

Health Consultation

Fruit and Vegetable Testing

FORMER AMERICAN BERYLLIUM SITE

TALLEVAST, MANATEE COUNTY, FLORIDA

EPA FACILITY ID: FLD0004100731

MAY 5, 2006

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

Agency for Toxic Substances and Disease Registry

Division of Health Assessment and Consultation

Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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HEALTH CONSULTATION

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Prepared by:

Florida Department of Health
Bureau of Community Environmental Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

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Foreword

This exposure investigation report evaluates fruit and vegetable metal testing results from 2004 and 2005. The Florida DOH and the Manatee County Health Department (CHD) collected and tested corn, oranges, grapefruit and tangerines from two properties near the former American Beryllium site in response to resident concerns.

Evaluating exposure: Florida DOH scientists begin by reviewing available information about environmental conditions at the site. The first task is to find out how much contamination is present, where it is on the site, and how people might be exposed to it. Usually, Florida DOH does not collect its own environmental sampling data. We rely on information provided by the Florida Department of Environmental Protection (DEP), the U.S. Environmental Protection Agency (USEPA), and other government agencies, businesses, and the public.

Evaluating health effects: If evidence is found that people are being exposed—or could be exposed—to hazardous substances, Florida DOH scientists will take steps to determine whether that exposure could be harmful to human health. Their assessment focuses on public health; that is, the health impact on the community as a whole, and is based on existing scientific information.

Developing recommendations: In an evaluation report—such as this exposure investigation report—Florida DOH outlines its conclusions regarding any potential health threat posed by a site, and offers recommendations for reducing or eliminating human exposure to contaminants. The role of Florida DOH in dealing with hazardous waste sites is primarily advisory. For that reason the evaluation report will typically recommend actions to be taken by other agencies—including the EPA and Florida DEP. If, however, the health threat is immediate, Florida DOH will issue a public health advisory warning people of the danger and will work to resolve the problem.

Soliciting community input: The evaluation process is interactive. Florida DOH solicits and evaluates information from various government agencies, the organizations or individuals responsible for cleaning up the site, and from community members who live near the site. Any conclusions are shared with the organizations and individuals who provided information. Once an evaluation report has been prepared, Florida DOH seeks feedback from the public. *If you have questions or comments about this exposure investigation report, we encourage you to contact us. Please write to:*

Please write to: Susan Skye / Health Assessment Team
Bureau of Community Environmental Health
Florida Department of Health
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Summary and Statement of Issues

Residents living near the former American Beryllium site in the Tallevast community of Manatee County asked the Florida Department of Health (DOH) to test fruit and vegetables from their gardens. The residents were concerned that chemicals from the soil and ground water could contaminate their fruit and vegetables. Even though the Florida DOH found ground water and soil contaminants of concern unlikely to accumulate in produce, they tested neighborhood fruit and vegetables based solely on requests from the residents. The calculated doses for eating the homegrown produce were less than recommended dietary intake levels and ATSDR's Minimal Risk Levels (Tables I, II and III). Therefore, the levels of metals found in the fruit and vegetables are not likely to cause illness.

This health consultation evaluates metal testing results from corn, oranges, grapefruit and tangerines collected from two properties in the Tallevast community in 2004 and 2005.

Background

Site Background and History

Between 1961 and 1996, the former American Beryllium company manufactured ultra-precision beryllium machine parts at a five-acre facility at 1600 Tallevast Road in the Tallevast community, Manatee County, Florida. The main plant consisted of numerous machining departments that included lathes, milling, jig boring, deburring, grinding, and electrical discharge machining. The machining of beryllium, aluminum, titanium, and albetmet (a 60% beryllium and 40 % aluminum blend) produced beryllium-containing dust (TetraTech 1994).

The former American Beryllium company collected wastewater in a holding pond on the southeast corner of the site (DEP 1994). In 1996, Lockheed-Martin purchased the former American Beryllium site and ceased operations. In 2000, Wiring Pro International (WPI) purchased the former American Beryllium facility from Lockheed-Martin. WPI manufactures light cable wire. Lockheed-Martin, however, retains responsibility for environmental contamination.

In June and December 2004, the Florida DOH and Manatee CHD attended public meetings in Tallevast to gather health concerns and answer health questions.

In August 2005, ATSDR/DOH published a health consultation evaluating volatile organic compound (VOC) indoor air results [ATSDR 2005]^b. The Florida DOH found the levels of VOCs inside three homes and the community center are not likely to cause illness.

In December 2005, ATSDR/DOH published a health consultation summarizing blood collection procedures and beryllium sensitivity test results for 359 former American Beryllium workers, household members and nearby residents [ATSDR 2005]^a. Of the 359 tests covered in this report, 348 (97%) were not beryllium sensitive. Nine (2.5%) were abnormal, borderline, or uninterpretable for beryllium sensitivity. Two of the 359 people tested (0.5%) did not supply a sufficient volume of blood for analysis. These two individuals declined retesting.

Site Description

The Tallevast community is in southern Manatee County midway between Sarasota and Bradenton (Figure 1). The neighborhood is a blend of single-family homes, and light commercial/industrial development. The Tallevast community surrounds the former American Beryllium site. Homes and Tallevast Road are north of the former facility. The former Spindrift fiberglass boat manufacturing facility is to the west. The Sarasota-Bradenton International Airport is to the southwest. The Tallevast Community Center, a golf course, and homes are to the south. More homes and undeveloped land are to the east (Figure 1).

Demographics

In 2000, about 200 people lived within a 0.5-mile radius of the site. Approximately 82% were black and 13% were white. Other racial/ethnic groups include 5% American Indian, Hispanic or Latino (Bureau of the Census, U.S. Department of Commerce 2000).

Community Health Concerns

In 2004, Tallevast residents expressed concern that gardens in the area might be contaminated from chemicals in the soil or ground water. Residents reported they had more gardens in the past. In 2004 and 2005 DOH noted only one garden and several fruit trees in the neighborhood.

Discussion

Even though the Florida DOH found ground water and soil contaminants of concern unlikely to accumulate in produce, they tested neighborhood fruit and vegetables based solely on requests from the residents.

In July and August 2004, the Florida DOH spoke with residents on the phone and went door-to-door within one mile of the site inquiring about gardens within one mile of the Tallevast site. The Florida DOH found one garden with newly planted corn and one property with fruit trees. They collected five oranges and two ears of corn and sent them to the Department of Agriculture in Tallahassee for analysis of 57 metals. The Department of Agriculture lab analyzed the corn and oranges for metals using a closed vessel microwave digestion using nitric acid. The instrumental method is a semi-quantitative ICP-MS screen using default conditions established by the instrument manufacturer. The laboratories DOH contacted can test for metals in produce but do not test for TCE, DCE and other volatile compounds. TCE and other volatiles found in the ground water do not accumulate significantly in produce.

In September 2004, the Florida DOH evaluated the laboratory results and sent letters to both residents explaining their results. Both residents were informed that the metals found in their oranges or corn are commonly found in fruits, vegetables and other foods and are not likely to cause illness at these levels.

Later in 2005, the Florida DOH attended a public meeting and spoke with several residents about gardens they had in the past. One gentleman said he has fruit trees that were productive in the winter and asked if the tangerines and grapefruit could be tested.

In December 2005, the Manatee County Health Department (CHD) collected 10 grapefruit and 10 tangerines from the residential yard closest to the site. They shipped the fruit to the Department of Agriculture lab in Tallahassee for analysis of 66 metals. The lab used the same analysis to test the grapefruit and tangerines as they did for corn and oranges in 2004.

In March 2006, the Florida DOH evaluated the fruit data and sent a letter to the resident explaining their results.

Fruit and Vegetable Results

Tables I, II and III contain the fruit and vegetable results from 2004 and 2005. Dietary intake information is available for barium, boron, chromium, copper, lead, manganese, molybdenum, rubidium and zinc. The calculated doses of these metals were less than or within the referenced daily dietary intake amounts. Therefore, the levels found in the corn, oranges, grapefruit and tangerines are not likely to cause illness.

In addition, the levels of barium, boron, copper, strontium and zinc were all less than the MRL (Minimal Risk Level). This too indicates that none of these metals detected in the fruit and vegetables are likely to cause illness.

The three remaining metals (hafnium, titanium and zirconium) are found naturally in ore deposits in Florida. Titanium is also used as a pigment in foods and silicon is in pectin in orange juice. Furthermore, these metals are minerals that are added to liquid nutrient drinks sold in health food stores. In addition, these three metals were not identified as being contaminants of concern from the former American Beryllium site. They were, however, included in the metals scan for the other metals. We do not expect low levels of these metals in fruits and vegetables to cause illness.

The calculated doses for eating the homegrown produce were less than recommended dietary intake levels and ATSDR's Minimal Risk Levels (Tables I, II and III). Therefore, the levels of metals found in the fruit and vegetables are not likely to cause illness.

Consideration of Biological Testing

The level of metals found in the corn, oranges, grapefruit and tangerines do not warrant blood or urine testing.

Child Health Considerations

The levels of metals found in the corn, oranges, grapefruit and tangerines are not likely to cause illness in children.

In communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than are adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children

are shorter than are adults; this means they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus adults need as much information as possible to make informed decisions regarding their children's health.

Conclusions

In 2004 and 2005, the levels of metals in the corn, oranges, grapefruit and tangerines from Tallevast gardens are not likely to cause illness. The calculated doses for eating the homegrown produce were less than recommended dietary intake levels and ATSDR's MRLs (Table II and III).

Recommendations

As prudent public health practice: As with any home garden, you should wash your hands after gardening and rinse fruits and vegetables before eating.

Public Health Action Plan

Past Actions:

In 2005, the Florida DOH published two health consultations; one evaluating volatile organic compounds in indoor air and another testing beryllium sensitivity in individuals from the Tallevast community.

Planned Actions:

The Florida DOH will evaluate the public health threat from contaminated soil and ground water in the Tallevast community.

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Appendix A. Figures and Tables

FIGURE 1
Manatee County Map

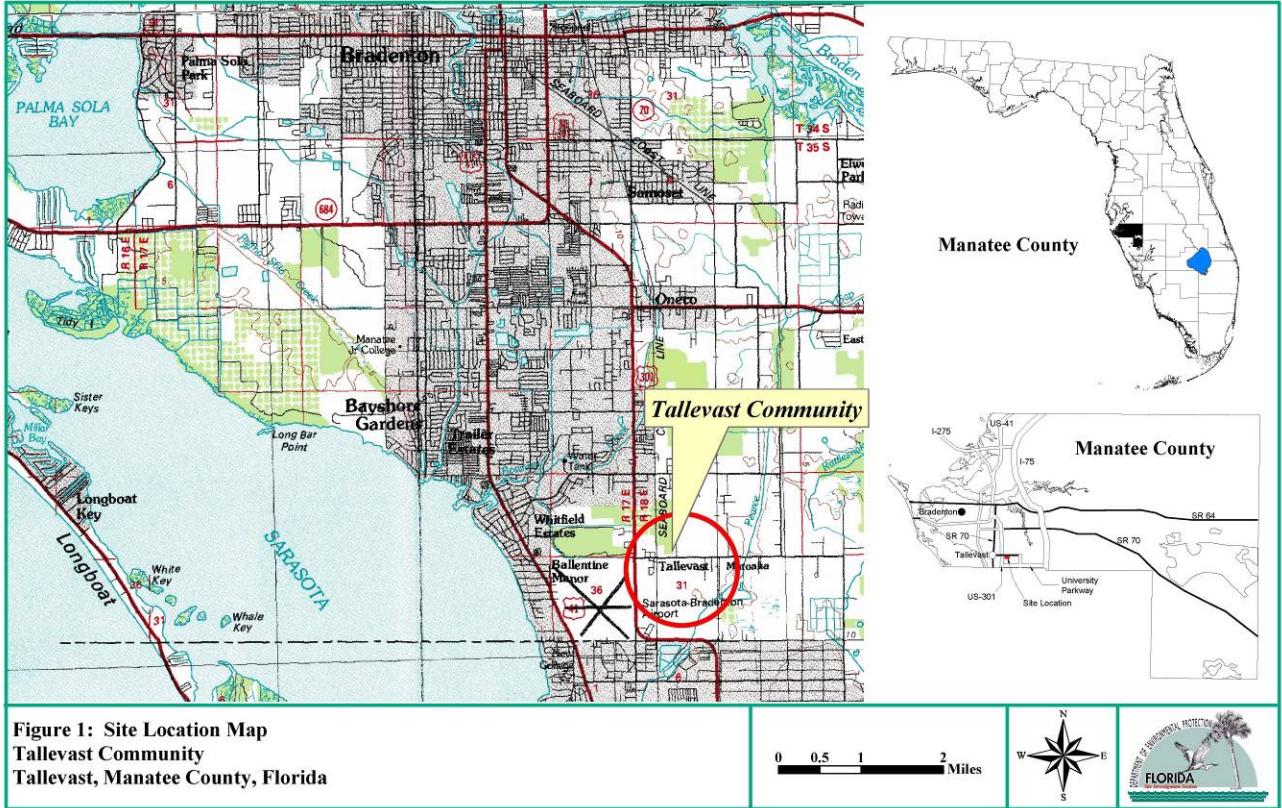


TABLE I
Metal Concentrations Found in Tallevast Corn, Oranges, Grapefruit and
Tangerines
Tested in 2004 and 2005

	Corn	Oranges	Grapefruit 1	Grapefruit 2	Tangerines 1	Tangerines 2
Metals Analyzed	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Barium	BDL	0.40	0.75	0.38	0.47	0.93
Boron	1.2	3.8	2.26	1.52	5.00	4.63
Chromium	0.6	BDL	BDL	BDL	BDL	BDL
Copper	0.6	1.1	0.34	0.29	0.33	0.37
Hafnium	BDL	BDL	0.02	BDL	BDL	BDL
Lead	BDL	0.1	0.05	BDL	BDL	BDL
Manganese	0.6	0.3	0.12	0.13	0.26	0.67
Molybdenum	0.1	0.1	BDL	BDL	BDL	BDL
Rubidium	1.5	3.7	2.04	1.57	1.36	2.17
Silicon	11	4.2	n/a	n/a	n/a	n/a
Strontium	1.7	2.2	3.67	3.65	4.59	5.60
Titanium	BDL	BDL	0.33	0.18	0.47	BDL
Zinc	12	BDL	BDL	1.33	1.31	1.77
Zirconium	BDL	BDL	0.03	BDL	BDL	BDL

Grapefruit and tangerines were collected from two different fruit trees on the same property

n/a = not tested mg/kg = milligrams per kilogram BDL= below detection limits

For corn and oranges, BDL=level detected was less than 0.1 mg/kg

For grapefruit and tangerines, BDL=levels were less than 3x the method reagent blank

In addition to elements in the table, the following elements were tested for in corn, oranges, grapefruit and tangerines and were BDL:

aluminum, antimony, arsenic, beryllium, bismuth, cadmium, calcium, cerium, cesium, europium, gadolinium, dysprosium, holmium, erbium, thulium, gallium, gold, hafnium, iridium, iron, lanthanum, lithium, magnesium, neodymium, nickel, niobium, osmium, palladium, platinum, potassium, praseodymium, rhenium, ruthenium, samarium, selenium, silver, sodium, strontium, tantalum, tellurium, terbium, thallium, thioium, tin, tungsten, uranium, vanadium and ytterbium.

Grapefruit and tangerines were also tested for the following elements which were all BDL: bismuth, cobalt, germanium, indium, lithium, lutetium, rhodium, scandium, terbium and yttrium

Only corn and oranges were tested for silicon due to lab method changes from 2004 to 2005

TABLE II
Comparison of Calculated Doses in Metals vs. ATSDR Minimal Risk Levels (MRLs)
In Tallevast Corn, Oranges, Grapefruit and Tangerines
2004 and 2005

	Corn	Oranges	Grapefruit	Tangerines		
Element Analyzed	dose mg/kg/day	dose mg/kg/day	dose mg/kg/day	dose mg/kg/day	MRL	acute interm or chronic
Barium	n/a	0.0004960	0.0001100	0.0000082	0.6 mg/kg/day 0.7 mg/kg/day	chronic intermediate
Boron	0.0002840	0.0047120	0.0003300	0.0000442	0.01 mg/kg/day	intermediate
Copper	0.0001420	0.0013640	0.0000500	0.0000012	0.02mg/kg/day	intermediate
Strontium	0.0004024	0.0027280	0.0001960	0.0005000	2.0 mg/kg/day	intermediate
Zinc	0.002800	n/a	0.0001900	0.0000160	0.3mg/kg/day	chronic

Nutrient elements (Magnesium, Sodium, Calcium, Potassium, and Iron) are not listed

Note - The highest level of element found in tangerines and grapefruit were used in the calculations

Doses were calculated using EPA's food ingestion factors assuming people eat garden fruits and vegetables 100% of the time(4) MRL= Minimal Risk Level [ATSDR]

mg/kg/day = milligrams per kilogram per day

n/a = element was bdl so no calculation necessary

Please note other metals were detected in these fruit and vegetables, however MRLs are not available. In this case, dietary intake only was used as a comparison - see Table I for this information

Please note that this is a screening method and values given are approximate. Should any of these elements be of concern, a quantitative method should be utilized as confirmation of the amount present.

TABLE III
Calculated Doses and Daily Dietary Intakes
For Metals Found in Tallevast Corn, Oranges, Grapefruit and Tangerines
2004 and 2005

	Corn	Oranges	Grapefruit*	Tangerines*	
Element Analyzed	mg/day	mg/day	mg/day	mg/day	Dietary Intake/Other
Barium	n/a	0.01	0.011	0.003	avg daily intake (adult) = 1.33 mg/day (1)
Boron	0.016	0.078	0.032	0.016	UL - 3-17 mg/day children 11-20 mg/day adults (2)
Chromium	0.005	n/a	n/a	n/a	RDA - infants 0.2-5.5 mg/day children 11-24 mg/day adults 20-30 (2)
Copper	0.008	0.022	0.005	0.001	RDA- infants 0.20-0.22 mg/day children 0.340-0.890 mg/day adults 0.90 mg/day (2)
Hafnium	n/a	n/a	0.000	n/a	Found with Zr deposits naturally present in FL(6);most Zr minerals contain 1-5% Hf(6)
Lead	n/a	0.002	0.001	n/a	0.1-0.5 mg/day dietary lead exposure (3)
Manganese	0.008	0.006	0.002	0.002	RDA- infants 0.003-0.6 mg/day children 1.2-2.2 mg/day adults 1.6-2.3 mg/day (2)
Molybdenum	0.001	0.002	n/a	n/a	RDA - infants 0.002-0.003 mg/day children 0.017-0.043 mg/day adults 0.043-0.045 mg/day (2)
Rubidium	0.02	0.075	0.029	0.007	1-5 mg/day (4)

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	Corn	Oranges	Grapefruit*	Tangerines*	
Element Analyzed	mg/day	mg/day	mg/day	mg/day	Dietary Intake/Other
Silicon	0.015	0.086	n/a	n/a	found in pectin in orange juice
Strontium	0.022	0.045	0.052	0.018	1-8-2.0 mg/day (5)
Titanium	n/a	n/a	0.005	0.002	Naturally present in ore deposits in FL, also used as a pigment in foods
Zinc	0.158	n/a	n/a	0.006	RDA infants 2-3 mg/day children 3-11 mg/day adults 8-11 mg/day (2)
Zirconium	n/a	n/a	0.000	n/a	naturally present in ore deposits in FL; 0.05 mg/day(6)

*Note: the highest concentration from the 2 grapefruit and tangerine samples was used in the dose calculations

UL= max level of daily nutrient intake likely to pose no risk of adverse effects(2) UL listed if no FDA intake available

RDA - Recommended daily allowance Note: for pregnant and lactating women, numbers are higher

RDA and UL numbers given are ranges only. For age specific intakes, see reference (2)

For corn and oranges, BDL=level detected was less than 0.1 mg/kg

For grapefruit and tangerines, BDL=levels were less than 3x the method reagent blank

Nutrient elements (Magnesium, Sodium, Calcium, Potassium, and Iron) are not listed

Please Note that this is a screening method and values given are approximate. Should any of these elements be of concern, a quantitative method should be utilized as confirmation of the amount present.

In addition to elements in the table, the following elements were tested for in corn, oranges, grapefruit and tangerines and were BDL:

aluminum, antimony, arsenic, beryllium, bismuth, cadmium, calcium, cerium, cesium, europium, gadolinium, dysprosium, holmium, erbium, thulium, gallium, gold, hafnium, iridium, iron, lanthanum, lithium, magnesium, neodymium, nickel, niobium, osmium, paladium, platinum, potassium, praseodymium, rhenium, ruthenium, samarium, selenium, silver, sodium, strontium, tantalum, tellurium, terbium, thallium, tholium, tin, tungsten, uranium, vanadium and ytterbium.

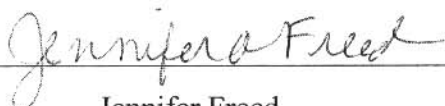
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Only corn and oranges were tested for silicon due to lab method changes from 2004 to 2005

References : (1) Spectrum (2) National Academies (3) Spectrum (4) Nielson (5) Nuclear Energy Institute (6) NetElements

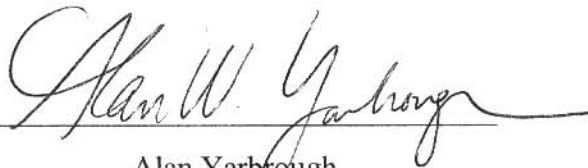
CERTIFICATION

The Florida Department of Health, Bureau of Community Environmental Health prepared this Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It followed approved methodology and procedures existing at the time it began. The Cooperative Agreement Partner completed editorial review.



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The Division of Health Assessment and Consultation, ATSDR, has reviewed this health consultation, and concurs with its findings.



Alan Yarbrough
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CAT, SPAB, DHAC, ATSDR