

Mr. John J. Light  
Balanced Industries  
3505 Horse Drive  
Indianapolis, IN 46222

Dear Mr. Light:

This refers to your letter of March 24, 1979, in which you ask questions concerning the effect of various kinds of earth on copper pipe carrying freon.

Question: "What earth conditions cause copper to coat, reducing the conductance or attacking the copper causing leaks of freon?"

Answer: Generally cinders, marl, and soils containing organic acids derived from decaying organic matter, i.e., humus, soils containing sulfates and sulfate reducing bacteria, concentrations of sodium chloride and sodium sulphate are relatively corrosive to copper. The corrosivity of a given soil is governed by the porosity (aeration), electrical conductivity of the dissolved salts including depolarizers or inhibitors, moisture, and pH. When copper pipe is buried in any of the aforementioned soils or mixtures thereof, corrosion may occur. Products of corrosion would form films or coat the copper pipe reducing its heat conductivity and eventually the copper pipe wall would corrode and leak.

The most extensive field tests on various metals and coatings in practically all types of soils were initiated in 1910 by K. H. Logan of the National Bureau of Standards (NBS). These tests were published in 1957 by NBS Circular 579, "Underground Corrosion," M. Ronmanoff. We suggest that you obtain a copy of the study from a technical library or National Bureau of Standards, B354 Materials Building, Washington, D.C. 20234.

Question: "What copper, alloys, or coatings are best?"

Answer: The Materials Transportation Bureau does not certify or endorse proprietary items such as copper, alloys, or coatings for pipe. However, you may wish to contact the National Association of Corrosion Control Engineers, Group Committee T-10 "Underground Corrosion Control" at 1440 South Creek, Houston, Texas 77084, for additional information concerning the performance of copper and its alloys in various types of soil.

Sincerely,

Cesar DeLeon  
Associate Director for  
Pipeline Safety Regulation  
Materials Transportation Bureau

BALANCED INDUSTRIES

Office of Hazardous Materials  
Pipeline Hazardous  
Materials Experts

Gentlemen:

I am an economist and builder. I plan to put in several hundred homes, with copper pipe (or an alloy, etc.) which will carry freon in it.

I need to know how earth of various kinds interacts with copper (etc.) pipe, which is 5°F to 10°F colder than the earth around it. The copper will not be less than 35°F+/- . In Canada, in wet high water table sandy soil, the copper pipe had no difficulties in absorbing ground heat for 23+ years. In some soils in Indianapolis it has been successfully used. In a few cases a lime type accumulation occurred on the pipe after a few years, reducing the conductivity of the pipe.

Based on the good examples that worked we can provide heat very reasonably by this system. Much copper or copper alloy will be used, however, I want to know what earth conditions cause copper (etc.) to coat, reducing conductance or attacking the copper, causing leaks of freon. What copper, or alloy, or coatings, are best? I will deeply appreciate your help; and thus open up a new enormous market for copper.

Sincerely yours,

John J. Light

**NOTE: ATTACHED IS AN ARTICLE WITH THIS LETTER**

Who is John J. Light?

Analyst who is highly respected in Washington, by writers for businessmen, and by economists in various countries.

Republic of the Philippines  
DEPARTMENT OF INDUSTRY  
BUREAU OF INDUSTRIAL INFORMATION AND PROGRAMS  
Chronicle Building, Meralco Avenue  
Pasig, Rizal, Philippines  
P.O. Box 322 Greenhills 3113

27 April 1977

Dear Mr Light:

. . . We view the introduction of this concept of Balanced Industries as a significant innovation in the field of investments . . .

Lilia R. Bautista  
Asst. Secretary

THE WHITE HOUSE  
WASHINGTON

March 29, 1977

Dear Mr. Light:

I apologize for this belated acknowledgment of your letter, but want you to know that I appreciated your thoughtfulness in writing. The enclosures which accompanied your letter will be shared with members of the staff here.

Best regards,

Sincerely,

Hamilton Jordan  
Assistant to the President

U.S. News & World Report  
WASHINGTON

Dear Mr. Light:

Thank you for your letter and enclosures. I read them with interest, and am passing them on to the editors who are responsible for the news content of "U.S. News & World Report".

Sincerely,

Howard Flieger

U.S. Department of Labor  
Employment and Training Administration  
Washington, D.C. 20213

Dear Mr. Light:

Your letter to Mr. Eisenstat enclosing your suggestions about achieving full employment with lower prices and without deficit financing has been referred to me for reply.

It must have taken a great deal of time and effort to compile this thought provoking material. The sections on the discretion of money and a self-help program for housing, food production and transportation were especially intriguing. Thank you for sharing your ideas with us.

With the help of concerned citizens such as yourself, we will hopefully be able to make progress in this most important area.

Sincerely,

Administrator  
Policy, Evaluation and Research

William B. Hewitt

". . . We are looking forward to having you consult with us on establishing balanced industries in our country . . ."

An African Country

John J. Light

Staff member U.S.A. Foreign Economic Administration, in World War II, in charge of preparing estimates of need, and allocating supplies of all machinery and other critically needed supplies, to all allied and neutral nations; plus estimating supplies needed and allocating machinery and supplies for all economic development projects outside the U.S.A., for steel mills, coal mines, etc. for various nations.

Phi Beta Kappa, Magna Cum Laude, University of Chicago.