

Community Environmental Fact Sheet

UNDERSTANDING THE LINK BETWEEN EXPOSURE AND RISK

Drinking Water near Joint Base Cape Cod

This fact sheet summarizes the science of exposure to a contaminated media and public health risk given the presence of contaminated groundwater plumes associated with Joint Base Cape Cod (JBCC) and the use of groundwater as a source of drinking water near the base. Terms identified in **bold** are defined in the glossary.

There are three basic factors that must be present to cause potential harm from environmental contamination: a **contaminated medium** (e.g., **groundwater**), an **exposure pathway**, and a recipient. These three elements are the basis of any health and/or ecological risk assessment. This fact sheet will specifically focus on **exposure via drinking water off-base near JBCC**. For specific questions about health effects and exposure to a particular chemical, contact your local board of health or the Massachusetts Department of Public Health.

There are two cleanup programs on Joint Base Cape Cod addressing **plumes** of groundwater contamination, and their sources. The Installation Restoration Program (IRP) is managed by the Air Force and is addressing contamination found primarily on the southern portion of JBCC and off base. The Impact Area Groundwater Study Program (IAGWSP) is managed by the Army and is addressing contamination from the northern portion of JBCC and some off-base areas. Both of the programs' efforts are being conducted with oversight from the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP).

For the IRP and IAGWSP, groundwater plumes are being addressed through treatment and/or monitored natural attenuation (MNA). MNA uses the natural process of dilution, dispersion and degradation. The majority of the source areas that contributed to soil and/or groundwater contamination have been cleaned up. Best Management Practices have been implemented to properly manage hazardous materials and respond promptly to any releases.

HOW CAN EXPOSURE OCCUR?

People, plants and animals can be exposed to pollutants by breathing, eating, drinking or through contact. There is a potential health risk only if there is a completed exposure pathway. A completed pathway occurs when the contaminant is known to travel from the source to a person, animal or plant.

WHAT IS AN EXPOSURE PATHWAY?

Exposure can occur only if there is an **exposure pathway** for the **contaminants** to go from the source to the individual, animal or plant. At JBCC, historically the sources of the contaminants were chemical spills, fuel spills and military activities that occurred at several locations. To be exposed to contaminants from JBCC the contaminants would have to travel through the soil, water, air, or food chain (or some combination thereof) to people, plants, and animals.

WATER: People, plants and animals may be exposed to contaminants through direct contact with, or drinking, contaminated groundwater. Contaminated groundwater may also flow into ponds, rivers, or harbors. People and animals may be exposed by direct contact with, or ingesting, the contaminated surface water, or consumption of contaminated fish. Using contaminated groundwater and surface water for irrigation can result in plants taking up the contaminants. People and animals may then be exposed by eating the contaminated plants.

SOIL: People and animals may be exposed to contaminants by eating or touching the contaminated soil. Plants growing in the contaminated soil may take up the contaminants through their roots; people and animals may be exposed by eating the contaminated plants.

AIR: People and animals may be exposed through the air by breathing or inhaling contaminants. Contaminants may travel from water to the air as a vapor if contaminated water is used for showering. Contaminated dust and airborne contaminants may be deposited on plants and in ponds and rivers.

WHAT IS BEING DONE TO REDUCE EXPOSURE TO GROUNDWATER CONTAMINANTS FROM JBCC?

Both IRP and IAGWSP operate groundwater treatment systems: the IRP treats 7.94 million gallon per day (MGD) and the IAGWSP treats 3.96 MGD. To ensure that there is no exposure pathway, Land-Use Controls (LUCs) are put in place to ensure the public's safety both on and off JBCC with regards to drinking water and the plumes associated with JBCC. LUCs include coordination with local Boards of Health, evaluation of private wells near plumes, and other protective measures designed to prevent the development or use of drinking water supplies in areas affected by plumes. In some cases, bottled water, connection to public water supplies, in-home water filtration systems, and wellhead treatment is provided. As long as groundwater contaminants remain above cleanup levels, LUCs to prevent exposure are maintained through continual interaction with local officials and property owners in affected areas. LUC areas are outlined in the map on page 3.

HOW MIGHT I BE HARMED?

Health effects from exposure to a contaminant will depend on how much a person is exposed to and how frequently and for how long they are exposed. Possible harm from exposure also depends on personal factors such as age, sex, diet, lifestyle and current health status.

HOW CAN I REDUCE MY EXPOSURE TO CONTAMINATED GROUNDWATER?

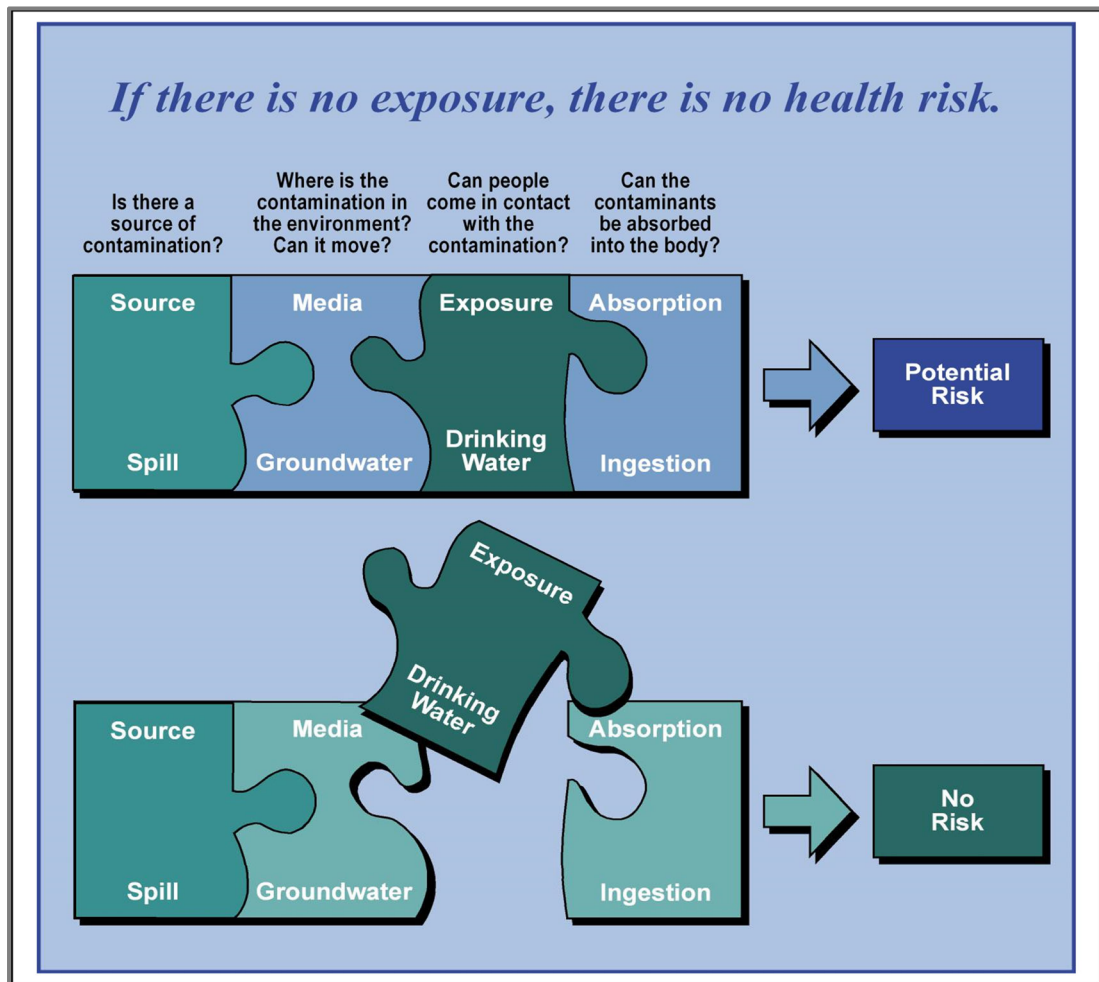
If you have a private drinking water well and you are not sure if your well is contaminated, have your well tested. Contact your town's health agent for more information on the recommended tests and any necessary follow-up action (see information on page 4).

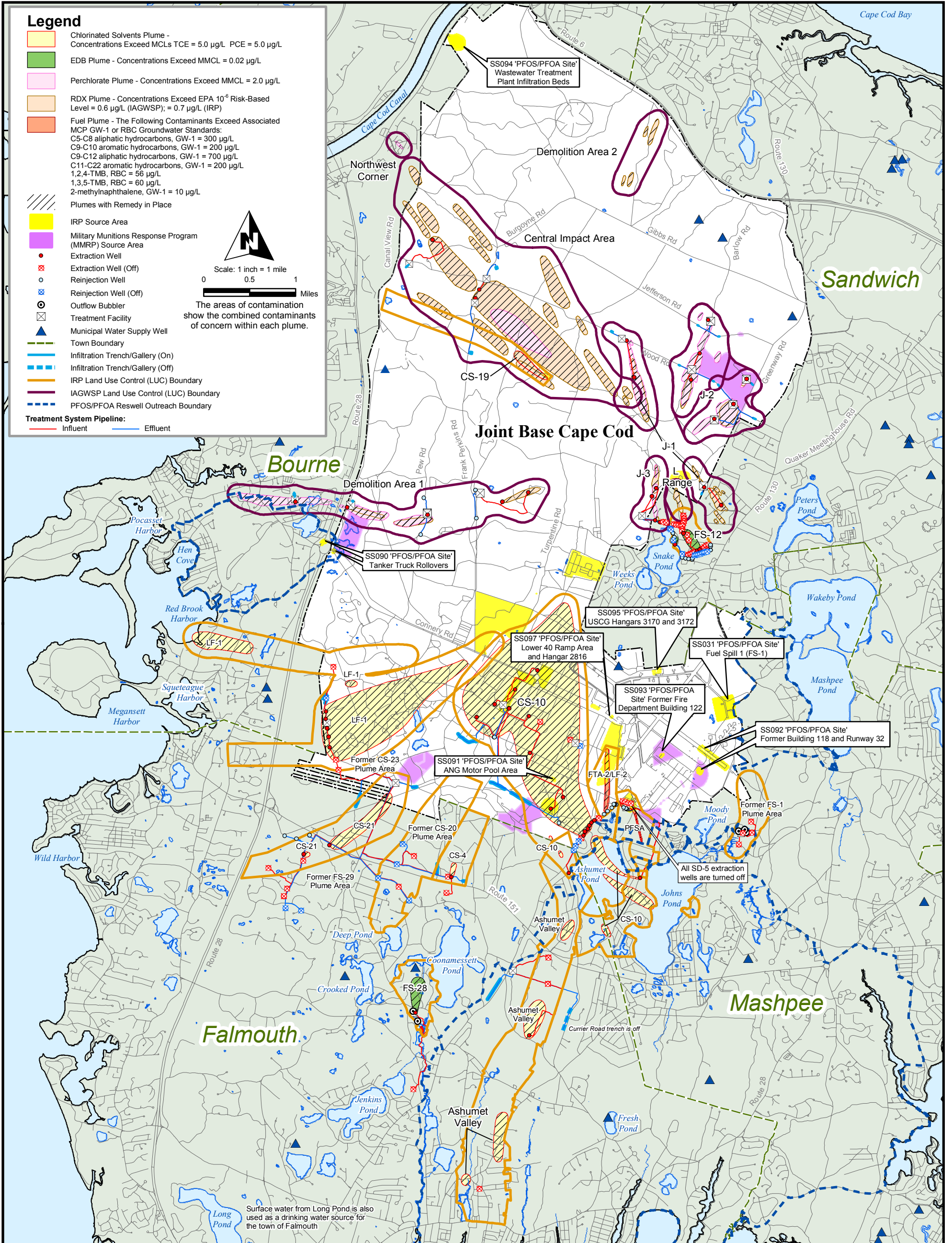
If you are located in an area that may be affected by contamination from JBCC (see map on page 3), you may be eligible for residential well sampling program at no charge to you. If your well is tested as part of this program and is found to be affected, you may be provided with an alternate source of safe drinking water (bottled water, carbon filtration and/or hook-ups to municipal water.)

In addition, you should follow fishing advisories and the pertinent recommendations of Federal, State and local health agencies for any affected surface waters. The Massachusetts Department of Public Health has published a fact sheet on the Recreational Use of Waterbodies on or near JBCC. It can be found at:

<https://www.mass.gov/doc/recreational-use-of-waterbodies-on-or-near-joint-base-cape-cod-jbcc/download>

For further specific information, see the points of contact on page 4.





Contaminant of Concern (COC)	Type of Contaminant	Risk-Based Level
TCE = trichloroethene	solvent	MCL = 5 µg/L
PCE = perchloroethene	solvent	MCL = 5 µg/L
CCl ₄ = carbon tetrachloride	solvent	MCL = 5 µg/L
EDB = ethylene dibromide	fuel-related compound	MMCL = 0.02 µg/L
benzene	fuel-related compound	MCL = 5 µg/L
VC = vinyl chloride	solvent	MCL = 2 µg/L
1,1,2,2-TeCa = 1,1,2,2-tetrachloroethane	solvent	GW-1 = 2 µg/L
1,4-DCB = 1,4-dichlorobenzene	solvent	MMCL = 5 µg/L
Mn = manganese	metal	EPA Health Advisory = 300 µg/L
thallium	metal	MCL = 2 µg/L
lead	metal	15 µg/L (treatment technique action level for water distribution systems)
toluene	fuel-related compound	MCL = 1,000 µg/L
RDX = hexahydro-1,3,5-trinitro-1,3,5-triazine	explosive	HA = 2 µg/L GW-1 = 1 µg/L 10 ⁻⁶ = 0.6 µg/L (IAGWSP); = 0.7 µg/L (IRP)
perchlorate	oxidizer	HA = 15 µg/L MMCL = 2 µg/L
C5-C8 aliphatic hydrocarbons	fuel-related compound	GW-1 = 300 µg/L
C9-C10 aromatic hydrocarbons	fuel-related compound	GW-1 = 200 µg/L
C9-C12 aliphatic hydrocarbons	fuel-related compound	GW-1 = 700 µg/L
C11-C22 aromatic hydrocarbons	fuel-related compound	GW-1 = 200 µg/L
1,2,4-TMB	fuel-related compound	RBC = 56 µg/L
1,3,5-TMB	fuel-related compound	RBC = 60 µg/L
2-methylnaphthalene	fuel-related compound	GW-1 = 10 µg/L

Joint Base Cape Cod Groundwater Plume Map, IRP and IAGWSP LUC Areas, and IRP PFOS/PFOA Outreach Areas

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Note: MCL – Maximum Contaminant Level
 MMCL – Massachusetts Maximum Contaminant Level
 HA – Federal Lifetime Health Advisory
 PFOS – Perfluorooctane Sulfonic Acid
 PFOA – Perfluorooctanoic Acid
 GW-1 – State default cleanup value to be used in lieu of site-specific risk-based level
 10⁻⁶ – EPA level resulting in an excess cancer risk of one in a million
 RBC – Site Specific Risk Based Concentration

WHAT SHOULD I DO IF I HAVE BEEN EXPOSED AND HAVE CONCERNS ABOUT MY HEALTH?

If you believe that you have been exposed to contaminant(s), you should discuss your concerns with your health care provider. Your medical provider will determine if consultation with a specialist is warranted.

FEDERAL, STATE AND LOCAL CONTACTS

<p>AFCEC Doug Karson (508) 968-4678, ext. 2 douglas.karson@us.af.mil</p>	<p>Falmouth Health Department (508) 495-7485 health@falmouthma.gov</p>
<p>IAGWSP Pamela Richardson (339) 202-9360 Pamela.j.richardson.nfg@mail.mil</p>	<p>Mashpee Health Department (508) 539-1426 gharrington@mashpeema.gov</p>
<p>EPA Bob Lim (617) 918-1392 Lim.robert@epa.gov</p>	<p>Sandwich Health Department (508) 888-4200 dmason@sandwichmass.org</p>
<p>MassDEP Ellie Donovan (508) 946-2866 ellie.donovan@mass.gov</p>	<p>Massachusetts Department of Public Health Marc Nascarella (617) 624-5757 Marc.nascarella@state.ma.us</p>
<p>Bourne Health Department (508) 759-0600, ext. 1513 tguarino@townofbourne.com</p>	<p>ATSDR (800) 232-4636 Toxic Substance Portal: https://www.atsdr.cdc.gov/substances/index.asp</p>

GLOSSARY

contaminants: substances (e.g. impurity, toxin, pollutant) that diminish the quality of air, water, soil, or food.

exposure: the state of being subjected to contact with something.

exposure pathway: the way (i.e., drinking, inhaling or absorption through skin) a person can come into contact with a hazardous substance i.e. the route by which a contaminant travels from the source area to reach a receptor (humans, birds, etc.).

plume: a mass of material, typically a pollutant, spreading from a source dissolved in groundwater.

source: the location/origin where contaminants enter soil, water, air or sediment.

FOR INFORMATION ON JBCC CLEANUP PROGRAMS

Additional information about the IRP and the IAGWSP is available on the programs' websites at:

- <https://massnationalguard.org/JBCC/afcec.html>
- <http://jbcc-iagwsp.org>

The websites include fact sheets, reports, meeting minutes and other information to help keep the community informed of the programs' progress.

Both programs maintain Administrative Records, which is the public record of all documents used in the decision-making process.

The administrative record for the IRP can be found online at: <https://ar.afcec-cloud.af.mil/>. Select "Joint Base Cape Cod." It is also located at: 322 East Inner Road, Otis ANG Base, MA. Access is by appointment only. Please call the AFCEC Community Involvement office at (508) 968-4678, ext. 2.

The administrative record for the IAGWSP is located at 1807 West Outer Road, Camp Edwards, MA. Access is by appointment only. Please call IAGWSP at (339) 202-9360