To Drink or Not to Drink … A study of Water Units on BNL's Site

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Abstract

For quite some time, the laboratory has experienced groundwater contamination on different occasions. The instance was in 1996. High concentrations of radionuclides were found in the groundwater which has had residual effects on the opinions employees have about the drinking water (sources from groundwater wells directly on the BNL Property). Due to this, many of the workers on site use bottled water coolers as an alternative. While the bottled water coolers provide an alternative to tap water, they also have the capability to create their own set of problems. In response, the Environmental Protection Division proposed two possible solutions; either implement a cleaning service for the bottled water coolers or integrate more bottle filling water fountain stations on site. The goal of this project was to gather data that could help inform the future policy on water proposed by the EPD. The results of this study show that there are advantages and disadvantages to each solution

Introduction

Some staff on site are apprehensive about drinking the tap water. This apprehension is rooted in a number of factors based on both facts and personal bias but the most notable is the history of tap water contamination on site. The most commonly mentioned contamination is from the High Flux Beam Reactor (HFBR). The HFBR operated from 1965 to 1996, which was used for scientific research. The High Flux Beam reactor was shut down in 1996 for routine maintenance but in 1997 high levels of tritium (above state and federal drinking standards) were found in the groundwater south of the HFBR. The lab was swift in addressing the contamination but as a result the Department of Energy shut down the HFBR in November 1999[2]. The events that took place have had residual effects on the opinions employees have about the potable water on site. As a result some people use water coolers for drinking water. Not only are the bottles that supply the water coolers very expensive, but if the units are not properly handled they can pose health risks to the user [1, 3]. One solution could be to implement new bottle filling stations to promote the drinking of tap water. The problem with this is that not every building/current fountain unit has the ability to have a bottle filling station installed without additional infrastructure changes (i.e., plumbing, electrical, or building renovation). Another solution could be to implement a cleaning service for the water coolers. The problem with this is that it could be an unnecessary cost to the lab if there are other clean water sources available. Also, this would not be the most sustainable option from an environmental perspective.

Methods

Data was collected in the form of key plans (fig.1) and the following surveys for each unit:

- water fountains
- bottled water dispensers
- bottled water storages
- faucets.

The surveys focused on two things:

Cleanliness

- noticeable amount of dust/ dirt present
- the color of the water
- the flow rate
- if there is an odor present.
- usage

Design and components

- model type
- outlets available
- If it is BNL owned
- if there was a visible filter attached

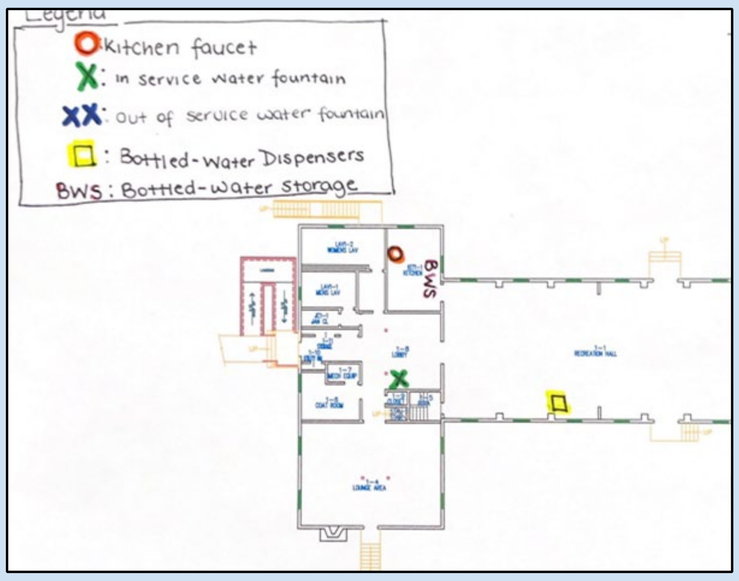

Figure 1: This is an example of one of the key plans used to map out the units within a building

Results

- Sample size = 46 buildings
- 37% of the faucets had a filter helping to ensure the quality of the water
  - 70.3% of these filter cartridges were replaced in the year of 2022
- Only 37% of the recorded water fountains had visible filter units and only 10 were replaced within the last year
- Only 30% of the water fountains observed had outlets near or next to the unit.
- 72.4% of the water dispensers recorded were BNL approved
- 14% of faucets recorded showed a build up of white stains in the sink
- 30% of faucets recorded had rust build up around the drain area
- Only 4 water dispensers had a tag that indicated the last time the dispenser was cleaned
- 45.08% water dispensers showed buildup with dirt or dust in the drain area
- 31% of the bottled water storages were kept in inadequate conditions
- 69% of the recorded water fountains were either not used often or not used at all compared to 4% for the recorded bottled water dispensers

Discussion

Long term, the use of bottle filling stations is more sustainable from a monetary and environmental standpoint. Though it would cost more up front to renovate fountains and necessary infrastructure, it takes far less maintenance to upkeep fountains as opposed to the bottled water dispensers. On the other hand, the data as well as feedback from staff show that the preferred source of drinking water right now is the bottled water dispenser. This is an important factor to consider because it would be counterproductive to renovate fountains if people would continue using bottled water dispensers. Especially because there were a number of dispensers found that were not owned by BNL. Seeing that in many cases the use of bottled water dispensers were used because of personal preference as opposed to lack of other potable water units, it is clear that the solution to the current problem does not have just one answer. The findings from this study show that more research should be carried out to further understand the people on site and not just the actual water units.

Figure 2 & 3: These photos were taken during data collected to document examples of improperly cleaned units

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[2] Environmental Protection Division.*Brookhaven National Laboratory*. Brookhaven National Laboratory. The High Flux Beam Reactor (HFBR) at Brookhaven National Laboratory (BNL) is being decommissioned because the Department of Energy (DOE) decided in 1999 that it would be permanently closed. The reactor was shut down in 1997 after tritium from a leak in the spent-fuel pool was found in the groundwater.

[3] Keresztes, S., Tatár, E., Mihucz, V. G., Virág, I., Majdik, C., & Záray, G. (2009). Leaching of antimony from polyethylene terephthalate (PET) bottles into mineral water. *Science of the Total Environment, 407*(16), 4731-4735. https://doi.org/10.1016/j.scitotenv.2009.04.025

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