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## MEMORANDUM

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**FROM:** JOEL I. CEHN  
**SUBJECT:** 2014 SUMMER TESTING RESULTS  
**DATE:** SEPTEMBER 30, 2014

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### BACKGROUND

Environmental testing of the Brandeis Bardin Campus (BBC) occurs periodically. This year's testing included crops grown on the campus, and groundwater near the southwest property line. Food crops have always tested clean, but are still tested from time to time. Groundwater near the southwest property line has a history of tritium contamination, but that has been decreasing over time. Testing occurred the week of August 10<sup>th</sup>.

### SUMMARY OF TESTING RESULTS

#### Crops

Three gardens were tested: the garden at the main gate, the "organic garden" on the road to the House of the Book, and the "flower garden" across from the administration building. The Gan Alonim garden did not contain producing plants. Also, several orchards were visited: the "Main House" citrus grove, the orchard by the Arness house and the avocado orchard. Gardens adjacent to ranch employees' homes were not tested. Tomatoes and tomatillos were collected from a local market, for comparison.

The vegetables collected and tested are shown in Table 1.

#### Metals in Crops

Crops were tested for the following metals: Arsenic, Barium, Beryllium, Cadmium, Chromium, Lead, Mercury, Selenium and Silver. Some of these have been found to contaminate soils at Boeing. Previous testing of BBC soils was negative for elevated levels. This summer's testing of crops was negative for the presence of these metals.

#### Radioactivity in Crops

The crop samples were also tested for radioactivity. Radioactive cesium (cesium-137) was targeted as a known Boeing contaminant. All results were negative. Citrus from the

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Main House orchard was tested for tritium. The level measured (22 pCi/L) is consistent with natural levels measured in rainwater in years past.

### **Tritium in Groundwater**

Tritium is the most mobile of the radioactive elements found at Boeing. It has been found in groundwater and vegetation near the property line. Testing is done to gauge its movement in groundwater, which is toward BBC. Water was collected from three flowing springs. I attempted to collect water transpired from plants closer to the property line. However, this was unsuccessful, likely due to the drought and the lowered water table. In the past, this has been an efficient way to collect groundwater, without the need for a drilled well. But this year, no water could be collected from plant transpiration.

Results show near zero levels of tritium in the springs at the southwest corner of the property (Table 2). In 1995, levels were as high as 520 picocuries per liter of water (pCi/L) in this area. The drop may be due to groundwater movement being affected by the drought. It may simply be due to a decrease via natural processes such as dispersion. I measured 25 pCi/L in this area in 2007. Note that groundwater typically has no tritium content, as opposed to surface water. Natural tritium is created by cosmic rays in the upper atmosphere.

### **CONCLUSIONS AND RECOMMENDATIONS**

The only change observed in this summer's testing is a drop in the levels of tritium in groundwater. Tritium was released by Boeing decades ago and levels have been slowly decreasing. We should re-test groundwater after the drought is over, to see if contamination returns.

Vegetables grown at BBC were tested and found to be free of contamination. These, too, are safe to consume.

I am enclosing copies of the lab reports. Contact me if you have any questions.

Table 1. Gardens Tested

Locations	Code	Produce Tested
Main Gate Garden	(MGG)	Squash, tomatoes
Organic Garden	(OG)	Tomatoes, pomegranates
Flower Garden	(FG)	Tomatillos
Main House Orchard	(MH)	Lemons
Arness House Orchard	(ARG)	Apples
Avocado Grove	(AG)	Avocados
Local Market	(VN)	Tomatoes, tomatillos

Table 2. Water Tested

Well/Spring	Location
Spring OS-3	Southwest corner of property
Spring OS-5	Southwest corner of property
Spring OS-7	Southwest corner of property