State Summary for Connecticut

Information on population density, use of domestic wells for water supply, land use, and distribution of the 11 selected contaminants (arsenic, atrazine, benzene, deethylatrazine (CIAT), manganese, nitrate (data for nitrate consists of analyses for nitrite plus nitrate, as N, by the laboratory), perchloroethene (PCE), radon, strontium, trichloroethene (TCE), and uranium) for domestic well data for Connecticut is shown in figures CT1–CT16. The percentage of samples greater than U.S. Environmental Protection Agency (USEPA) human-health benchmarks for National Water-Quality Assessment (NAWQA) Program major-aquifer studies that included Connecticut is given in table CT1. The areal extent of some NAWQA major-aquifer studies goes beyond the State boundary (fig. CT4). All data associated with a major-aquifer study are provided and are used in contaminant summaries even if the sampled well was located outside the State boundary. The "Selected References" section at the end of this summary lists previous Connecticut studies that are relevant to the 11 contaminants.

In Connecticut, the largest areas with the highest population density are located along the central and southwestern parts of the State (fig. CT1). Almost all domestic (private) drinking-water supply in Connecticut is obtained from ground water (John Mullaney, U.S. Geological Survey (USGS), written commun., 2007), and only about 15 percent of the public supply is obtained from ground water. The population (by census-block group for 1990) using a domestic-water supply from ground water was widespread throughout the State, with the exception of the major population centers where less than 250 people per census block group were using ground water as a domestic water supply (fig. CT2). Although Connecticut is a heavily populated State, it also contains many forested lands. Most of the forested areas are located in the northwestern and eastern parts of the State (fig. CT3).

Two major-aquifer studies in two principal aquifers (New York/New England crystalline-rock and glacial aquifers) were conducted in Connecticut (fig. CT4). New York/New England crystalline rock aquifers in Connecticut consist mostly of metamorphic and igneous rocks and are mostly unconfined aquifers in the upper 200 feet and may be confined at depth (Olcott, 1995). The regolith and fractures in the bedrock serve as the primary areas of storage and well yields generally are only a few gallons per minute, although some wells may exceed 200 gallons per minute (Olcott, 1995).

Several glacial aquifers occur near the land surface throughout Connecticut and are contained in unconsolidated sand and gravel deposits of Quaternary age. Most of the individual aquifers that comprise the system are not hydraulically connected, and were formed mostly from sediments deposited by continental glaciers or by meltwater from glaciers, or from alluvium in valleys of major streams (Trapp and Horn, 1997). Most of the productive aquifers contain water under mostly unconfined conditions. Well yields are quite variable in the glacial systems because of variable thicknesses, coarseness of material, and the extent of the deposits.

Water-quality data for 11 selected contaminants (table 2) in samples from domestic-water supplies were compiled and summarized. The concentrations relative to USEPA human-health benchmarks (table 2, fig. CT5) and the number of major-aquifer studies with concentrations greater than human-health benchmarks were both considered in evaluating the potential concern to human health. This analysis assumes that current USEPA benchmarks (U.S. Environmental Protection Agency, 2006) are the most relevant and accurate measure of human-health risk.

Radon, manganese, arsenic, and nitrate had concentrations greater than USEPA human-health benchmarks for NAWQA studies of domestic wells (table CT1). Radon had the greatest potential human-health concern because it had

Table CT1. Percentage of samples with concentrations greater than U.S. Environmental Protection Agency human-health benchmarks for National Water-Quality Assessment (NAWQA) Program major-aquifer studies that included Connecticut.

Study-Unit code for NAWQA major-aquifer study	Principal aquifer	Contaminant	Number of samples	Percentage of samples with concentrations greater than human-health benchmark
connsus1	New York/New England crystalline-rock aquifers	Radon	27	[1]96/37
connsus2	Glacial aquifers	Radon	27	[1]81/3.7
connsus2	Glacial aquifers	Manganese	28	7.1
connsus1	New York/New England crystalline-rock aquifers	Arsenic	26	3.8
connsus2	Glacial aquifers	Nitrite plus nitrate	28	3.6

[1]First number is the percentage greater than 300 picocuries per liter (proposed Maximum Contaminant Level), and second number is the percentage greater than 4,000 picocuries per liter (alternate proposed Maximum Contaminant Level).

the largest percentage of samples with concentrations greater than the human-health benchmark of 300 picocuries per liter (pCi/L). Radon concentrations were largest in the connsus1 major-aquifer study in the New York/New England crystalline rock aquifers, where about 96 percent of the samples had concentrations greater than 300 pCi/L, which is the proposed Maximum Contaminant Level (MCL) for radon, and about 37 percent of the samples had concentrations greater than the alternative proposed MCL of 4,000 pCi/L (table CT1). The median radon concentration in the connsus1 major-aquifer study was about 2,000 pCi/L (fig. CT5). About 81 percent of samples in the connsus2 major-aquifer study in the glacial aquifers had radon concentrations greater than the proposed MCL; about 4 percent (one sample) had a concentration greater than the alternative proposed MCL. The median radon concentration in the connsus2 major-aquifer study was less than 1,000 pCi/L (fig. CT5, table CT1). U.S. Geological Survey (USGS) State data also showed radon concentrations to be greater than the human-health benchmark in most of the samples collected (fig. CT13). Radon-222 is a decay product of radium-226, and radon concentrations greater than the human-health benchmark are widespread and can be attributed to natural sources in the soil and rock material in Connecticut.

Manganese concentrations were greater than the USEPA human-health benchmark, which is the Lifetime Health Advisory (HA) of 300 micrograms per liter (µg/L), in 2 of the 28 samples (about 7 percent) collected for the connsus2 major-aquifer study; one of which was collected in Connecticut (fig. CT10). USGS State data showed several additional samples with manganese concentrations greater than the human-health benchmark, but samples were distributed randomly and are interspersed with samples that have concentrations less than the human-health benchmark.

One of 26 samples (about 4 percent) collected from the connsus1 major-aquifer study in the New York/New England crystalline-rock aquifers had an arsenic concentration greater than the human-health benchmark (MCL of 10 µg/L) (table CT1). The median arsenic concentration for the connsus1 samples was 2 µg/L (fig. CT5), which was within an order of magnitude of the human-health benchmark.

One of the 28 samples (about 4 percent) for the connsus2 major-aquifer study in the glacial aquifers had a nitrate concentration greater than the human-health benchmark, which is the MCL of 10 milligrams per liter (mg/L). The median nitrate concentration for the connsus2 samples was 1 mg/L (fig. CT5), which was within an order of magnitude of the human-health benchmark.

None of the NAWQA samples in Connecticut had uranium concentrations greater than the human-health benchmark (MCL of 30 µg/L); however, several samples available from USGS State data had uranium concentrations greater than the human-health benchmark (fig. CT16). These concentrations appear to be distributed randomly and are interspersed with samples that have concentrations less than the human-health benchmarks.

For the entire Connecticut data set, atrazine (fig. CT7), benzene (fig. CT8), CIAT (fig. CT9), PCE (fig. CT12), strontium (fig. CT14), and TCE (fig. CT15) did not have concentrations larger than USEPA human-health benchmarks for either NAWQA or USGS State data. CIAT is a degradation product of atrazine and does not have a human-health benchmark; however, for this report, the MCL for atrazine is used as a benchmark for CIAT because their toxicities are considered equivalent.

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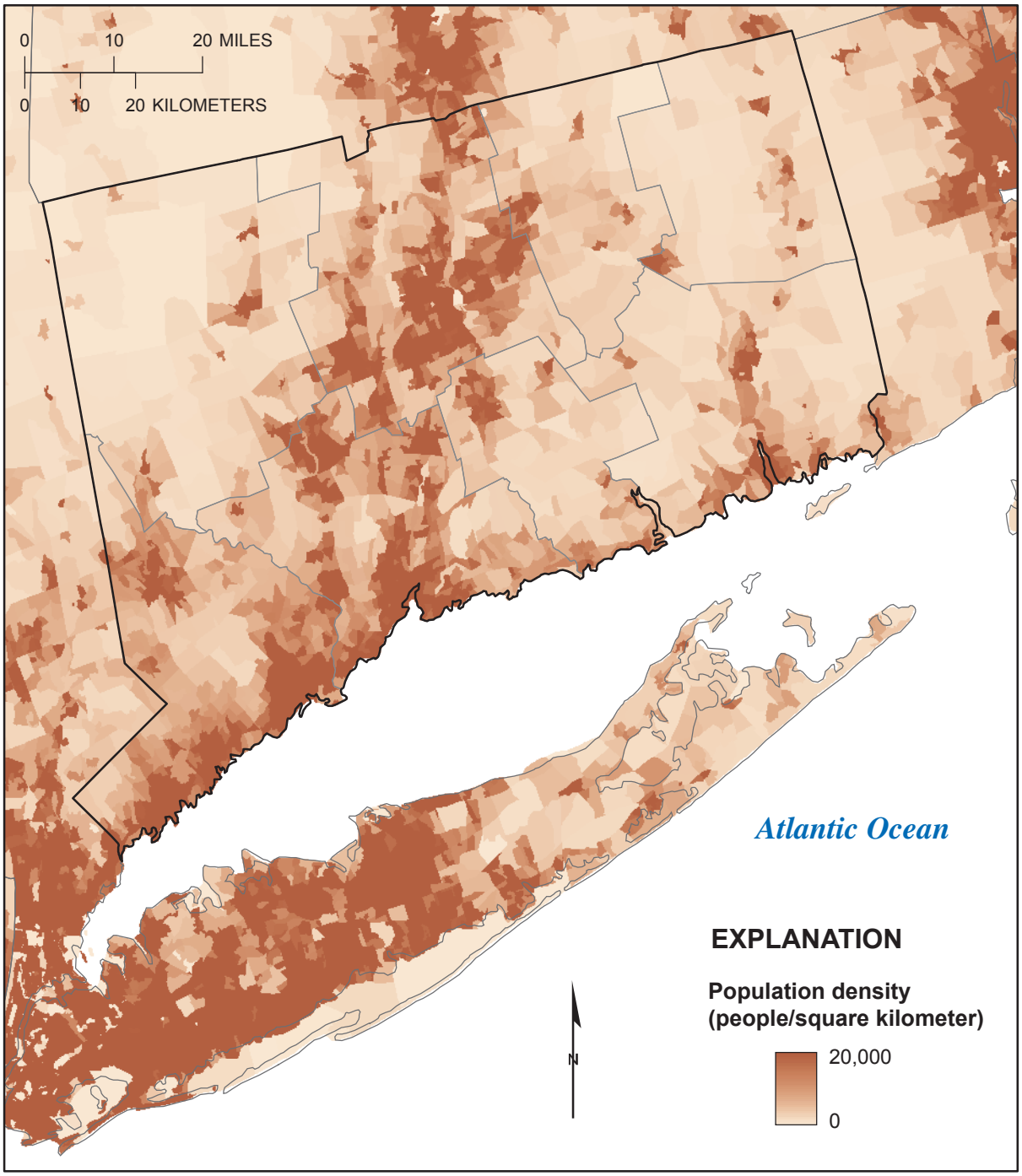
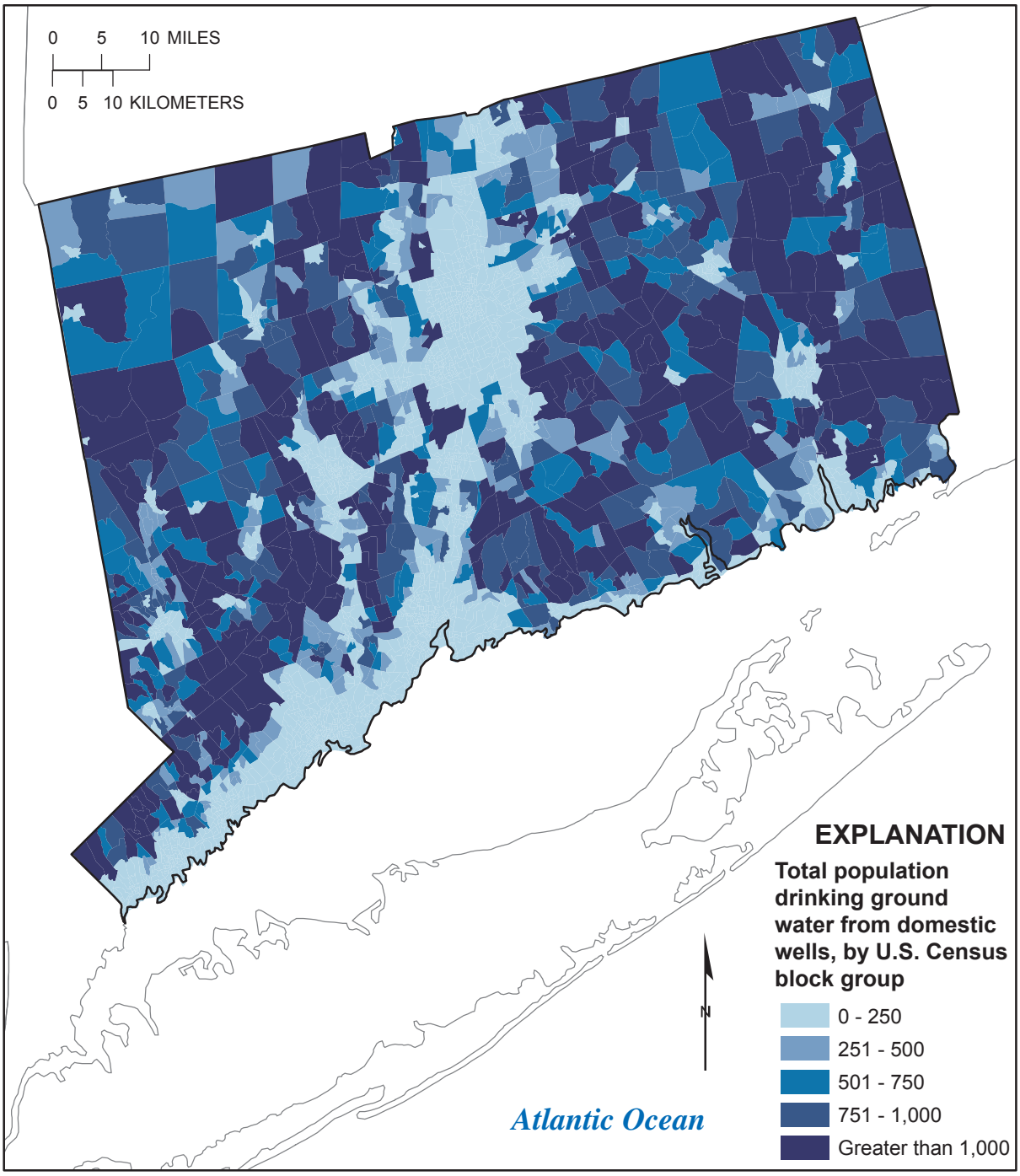


Base information from U.S. Geological Survey digital data, 1:2,000,000
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Figure CT1. Population density for Connecticut and nearby States. (Data from Hitt, 2003.)



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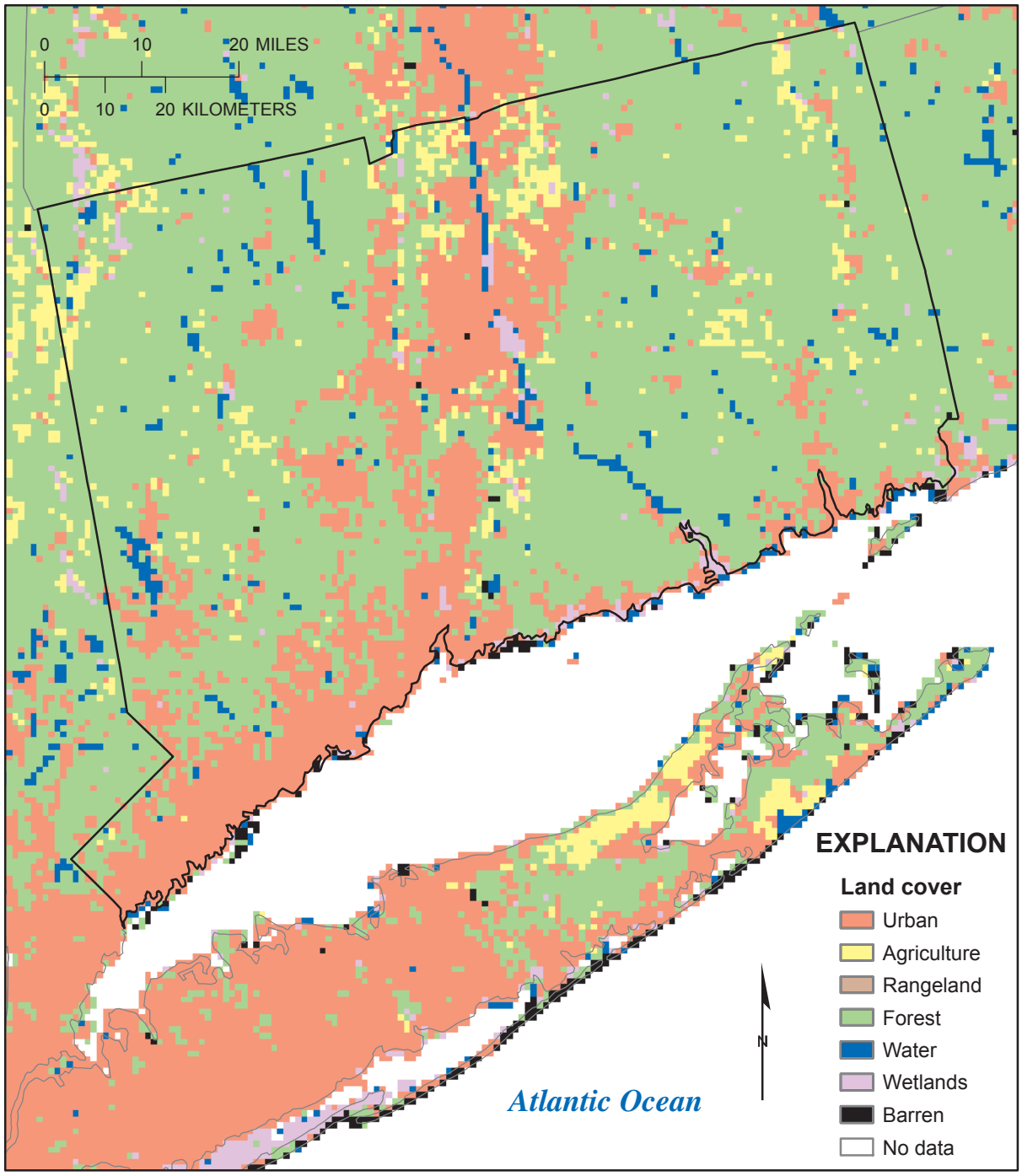
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Figure CT2. Population using domestic-water supply (from ground water) for Connecticut. (Data from 1990 U.S. Census block group, Kerie Hitt, U.S. Geological Survey, written commun., 1997.)



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Albers Equal-Area projection
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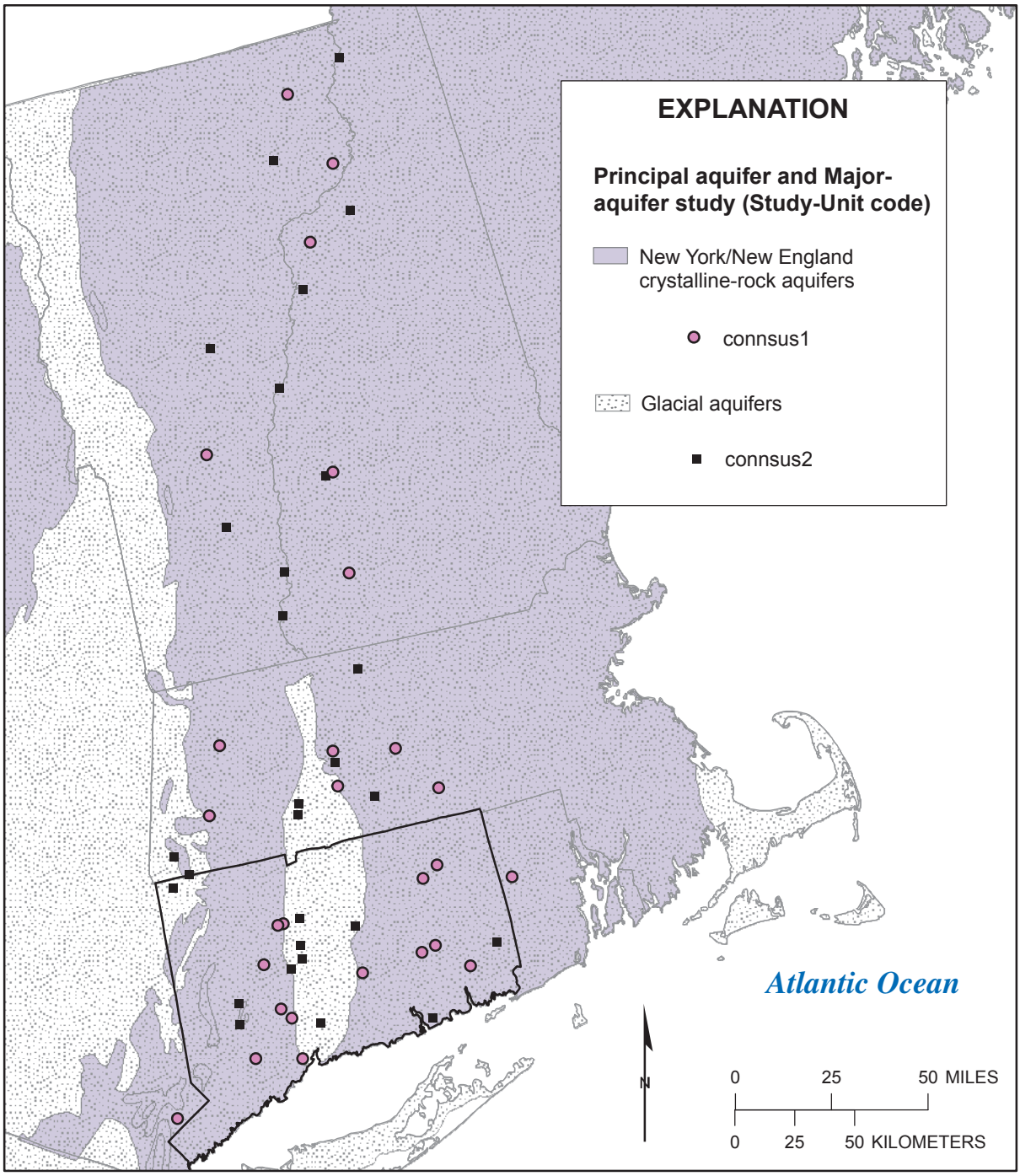
Figure CT3. Land use/land cover for Connecticut and nearby States. (Data from Naomi Nakagaki, U.S. Geological Survey, written commun., 2005.)



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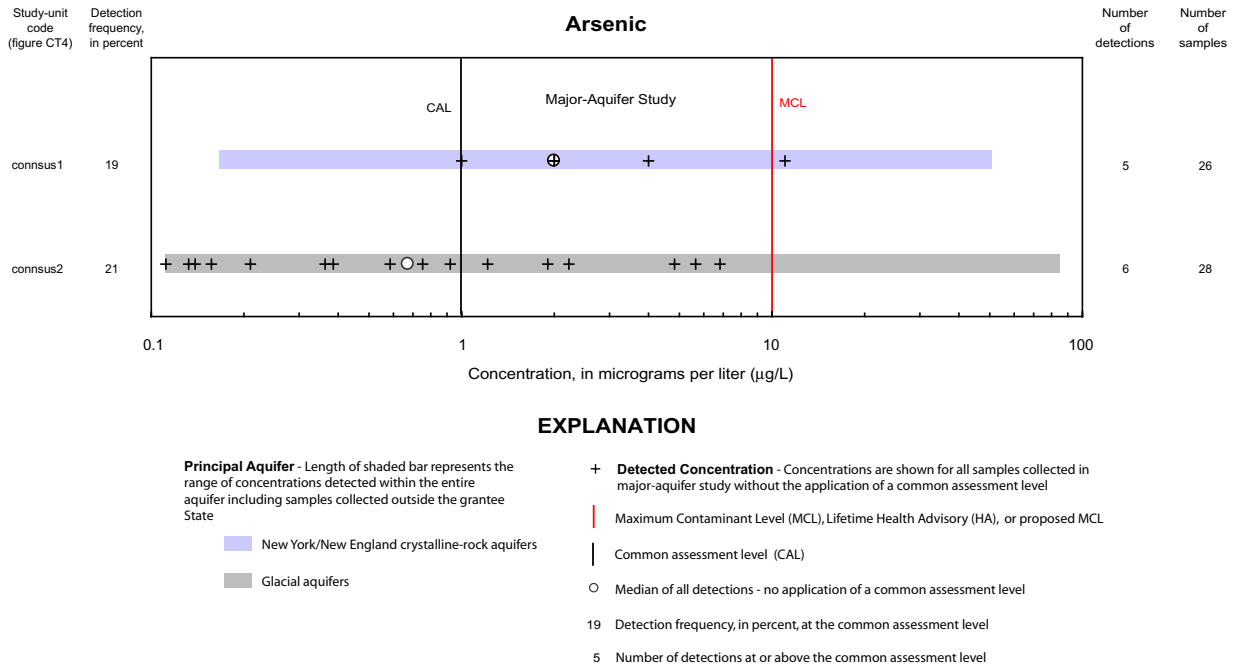
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

Figure CT4. Location of domestic wells sampled for National Water-Quality Assessment (NAWQA) major-aquifer studies that included Connecticut.



EXPLANATION

Principal Aquifer - Length of shaded bar represents the range of concentrations detected within the entire aquifer including samples collected outside the grantee State

New York/New England crystalline-rock aquifers

Glacial aquifers

\+ **Detected Concentration** - Concentrations are shown for all samples collected in major-aquifer study without the application of a common assessment level

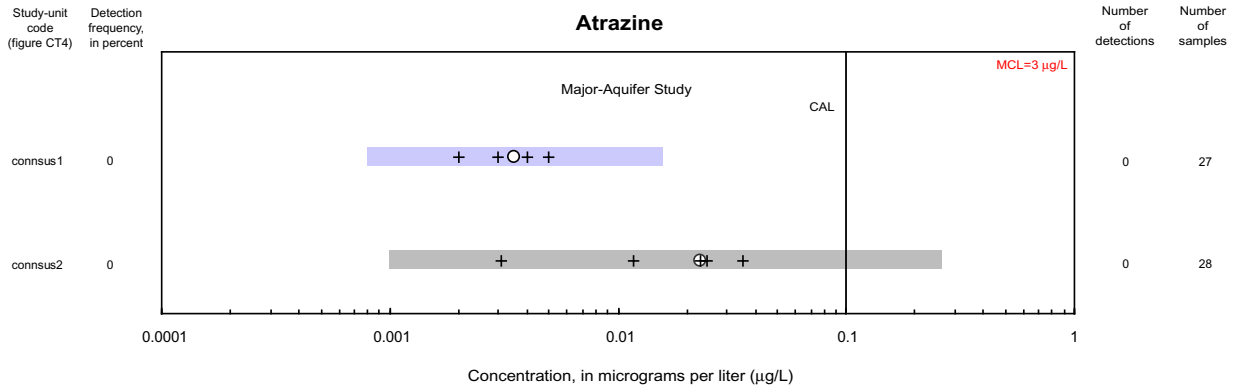
Maximum Contaminant Level (MCL), Lifetime Health Advisory (HA), or proposed MCL

Common assessment level (CAL)

○ Median of all detections - no application of a common assessment level

19 Detection frequency, in percent, at the common assessment level

5 Number of detections at or above the common assessment level



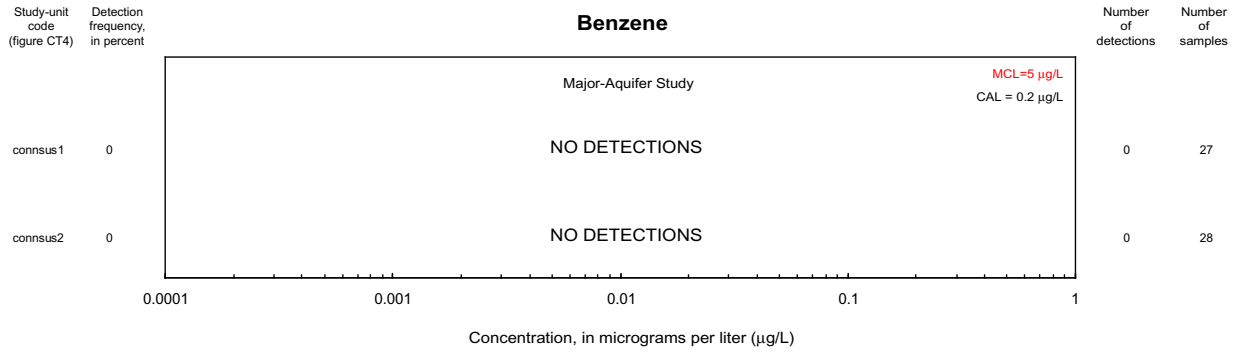


Figure CT5. Statistical summary for 11 selected contaminants by major-aquifer study using domestic-well data from National Water-Quality Assessment (NAWQA) studies for Connecticut (includes studies for which at least 10 analyses were available).

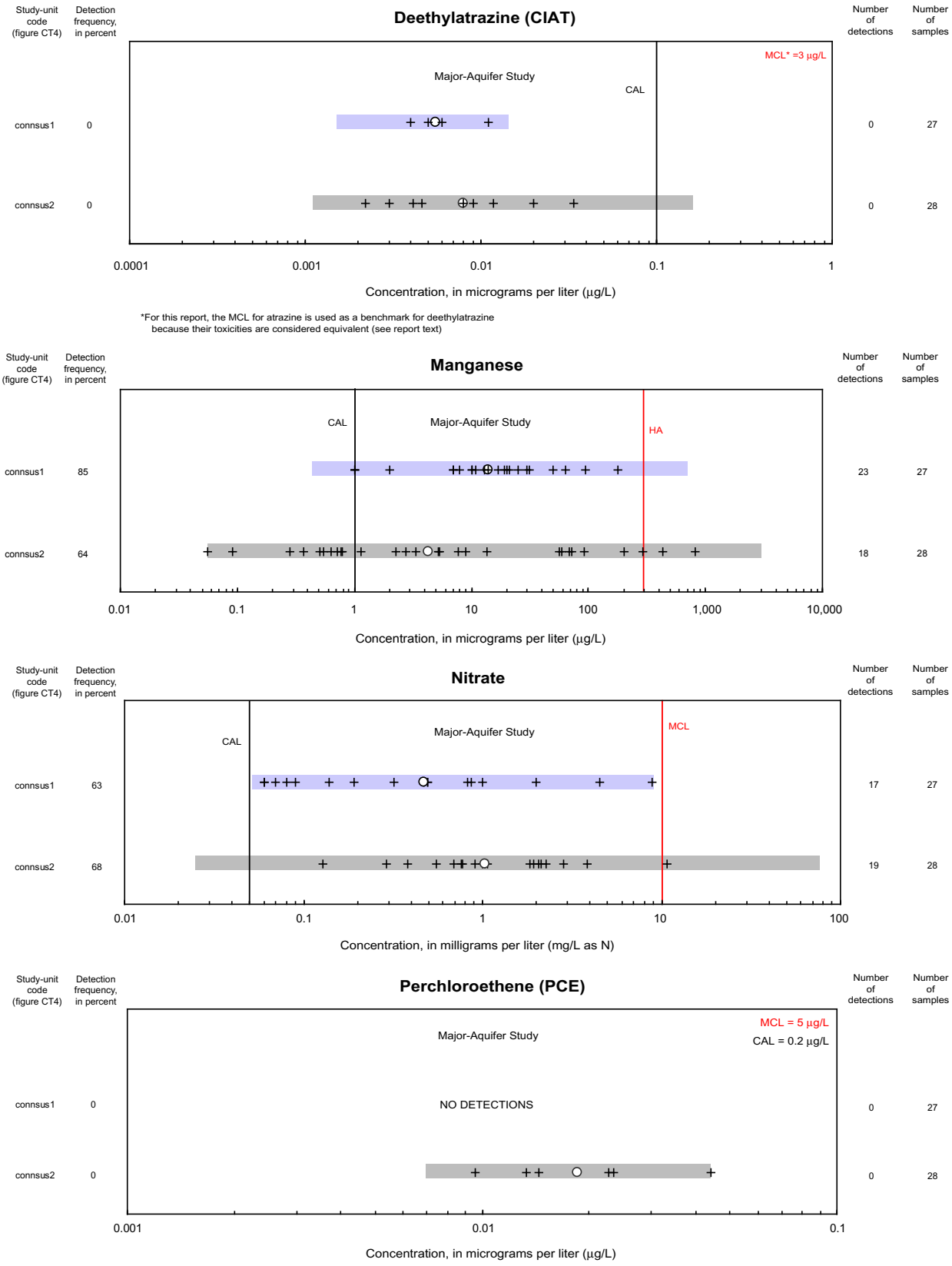
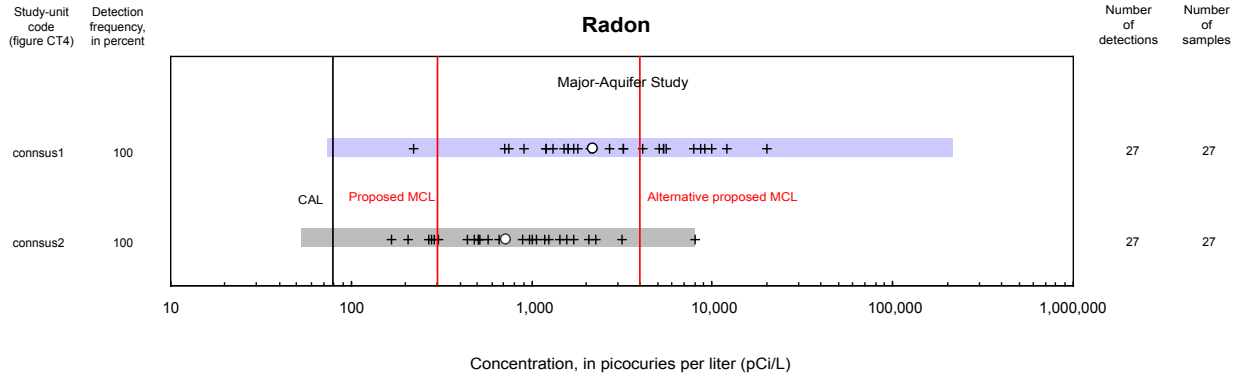
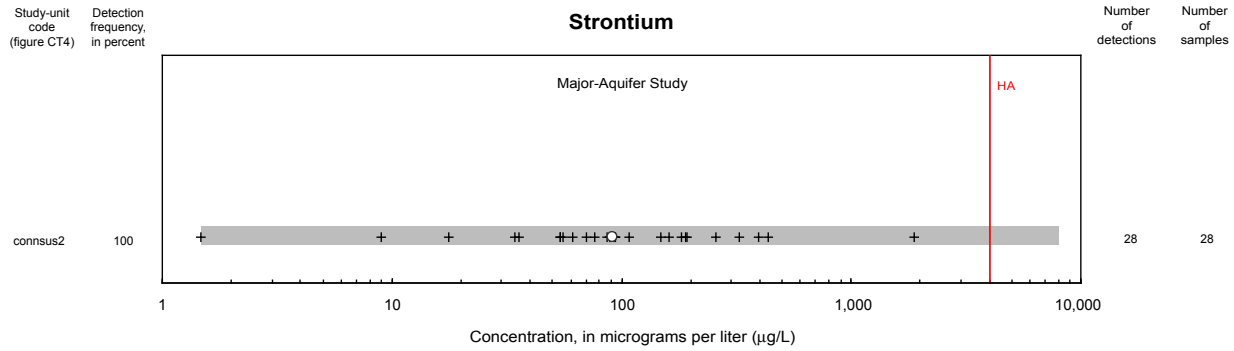
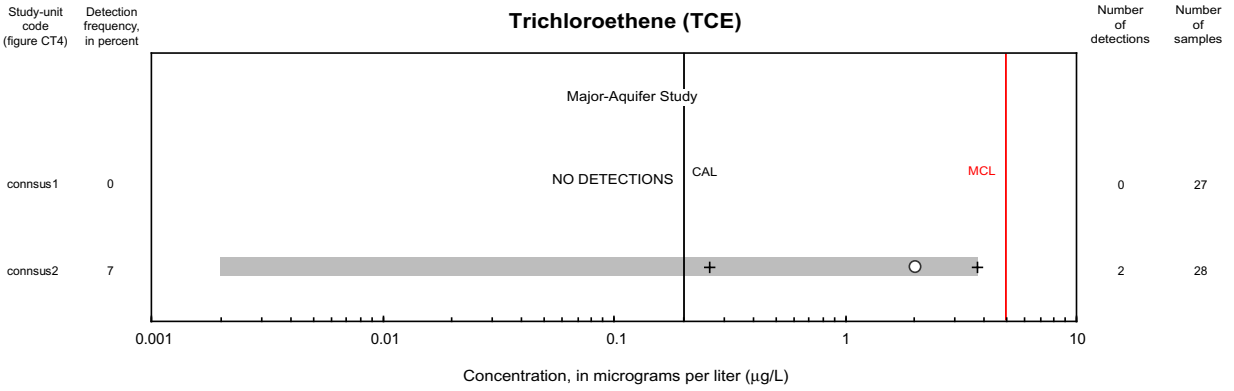


Figure CT5. Statistical summary for 11 selected contaminants by major-aquifer study using domestic-well data from National Water-Quality Assessment (NAWQA) studies for Connecticut (includes studies for which at least 10 analyses were available). —Continued







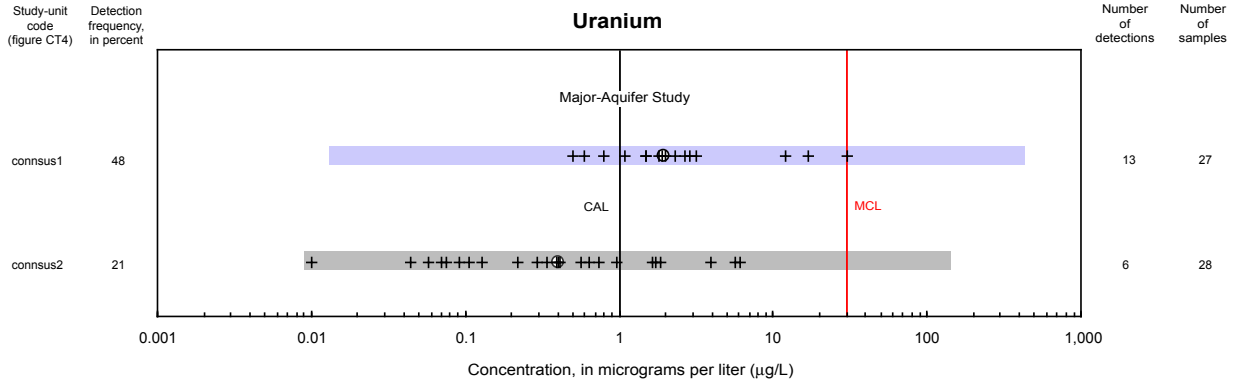
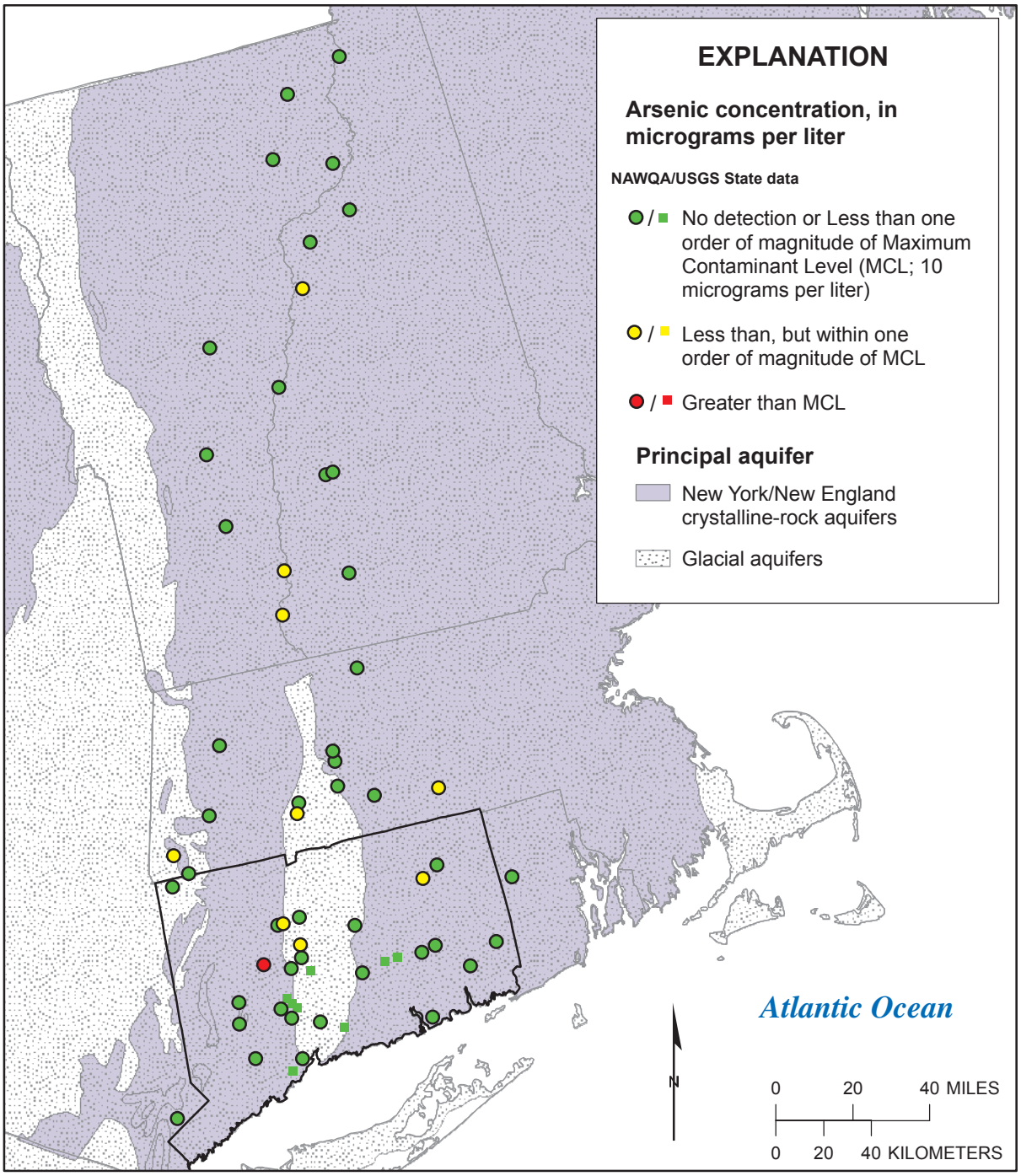


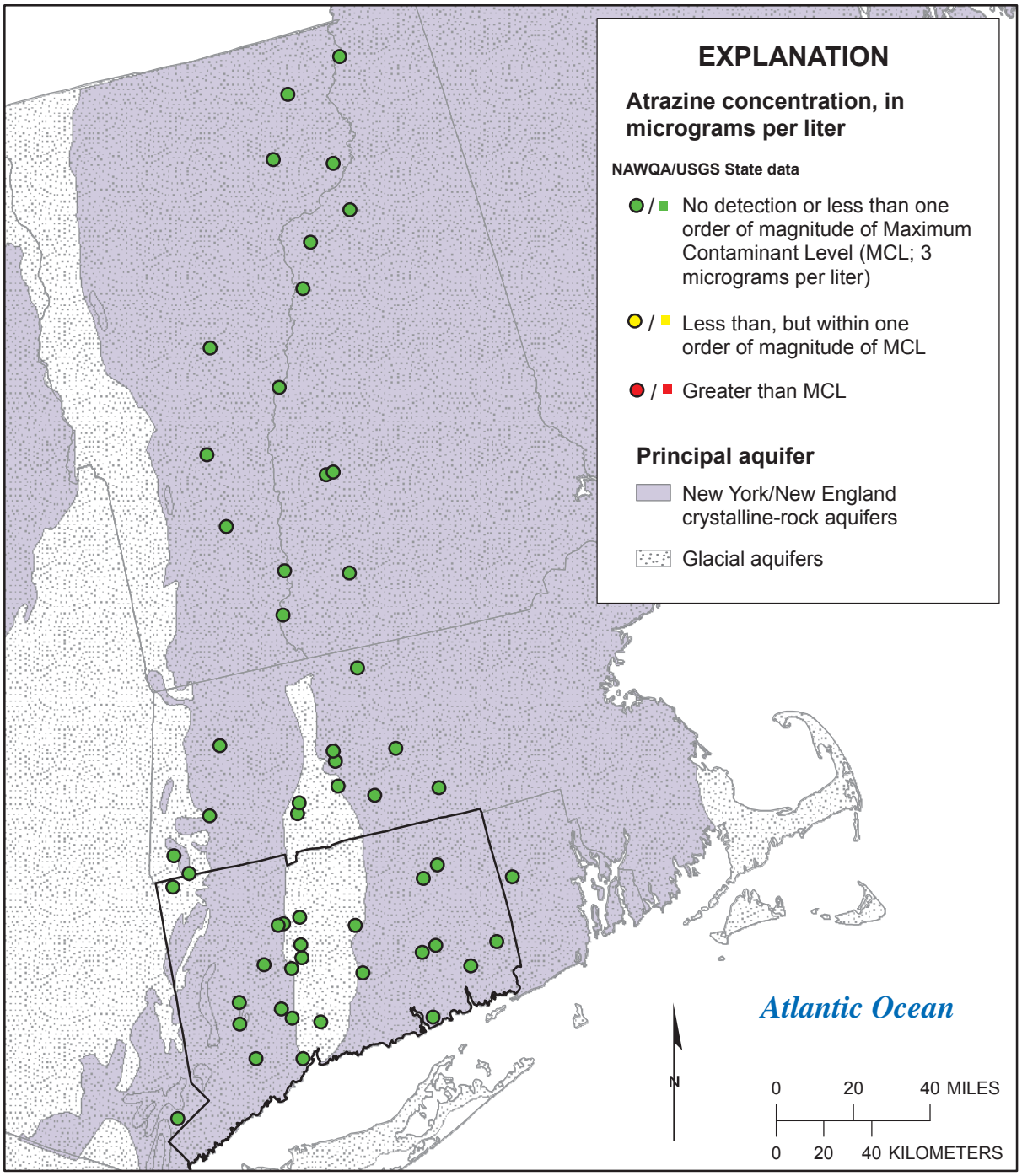
Figure CT5. Statistical summary for 11 selected contaminants by major-aquifer study using domestic-well data from National Water-Quality Assessment (NAWQA) studies for Connecticut (includes studies for which at least 10 analyses were available). —Continued



Base information from U.S. Geological Survey digital data, 1:2,000,000
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

Figure CT6. Concentration of arsenic in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



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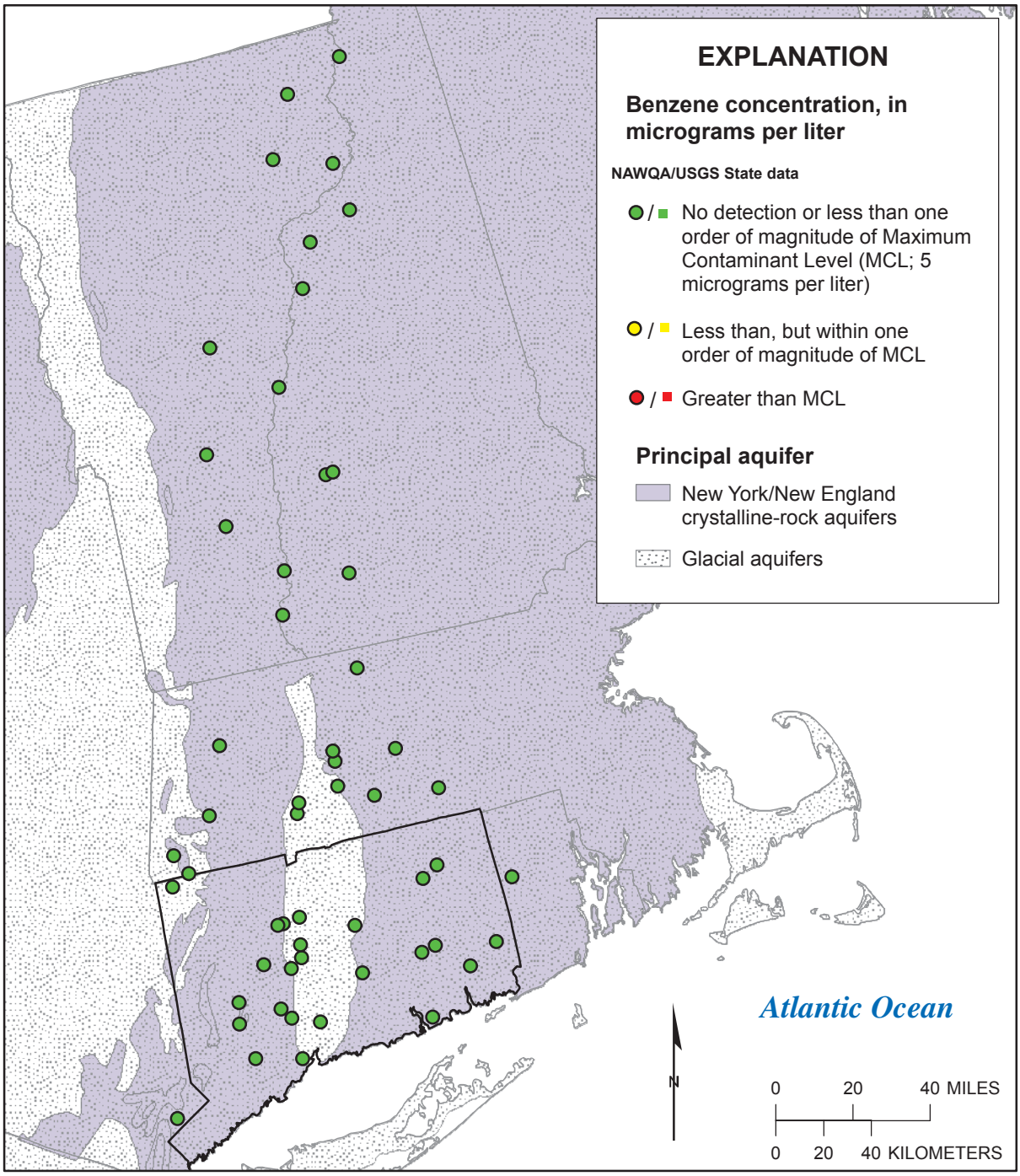
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

Figure CT7. Concentration of atrazine in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey State (USGS) data in the National Water Information System (NWIS)).



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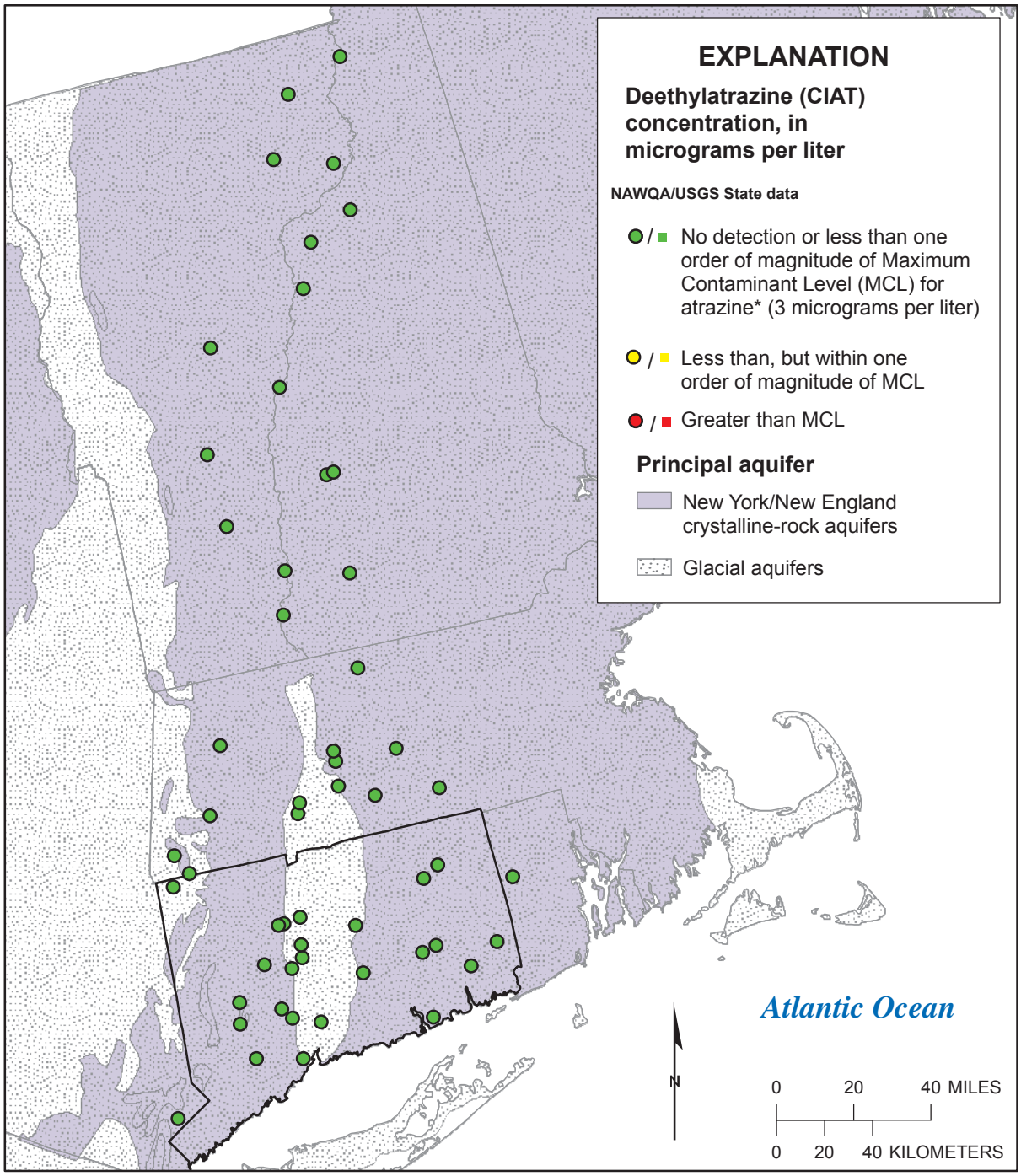
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

Figure CT8. Concentration of benzene in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



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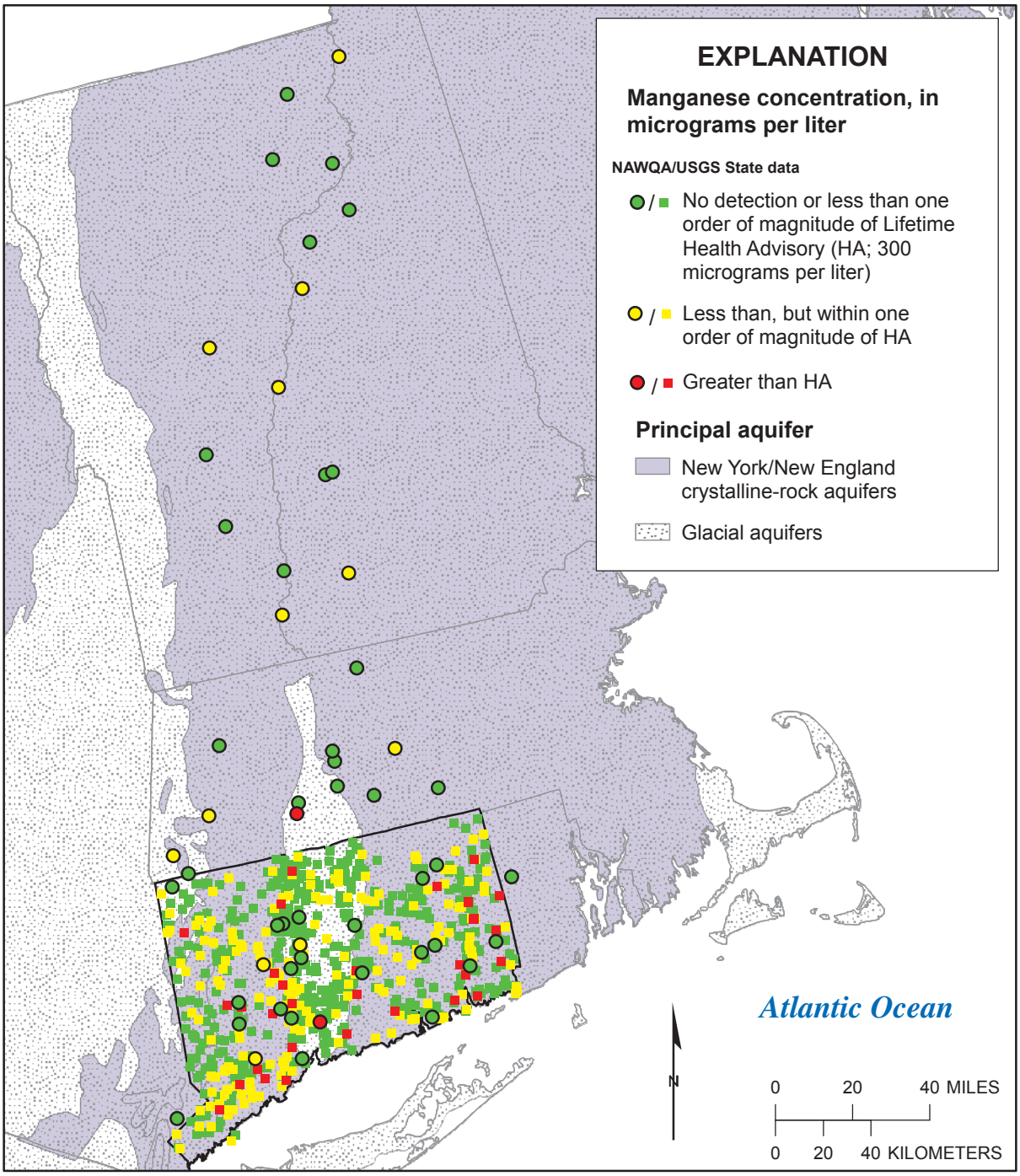
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

* For this report, the MCL for atrazine is used as benchmark for deethylatrazine because their toxicities are considered equivalent (see report text).

Figure CT9. Figure CT9. Concentration of deethylatrazine (CIAT) in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



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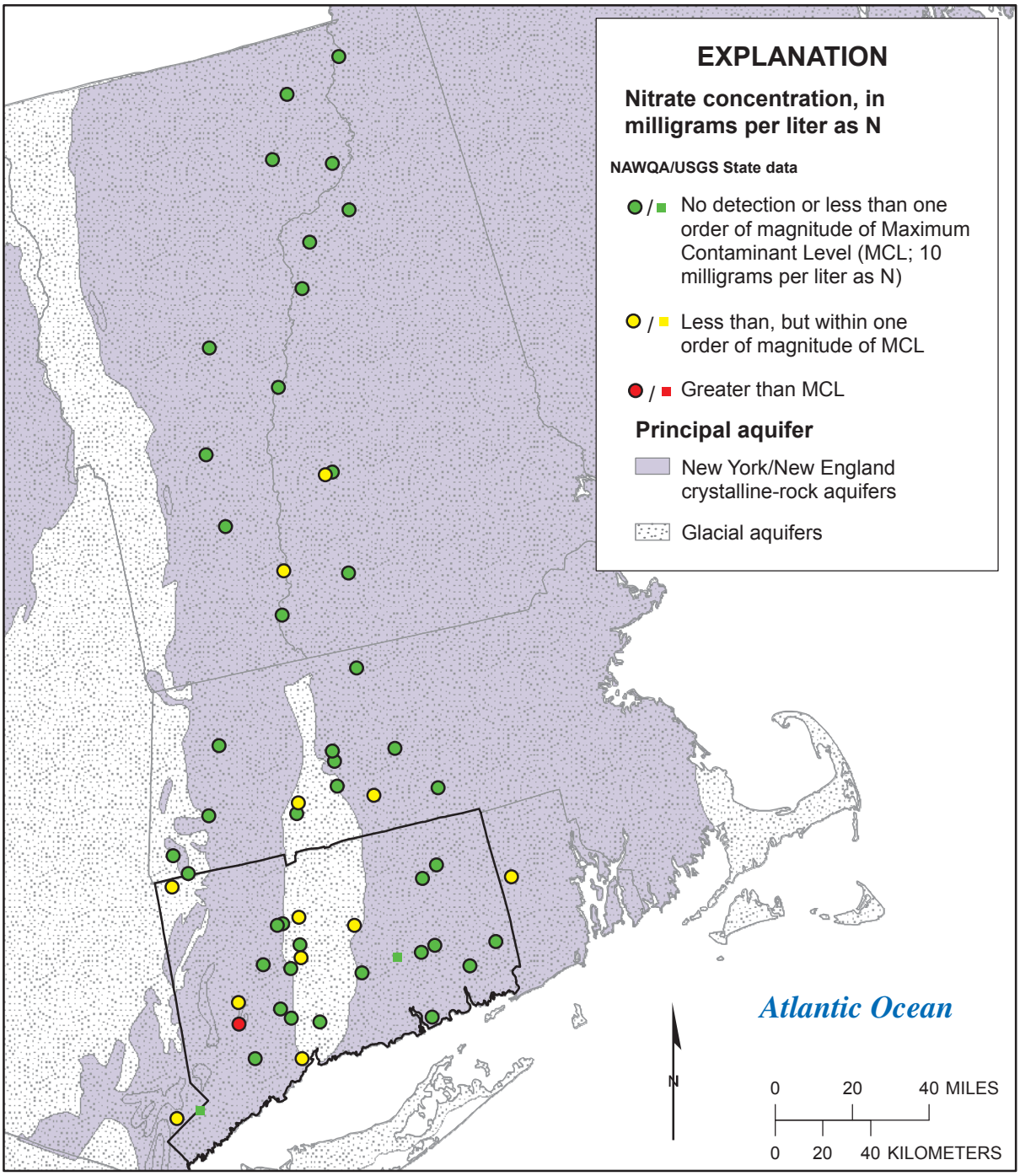
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

Figure CT10. Concentration of manganese in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water-Information System (NWIS)).



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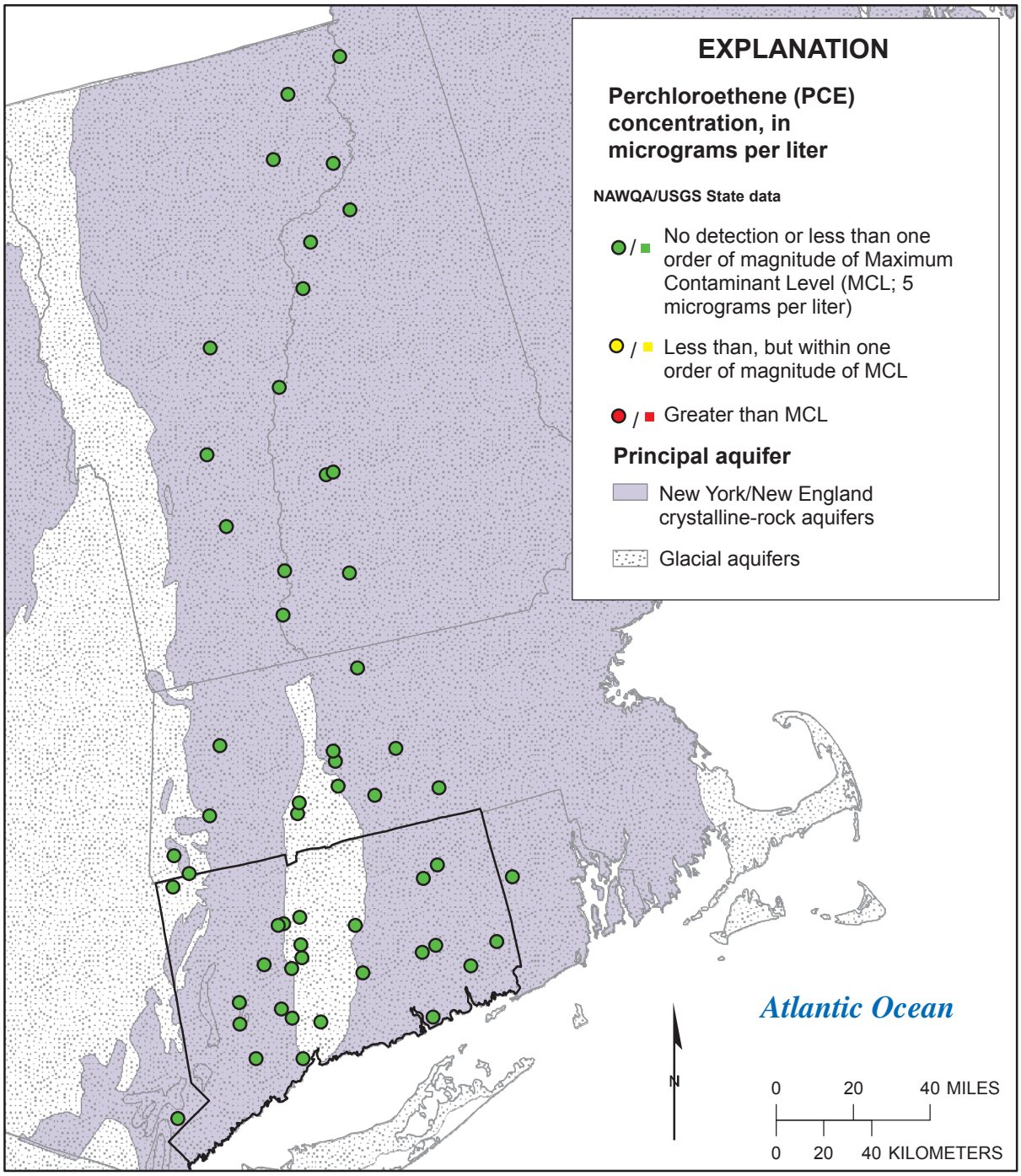
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

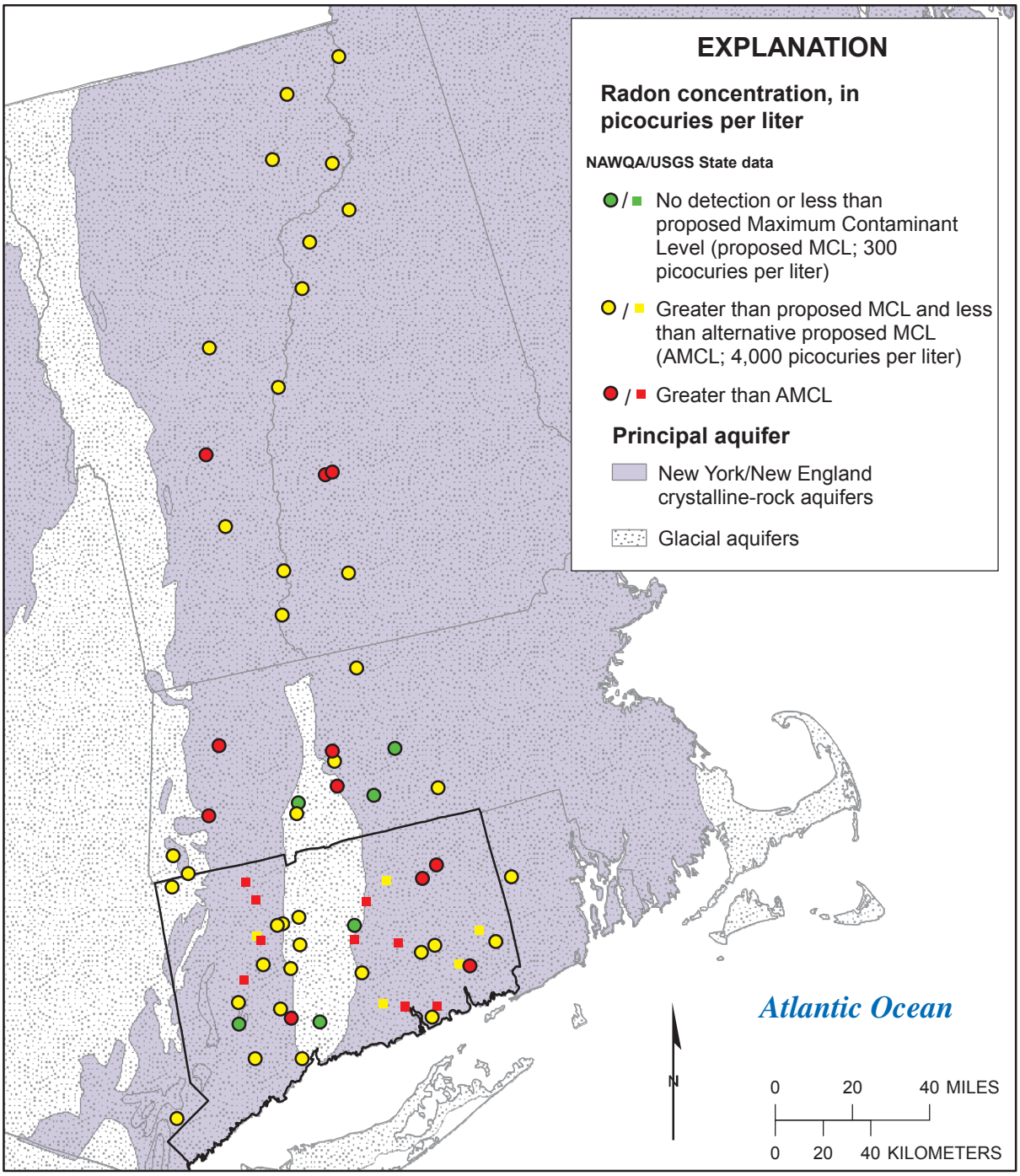
Figure CT11. Concentration of nitrate in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



Base information from U.S. Geological Survey digital data, 1:2,000,000
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

Figure CT12. Concentration of perchloroethene(PCE) in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



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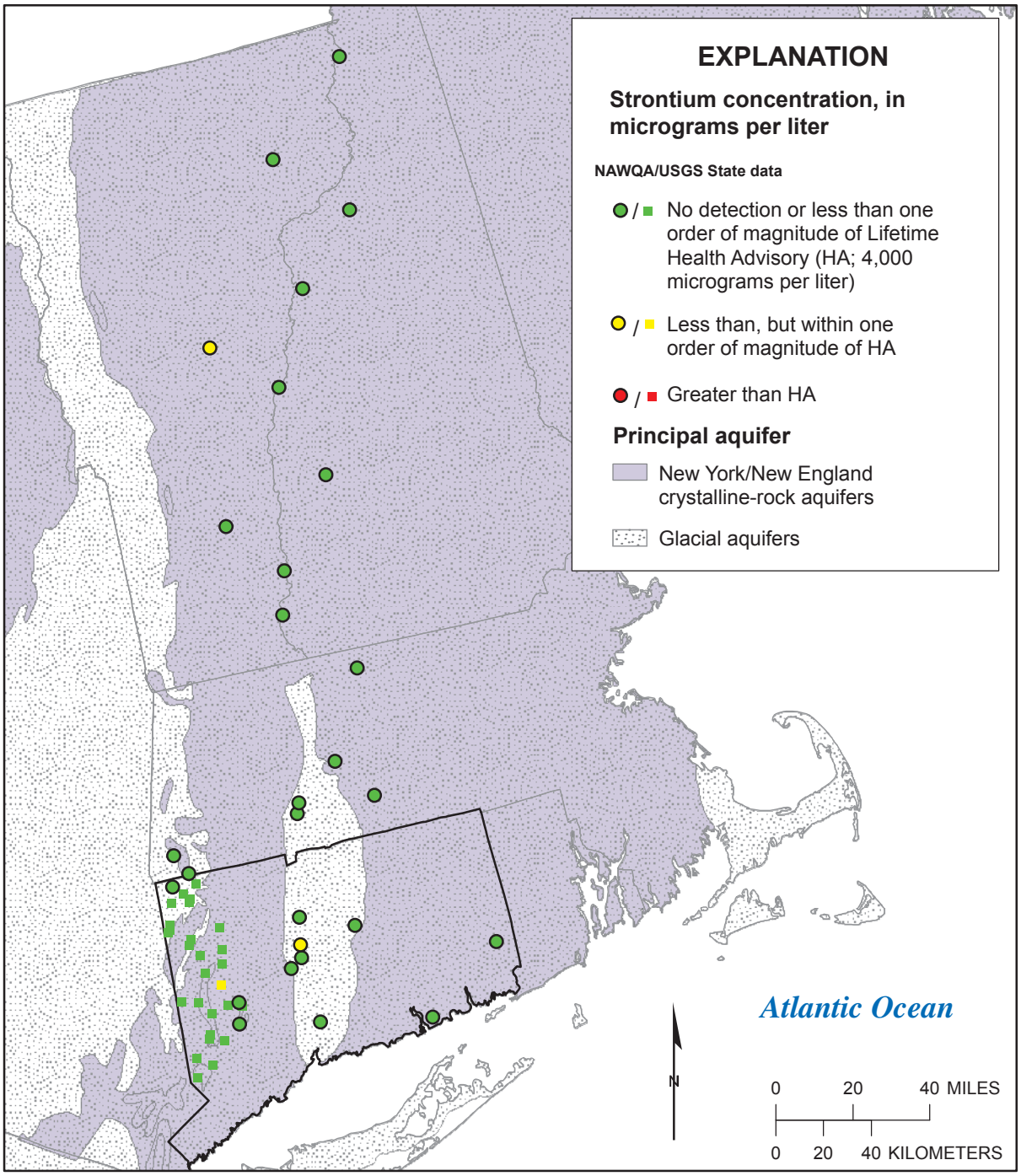
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

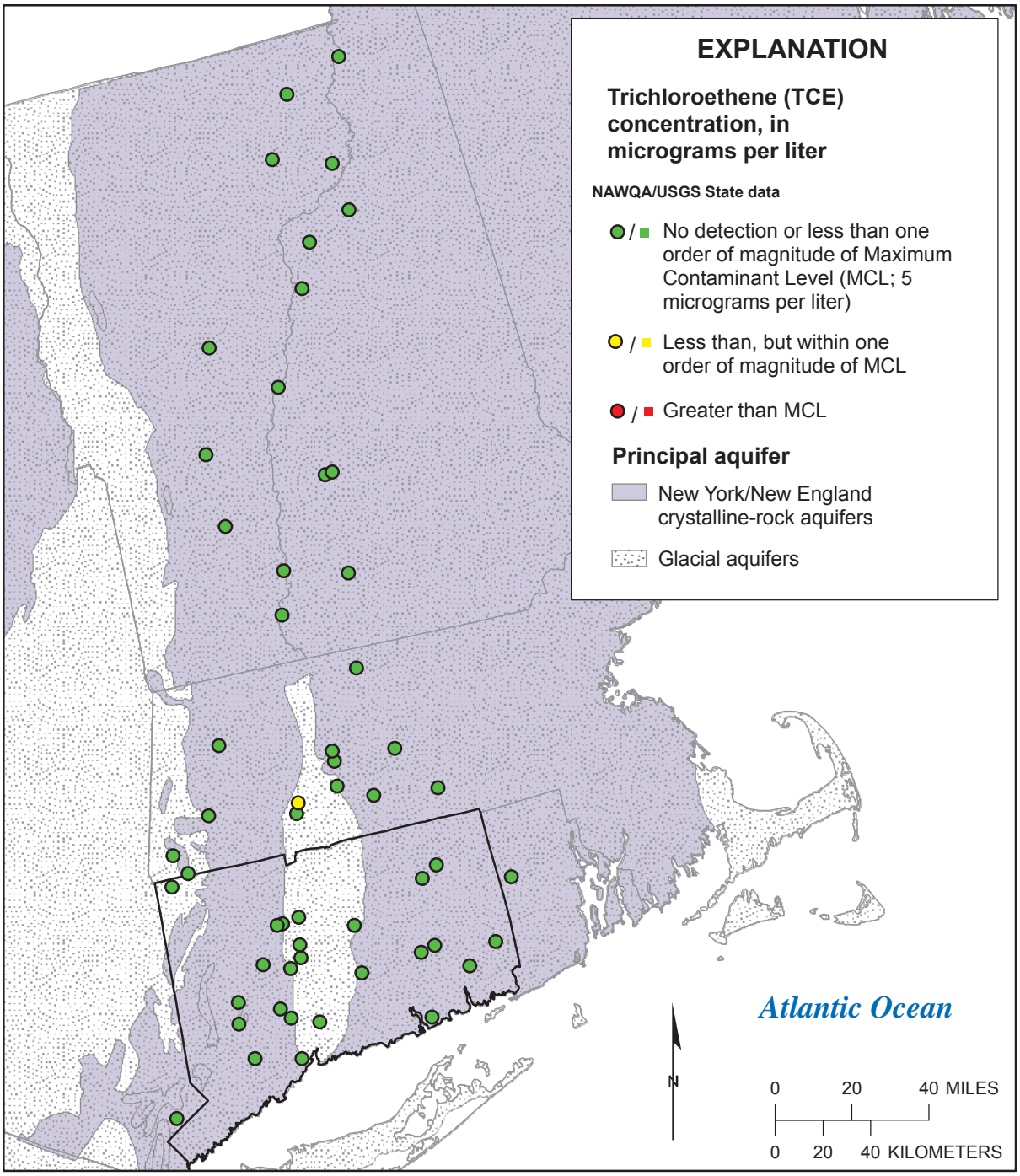
Figure CT13. Concentration of radon in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



Base information from U.S. Geological Survey digital data, 1:2,000,000
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

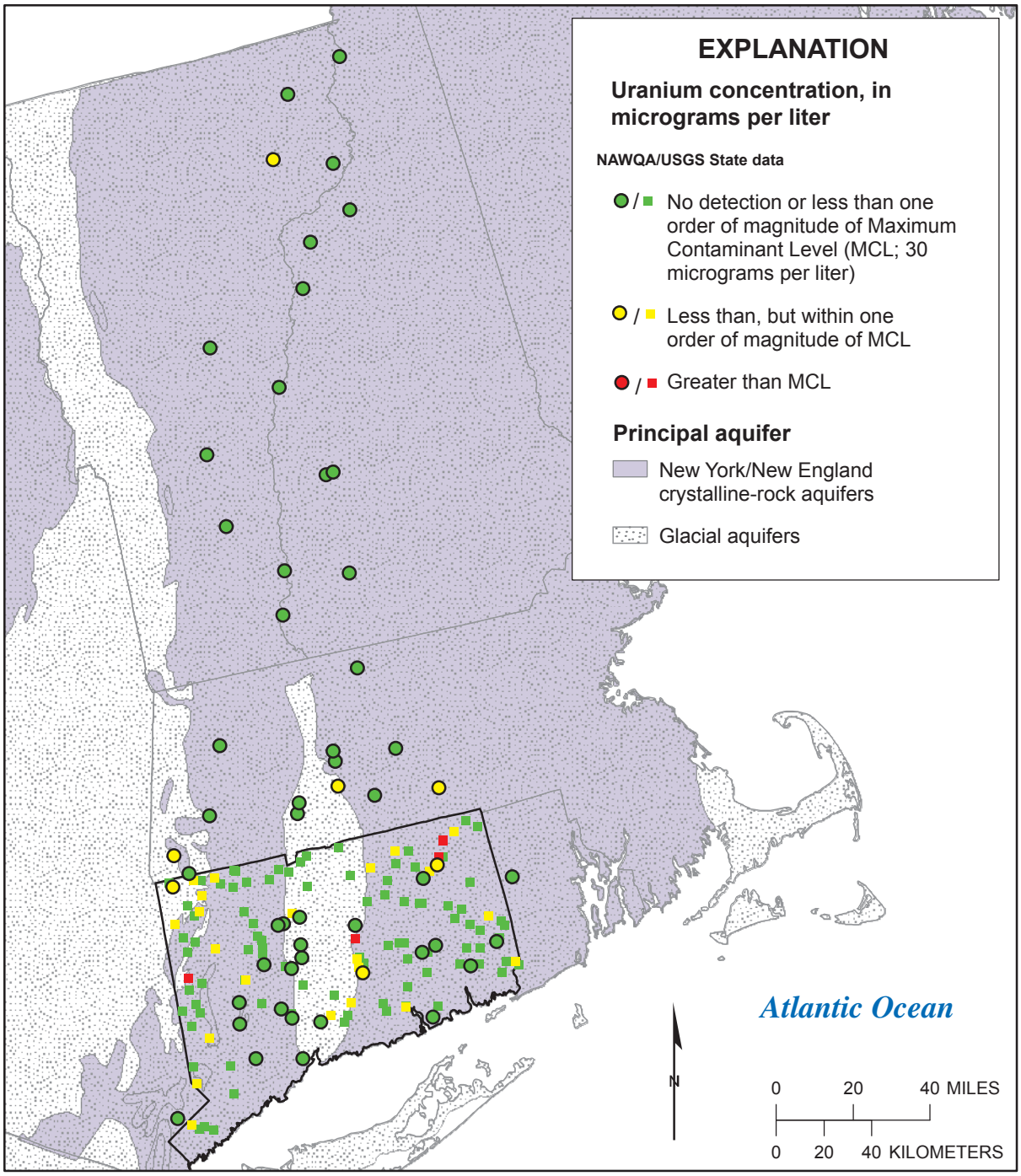
Figure CT14. Concentration of strontium in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



Base information from U.S. Geological Survey digital data, 1:2,000,000
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

Figure CT15. Concentration of trichloroethene (TCE) in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



Base information from U.S. Geological Survey digital data, 1:2,000,000
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

Principal aquifer data from U.S. Geological Survey, 2003

Figure CT16. Concentration of uranium in samples from domestic wells in Connecticut and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).