

City of Bad Water
100 Main Street
Bad Water, NV 89422

Independent Mathematical Contractors
Any College
1 Your Street
City, State 00000

Dear IMC:

The city I work for is currently undergoing a project to reduce the level of arsenic in its drinking water. Our city receives its drinking water from three different wells located around the city. Each well contains arsenic at varying levels. The Environmental Protection Agency gave our city an exemption for several years in complying with EPA rules. However, we are required to submit a plan to them in 6 months regarding how we will reduce the level of arsenic in the city's drinking water to an acceptable level.

Arsenic is an element in the periodic table that occurs naturally in the earth's crust. It also can enter the drinking water supply through agricultural and industrial practices. When ingested, arsenic can cause thickening and discoloration of the skin, stomach pain, nausea, vomiting, diarrhea, numbness in the extremities, paralysis and blindness. As if that was not enough, arsenic has been linked to several cancers including cancer of the bladder, lungs, skin, kidney, nasal passages, liver and the prostate.

Under previous rules, my city was well within the acceptable arsenic standard which was 50 parts per billion (ppb). However, these rules changed and required compliance with a new standard by January 23, 2006. This standard was set at 10 ppb and only one of our wells was able to meet that standard. At the time, we were able to use this well to supply the drinking water for the entire city. Growth has necessitated that we use the other wells (that do not meet the standard).

The table below shows the three wells, their respective levels of arsenic and their capacities.

Well	Arsenic Level (ppb)	Capacity (millions of liters per day)
1	5	1.5
2	$8 + F$	2.0
3	$10 + L$	1.0

In this table, F is the number of letter in your first name and L is the number of letters in your last name. The city has an average daily demand of $3.5 + 0.01 \cdot M$ million liters that must be supplied from these three wells. M is the number of letters in your middle name.

To meet this demand, we plan to blend water from these three wells. This is done by piping the water to a central location and then combining different amounts from each well together to get a mixture that

contains 8 ppb of arsenic. To help us write the plan for the EPA, we would like to know how much water we must pump daily from each of the wells.

Please document your work in a technical memo. This document must contain enough detail so that we could modify your calculations should any of the numbers above change. This means that numbers alone will not be sufficient. We need to see your calculations and understand the steps you followed to solve the problem outlined above.

Sincerely,

Mortimer Bruster
Director of Utilities
City of Bad Water, Nevada