Health Consultation

Review and Comment on Radionuclide and Radon Investigations Conducted at the

WEYMOUTH NECK SITE

WEYMOUTH, NORFOLK COUNTY, MASSACHUSETTS

MDEP RTN 4-3001361

Prepared by the
Massachusetts Department of Public Health

MAY 10, 2010

Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners 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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Prepared By:

Massachusetts Department of Public Health
Bureau of Environmental Health
Environmental Toxicology Program
Boston, Massachusetts

Under Cooperative Agreement with:
Public Health Service
Agency for Toxic Substances and Disease Registry
United States Department of Health and Human Services
Atlanta, Georgia

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I. Summary

Introduction

ATSDR/MDPH aims to provide Massachusetts residents with the best information possible on any public health concerns associated with potential historical opportunities for exposure to environmental contamination in the Weymouth Neck area of Weymouth, MA. This Health Consultation was conducted by the Massachusetts Department of Public Health, Bureau of Environmental Health (MDPH/BEH) as part of a larger interagency effort aimed at addressing community concerns relative to historical opportunities for exposure to radioactive materials associated with historical Agrico Fertilizer Facility Operations that occurred at the Weymouth Neck site. These concerns were raised by a former resident and MDPH evaluated sampling protocols and environmental data in response to a request from the Massachusetts Department of Environmental Protection (MDEP) for technical expertise. Specifically, MDPH/BEH Environmental Toxicology and Radiation Control programs collaborated on a review of several radionuclide and radon investigation protocols and draft reports prepared by ConocoPhillips describing activities conducted at Weymouth Neck over the past year and a half. This Health Consultation: 1) documents the technical review and comments provided to MDEP by MDPH/BEH on these reports, and 2) provides an evaluation of the environmental data generated to assess whether opportunities for exposure to radioactive materials were likely to present a potential health impact to area residents.

Conclusion

Results of the scoping survey, radon testing, and groundwater monitoring appear to indicate that widespread radionuclide

	contamination is not present at the Weymouth Neck site and therefore based on the information currently available, exposure while living near and/or visiting Weymouth Neck is not expected to harm people's health under current site conditions. MDPH/BEH cannot fully evaluate if historical exposures to radionuclides at the Weymouth Neck site could have harmed people's health in the past because the information needed to make a decision is not complete. MDPH/BEH believes installations of radon mitigation systems by ConocoPhillips in one residential and two non-residential buildings located on Weymouth Neck where radon was detected at or slightly greater than the EPA radon action level (4.0 pCi/L) are appropriate.
Basis for Decision	In order to reach a conclusion regarding historical opportunities for exposure to radionuclides at Weymouth Neck in the past, it would be helpful to have data characterizing radionuclides in soil beneath the capped areas of the site and speciation of groundwater samples to determine whether elevations may be due to natural or radioactive waste sources. However, in the absence of these data, results of the recent radon and radionuclide investigations in soil and groundwater do not suggest historical opportunities for exposure to widespread radionuclide contamination were likely to have occurred at Weymouth Neck in the past.
Next Steps	• MDPH/BEH will consider the information generated by the radionuclide and radon investigations when conducting a Public Health Assessment of historical opportunities for exposure to radionuclides and other site contaminants at Weymouth Neck in response to a request from a former resident. • If additional materials relative to radionuclide or radon

	investigations conducted at Weymouth Neck become available, MDPH/BEH will review and provide comments to MDEP upon request.
For More Information	If you have concerns about your health, you should contact your health care provider. You may also call ATSDR at 1-800-CDC-INFO or MDPH at 617-624-5757 and ask for information on the Weymouth Neck site.

II. Background and Statement of Issues

The Massachusetts Department of Public Health, Bureau of Environmental Health (MDPH/BEH) was contacted by the Massachusetts Department of Environmental Protection (MDEP) in February 2008 requesting assistance in addressing community concerns about the possible presence of radioactive materials associated with historical Agrico Fertilizer Facility operations on the Weymouth Neck peninsula (a.k.a. the Weymouth Neck site) in Weymouth, Massachusetts. In response, the MDPH/BEH Environmental Toxicology and Radiation Control programs collaborated on a review of several radionuclide and radon investigation protocols and draft reports conducted at Weymouth Neck by ConocoPhillips over the past year and a half and provided technical comments to MDEP. This Health Consultation documents MDPH/BEH's review and comment process and provides an evaluation of the available data to determine whether current or historical opportunities for exposure to radionuclides are likely to result in human health impacts. It is important to note that MDPH/BEH was also previously contacted by a former resident of Weymouth Neck who expressed concerns about historical opportunities for exposure to a number of contaminants associated with the Weymouth Neck site including lead, arsenic, and more recently, radiation. Therefore, in addition to considering their concerns about radiation exposure in completing this Health Consultation, MDPH/BEH has committed to conducting a Public Health Assessment for this site after all environmental investigations have been completed.

The phosphate fertilizer facility was in operation on the Weymouth Neck peninsula from the mid-late 1800s until ConocoPhillips acquired the factory and closed the plant in the 1960s. ConocoPhillips sold the property to the Weymouthport Peninsula Corporation in 1967 and the manufacturing buildings were demolished for redevelopment. Residential condominiums were built on this area of the site in the 1970s and 1980s. Environmental sampling conducted at Weymouth Neck in the late 1990s identified elevated concentrations of arsenic and lead in soils in certain areas of the site. ConocoPhillips accepted responsibility for implementing a clean-up program in accordance with MDEP requirements which is in the final stages of completion. The area of community

environmental concern is shown in Figure 1, which at present, includes seven properties covering approximately 68 acres with portions of the site developed with condominiums, a marina, an office building, and Webb Memorial State Park (see Figure 1).

III. Radionuclide and Radon Investigations

MDEP contacted MDPH/BEH in February 2008 and requested assistance from the MDPH/BEH Radiation Control Program in addressing concerns raised by a former Weymouth Neck resident about the possible presence of radioactive materials at the former fertilizer factory site. Until this time, environmental investigations at Weymouth Neck had been primarily focused on lead and arsenic in soil. The site had been screened for possible radiation contamination in 1998 and no radiation levels of concern were reported.

Staff from the MDPH/BEH Radiation Control and Environmental Toxicology Programs provided initial technical advice to MDEP on possible methods for testing radionuclides in soil and radon in buildings during a conference call in February 2008. Radiation Control Program staff reported that a cursory radiological survey they conducted in Weymouth Neck indicated that no external radiation measurements were detected above background (with the expected exception of several granite stones at the entrance of the park as granite contains naturally occurring radionuclides). In addition, MDPH/BEH indicated that although it is unlikely that Technologically-Enhanced, Naturally-Occurring Radioactive Materials (TENORM) existed at Weymouth Neck, an investigation of whether radiological conditions at the site are within expected background levels could prove useful in addressing radiation concerns raised by the former resident.

In response to the initial MDPH comments, in April 2008, MDEP contacted ConocoPhillips and requested that a work plan be prepared for a general area gamma radiation screening survey as well as representative testing within the buildings at Weymouth Neck for the presence of radon. It is important to note that MDPH generally recommends that buildings be tested for radon, which occurs naturally in buildings

throughout the Northeast. At MDEP's request, MDPH staff participated in a June 2008 site visit and provided technical advice to MDEP and ConocoPhilip's Licenced Site Professional (LSP) regarding the radon testing effort. Subsequent to the site visit, MDPH staff reviewed and provided technical comments on the proposed radon testing work plan submitted to MDEP by the LSP (Attachment A). The comments and expertise provided by MDPH were incorporated into MDEP's letter to Conoco-Phillips regarding the work plan.

IV. MDPH/BEH Review of Weymouth Neck Investigations

A draft Radionuclides Scoping Survey and Preliminary Radon Testing Report was completed and submitted by ConocoPhillips to MDEP in December 2008. In addition, ConocoPhilip's LSP conducted radionuclide testing of groundwater at Weymouth Neck and submitted the results to MDEP in April 2009 as part of their post remediation groundwater monitoring program. MDEP requested that MDPH staff review and provide comments on each of these investigations prior to the documents being completed and made publicly available through MDEP's public comment process. The MDPH review and comments described below also included an evaluation of the data generated in the context of possible opportunities for exposure to radiation at Weymouth Neck and raised as a concern by the former resident.

A. *Radon Investigations*

Preliminary radon testing was conducted by ConocoPhillips' LSP in buildings located on Weymouth Neck in November 2008, and results were summarized as part of the December 2008 Draft report. A second round of radon testing was completed at Weymouth Neck in January to represent 'worst-case' conditions during the winter when buildings are more likely to be closed up. In response to a request from MDEP, staff from the MDPH/BEH Radiation Control Program provided technical comments to MDEP on both phases of the radon testing (refer to Appendix B and Appendix C).

ATSDR has not derived an inhalation MRL for radon (ATSDR 2008). U.S. EPA and the Surgeon General recommend that action be taken to reduce radon levels when radon is detected in homes at 4 pCi/L or greater based on lung cancer risk (USEPA 2007). This radon limit was applied to the radon test results for both residential and non-residential spaces at Weymouth Neck. While occupational limits for radon could be as high as 100 pCi/L for radiation workers, MDPH supports the use of 4 pCi/L as an appropriate action level for occupied spaces in both residential and non-residential buildings at Weymouth Neck and elsewhere.

Results of radon testing conducted at Weymouth Neck are summarized in Table 1. The majority of radon test results for frequently-occupied areas of four non-residential buildings (n=93) and five buildings containing both residential units (n=83) and non-residential (n=30) spaces located on Weymouth Neck were all below 4 pCi/L. Radon testing conducted at four of the buildings (residential units in one condominium building and two occupied areas and a basement of three non-residential buildings) at Weymouth Neck had radon levels detected at or above 4.0 pCi/L. Specifically, maximum radon levels detected in two units of one residential building were 4.0 and 6.4 pCi/L, respectively. The maximum radon level detected in non-residential buildings was 8.1 pCi/L. Although it is not possible to determine whether the source of radon is naturally occurring, ConocoPhillips agreed to install radon mitigation systems for buildings where radon was detected at 4.0 pCi/L or greater.

B. *Radionuclide Gamma Scoping Survey*

The gamma radiation scoping survey was conducted by ConocoPhillips' LSP at Weymouth Neck during November 2008 and results were summarized as part of the December 2008 Draft report (URS 2008b). In response to a request by MDEP, MDPH staff from the BEH Radiation Control Program and staff from the BEH Environmental Toxicology Program reviewed the draft scoping survey, asked for and received additional clarifying information from the LSP, and subsequently provided comments to MDEP in May 2009 (refer to Appendix D).

Results of the radionuclide scoping survey conducted by ConocoPhillips' LSP at Weymouth Neck are provided in Table 2. MDEP requested that the ConocoPhillips survey methods follow the applicable guidelines contained in the Federal Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) to do a screening-level evaluation of whether radiological contamination is present above background levels at Weymouth Neck (which would then help MDEP determine whether a more detailed survey would be necessary). Gamma radiation levels at Weymouth Neck were measured using sodium iodide (NaI) gamma scintillation detectors mounted on an all-terrain vehicle linked to a global positioning system (GPS) data collector, and the radiation count rate and geospatial location were recorded each second (URS 2008b). For comparison purposes, the survey also established a 'background' investigation level of 22,000 counts per minute (cpm). This investigation level was set at 2-times the average number of counts per minute (11,000 cpm) measured at Great Esker Park, located off-site and to the southwest of the Weymouth Neck peninsula (URS 2008b).

With the exception of four specific areas where granite walkways, stones, or curbing were placed during site restoration activities at Weymouth Neck, gamma radiation levels measured in the ConocoPhillips' LSP scoping survey were less than the 22,000 cpm 'background' investigation level. Thus, based on a review of the results provided in the ConocoPhillips' LSP scoping survey, MDPH determined that health risks associated with possible exposure to radionuclides in soil at Weymouth Neck would not be expected under current site conditions. However, because MDPH is aware that certain areas of the site that are the former resident's focus of concern are currently capped, MDPH indicated that unless measurements are taken beneath the cap, it will not be possible to fully evaluate whether historical exposure to radionuclides would have been possible that might suggest health impacts. Thus, MDPH recommended to MDEP that the best way to address these concerns would be to sample beneath the cap as opposed to surface soil sampling. However, if the final results of the groundwater investigations and the radon testing do not indicate widespread elevations of radionuclides or radon above background levels, those findings in combination with results of the scoping survey for the uncapped

site areas may indicate that historical opportunities for exposure to high levels of radionuclides at Weymouth Neck are unlikely. MDPH determined that the radioactivity measurements attributed in the survey report to granite curbing, walkways, and pavement containing natural granite aggregate were also consistent with observations of BEH Radiation Control Program staff that initially visited the area and did a cursory survey in February 2008.

C. *Radionuclides in Groundwater*

In April 2009, MDEP forwarded a post-remediation groundwater monitoring report to MDPH for review that included results for radionuclides in 26 groundwater samples collected at the Weymouth Neck peninsula in February 2009. MDPH staff from the BEH Radiation Control and Environmental Toxicology Programs reviewed the radionuclides in groundwater results and provided comments to MDEP together with comments on the draft scoping survey discussed above in May 2008 (refer to Appendix D). Since the soil gamma scoping survey did not include measurements beneath the cap in areas that have been identified as a concern to the former resident, MDPH/BEH staff gave particular focus to results of groundwater samples collected at or near capped areas of Weymouth Neck. Monitoring results for radionuclides in groundwater are summarized in Table 3.

It is important to note that groundwater at Weymouth Neck is not a source of drinking water and thus, exposure to radionuclides that may be present in groundwater at Weymouth Neck via drinking water was eliminated as a potential exposure pathway. Although groundwater at Weymouth Neck is not a source of drinking water, concentrations of radionuclides detected in groundwater were compared with Maximum Contaminant Levels (MCL) for drinking water provided by U.S. EPA's Radionuclides Rule for screening-level purposes. Based on the results of the radionuclides detected in groundwater samples presented in the draft report, MDPH noted that the majority of groundwater samples had radionuclide levels below the drinking water MCLs with a few exceptions (5 of 26 samples), and hence, these data did not suggest wide-spread radionuclide contamination. MDPH identified two groundwater samples at or near

capped areas of the site where Gross Beta results (minus potassium-40) were slightly greater than the MCL (50 pCi/L) at 57.40 pCi/L and 53.48 pCi/L respectively, and another sample from a capped area where radium was slightly above the MCL (5 pCi/L) at 7.77 pCi/L. A fourth sample with 552.46 pCi/L Gross Beta (minus potassium-40) was described in the report as having characteristics that are not representative of groundwater in the area (i.e. sample was anaerobic, had a hydrogen sulfur odor and was dark grey in color). Since this groundwater monitoring well is located near an area of concern to the former resident, MDPH/BEH provided comments to MDEP suggesting that additional information about why this sample was not considered representative of groundwater at Weymouth Neck be provided in the final report. Finally, total radium was also detected in a fifth sample collected from a well near one of the condominium buildings at 6.14 pCi/L, which was slightly above the MCL (5 pCi/L). Based on a review of these groundwater results, MDPH/BEH noted that a determination as to whether the source of radionuclides in the above-noted samples was naturally occurring or from some buried radioactive waste could not be determined without further speciation of radionuclides detected in the samples. Additional technical comments on the draft groundwater monitoring report were also provided to MDEP by MDPH/BEH Radiation Control Program staff (refer to Appendix D).

V. Conclusions

ATSDR requires that overarching conclusion category statements be used to summarize findings of a health consultation. Conclusion category statements are selected from site-specific conditions such as the degree of public health hazard based on the presence and duration of human exposure, contaminant concentration, the nature of toxic effects associated with site-related contaminants, presence of physical hazards, and community health concerns. Results to date based on the scoping survey, radon testing, and groundwater monitoring appear to indicate that widespread radionuclide contamination is not present at the Weymouth Neck site. Therefore, based on the information currently available, exposure to radionuclides in soil and groundwater, while living and visiting Weymouth Neck, is not expected to harm people's health under current conditions.

In order to reach a conclusion regarding historical opportunities for exposure to radionuclides at Weymouth Neck in the past, it would be helpful to have data characterizing radionuclides in soil beneath the capped areas of the site and further speciation of groundwater samples to determine whether elevations may be due to natural or radioactive waste sources. Thus, MDPH/BEH cannot conclude whether exposure to radionuclides from the Weymouth Neck site could have harmed people's health in the past. However, despite these data gaps, results of the recent radon and radionuclide investigations in soil and groundwater do not suggest historical opportunities for exposure to widespread radionuclide contamination were likely to have occurred at Weymouth Neck in the past.

VI. Recommendations

- MDPH/BEH supports Conoco-Phillips' installation of radon mitigation systems for buildings located on Weymouth Neck where radon was detected at 4.0 pCi/L or greater.
- MDPH/BEH should consider the information generated by the radionuclide and radon investigations when conducting a Public Health Assessment of historical opportunities for exposure at Weymouth Neck.

VII. Public Health Action Plan

The purpose of the Public Health Action Plan is to ensure that this health consultation not only identifies potential public health hazards, but also provides a plan of action designed to mitigate and prevent adverse health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ATSDR/MDPH to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by ATSDR/MDPH are as follows:

- MDPH/BEH will consider the information generated by the radionuclide and radon investigations when conducting a Public Health Assessment of historical opportunities for exposure at Weymouth Neck.
- If additional materials relative to radionuclide or radon investigations conducted at Weymouth Neck become available, MDPH/BEH will review and provide comments to MDEP upon request.

VIII. Documents Reviewed

URS Corporation. 2008a. Radionuclides Scoping Survey and Radon Testing Work Plan, Weymouth Neck, Massachusetts. Prepared for ConocoPhillips Company May 13, 2008.

URS Corporation. 2008b. Radionuclides Scoping Survey and Preliminary Radon Testing Report, Weymouth Neck, Massachusetts. Prepared for ConocoPhillips Company December 24, 2008 (Revised May 29, 2009).

URS Corporation. 2009. Draft Weymouth Neck Post Remediation Groundwater Monitoring Program – February 2009. Prepared for ConocoPhillips Company April 9, 2009.

Bluewind Consulting. 2009. Weymouth Neck Site Draft Final Phase II Radon Survey Report. Prepared for Safety and Ecology Corporation and submitted by URS Corporation April 2009 (Finalized May 2009).

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological Profile for Radon, Draft for Public Comment, Atlanta, GA: U.S. Department of Health and Human Services.

U.S. Environmental Protection Agency. 2007. A Citizen's Guide to Radon. http://www.epa.gov/radon/pubs/citguide.html.

PREPARER

This document was prepared by the Bureau of Environmental Health of the Massachusetts Department of Public Health. If you have any questions about this document, please contact Suzanne K. Condon, Director of BEH/MDPH at 250 Washington Street, 7th Floor, Boston, MA 02108.

CERTIFICATION

The Health Consultation, *Review and Comment on Radionuclide and Radon Investigations for the Weymouth Neck Site, Weymouth, Norfolk County, Massachusetts, Massachusetts, MassDEP RTN* 4-3001361 , was prepared by the Massachusetts Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the Health Consultation was initiated. Editorial review was completed by the cooperative agreement partner.

Technical Project Officer, CAT, CAPEB, DHAC, ATSDR

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

Team Lead, CAT, CAPEB, DHAC

Figure 1

Weymouth Neck

Tables

Table 1
Summary of Radon Testing
Conducted in Residential and Non-residential Buildings*
November 2008 and January/February 2009
Weymouth Neck, Massachusetts

Building Name and Location	Number of Radon Samples ≥ 4 pCi/L	
	Residential	Nonresidential
Tern Harbor 275 River St.	0/2	0/11
Weymouthport Condominiums 51 Broad Reach	0/33	0/13
Essex Condominiums 71 Broad Reach	0/18	0/3
East Bay Condominiums 54 Broad Reach	0/12	0/2
Arc of the South Shore 371 River St.	*NA*	3/80**
Arc of the South Shore 365 River St.	*NA*	6/9**
300 River Street Condominiums	5/18	0/1
Office 285 River Street	*NA*	1/2
Maintenance Garage River Street	*NA*	0/1

* Radon testing conducted by Bluewind Consulting; results extracted from *URS 2008b* and *Bluewind Consulting 2009* reports
** includes re-testing results

Table 2
Summary of Radionuclide Scoping Survey Results*
November 2008
Weymouth Neck, Massachusetts

Location	# of Measurements	Minimum CPM**	Maximum CPM***	Average CPM
Great Esker Park	4,622	7,323	15,228	11,167
Lot 1	54,040	3,367	14,101	8,270
Lots 24/25	9,352	6,442	16,109	10,214
Webb State Park	65,535	2,589	40,033 (1)	8,551
300 River St.	3,010	6,956	18,216	9,889
285 River St, East Bay, and Essex Condominiums	27,389	4,752	35,502 (2,3)	11,343
Weymouthport Condominiums	10,779	6,127	29,887 (4)	10,011
Tern Harbor Marina	3,757	6,513	15,209	10,426

* Radionuclide Scoping Survey conducted by Safety and Ecology Corporation; results extracted from *URS 2008b report*

** CPM=Counts per minute (measured using sodium iodide gamma scintillation detectors mounted on an all terrain vehicle with a global positioning system data collector).

*** Locations with CPM detected above 22,000 investigation level

1 Granite walkway at Webb State Park to kiosk/restroom area (40,033 cpm)
2 Granite curb at East Bay Condominiums, Building A (27,469 cpm)
3 Granite curb at Essex Condominiums, Building B (35,502 cpm)
4 granite walkway on south side of Weymouthport condominium building (29,887 cpm)

Table 3
Summary of Radionuclides Detected in Groundwater Samples*
February 2009
Weymouth Neck, Massachusetts

Radionuclides	Number Detected	Minimum Result	Maximum Result	US EPA Drinking Water MCL**	Locations Where Sample >MCL
Gross Alpha	7 / 26	ND	5.8 pCi/L	15 pCi/L	*NA*
Gross Beta – Potassium 40	26 / 26	-92.2 pCi/L	57.4 pCi/L**	50 pCi/L	Lot 24/25; Lot 1; Webb State Park (Area 2)
Total Radium	22 / 26	ND	7.77 pCi/L	5 pCi/L	Lot 1; East Bay
Uranium	0 / 26	ND	ND	30 ug/L	*NA*

* Groundwater monitoring for radionuclides was conducted by URS Corporation on behalf of ConocoPhillips; results extracted from *URS 2009* report

** Maximum Contaminant Levels (MCL) from *U.S EPA's Radionuclides Rule for Drinking Water* are used for comparison purposes only; groundwater at Weymouth Neck is not a source of drinking water.

*** A gross beta minus potassium 40 result = 552.46 pCi./L from monitoring well WN-20 was also reported, but sample was described as being not representative of groundwater (i.e. anaerobic, dark grey color, hydrogen sulfide odor).

Appendix A

Blanchet, Meg (DPH)

From: Blanchet, Meg (DPH)
Sent: Tuesday, July 01, 2008 1:21 PM
To: Johnson, Stephen (DEP)
Cc: Steele, Martha (DPH); Bell, William J (DPH); Walker, Bob (DPH)
Subject: FW: RCP comments re Weymouth Neck
Attachments: Weymouth Neck Photos_2008-06-09.pdf

Hi Steve,
Below are some specific comments from Bill Bell regarding the Radionuclides Scoping Survey and Radon Testing Work Plan proposed by URS following the site visit at Weymouth Neck on June 9th. Also attached are photographs taken by Bill during the site visit. Please let us know if you have any questions or wish to discuss.
Thanks,
-Meg

1. **Section 1.0, 1st paragraph, last sentence – It is important to note that some amount of radionuclides are always present everywhere on the planet.**

2. **Section 1.0, 2nd paragraph, #2 – Based on the 6/9 site visit, it is our understanding that URS does not plan to test every building. It is important that every building that is tested be tested thoroughly so that we do not miss high radon concentrations that people may be exposed to now or in the future.**

3. **Section 2.0, 1st paragraph, last sentence – Naturally occurring radon gas exists in all buildings and in outdoor air and hence we expect to see detectable levels of radon in all samples. The purpose of the testing should be to evaluate whether radon gas levels are elevated at a level of potential health concern. If elevated levels are detected, it will not be possible to determine from these results alone the source of the radon (e.g. naturally occurring radon, past fertilizer manufacturing). For purposes of the sampling protocol, it should be noted that in Norfolk County (where Weymouth Neck is located), 21 percent of homes contain indoor air concentrations of radon in excess of EPA's Action guideline for taking remediation steps of 4 picocuries per liter (pC/L).**

4. **Section 2.0, 2nd paragraph – The sampling plan should include information about certifications for radon testing and use of accredited radon laboratories for analysis.**

5. **Section 3.0, 1st sentence - This would be more clearly stated as "...to assess radon levels in breathable air of ground contact occupiable spaces indoors."**

6. **Section 3.0 –**
    - **During the walk through it was recommended that the best course of action would be to test each of the units on the lowest residential level in addition to any closed occupiable spaces on the ground contact garage level of the Weymouthport, Essex and East Bay Condos.**

- Each of the ground contact units at 300 River St., the basement at 285 River St., and all of the occupiable rooms in the 2 SSARC buildings should be tested.
- At the Tern Harbor Marina each of the occupiable ground contact spaces should be tested including workshops and offices. The residential units of the Tern Harbor Marina building appear to be over ground contact office space and therefore would not need to be tested.
- All testing should occur during the next heating season.

7. Section 3.1, 1st paragraph, 3rd sentence - This is best accomplished in winter. It is important that a Certified Radon Measurement Specialist or an Accredited Radon Laboratory is used.

8. Section 3.2, 1st bullet – The 'lowest lived-in level' is the location referenced in the "Citizen's Guide". In real estate practice the location would be ground contact livable or lowest livable level. In non-residential buildings the location should be all ground contact frequently occupiable spaces.

9. Section 3.2, 3rd paragraph beginning with 'Garages…' - During the walk through it was noted that there are occupiable spaces present (i.e. maintenance office and mechanical spaces which can be occupied by workers). These spaces should be tested in addition to the residential units above which meet the lowest livable level criteria.

10. Section 3.2, 4th paragraph beginning with 'The 285 River Street Property…' – 'Lived-in' here implies residential. All these buildings have frequently occupied spaces which should be tested. EPA would not recommend testing these spaces under its residential guidance because they are not residences. They would recommend testing under the more general "every school and workplace should be tested" policy. The schools document, which is used for other large buildings, also specifies an additional test device for every 2000 square feet in large rooms.

11. Section 3.3 - This Lab does not appear to be accredited to perform Radon Analysis.

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Appendix B

Blanchet, Meg (DPH)

From: Bell, William J (DPH)
Sent: Tuesday, January 20, 2009 1:42 PM
To: Johnson, Stephen (DEP)
Cc: Walker, Bob (DPH); Blanchet, Meg (DPH); Whalen, Michael (DPH)
Subject: Weymouth Neck report dtd 12/24/2009 Comments

Comments on: "Radionuclides Scoping Survey and Preliminary Radon Testing Report Weymouth Neck, Massachusetts," December 24, 2008

Page 18, 5.0 Radon Testing

- Para 1describes Bluewind as "a MassDPH accredited and certified radon testing and consulting firm…"

Comment: Mr. Christopher Juliano of Bluewind is certified as a Radon Measurement Specialist by the National Radon Safety Board. MDPH does not accredit or certify any person to conduct radon measurements.

Page 19, Table 2

- The description of locations would be improved with simple floor plan. Descriptions like Joe's Office of Bruce's Office, change over time, making the data difficult to interpret. Similarly, in Weymouthport Condominiums, to describe a location by it's current use such as "Conference," is not definitive alone. If in the future, a conference room becomes an office or a recreation room more uncertainty would be introduced. The addition of floor plans with locations labeled removes this uncertainty.

Page 22, Table 2 & Bluewind Report page 1 of 2

- Unit #2 at 300 River Street was tested sequentially, or nearly so. The first test ended on 11/14/08 at 16:00 and the second exposure period started 1 hr 45 min before the first period ended. This timing seems odd as it would have required two trips or an extended stay at that location. Please confirm the start and end times/dates of all samples.

Page 22, 6.0 Testing Findings

- If two sequential radon tests were conducted in Unit #2 at 300 River Street and both exceed the 4 pCi/L Action Guide, then there is ample evidence now to justify mitigation.

Page 2 of 2 Bluewind Report & Attachment 1 Inter-exposure Duplicates.

The term "Inter-exposure Duplicates" gives me some trouble. "Duplicate measurements" are co-located, co-terminus, replicates, intended as a measure of precision of the measurement system. These exposures may have been conducted at the same locations but were not cotemporaneous. There is no acceptable or unacceptable RPD for differences between sequential tests. They are what they are.

While they may be useful for other reasons, such as a reference point between two sets of data, it seems

inappropriate to call them "duplicates."

Accustar Lab Reports

I did not find the Accustar report for 300 River Street for the period 11/14-17/08 or for the sample for #6 Living Room which ended 11/14/08 @ 18:31.

The Accustar report dated 11/18/08 for 51 Broad Reach, the address for Weymouthport Condominiums has Weymouth Condominiums listed as the location.

All Sections

The 300 River Street condominium building is sometimes described as "River Road," or by the name "Weymouth Condominiums" with the address. These inconsistencies should be resolved.

William J. Bell
Radiation Scientist
Massachusetts Dept. of Public Health
Radiation Control Program
23 Service Center
Northampton, Ma 01060

413 586-7525 x1124

Appendix C

Blanchet, Meg (DPH)

From: Blanchet, Meg (DPH)
Sent: Monday, May 18, 2009 10:56 AM
To: Johnson, Stephen (DEP)
Cc: Bell, William J (DPH); Walker, Bob (DPH); Steele, Martha (DPH); Gallaghar, Robert (DPH)
Subject: RE: Draft Final Phase II Radon Survey Report - Weymouth Neck
Attachments: MDPH comments on Draft Weymouth Neck RN Phase II Report.doc

Hi Steve,
Bill Bell, MDPH Radiation Control Program, has reviewed the Draft Final Phase II Radon Survey Report prepared by Bluewind Consulting for Weymouth Neck. Bill's comments are attached.
Thanks,
-Meg

Meg Blanchet, M.S., REHS
Assistant Director
Environmental Toxicology Program
Bureau of Environmental Health
Massachusetts Department of Public Health
250 Washington Street, 7th Floor
Boston, MA 02108
phone: 617.624.5757
fax: 617.624.5777

From: Johnson, Stephen (DEP)
Sent: Thursday, April 16, 2009 5:24 PM
To: Bell, William J (DPH)
Cc: Blanchet, Meg (DPH); Walker, Bob (DPH); Steele, Martha (DPH)
Subject: FW: Draft Final Phase II Radon Survey Report - Weymouth Neck

Bill, attached is a "draft final" report on the second round of radon testing done at Weymouth Neck. This round was done in January to represent "worst case" conditions. This "draft final" report is being made available to us to review and provide comments to ConocoPhillips before it is made available to the Public Involvement mailing list. The attachment does not have a complete set of the laboratory data sheets. Conoco's consultant (URS Corp.) has told me that they will include a figure with the final report, but "Due to individual homeowner privacy reasons, we do not want to show details of where the tests were conducted". URS is planning to install radon mitigation systems in the three buildings where radon levels were detected in any rooms above 4 pCi/L.

If you have any questions or comments, please let me know. Thanks for your help on this case.

Steve Johnson
MassDEP

From: Russ_Wilder@urscorp.com [mailto:Russ_Wilder@urscorp.com]
Sent: Wednesday, April 15, 2009 5:06 PM
To: Johnson, Stephen (DEP)
Cc: Charles_Schneider@urscorp.com; deborah.lamond@conocophillips.com
Subject: Draft Final Phase II Radon Survey Report - Weymouth Neck

Steve:

Here is the draft final Phase II Radon Survey Report for your review. Please send any comments or questions that you may have back to me for resolution.

(See attached file: Draft Final Phase II Radon Survey Report sent to MassDEP.pdf)

Regards,

Russ Wilder, PG, LSP
Vice President
Environmental Services
URS CORPORATION
5 Industrial Way
Salem, NH 03079

603-890-3321 x 2271(direct)
603-893-0616 (main)

260 Franklin St.
3rd Floor
Boston, MA 02110

617-542-4244 (main)
857-383-3851 (direct)

617-515-7258 (mobile)

Please consider the environment before printing this e-mail

To: Meg Blanchet
From: William J. Bell

May 13, 2009

Subject: Comments on: **Radon Survey Report Phase II** Weymouth Neck Site, Weymouth, Massachusetts prepared by Bluewind Consulting for Safety and Ecology Corporation

General observations:

The lack of floor plans makes it impossible to determine the coverage of the survey.

Specific Comments:

Page 1 - **Radon Survey**, Weymouth Neck, Paragraph 3

The type of test device is not described. While it is known to this reviewer that the devices are Charcoal Liquid Scintillation Radon Detectors, that is not necessarily obvious to other readers.

Page 1 – **Site Observations** 300 River Street

The last sentence of the paragraph reads "Unit 4 was overexposed and retested in a later exposure period." The use of the word "overexposed" here, means that the duration of the sampling period exceeded the test device specifications. It does not mean that the concentration sampled exceeded the device's ability to measure radon. This reviewer suggests that as written, the meaning is subject to misinterpretation and should be revised for clarity.

Page 2 – **Results**, Paragraph 1

The unit "pCi/L" is introduced in this document for the first time. It is suggested that the first time the unit is used that it be written out such as "picocuries per liter of air (pCi/L)." Also the case of the unit abbreviation (pCi/L vs. pCi/l) is inconsistent in this paragraph.

Page 3 – **Quality Control**, Blind spikes

The term "blind spikes" was used to describe known exposure measurements here. The table on page 5 where this reviewer believes the data is presented is labeled "Blind Test." Recommend use of consistent terms. Also the Lab sheets supporting the table on page 5 were not found.

This section indicates that the address reported to the lab was, 1 Broad Reach. If this is a fictitious address intended to preserve the blind nature of these quality assurance measurements then please disclose that here to avoid misunderstanding down the road.

Page 5 – **Quality Control Summary: Blind Tests**

"Target value" column heading would benefit from specifying the units (pCi/L).

Pages 6 thru 12 – **Tables**

Result units are not specified.

Date test start format is inconsistent. Sometimes date and time are reported other times only date.

Last two Date columns should be labeled such as "Lab Received" or "Lab Reported."

Lab reports for some data in these tables were not found. All Lab reports attached to the subject document were for results of measurements conducted in early February 2009. The Tables on pages 6-8, for example, contain results of measurements in January.

In general, no attempt was made to hide the identity of blank or duplicate samples from the laboratory. The identification system was not always consistent. For example, on the lab report for The ARC of the South Shore dated 2/10/2009, device numbers 1962729 and 1962730 each were identified as "Store Room/Shipping." This could mean that two discrete (not co-located) measurements were made in the same room. The Table on page 10 has the same Location ID's for these devices. The table of Duplicates on page 4 shows that the samples were duplicate measurements.

In another case, device numbers 1962719 and 1962720, also at the ARC, both listed "Sensory Room" as the location. The Table on page 10 shows 1962720 as a duplicate of 1962719. The table of Duplicates on page 4 does not show this pair.

Please review the entire data set to make sure the process is clear.

Page 6 – **Device number 1958503, Location**

See comment above for Page 1 – **Site Observations** 300 River Street

Appendix D

Blanchet, Meg (DPH)

From: Blanchet, Meg (DPH)
Sent: Tuesday, May 05, 2009 10:00 AM
To: Johnson, Stephen (DEP)
Cc: Walker, Bob (DPH); Steele, Martha (DPH); Whalen, Michael (DPH); Bell, William J (DPH)
Subject: FW: Comments on 12/24/09 Weymouth Neck report
Attachments: Additional Technical Comments on DRAFT GW Monitoring Report.pdf

Hi Steve,

Per your request, staff from the Radiation Control Program (RCP) and Environmental Toxicology Program (ETP) in the MDPH Bureau of Environmental Health (BEH) have reviewed the 12/24/08 report "Radionuclides Scoping Survey and Preliminary Radon Testing Report" submitted to MDEP by ConocoPhillips Company for the Weymouth Neck site. As you know, MDPH BEH provided comments on the radon portion of the original scope of work for this effort last June. Comments on the preliminary radon testing portion of the 12/24/08 report were provided to you previously (please see email from Bill Bell, BEH RCP, below).

Based on our review of the radionuclide scoping survey, we have the following comments:

1. In general, based on the information provided in the scoping survey report, the measurements and methods applied are in accordance with other typical scoping surveys, with one exception. Table 1 of the scoping survey report provided minimum, maximum, and average counts per minute (CPM) for each site area scanned. Although the report states that only four locations at Weymouth Neck had measurements that exceeded the 22,000 CPM investigation level, it would be helpful to know the maximum CPM values at each site area that were not coincident with granite curbing, walkways, and pavement containing granite aggregate. In addition, for completeness, all the raw data should be provided on a CD, for example, in an Appendix.
2. Based on the data available in the scoping survey, risks associated with possible exposure to radionuclides in soil at Weymouth Neck would not be expected under current site conditions. However, it is our understanding that some areas of the Weymouth Neck site of particular concern to a former resident of this area are currently capped. Therefore, it is important to note that unless soil sample measurements are taken beneath the cap, it is not possible to fully evaluate whether historical exposure to radionuclides would have been possible in those areas now covered with clean fill that might suggest health effects. If the final results of the groundwater investigations and the radon testing do not indicate widespread elevations of radionuclides or radon, those findings in combination with results of the scoping survey for the uncapped portions of the site, may indicate that historical opportunities for exposure to high levels of radionuclides at Weymouth Neck were unlikely.
3. Based on our review of the DRAFT results of the groundwater sampling conducted at Weymouth Neck in February 2009, it appears that the majority of groundwater samples at or near the capped portions of the site had radionuclide levels below the Maximum Contaminant Levels (MCL) for drinking water provided by U.S.

Environmental Protection Agency's Radionuclides Rule with a few exceptions. Two groundwater samples (WN-3 in Lot 24/25 and WN-12 in Lot 1 had Gross Beta (minus potassium-40) activity levels of 57.40 pCi/L and 53.48 respectively, which are slightly greater than the EPA MCL of 50 pCi/L. Total radium was detected slightly above the EPA MCL (5 pCi/L) at 7.77 pCi/L in WN-18. One sample, well WN-20 (Area 2), had a concentration of 552.46 pCi/L Gross Beta (minus potassium-40). While the DRAFT report states that this sample was not considered representative of groundwater in this area (i.e. water was anaerobic, had a hydrogen sulfide odor and was dark grey in color), additional information as to why this sample was not considered valid should be provided. As you know, the groundwater at Weymouth Neck is not a source of drinking water, and hence exposure opportunities via drinking water are not expected. Whether the source of radionuclides in the above-noted samples was naturally occurring or from some buried radioactive waste cannot be determined without further speciation of radionuclides detected in the samples. (Some additional specific comments on the DRAFT groundwater sampling report are attached to this email).

4. Results of the radioactivity measurements attributed to granite curbing, walkways, and pavement containing granite aggregate presented in the scoping survey report would be expected, and the findings are consistent with what was noted by RCP staff who initially visited the area with a hand-held NaI detector for several hours in winter 2008 in response to concerns of the former resident of Weymouth Neck.
5. As you are aware, three specific questions about the methodology used in the scoping survey have been forwarded to BEH's RCP from the wife of a former resident of Weymouth Neck. While RCP was not involved in conducting the scoping survey, we considered these three questions when reviewing the report and have the following comments:
    - Calibration of the scintillation detectors to a radium 226 standard – the sodium iodide (NaI) scintillation detectors used for this scoping survey were not calibrated with a Ra-226 source. However, the NaI scintillation detectors that were used in this survey are fully capable of measuring a range of energy that would be associated with manufacture of fertilizer from phosphate rock (i.e., radioactive Radium, Thorium, and Uranium.) In fact, the NaI scintillation detectors would likely over respond to the expected energy range.
    - Radiation background levels – The selection of two times background as an investigation level for comparison purposes is a typical approach used for these types of scoping surveys. It is important to note that the MDPH is not aware of any information that confirms there is Technologically-Enhanced Naturally Occurring Radioactive Material (TENORM) at Weymouth Neck. In general, in the case of facilities that were formerly licensed (which does not apply to Weymouth Neck), some residual radioactivity above background is permitted to remain provided that an analysis has been done to show that no member of the public will receive an unacceptable dose of radiation from residual radioactivity. Based on the current conditions at Weymouth Neck, it appears that the levels of radiation detected are typical for this area of the state and if radiation was the only contaminant of concern at the site, the BEH RCP would release the area for unrestricted use.
    - Temperature conditions and background count rate – Information from the manufacturer of the Model 44-10 NaI Scintillation detector used for the

scoping survey shows that the detector is fine to use between -4 degrees F and 122 degrees F. In general, the detector response of the Model 44-10 NaI will increase slightly as the temperature decreases. From the log sheets in Appendix C of the report, it appears that the day that Great Esker Park was scanned, 11/10/2008, (for background determination) was warmer than the next four scanning days. This resulted in a lower 'background' investigation level (i.e. twice background), than would have been acquired on one of the four subsequent sampling days when temperatures were colder. Thus, because it appears that the 'background' location was scanned on a warmer day than the days when the scanning occurred at Weymouth Neck, the approach would be considered conservative.

We hope you find these comments to be useful. Please feel free to contact us if you have any questions or wish to discuss.

Thanks,
-Meg

Meg Blanchet, M.S., REHS
Assistant Director
Environmental Toxicology Program
Bureau of Environmental Health
Massachusetts Department of Public Health
250 Washington Street, 7th Floor
Boston, MA 02108
phone: 617.624.5757
fax: 617.624.5777

From: Bell, William J (DPH)
Sent: Tuesday, January 20, 2009 1:42 PM
To: Johnson, Stephen (DEP)
Cc: Walker, Bob (DPH); Blanchet, Meg (DPH); Whalen, Michael (DPH)
Subject: Weymouth Neck report dtd 12/24/2009 Comments

Comments on: "Radionuclides Scoping Survey and Preliminary Radon Testing Report Weymouth Neck, Massachusetts," December 24, 2008

Page 18, 5.0 Radon Testing

- Para 1describes Bluewind as "a MassDPH accredited and certified radon testing and consulting firm…"

Comment: Mr. Christopher Juliano of Bluewind is certified as a Radon Measurement Specialist by the National Radon Safety Board. MDPH does not accredit or certify any person to conduct radon measurements.

Page 19, Table 2

- The description of locations would be improved with simple floor plan. Descriptions like Joe's Office of Bruce's Office, change over time, making the data difficult to interpret. Similarly, in Weymouthport Condominiums, to describe a location by it's current use such as "Conference," is not definitive alone. If in the future, a conference room becomes an office or a recreation room more uncertainty would be introduced. The addition of floor plans with locations labeled removes this uncertainty.

Page 22, Table 2 & Bluewind Report page 1 of 2

- Unit #2 at 300 River Street was tested sequentially, or nearly so. The first test ended on 11/14/08 at 16:00 and the second exposure period started 1 hr 45 min before the first period ended. This timing seems odd as it would have required two trips or an extended stay at that location. Please confirm the start and end times/dates of all samples.

Page 22, 6.0 Testing Findings

- If two sequential radon tests were conducted in Unit #2 at 300 River Street and both exceed the 4 pCi/L Action Guide, then there is ample evidence now to justify mitigation.

Page 2 of 2 Bluewind Report & Attachment 1 Inter-exposure Duplicates.

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William J. Bell
Radiation Scientist
Massachusetts Dept. of Public Health
Radiation Control Program
23 Service Center
Northampton, Ma 01060

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MDPH Bureau of Environmental Health, Radiation Control Program
Technical Comments on 4/9/09 DRAFT *Weymouth Neck Post Remediation Groundwater Monitoring Program* report prepared by URS Corporation

1. Page 2, 1st paragraph, states the lowest gross alpha measurement was -0.3 U pCi/L at sample location MW-N86, while Table 7 shows the lowest measurement occurred at location MN-17, corresponding to -0.4 pCi/L.

2. Page 2, 3rd paragraph states the highest gross beta minus potassium calculation was 57.4 pCi/L at sample location WN-3, while Table 7 shows the highest gross beta calculation to be 552.46 pCi/L and occurring at WN-20. An explanation about why URS feels the latter sample was not considered valid is not provided until page 22 of the report.

3. Page 2, 4th paragraph states the highest total radium was 6.14 pCi/L at MW-N85, while Table 7 shows the highest total radium to be 7.77 pCi/L at WN-18.

4. Page 6, paragraphs 2, 3, and 4 seem out of place. This section of the report is for Sampling and Analysis Methods. Perhaps these paragraphs belong in a Historical or Background section of the report.

5. Page 6, last paragraph, it is not clear what statistical method was used in evaluating radionuclide results in groundwater.

6. Page 15, paragraph 3, regarding the gross beta activity should include discussion that the potassium-40 concentrations were not acquired, thus, cannot be compared to the 50 pCi/L secondary standard, and thus no conclusions can be made regarding these November 2008 gross beta activity measurements. This draft report does not mention this until page 17, top paragraph.

7. Page 15, paragraph 4, 2nd sentence: 6.2 pCi/L of uranium is not the "only exceedance" of the radium MCL. Well WN-18 (7.77 pCi/L) also exceeds the radium MCL. The text should be revised to make it more clear that 6.2 pCi/L of uranium was not the only exceedance during the November 2008 sampling round.

8. Page 16, paragraph 3 and 4, are duplicitous and out of place. As stated in Number 6 above, this discussion, if to be re-stated again, is best placed with paragraph 3 of page 15.

9. Page 17, paragraph 3, states that the 4-Liter plastic sample bottle for WN-21 broke, thus, was re-sampled on February 26, 2009. Table 7 lists this sample date for this sample to be (incorrectly) February 23, 2009.

10. Sampling date for Table 7, WN-21 is different date than WN-21 has on Tables 5 and 6.

11. Detection limits in Table 7 should be specified for results with data qualifiers (e.g. U).

12. In Table 7, it would be helpful to explain why different samples had different detection limits for radionuclides (e.g., WN-8 vs. WN-9 gross alpha DL).