KE 0022972

N22725

WATER CANS, FIELD, 5 GALLON, GALVANIZED

FINAL REPORT

December 17, 1941.

The following additional report, supplementing the preliminary report of October 9, 1941, is submitted:

1. TOTAL SOLIDS

a. Cans used and description:

Can "A" - No visible breaks in lining.
"B" - Notheaten and rusty from galvanic action.
"C" - No visible breaks in lining.
"D" - No visible breaks in lining.

b. Experiment: All cans were thoroughly scrubbed with calgonite and hot water, using a stiff fiber brush. After very thorough rinsing, 10 liters of water (as described in the table below) were introduced and allowed to remain, with occasional shaking, for 24 hours. In the case of chlorinated samples, the amount of chloride solution required to give a residual concentration of 1 ppm. of free chlorine after one-half hour was first determined for each water, then that amount of chlorine solution was added to the water in the can.

c. Results:

TOTAL SOLIDS
(All results in mg. per liter = parts per million)

Can	Type of Water	Sediment	Solids in Solution	Total Solids	Solids in Blank	Net Solids Added by Solution of Can Lining	Character of Water after 24 hrs. in can
C	Distilled	3	20	23	4	19	Slightly cloud
C	Distilled + 1 ppm residual chlorine	21	15	36	3	28	Quite cloudy
D	Tap water	23	185	208	188	20	Very cloudy + rust.
A	Tap water + 1 ppm chlorine	30	170	200	181	19	Very cloudy + rust.
C	Tap water + 1 ppm residual chlorine	40	174	214	181	33	Very cloudy + rust.
B	Tap water + 1 ppm residual chlorine	48	185	233	181	52	Very cloudy + rusty ppt.

2. LEAD and ZINC

All determinations of lead were made by a photometric dithizone method adapted from that of Sanbach, E., Ind. Eng. Chem., Anal. Ed., 11, 400 (1939). Zinc determinations attempted by the method of Fiehl, C. B., J. Am. Water-works Assn., 33, 240 (1941), gave discordant results as did the unmodified methods of Wichmann, H. J., Ind. Eng. Chem., Anal. Ed., 11, 66 (1939), and Fowling, L., and Miller, T. J., Ind. Eng. Chem., Anal. Ed., 13, 145 (1941). A modification of these methods by this Division (to be published) has finally given results which are reproducible and reasonably accurate.

a. Cans used were as described in 1 a.supra.

b. Experiment: All cans were again thoroughly cleansed as in 1 b. Raw water was secured from Rock Creek, allowed to sediment in glass for 24 hours, and the supernatant siphoned off. To 10 liter amounts of this water and to similar volumes of tap water, the predetermined amount of chlorine solution was added so that a residual of 1 ppm. of free chlorine remained after 30 minutes in glass. The chlorinated water was then placed in the cans, allowed to remain for 24 hours, and then transferred to clean glass bottles where it was kept tightly stoppered during the determinations.

All samples showed marked cloudiness.

c. Results: All are in mg. per liter, or parts per million.

LEAD and ZINC

Can	Type of Water	Lead	Zinc
A	Tap water + 1 ppm residual Cl	0.038	70.3
D	Tap water + 1 ppm residual Cl	0.035	62.0
B	Rock Cr. water + 1 ppm residual Cl	0.037	27.5
C	Rock Cr. water + 1 ppm residual Cl	0.027	23.0

Note: Figures for lead are the average of five separate determinations in each case. Variation from the average did not exceed ± 0.0015 mg in any instance.

3. DISCUSSION

Attached hereto and to be considered with the above is a report by Dr. Dillard Jacklo, Kettering Laboratory of Applied Physiology, University of Cincinnati, on three similar cans. It will be noted that the preliminary and subsequent cleansings of cans at the Army Medical School were far more complete than those by Dr. Jacklo. Also, the cans at the Army Medical School were used many times over a period of 3 months before the final determinations

of lead and zinc were found to be acceptably accurate. These facts may account for the lesser amounts of lead found at this laboratory.

4. CONCLUSIONS

a. The conclusions expressed by Dr. Lachle on page 1 of his report of November 21, 1941, and his discussion on pages 3 and 4 amply cover the problem.

b. The lesser amounts of lead found in our laboratory may well be due to the repeated strenuous cleansing, or to variations in the composition of the lining of the cans, since the cans submitted to the Lettering Laboratory differ from those submitted to the Army Medical School.

c. In addition to the health hazard stressed by Dr. Lachle, and to the unpalatability of water from these cans, particularly noted in the preliminary report of October 7, 1941, attention is called to the mechanical defects in the cans. In every can examined, "blisters" resulting from non-adherence of lining to base metal were found. During use, these "blisters" break, exposing the iron of the base metal. Electrolytic action is then set up, the zinc lining rapidly becomes moth-eaten with exposure of more of the base metal, which rusts through and produces leaks.

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