UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street, WTR-6
San Francisco, CA 94105

18 June 2014

Mr. Anthony T. Nguyen
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PO Box 931
Imperial, CA 92251

Dear Mr. Johnson:

Thank you for your letter of 11 June, 2014, asking about possible health effects from your drinking water when you at the Kern Valley State Prison in Delano. You had some specific questions about whether you can get exposed to arsenic through your skin, by rinsing your mouth, or by inhalation of mists while showering. You also wanted to know about long-term poisoning by low levels of arsenic.

I'll try to answer your question about the effects of drinking water with arsenic in it in two parts: what arsenic does to people, and what you can expect from drinking water with arsenic at the levels you got at KVSP.

With respect to arsenic, if you consume enough of it, it is definitely a poison and has several adverse physiological effects. At high enough levels (about 100-200 milligram (mg, 1/1000th of a gram)), it stops mitochondrial respiration, your cells can't generate energy, and they (and you) die. This is what is meant by acute toxicity. In addition, arsenic appears to cause oxidative damage and stimulates the formation of a variety of physiological stress-related proteins. At lower levels, if ingested chronically over a longer time (1-10 mg per day or so for months or years), this still goes on, but not enough to kill you outright. However, your system may be weakened to the point that it isn't as effective at fighting off other kinds of cellular damage, which can build up and lead to other problems. Adverse health effects may occur only after years of exposure to these lower levels. Some of these include circulatory, neurological and liver problems. For example, a variety of skin diseases (hyperkeratoses, blackfoot, hyperpigmentation) are known to occur at levels starting around 0.1-0.2 mg per day. Arsenic also has hormonal effects that can cause diseases such as diabetes. These appear to happen even at much lower levels, perhaps less than 0.1 mg per day.

Arsenic is also a known human carcinogen. It appears to cause broken and missing chromosomes and other chromosomal abnormalities. It can cause lung, bladder, and skin cancers, and may cause liver, kidney and prostate cancers. Elevated cancer levels are seen in groups of people drinking water with arsenic levels of 0.1-0.2 mg per liter, which is about 0.2-0.4 mg per day. It usually takes many years of drinking water at these levels for cancers to

occur. At higher levels (0.5-1.0 mg per day), these cancers can form faster.

Fortunately, you weren't getting that much arsenic in the KVSP drinking water. The levels of arsenic in the drinking water at KVSP were around 0.012-0.023 mg per liter, slightly above our Maximum Contaminant Level of 0.010 mg per liter. If you consume 2 liters of water a day by drinking it or from eating food cooked in this water, you get about 0.030-0.040 mg per day of arsenic. It may be a bit of a comfort that medical studies don't show much, if any, disease being caused by arsenic at these levels.

You mentioned that you developed small warts or corns on you palms and that a blood test showed low lymphocyte levels. While a physician should be consulted on these issues, arsenic isn't known to be associated with them.

I hope that this addressed your concerns. If not, or if you have more questions, you can reach me at the above address, or at 415 972-3569.

Sincerely,

Bruce A. Macler, PhD
Regional Toxicologist
Drinking Water Program