and incorporate them in their codes. Dr. Curtis stated that California generally accepts the Government Industrial Hygienists recommendations.

The threshold limits for any toxic substances represent a safe working environment for a man exposed eight hours a day to the atmosphere for prolonged periods of time (30 years). These values can be exceeded for a limited time. The threshold limit for carbon monoxide is 100 ppm.

Commenting on the degree of ventilation in the Yellow Cab garage, Dr. Cholak stated that he considers a wind velocity of 30 feet per minute as fair ventilation.

Mr. Cooley raised the question of the progress of lead-in-urine analysis. We have received no data yet on Phase II or Phase III for lead contents of the urine samples. Dr. Cholak stated that due to vacation schedules at Cincinnati we can expect future analyses to be produced only at about one half the rate of previous results. This triggered a lengthy discussion of how the analyses could be speeded up.

Mr. Cooley emphasized the value of bringing the test to a conclusion soon. The need for this was obvious to all parties concerned, both due to the value of having the results and the high costs of the tests. This discussion eventually culminated in a telephone call to Dr. R. A. Kehoe in Cincinnati. In this call, it was proposed that Dr. Gerlach's laboratory in Antioch conduct at least some of the lead-in-urine analyses. Dr. Kehoe was informed that the Antioch laboratory has had experience in running lead-in-urine by the ash method which is the procedure employed at the Kettering Laboratory. Dr. Kehoe replied that he believed there would be enough systematic difference in the results between the two laboratories so that we should not divert the samples at this time from the Kettering Laboratory. The question was raised as to whether we were not taking a risk in having no analyses from Phase III. How do we know that the personnel exposed to this atmosphere is not assimilating large quantities of lead? Dr. Kehoe replied that he was not at all concerned with this hazard. He stated that the lead-in-air results were not so high as reached by normal fluctuations in TEL manufacturing plants.

Originally, the duration of the test at the Yellow Cab site was planned to be three weeks. It now has been extended to six weeks. Mr. Cooley raised the question as to the probability of concluding in the future that a still longer test would be required. Dr. Kehoe stated that this will not be necessary. He stated that it takes more than a few weeks to approach a plateau of lead content in urine, sometimes a few months. However, conclusive results may be expected within six weeks at the Yellow Cab test site.

Dr. Kehoe emphasized that he considered that there is no hazard of lead intoxication to any of the Yellow Cab employees. However, to increase the safety of the test and to get the most significant results early, it was proposed that the most recent samples of urine obtained from Phase III be analyzed first. Then the analyst should work backwards from the recent samples, analyzing the oldest samples last. This was regarded as a good suggestion and will be adopted. Concerning a proposal to split some of the samples and send a portion to Dr. Kehoe and the other part to Antioch, Dr. Kehoe vigorously opposed this suggestion. He did agree, however, to a proposal to send him two of the three weekly samples from each subject. A third sample is to be sent to Antioch.

It is Dr. Kehoe's opinion that, if no serious differences in lead assimilation show up in the six-week test, the Surgeon General of the United States should then be approached for approval of the use of X-105A in gasoline. However, the commercialization of X-105A will have to be accompanied by measurements to obtain long term statistical data on the effect of the additive on the public health. Similar measurements of the effect of TEL on the public health have been continuously in progress almost since the inception of the use of TEL in gasoline.