

# Metabolic Solutions Report

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## "It's POLLUTION, Stupid! "

by George Glasser

Scientists can argue and bicker about the fluoride ion for eternity and beyond, but the one indisputable fact that no one can rebut is the origin of the product most used to fluoridate drinking water. The pro-fluoridationists are using captured pollution from phosphate fertilizer production: Commercial Grade Fluorosilicic Acid and Sodium Fluorosilicate. It is not, "simply the fluoride ion in water," it is a complex recipe of toxic substances that most countries have labeled:

Hazardous Air Pollutants (HAP).

United States Environmental Protection Agency

Rebecca Hanmer, Deputy Administrator for Water, USEPA, 1983, wrote:

"..in regard to the use of fluorosilicic acid as a source of fluoride for fluoridation, this agency regards such use as an ideal solution to a LONG-STANDING problem. By recovering by-product fluorosilicic acid from fertilizer manufacturing, water and air pollution are minimized, and water utilities have a low-cost source of fluoride available to them."

The Geology of Florida, 1997, University Press of Florida, Pg. 143 The Economic and Industrial Minerals of Florida.

In addition to uranium, fluorine is an economic by-product of phosphoric-acid production. The fluorine from the rocks reacts with silica to form SiF<sub>4</sub> gas. During acid production, this gas is recovered as fluorosilicic acid (H<sub>2</sub>SiF<sub>6</sub>) in wet scrubbers that are part of the environmental-protection equipment. Fluorosilicic acid is widely used in the preparation of chemical compounds and in the treatment of public drinking water... Radon, a daughter product of the uranium-series decay, remains a major environmental problem... Gases such as ammonia sulfur oxides, and fluorine species have caused problems in the past.

Production of Phosphoric Acid - Description

Also See: Production of Phosphoric Acid 2 - Description

Fluorine Recovery in the Phosphate Industry:

By H. F. J. Denzinger, H. J. König and G. E. W. Krüger

ABSTRACT - Phosphorous & Potassium #103 SEPT/OCT 1979, pages 33-39

The fluorine compounds liberated during the acidulation of phosphate rock are now rightly regarded as a menace and the industry is now obliged to suppress emissions-containing vapors to within very low limits in most parts of the world. As with any pollution control operation, it is highly desirable for the operator of the fluorine scrubber to help defray at least partially the cost of the operation. This article reviews the chemical and technical principles of gaseous fluorine compound removal, the principal types of practical fluorine recovery processes that have been developed and their limitations, and possible methods of utilizing the fluorosilicic acid solutions which these processes generate.

USEPA OFFICE OF AIR AND RADIATION

1996, USEPA Office of Air and Radiation, 40 CFR Part 63 [IL-64-2-5807; FRL-5656-4] RIN 2060-AE40 and 2060-AE44:

SUMMARY: Hazardous air pollutants (HAPs) emitted by the facilities covered by this proposed rule include hydrogen fluoride (HF); arsenic, beryllium, cadmium, chromium, manganese, mercury, and nickel (HAP metals); and methyl isobutyl ketone (MIBK) emissions. Human exposure to the HAP constituents in these emissions may be associated with adverse carcinogenic, respiratory, nervous system, dermal, developmental, and/or reproductive health effects. "

Carcinogenicity: Arsenic and Old Laws, NRDC

Bladder Cancer: EPA Arsenic Technical Fact Sheet, Proposed Rules

EPA: Radiation in Drinking Water

Section II (introduction); D. Phosphoric Acid Manufacturing and Phosphate Fertilizers Production Industry Profile (paragraph 2). The second means of manufacturing phosphoric acid is through wet processes. There are 47 wet acid plants at 21 locations. The basic step for producing phosphoric acid is the acidulation of phosphate rock. Typically, sulfuric acid, phosphate rock and water are reacted with one another to produce phosphoric acid and gypsum. When phosphate rock is acidulated to manufacture wet process phosphoric acid (WPPA), fluorine contained in the rock is released. Fluoride compounds, including HF, are evolved as particulates and gases which are emitted to the atmosphere unless removed from the exhaust stream.  
43 and 63 [IL-64-2-5807; FRL-6329-5] RIN 2060-AE40 and 2060-AE44, JUNE 10, 1999

Also, the commentator said the proposed MACT floor standard for existing facilities failed to consider the benefits of airborne radionuclides reductions achieved by the proposed new facility standard. Citing the Agency's proposal not to exercise its statutory authority to go beyond-the-floor and require more stringent controls on existing WPPA plants based upon EPA's analysis of the health impacts of HF and HAP metals, the commentator was unaware of any Agency analysis of the human health and environmental benefit. The commentator maintained that the Agency was required by section 112(d) To evaluate the public health benefit and the environmental benefit which would result from the decreased radionuclide emissions associated with the particulate if existing WPPA facilities were required to meet the new source WPPA standard for HF emissions.

Handling of radium and uranium contaminated waste piles and other wastes from phosphate ore processing

By G. Schmidt, C. Krüppers; annex by P. Robinson

Nuclear Science and Technology, Report EUR 15448 EN. p. 121 ISBN 92-827-4076-5, Published by the European Commission, Luxembourg 1995.

#### ABSTRACT

Natural phosphate ores contain radionuclides of the uranium series. In this report, calculations and evaluations of radiation doses for the public and workers from the phosphate industry are performed. From these findings, it is evaluated whether established radiation protection procedures should also apply to certain facilities, occupations and waste management practices in the phosphate industry. Measures for improvement and remediation are discussed and evaluated, and recommendations given.  
CONCLUSIONS:

The findings in this report are summarized with the following statements:

"Processing and waste handling in the phosphate industry is associated with radiation levels of concern for workers and the public. The level of protection for these groups should be more similar to the level of protection that is state of the art in other industries, particularly the nuclear industry. Radiation protection measures for workers are necessary, especially for certain areas of the facility and for repair jobs, because potential radiation doses reach a relatively high level of concern compared to levels in other branches. Some waste management practices still found in the phosphate industry still deliver high individual and/or collective doses to the public, that can be substantially reduced by shifting to alternative management strategies. Environmental risks from phosphogypsum piles can be reduced using relatively simple and cheap measures such as covers, liners or more sophisticated wastewater treatment. These are in place and working well at other facilities in and outside of Europe. The unrestricted reuse of materials from phosphate processing facilities and of waste materials creates potential hazards to man that exceed the limits for radiation protection."

Available from:

Office of Official Publications of the European Communities  
2, rue Mercier, L-2985 Luxembourg, Luxembourg

Patty's Industrial Hygiene and Toxicology, Vol. 2, Part A: 4th Edition, 1993.

Chapter 15, pg. 831-884: Silicon and Silicates, Including Asbestos, Carl O. Schulz, Ph.D., D.A.B.T. Pg. 832

The fourth revision of this book marks the first time that the toxicologic aspects of silicon and its compounds have been discussed in a separate chapter. Pg. 882-883: 10 Other Silicon Compounds, 10.1 Silicon Halides

Of the four silicon tetrahalides (also known as tetrahalosilanes), only three, the fluoride, chloride and bromide, are of commercial significance, with silicon tetrachloride being of greatest importance. The tetrafluoride is a gas at room temperature whereas the tetrachloride and tetrabromide are fuming liquids. They are prepared by the direct halogenation of pure quartz or silicon carbide at elevated temperature and pressure. The primary use of silicon tetrachloride is as the starting material for the manufacture of high-purity silicon, amorphous fumed silica and ethyl silicate. Silicon tetrafluoride is used as a starting material for fluosilic acid (H<sub>2</sub>SiF<sub>6</sub>) for water fluoridation. The silicon tetrahalides are readily hydrolyzed to their corresponding hydrogen halides and silica upon contact with moisture. For this reason all three silicon tetrahalides are highly toxic by either inhalation or ingestion and can

cause severe irritation of the skin and mucous membranes. In this respect their occupational hazards are qualitatively similar to those associated with the hydrogen halides. No TLVs or OSHA standards have been developed for these compounds.

Researchers use molecular silica dioxide precipitated from a better grade of Fluorosilicic Acid ( $H_2SiF_6$ ) for cancer research!

R. Eastman, General Chemistry: Experiment and Theory,

1969; Holt, Rinehart and Winston, Inc.

"Hydrofluoric acid has the distinctive property of attacking glass/sand (silicon dioxide). The reaction is the attack of a strong Lewis Base  $F^-$  (the fluoride ion) on the Si (silica) atoms, thereby replacing the O (oxygen) atoms."

AUTHOR: Saffiotti U, Ahmed N TITLE: Neoplastic transformation by quartz in the BALB/3T3/A31-1-1 cell line and the effects of associated minerals . SOURCE: Teratog Carcinog Mutagen; 15(6):339-56 1995 UI: 96310605 ABSTRACT: Quartz, the most common form of crystalline silica, was tested quantitatively for neoplastic transformation in the mouse embryo cell line, BALB/3T3/A31-1-1. Five quartz dust samples of respirable size [Min-U-Sil 5 (MQZ); hydrofluoric-acid-etched MQZ (HFMQZ); Chinese standard quartz (CSQZ); DQ12; and F600] all induced significant levels of neoplastic transformation, showing dose-dependent increases in the frequency of morphologically transformed foci at lower tested doses and a plateau level of response at higher doses. The plateau levels reached by the five tested samples did not differ substantially (maximum transformation frequencies per 10(5) cells ranging from 53.2 for MQZ to 28.3 for HFMQZ). F600 had minimal cytotoxicity but transforming activity comparable to the other samples. Cells from all tested transformed foci, when injected s.c. in nude mice, grew as sarcomas. Cytogenetic analysis showed that all tested silica-transformed cell lines had acquired one to five additional marker chromosomes, of types not seen in untreated control lines, indicative of induced chromosomal translocations and amplification. Increased expression of one or more of five genes (p53, myc, H-ras, K-ras, and abl) was observed in several quartz-transformed cell lines. No transforming activity was found for hematite and anatase (both nontoxic), and for rutile (more toxic than MQZ). Combined exposure (1:1 w/w per unit culture area) of each of these dusts with MQZ showed that hematite and anatase inhibited MQZ toxicity as well as transformation, whereas rutile markedly enhanced MQZ toxicity but not MQZ-induced transformation. AUTHORS: Rumiantsev GI; Novikov SM; Mel'nikova NN; Levchenko NI; Kozeeva EE; TITLE: Experimental study of the biological effect of salts of hydrofluosilicic acid SOURCE: Gig Sanit, ISS 11, 1988, P80-2 SECONDARY SOURCE ID: TOXBIB/89/212028 MAIN MESH HEADINGS : Fluorides/\*TOXICITY; Liver/\*DRUG EFFECTS, Nervous System/\*DRUG EFFECTS, Silicon/\*TOXICITY

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SEE: Seeds of Cancer -- Your Child --Links!  
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What does a company do with the essence of pollution?

In the late 1960's, Ervin Bellack, USEPA chemist and a manufacturing representative put their heads together and worked out the ideal solution to a monumental pollution problem.

The recovered phosphate fertilizer manufacturing pollution contained about 19% fluorine. The concentrated pollution scrubber liquor was perfect to use as a water fluoridation agent. It was a liquid and easily soluble in water unlike sodium fluoride (the waste product from aluminum manufacturers). It was also inexpensive, and there was a glut of the concentrated toxic waste.

Fate also intervened. The aluminum industry who previously supplied sodium fluoride for water fluoridation was facing a shortage of fluorospar used in smelting aluminum. They began to recover fluorine and make synthetic fluorospar. Consequently, there was a shortage of sodium fluoride to fluoridate drinking water.

Ervin Bellack and the industry seized the opportunity to fill the gap in the market and dump the new source of recovered pollution into America's drinking water.

For the phosphate fertilizer industry, the shortage of sodium fluoride was the key to turning red ink into black and an environmental liability into a perceived asset.

The concentrated pollution could be dispersed into drinking water throughout the United States, one drop at a time.

With the help of the USEPA and Ervin Bellack, fluorosilicic acid was not regarded as concentrated toxic waste anymore, a liability. It became "FLUORIDE, the proven cavity fighter."

USEPA and U.S. Public Health Service waived all testing procedures and expedited the disposal of the radioactive concentrate into America's drinking water as "New and Improved FLUORIDE."

Immediately, without any oversight and clinical or safety studies, the U.S. Public Health Service and American Dental Association encouraged cities to use the pollution concentrate for drinking water fluoridation.

1976, the Resource Conservation and Recovery Act (RCRA) opened the door for USEPA to work with industry and actively find markets for recovered pollutants such as fluorosilicic acid.

By 1983 the official USEPA policy was: "In regard to the use of fluosilicic (fluorosilicic) acid as a source of fluoride for fluoridation, this agency regards such use as an ideal environmental solution to a long-standing problem. By recovering by-product fluosilicic acid from fertilizer manufacturing, water and air pollution are minimized, and water utilities have a low-cost source of fluoride available to the communities." (Rebecca Hanmer, Deputy Administrator, Office of Water, USEPA in 1983 correspondence to Dr. Leslie Russell stated USEPA position on water fluoridation).

While the EPA Office of Drinking Water pushes the use of pollution scrubber liquor as a drinking water fluoridation agent, EPA Office of Air and Radiation considers knowingly pumping the same pollution into the atmosphere a felony violation of the Clean Air Act. "40 CFR Part 63 [IL-64-2-5807; FRL-5656-4] RIN 2060-AE40 and 2060-AE44:

This action proposes national emission standards for hazardous air pollutants (NESHAP) for new and existing major sources in phosphoric acid manufacturing and phosphate fertilizers production plants. Hazardous air pollutants (HAPs) emitted by the facilities covered by this proposed rule include hydrogen fluoride (HF) ; arsenic, beryllium, cadmium, chromium, manganese, mercury, and nickel (HAP metals); and methyl isobutyl ketone (MIBK) emissions. Human exposure to the HAP constituents in these emissions may be associated with adverse carcinogenic, respiratory, nervous system, dermal, developmental, and/or reproductive health effects."

In promoting the use of the pollution concentrate as a fluoridation agent, the ADA, Federal agencies and manufacturers failed to mention that it was hot, radioactive. Uranium and all of its decay rate products are found in the raw phosphate rock, fluorosilicic acid and in the phosphate fertilizer. Before 1991, upwards to 75% of the U.S. supply of uranium oxide to fuel the nuclear industry was produced in Central Florida. However, today, uranium is not extracted because of economic reasons. During the wet process manufacturing trace amounts of uranium and its decay rate products are released and captured in the pollution scrubber. As long as the amount of contaminants added to the drinking water (including radionuclides in fluorosilicic acid) do not exceed the limits set forth in the Safe Drinking Water Act , the EPA has no regulatory problem with the use of any contaminated products for drinking water treatment.

While uranium and radium found in fluorosilicic acid are known carcinogens, two decay rate products of uranium are even more dangerous and carcinogenic: Radon-222 and Polonium-210 .

During the acidulation process that creates phosphoric acid, radon (a gas) contained in the phosphate pebble can be released in greater proportions than other decay rate products (radionuclides) and carried over into the fluorosilicic acid. Polonium may also be captured in greater quantities during scrubbing operations because like radon it is easily soluble in acid and can readily combine with fluoride.

USEPA is responsible for regulating radionuclide levels in the air and drinking water; consequently, they are aware that Radon-222 decays into Lead-210 in 3.86 days. The lead isotope and does not give off harmful alpha radiation for twenty years until it turns into Polonium-210 . Unless someone knew to look for specific isotopes, no one would know that a transmutation to the extremely radioactive Polonium-210 occurs .

The more frightening aspects of the uranium decay rate products is that a "half life" means that one-half of the radionuclide decays to the next product within a given amount of time. In other words, when we are talking about Polonium 210 (or whatever) lasting for 138 days (or whatever), what actually happens is that after 138 days (one half life), half of the polonium will have changed to something else, but half will be still there. After another half life, it will down to be a quarter activity, after another half life it will be down to an eighth - i.e., decreasing by half with each half life; consequently, radionuclides are the poison that keeps on poisoning in ever diminishing amounts.

For more information on uranium decay rate products, go to: [Uranium Radiation Properties](#)

Polonium-210 may be the most insidious and most significant health threat in the pollution concentrate. Half of the polonium gives off intense alpha radiation for 138 days until it turns into regular lead and becomes stable, however, half still remains emitting alpha radiation for another 138 days, then a quarter of the original amount and so on.

During the decay period, a very small amount can be very dangerous. The lead-210 isotope acts like calcium in the body. It may lay stored in the bone or body tissues for up to twenty years before it explodes like a carcinogenic, time released nuclear devices as Polonium-210.

The fluoridated water someone drinks today, may be the cause of cancer twenty years down the road. No one knows what the consequences of using the pollution concentrate because there has never been any clinical research done with the product.

One particle of Polonium-210 gives off 5,000 times more alpha radiation than the same amount of radium. Damage occurs in the body from complete tissue absorption of the energy of the alpha particle. Scientists say that Polonium-210 can be carcinogenic to people if exposed to more than 0.03 microcuries (6.8 trillionths of a gram).

Scientists write 6.8 trillionths of a gram as  $6.8 \times 10^{-12}$ g because it would appear as 0.000000000068 grams. Figures like that are hard to grasp to the average person, but they show that polonium is harmful to humans in very minute amounts.

Use of the pollution concentrate to fluoridate drinking water places one at risk continuously. Drinking water fluoridated with fluorosilicic acid contains radon at every sequence of its decay to polonium. Also, the fresher the batch of pollution concentrate, the more polonium it will contain. The more water fluoridated with the pollution concentrate someone consumes, the better the chances of developing cancer. It all boils down to the luck of the draw. It all depends on how much is stored in the body and in what tissue.

The reason the contaminated fluorosilicic acid is allowed to be used for artificially fluoridating drinking water is because it is used in such small amounts. Federal regulations would not be violated. However, no clinical studies were ever performed with the product.

While water fluoridation proponents produce thousands of clinical studies about fluoride, there is not one clinical study done with the pollution concentrate or typical tap water containing fluorides. Except the unwary public, everyone involved in the promotion and sale of the pollution concentrate is aware that no clinical tests have been done with the products. They are also aware that radioactive and other carcinogenic substances are contained in the fluoridation agent. The contaminants could be at levels that may pose a statistically acceptable cancer risk to expendable subsets of the population.

The USEPA and Centers for Disease Control are aware of the increased cancer risk from using the toxic waste to fluoridate drinking water. However, they have never commissioned or required any clinical studies with the pollution concentrate, specifically, the hexafluorosilicate radical whose toxicokinetic properties are different than the lone, fluoride ion. In fact, the USEPA, Fluoride: Regulatory Fact Sheet , 1997 states:

"Ideally, the animal studies which support the fluoride drinking water standards would exactly replicate actual human exposure. Unfortunately, due to varying human life styles, diets, etc., this is not feasible. Rather, EPA must make a judgement as to whether a given animal study is or is not relevant to humans."

Section 104 (I) (5) of CERCLA (Comprehensive Environmental Response, Compensation and Liability Act) directs the Administrator of the Agency for Toxic Substances and Disease Registry (consulting with the USEPA and the Administrator of the USEPA and agencies and programs of the U. S. Public Health Service) with the National Toxicology Program to initiate a program of research of fluorides where adequate data is not available . However, after almost 30 years of using fluorosilicic acid and sodium fluorosilicate to fluoridate the drinking water, there has not been one study commissioned with the product. All clinical research with animal models are done using 99.97% pure sodium fluoride and double distilled or deionized water. All criteria used to determine the safety of artificial water fluoridation is based on the ideal circumstance and not the complex reality of the practice. Clinical studies done under controlled conditions are the models used to determine results of epidemiological and population studies. However, the reality of artificial drinking water fluoridation is quite different.

There is no real quality control of the product, and contaminants in the fluorosilicic acid are contingent upon the quality of the phosphate rock. Also, the reaction of fluorosilicic acid with other reactants (contaminants) in typical drinking water may create complex ions, potentially toxic ionic compounds. It is likely that these complex ions are exponentially more toxic than sodium fluoride dissolved in distilled water. The fluorosilicic acid is also contaminated with arsenic, cadmium, mercury, lead, sulfides, iron and phosphorous, not to mention radionuclides. Most of the contaminants have the potential to react with the hexafluorosilicate radical and may act as complex ionic compounds. The biological fates and toxicokinetic properties of these complex ions are unknown."The reality of artificial water fluoridation is so complex that determining the safety of the practice is impossible.

Tap water is chemically treated and often contains contaminants that are unique to a particular water system.

The addition of a fluoridation agent can create synergized toxicants in a water supply that have unique toxicokinetic properties found only in that particular water supply. Possible maladies resulting from chronic ingestion of the product would be considered an anomaly and not related to water fluoridation in population or epidemiological studies.

The fluoridated water you drink is not the same product as researched. The only similarity is the fact that the fluoride ion is present in some form. The fluoride ion only hypothetically exists as an entity in an ideal solution, purified water, and tap water is far from pure H<sub>2</sub>O.

Vendors selling the pollution concentrate as a fluoridation agent use a broad disclaimer found on the Material Data Safety Sheet: "In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent to the product."

The product is a pollution concentrate, not fluorine or fluoride as proponents state. Fluorine is only another captured pollutant comprising about 19% of the total product.

The next time you turn on the tap and water gushes out into a glass, reflecting on the USEPA disclaimer before drinking may be a prudent course of action.

"In the United States, there are no Federal safety standards which are applicable to additives, including those for use in fluoridating drinking water." (USEPA Fluoride: Regulatory Fact Sheet. 1997). In essence, consume at your own risk or "buyer beware."

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