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Lead and Tobacco Smoke

Because of the recent increased interest in the amount of lead in tobacco smoke some background information concerning this subject might be helpful. In 1921 Cadenhead and Jacques of Canada became interested in the problem that smoking tobacco could become contaminated with lead from the foil in which it was wrapped. They performed an experiment to show that, at least when lead was added to the tobacco to the extent of 17%, small quantities were volatilized during smoking and hence passed into the smoker's respiratory system. In 1929 Reitzel summarized the work that had been done on poisoning resulting from lead in snuff. He attributed the presence of lead in snuff to the use of lead chromate to improve the color of snuff, or to contamination from the lead containing foils in which the products were wrapped. He also mentioned as a source of contamination the spraying of tobacco plants with lead arsenate insecticides. In 1936 Cassil and Smith of the Division of Insecticide Investigations, U.S. Department of Agriculture, found from 3.5 to 85 p.p.m. of lead in smaples of chewing tobacco and from 12 to 131 p.p.m. in snuff, and they attributed the source of the lead to the lead arsenate used to dust the tobacco plants. Zeidler and Wagner working in Canada in 1937 found an average content of 22 p.p.m. lead in Canadian cigarettes as compared with an average of less than 2.5 p.p.m. in those made from pure oriental tobaccos. (no mention is made of the use of insecticides on oriental tobacco fields).

Other investigations concerning this problem of lead in tobacco smoke are being reviewed by me at this time, and as theinformation is available I will forward it to your office.

At the Lead Hygiene Conference in November of 1958, Dr. Stokinger made reference to a study performed at Duke University in 1956 concerning the amount of lead in tobacco smoke. At this conference he stated that in tobacco smoke, lead contains the highest metal content of all the metals analyzed excpet sodium and potassium and that the lead amounts to about three-tenths of a microgram per puff. He then went on to say that assuming a man smokes three packs of cigarettes per day, and assuming 50% retention of the smoke, that this would amount to about 0.09 mgm lead per day. I have included a rather detailed summary of the article concerning this study at Duke University, including methods used, so that you might have an idea of the experimental design and methodology of the project.

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It should be pointed out that Dr. Stokinger stated the maximum amount of lead found in cigarette smoke (as shown in this experiment). For the purpose of setting standards this probably is the value that should be used, if one wants to use the worst possible conditions. However, only in Brand B was there 3.0 micrograms of lead per cigarette (or three-tenths microgram per puff). In Brand A only 1.0 microgram of lead per cigarette in the smoke was found, and in the composite of five brands, 1.9 micrograms of lead per cigarette. All cigarettes used were 70 mm in length and without filters.

Although tobacco is an agricultural product, it is my understanding that the restrictions placed on foods have not been applied to tobacco. This restriction on foods states that the lead residue on an agricultural product shall not exceed 7.0 mg. per kilogram of food. In light of the recent interest in placing standards on the amount of lead allowable in the atmosphere, it might be worthwhile to consider including tobacco under the standards placedon foods. Certainly other insecticides for the horn worm, wire worm, and flew beetle have been developed besides those containing lead arsenate.

If one takes the known average concentration of lead in Los Angeles atmosphere, approximately 5 micrograms per cubic meter, and assuming 20 cubic meters breathed per day with 50% retention of lead, then a non-smoker in Los Angeles will retain 0.05 mg. lead per day solely from the atmosphere. Comparing this with Dr. Stokinger's three pack per day cigarette smoker and using his assumptions of lead retention resulting in the value of 0.09 mg. lead retained per day, it can be seen that the cigarette smoker of this magnitude will retain about twice as much lead in a relatively "lead-free" community atmosphere than the non-smoker will retain in Los Angeles. Might it not be more feasible to initiate our control of "lead air pollution" by limiting the lead content in tobacco?