State Summary for New Mexico

Information on population density, use of domestic-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 New Mexico is shown in figures NM1–NM16. 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 New Mexico is given in table NM1. The areal extent of some NAWQA major-aquifer studies goes beyond the State boundary (fig. NM4). 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 New Mexico studies that are relevant to the 11 contaminants.

In New Mexico, the largest areas with the highest population density are located along the north-central parts of the State (fig. NM1). In general, the population density in New Mexico is low except in urban centers (fig. NM1). Almost 90 percent of the domestic (private) supply and public supply is obtained from ground water. The population (by census-block group for 1990) using a domestic-water supply from ground water was variable throughout the State, and less than 250 people per census block group were using ground water as a domestic water supply in some of the less populated areas of the State (fig. NM2). Most of the land use in New Mexico is rangeland and forest lands (fig. NM3).

Three major-aquifer studies in two principal aquifers (High Plains aquifer and Rio Grande aquifer system) were conducted in New Mexico (fig. NM4). The High Plains aquifer is located in eastern New Mexico and consists of near-surface deposits of unconsolidated or partly consolidated gravel, sand, silt, or clay of Tertiary or Quaternary age (Robson and Banta, 1995). The Ogallala Formation is the principal geologic unit in New Mexico and ranges in thickness from 0 to about 500 feet. Recharge primarily is derived from infiltration of precipitation

Table NM1. 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 New Mexico.

Study-Unit code for NAWQA major-aquifer study	Principal aquifer	Contaminant	Number of samples	Percentage of samples with concentrations greater than human-health benchmark
hpgwsus1b	High Plains aquifer system	Radon	44	[1]77/0.0
hpgwsus1a	High Plains aquifer system	Radon	74	[1]74/0.0
riogsus1	Rio Grande aquifer system	Radon	24	[1]71/0.0
hpgwsus1b	High Plains aquifer system	Arsenic	45	31
riogsus1	Rio Grande aquifer system	Arsenic	25	24
riogsus1	Rio Grande aquifer system	Manganese	25	20
hpgwsus1b	High Plains aquifer system	Manganese	45	4.4
hpgwsus1b	High Plains aquifer system	Strontium	45	16
hpgwsus1b	High Plains aquifer system	Nitrite plus nitrate	46	13
hpgwsus1a	High Plains aquifer system	Nitrite plus nitrate	74	4.0
riogsus1	Rio Grande aquifer system	Uranium	25	4.0
hpgwsus1a	High Plains aquifer system	Uranium	74	1.4

[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).

or seepage from intermittent surface flow in streams. The average hydraulic conductivity is about 60 feet per day and ranges from less than 1 to more than 100 feet per day (Robson and Banta, 1995).

The Rio Grande aquifer system is located in central New Mexico and consists of a network of hydraulically interconnected aquifers in basin-fill deposits (Robson and Banta, 1995). Older and younger basin-fill deposits are the principal water-yielding materials in the system. Older fill consists of Tertiary- and Quaternary-age unconsolidated to moderately consolidated lenticular deposits of gravel, sand, and clay interbedded in some areas with andesitic and rhyolitic lava flows, tuffs, and breccias. Younger basin fill consists of unconsolidated, poorly to well sorted, interbedded Quaternary-age gravel, sand, silt and clay. Recharge is primarily from precipitation in the mountainous areas of the basins and streamflow that extends beyond the mountain front, and discharge is primarily from pumping wells used mostly for irrigation (Robson and Banta, 1995).

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. NM5) 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, arsenic, manganese, nitrate, and uranium had concentrations greater than USEPA human-health benchmarks for samples collected in the State of New Mexico. Radon had the greatest potential human-health concern because it had 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 major-aquifer studies (hpgwsus1b and hpgssus1a) in the High Plains aquifer where about 77 and 74 percent of the samples had concentrations greater than 300 pCi/L, which is the proposed Maximum Contaminant Level (MCL) for radon (table NM1). About 71 percent of samples in the riogsus1 major-aquifer study in the Rio Grande aquifer system had radon concentrations greater than the proposed MCL (table NM1). Median radon concentrations for the three studies ranged from about 400 to 500 pCi/L (fig. NM5), and none of the radon concentrations were greater than the alternative proposed MCL of 4,000 pCi/L (table NM1). Radon-222 is a decay product of radium-226, and radon concentrations greater than the human-health benchmark are widespread and probably can be attributed to natural sources in the soil and rock material in New Mexico.

Arsenic had the next largest potential concern to human health. About 31 percent of the samples from the hpgwsus1b major-aquifer study in the High Plains aquifer, and about 24 percent of the samples from the riogsus1 major-aquifer study in the Rio Grande aquifer system, had concentrations greater than the human-health benchmark (MCL of 10 micro-grams per liter (μg/L)) (table NM1). Median arsenic concentrations were within an order of magnitude of the human-health benchmark (fig. NM5). NAWQA and U.S. Geological Survey (USGS) State data showed arsenic concentrations to be greater than the human-health benchmark in several samples (fig. NM6) in the same general area in central New Mexico. These arsenic concentrations are near a major urban area, and some people could be using domestic-water supplies in the area on the basis of water-use data.

Concentrations of manganese were greater than the USEPA human-health benchmark (Lifetime Health Advisory (HA) of 300 μg/L) in one major-aquifer study in the Rio Grande aquifer system (about 20 percent from riogsus1) and in one major-aquifer study in the High Plains aquifer system (about 4 percent from hpgwsus1b) (table NM1). NAWQA and USGS State data for manganese (fig. NM10) showed concentrations of several samples to be greater than their human-health benchmark, but samples were distributed randomly throughout the State.

Concentrations of nitrate were greater than the USEPA human-health benchmark (MCL of 10 milligrams per liter (mg/L) as N) in two major-aquifer studies in the High Plains aquifer system (about 13 percent from hpgwsus1b and 4 percent from hpgwsus1a) (table NM1). Median concentrations were within an order of magnitude of the human-health benchmark (fig. NM5). NAWQA data only showed two samples in the eastern part of New Mexico to have nitrate concentrations greater than the human-health benchmark, but USGS State data showed an area in the central part of New Mexico with several nitrate concentrations greater than the human-health benchmark (fig. NM11). These nitrate concentrations appear near a major urban area, and some people could be using domestic-water supplies in the area on the basis of water-use data.

Concentrations of uranium were greater than the USEPA human-health benchmark (HA of 30 μg/L) in one sample (about 4 percent) in one major-aquifer study in the Rio Grande aquifer system and in one sample (about 1 percent from hpgwsus1a) in one major-aquifer study in the High Plains aquifer system (table NM1). Median uranium concentrations were within an order of magnitude of the human-health benchmark for all the studies (fig. NM5).

Strontium concentrations were not greater than the human-health benchmark of 4,000 μg/L in any NAWQA samples in the State of New Mexico. However, two strontium concentrations were greater than the human-health benchmark for USGS State data (fig. NM14).

For the entire New Mexico data set, atrazine (fig. NM7), benzene (fig. NM8), CIAT (fig. NM9), PCE (fig. NM12), and TCE (fig. NM15) did not have concentrations greater 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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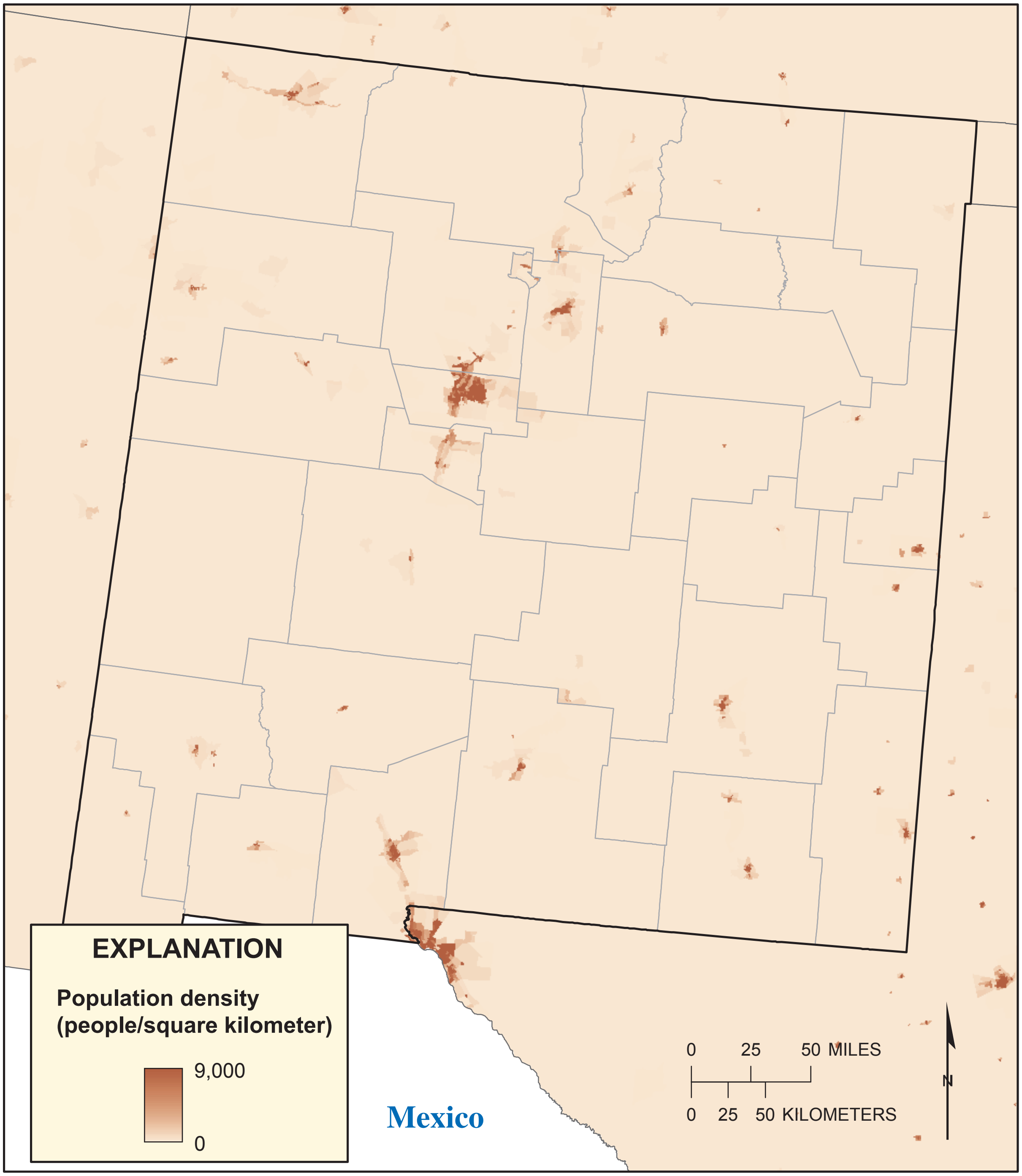

Base information from U.S. Geological Survey digital data, 1:2,000,000
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Standard Parallels 29°30' and 45°30', central meridian -96°

Figure NM1. Population density for New Mexico and nearby States. (Data from Hitt, 2003.)

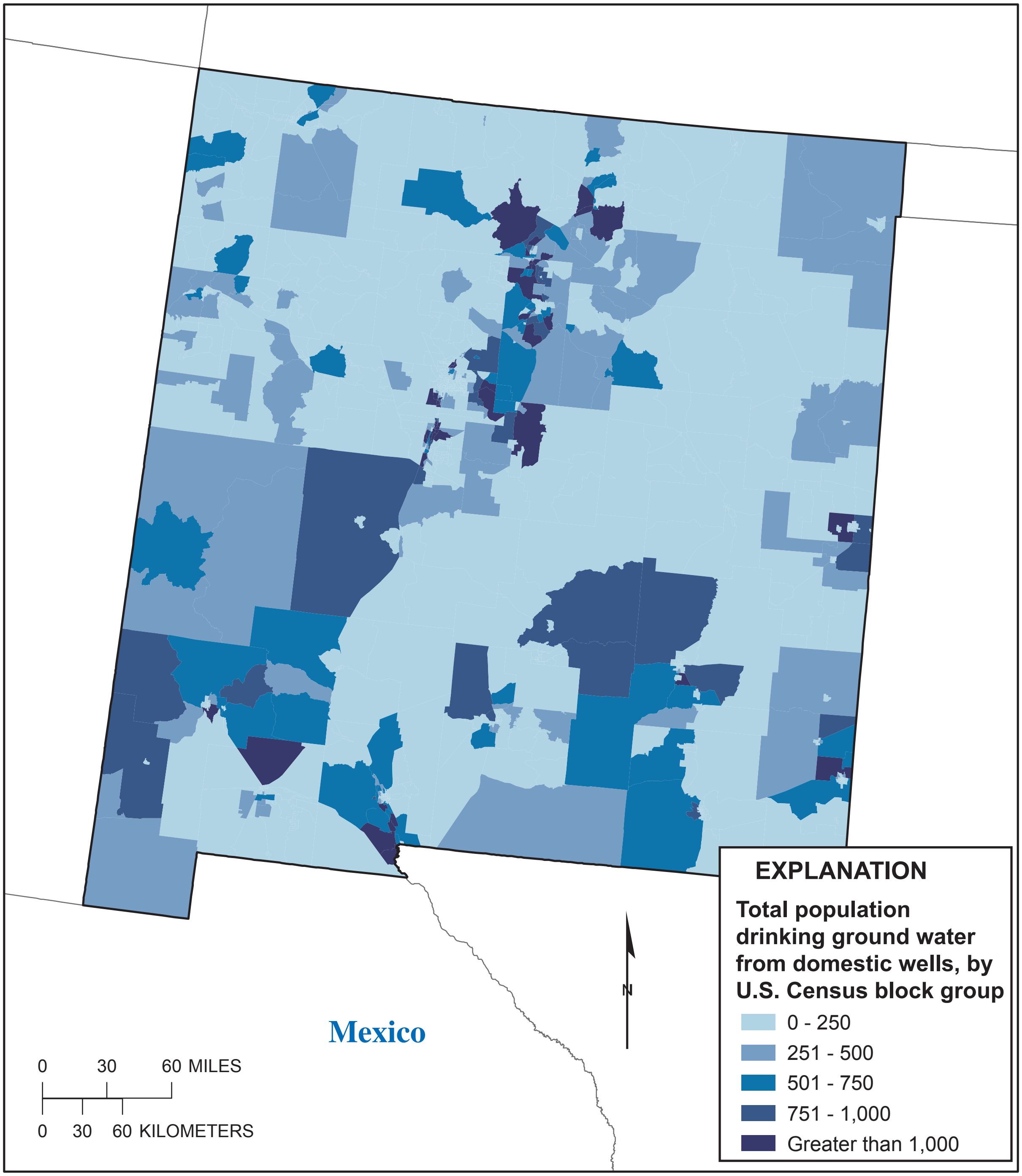

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Figure NM2. Population using domestic-water supply (from ground water) for New Mexico. (Data from 1990 U.S. Census block group, Kerie Hitt, U.S. Geological Survey, written commun., 1997.)

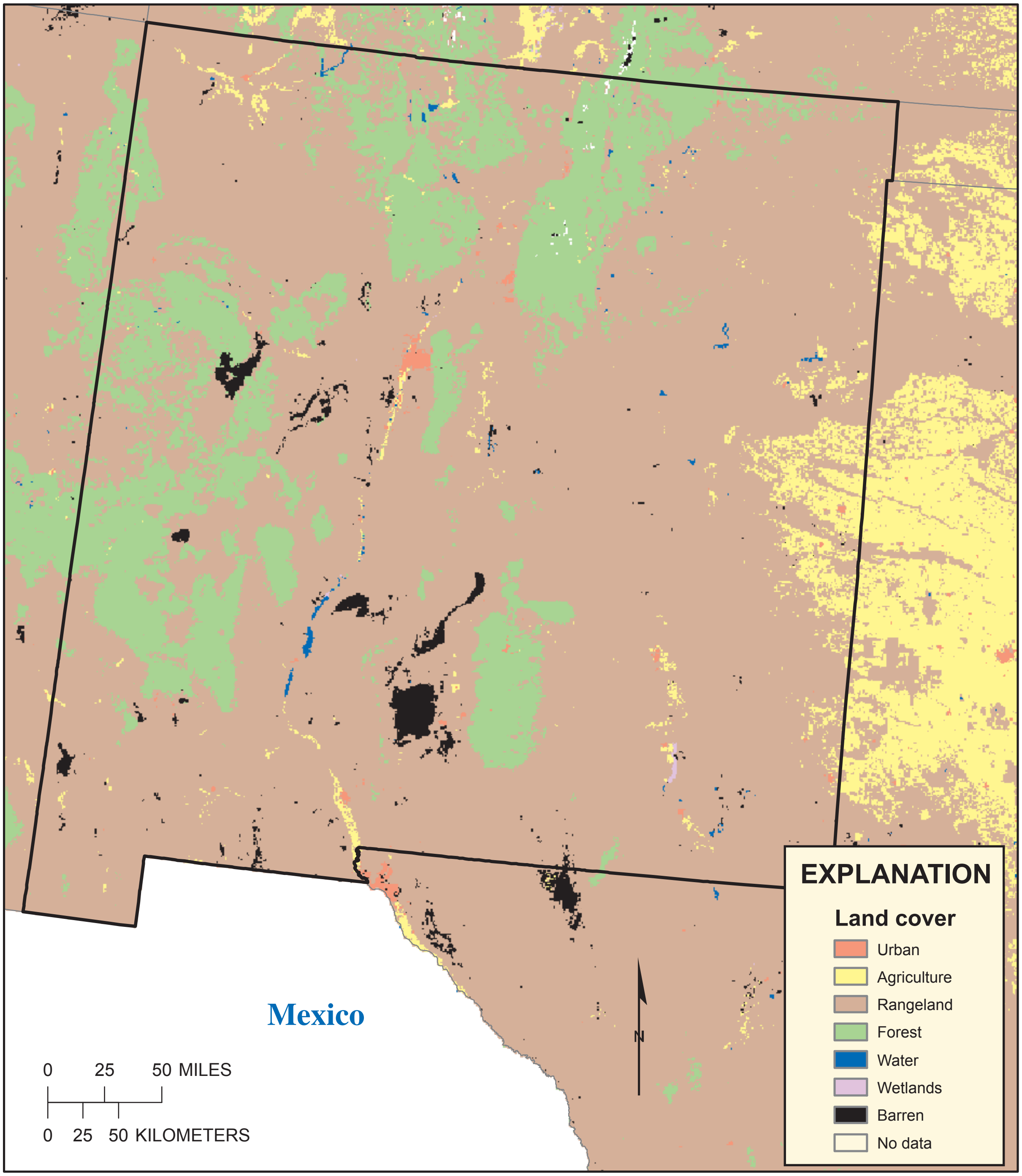

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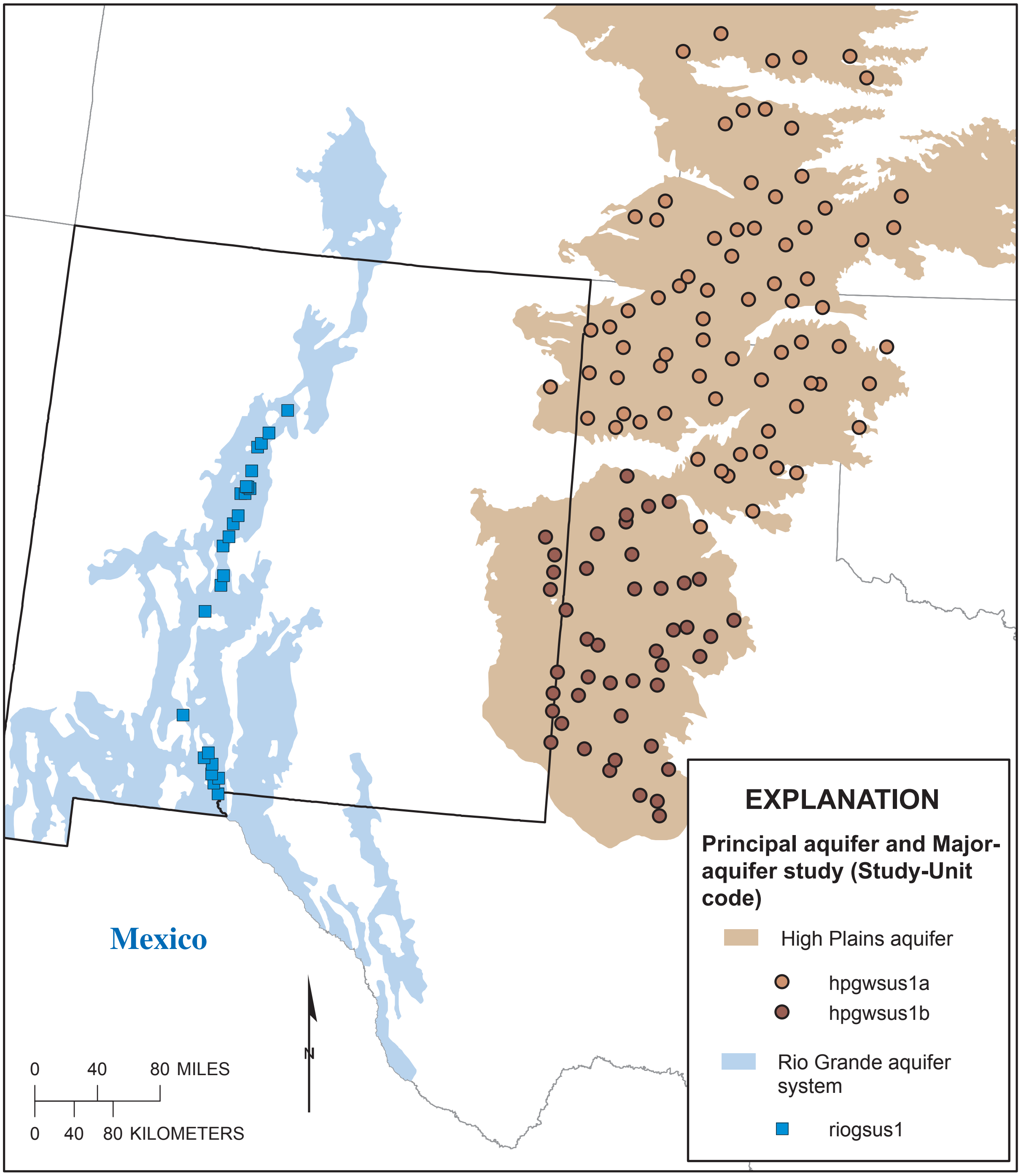
Figure NM3. Land use/land cover for New Mexico and nearby States. (Data from Naomi Nakagaki, U.S. Geological Survey, written commun., 2005.)



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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 NM4. Location of domestic wells sampled for National Water-Quality Assessment (NAWQA) major-aquifer studies that included New Mexico.

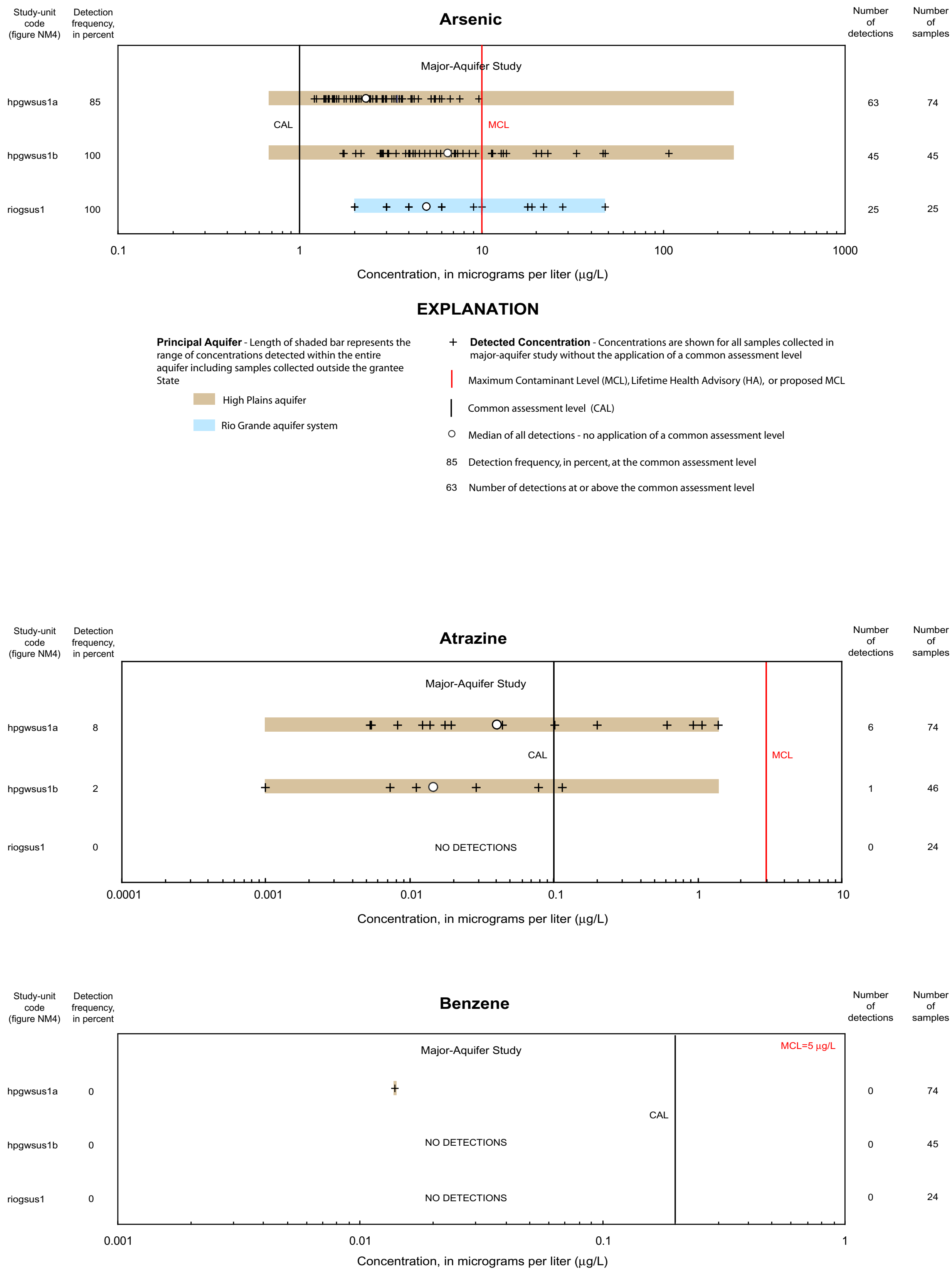


Figure NM5. Statistical summary for 11 selected contaminants by major-aquifer study using domestic-well data from National Water-Quality Assessment (NAWQA) studies for New Mexico (includes studies for which at least 10 analyses were available).

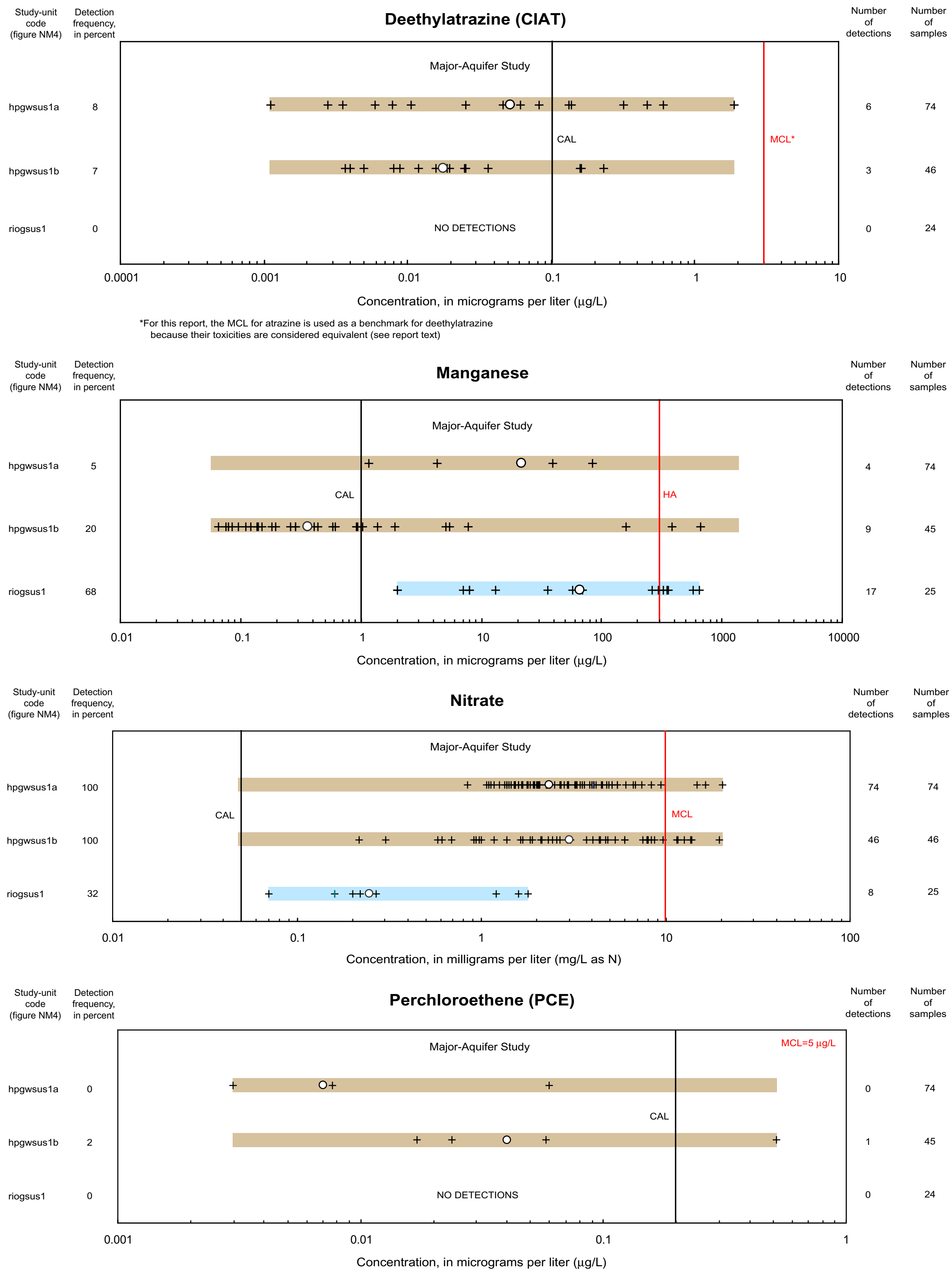


Figure NM5. Statistical summary for 11 selected contaminants by major-aquifer study using domestic-well data from National Water-Quality Assessment (NAWQA) studies for New Mexico (includes studies for which at least 10 analyses were available). —Continued

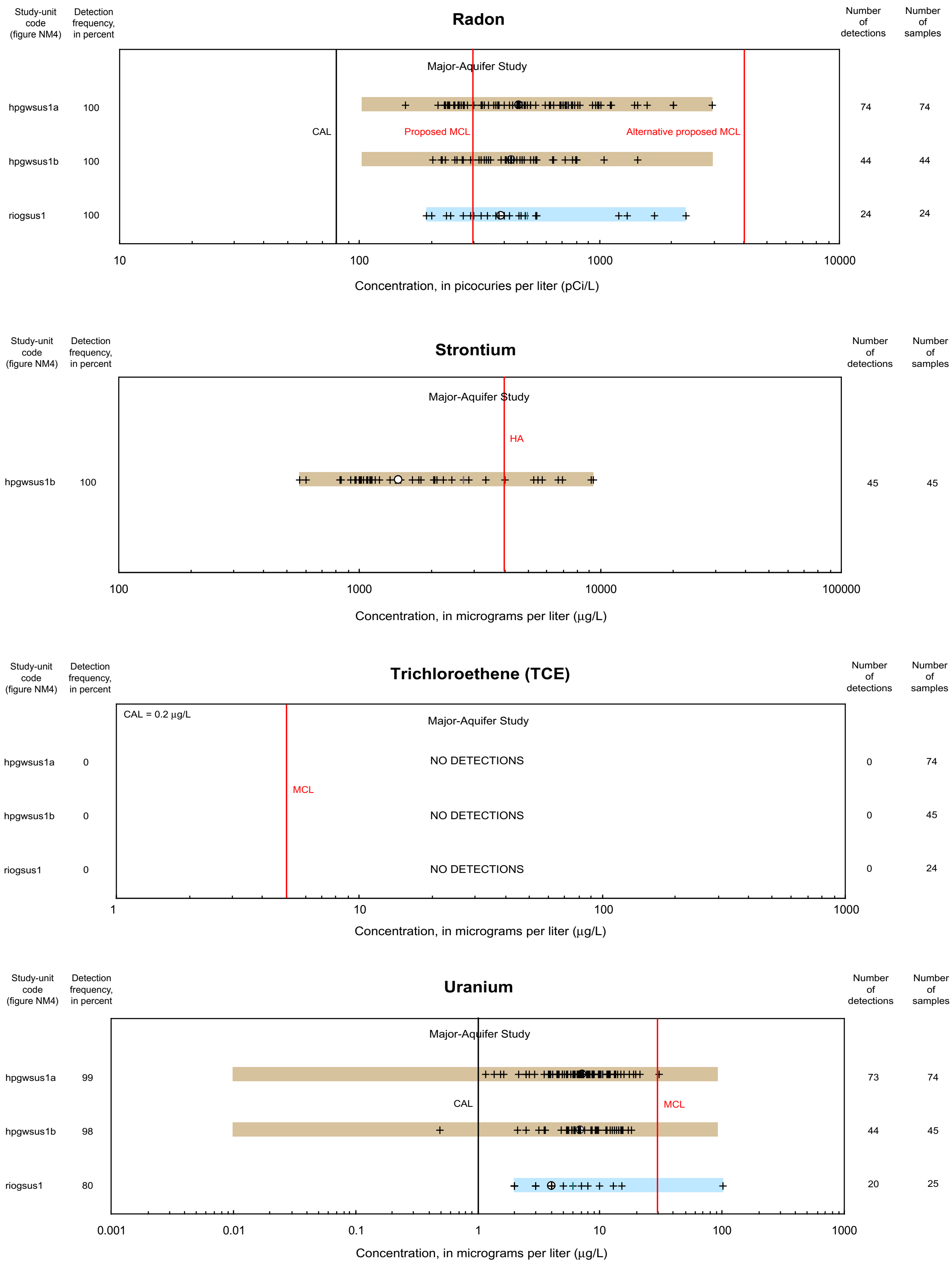
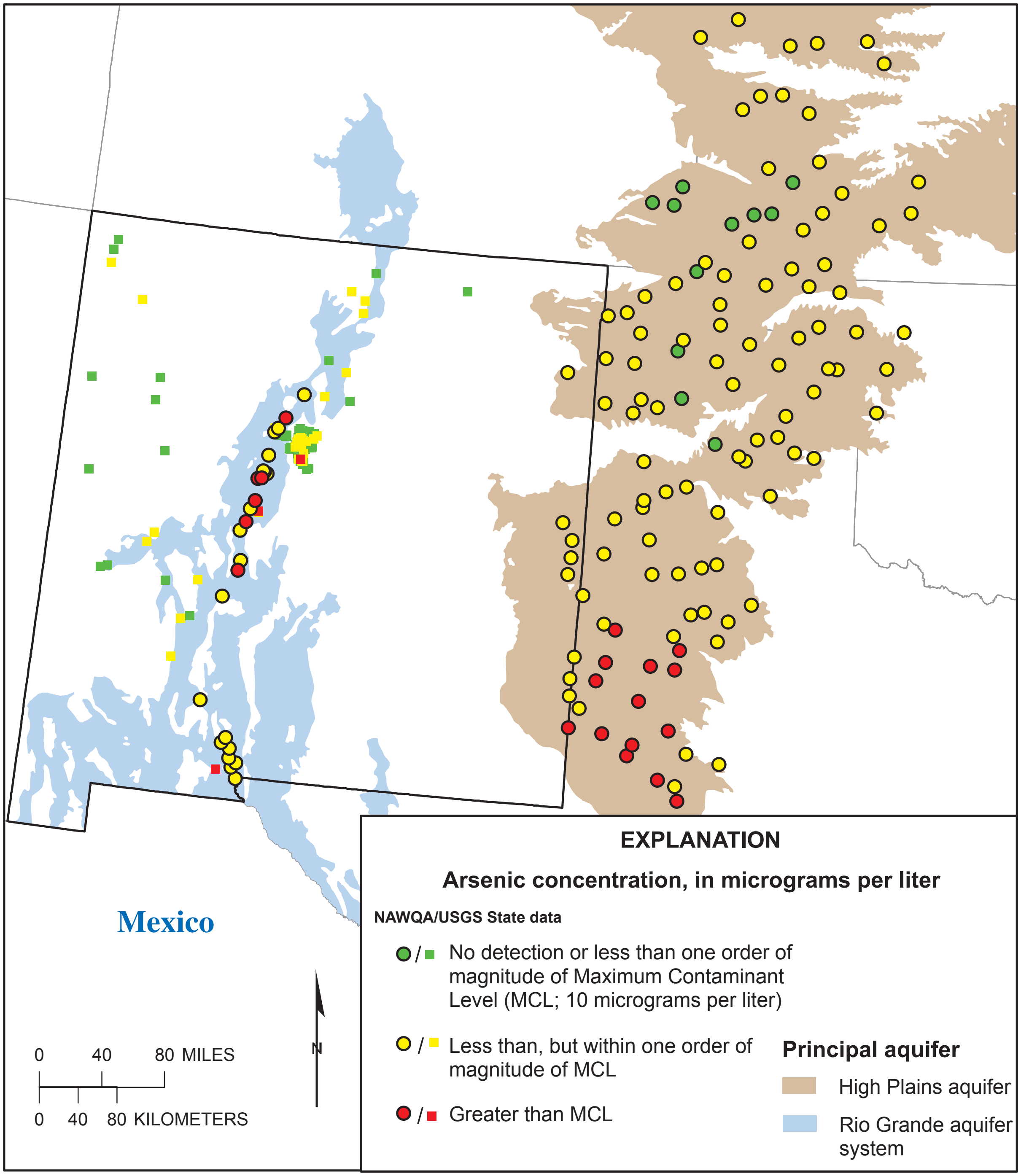


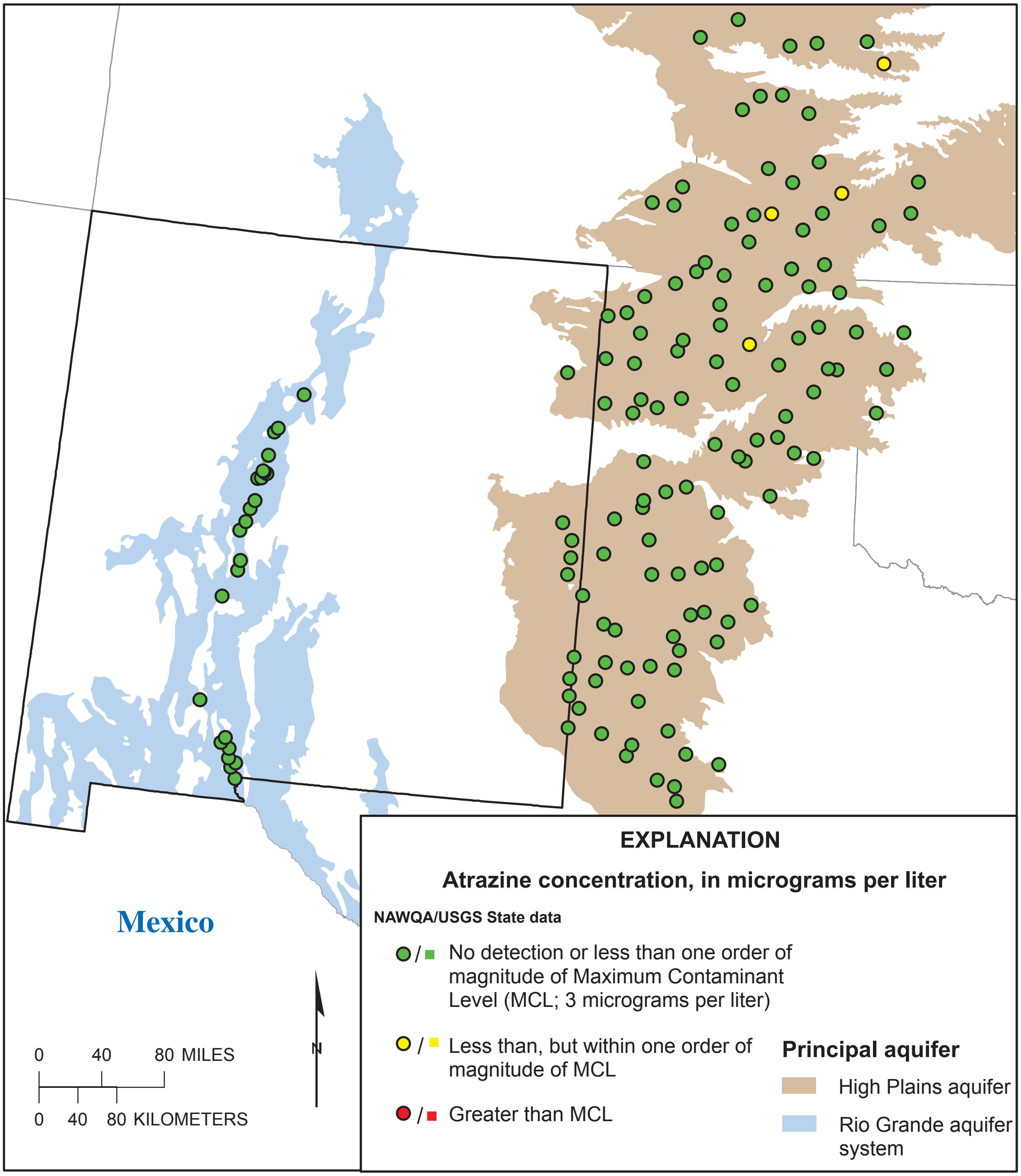
Figure NM5. Statistical summary for 11 selected contaminants by major-aquifer study using domestic-well data from National Water-Quality Assessment (NAWQA) studies for New Mexico (includes studies for which at least 10 analyses were available).—Continued



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

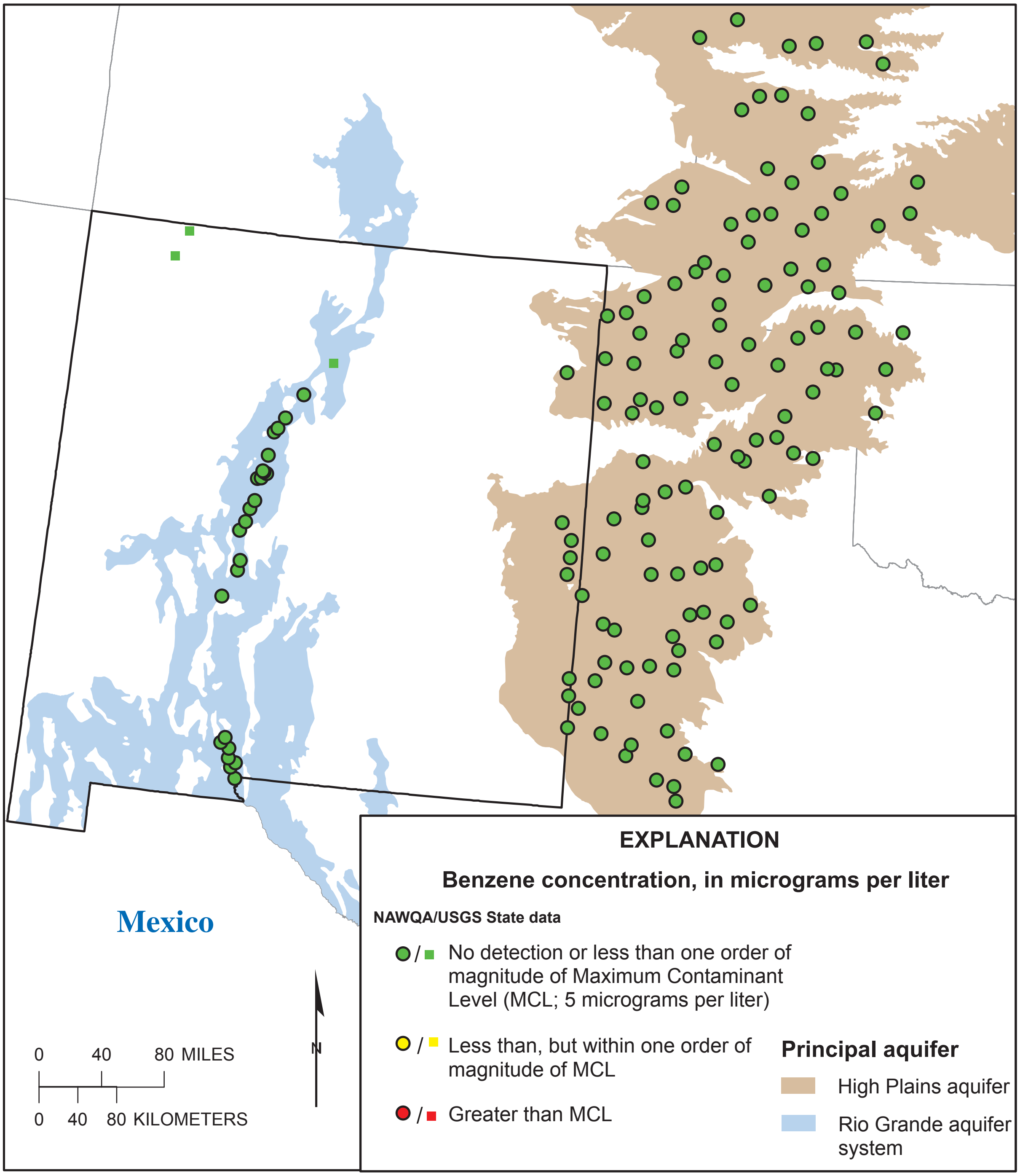
Figure NM6. Concentration of arsenic in samples from domestic wells in New Mexico and nearby States (from National Water-Quality Assessment (NAWQA) studies and U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



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 NM7. Concentration of atrazine in samples from domestic wells in New Mexico 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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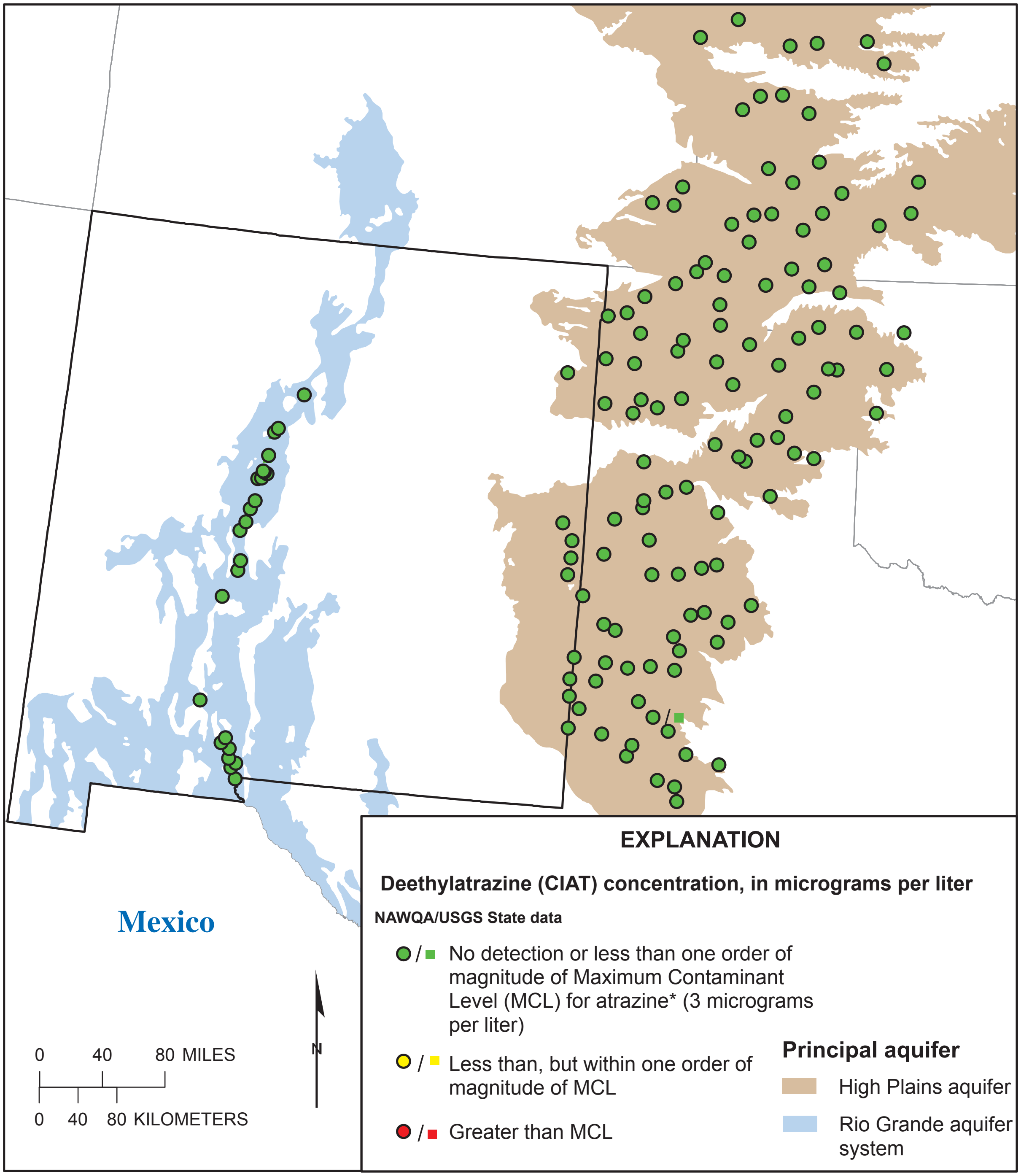
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

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

Figure NM8. Concentration of benzene in samples from domestic wells in New Mexico 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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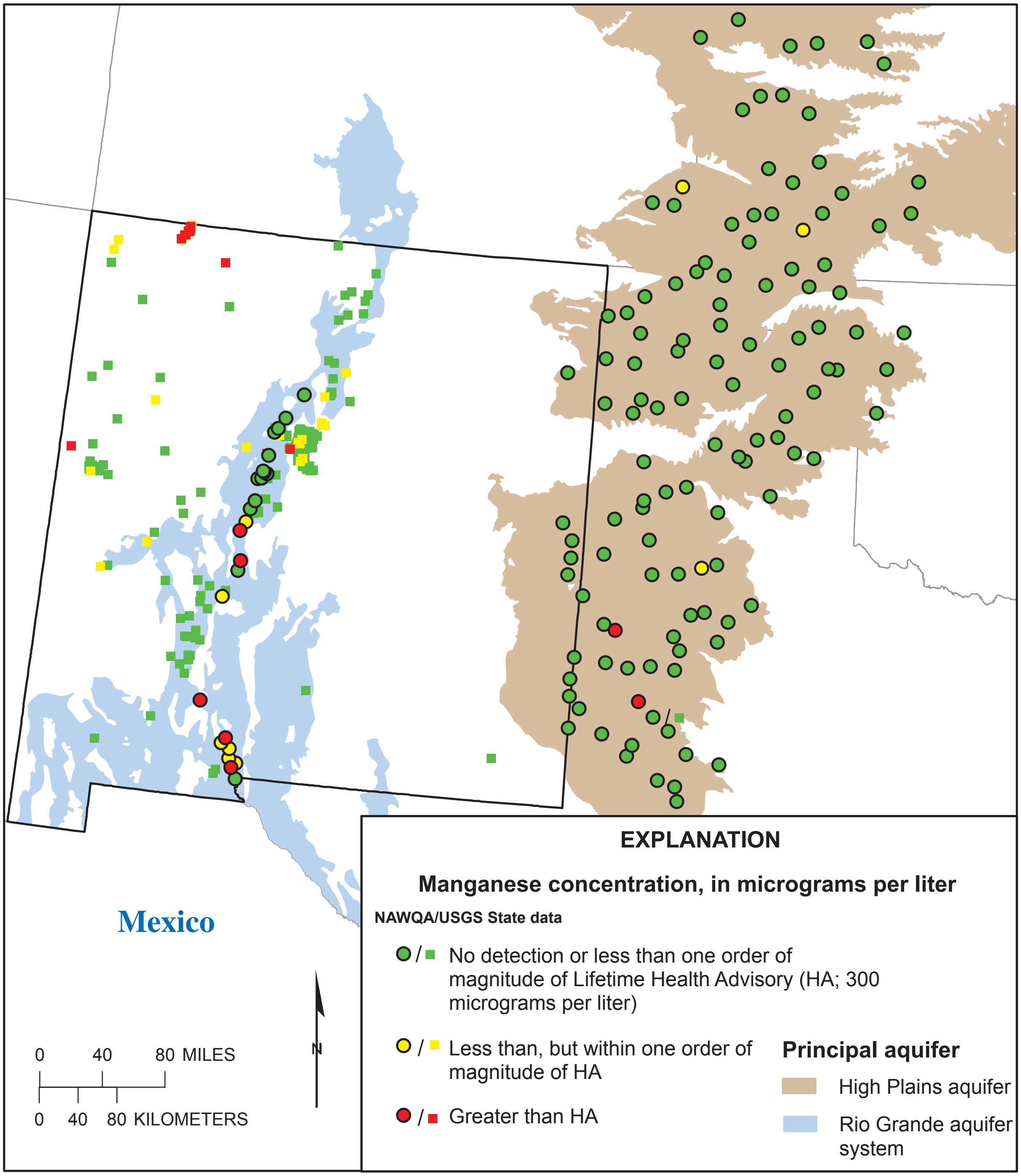
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

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 NM9. Concentration of deethylatrazine (CIAT) in samples from domestic wells in New Mexico 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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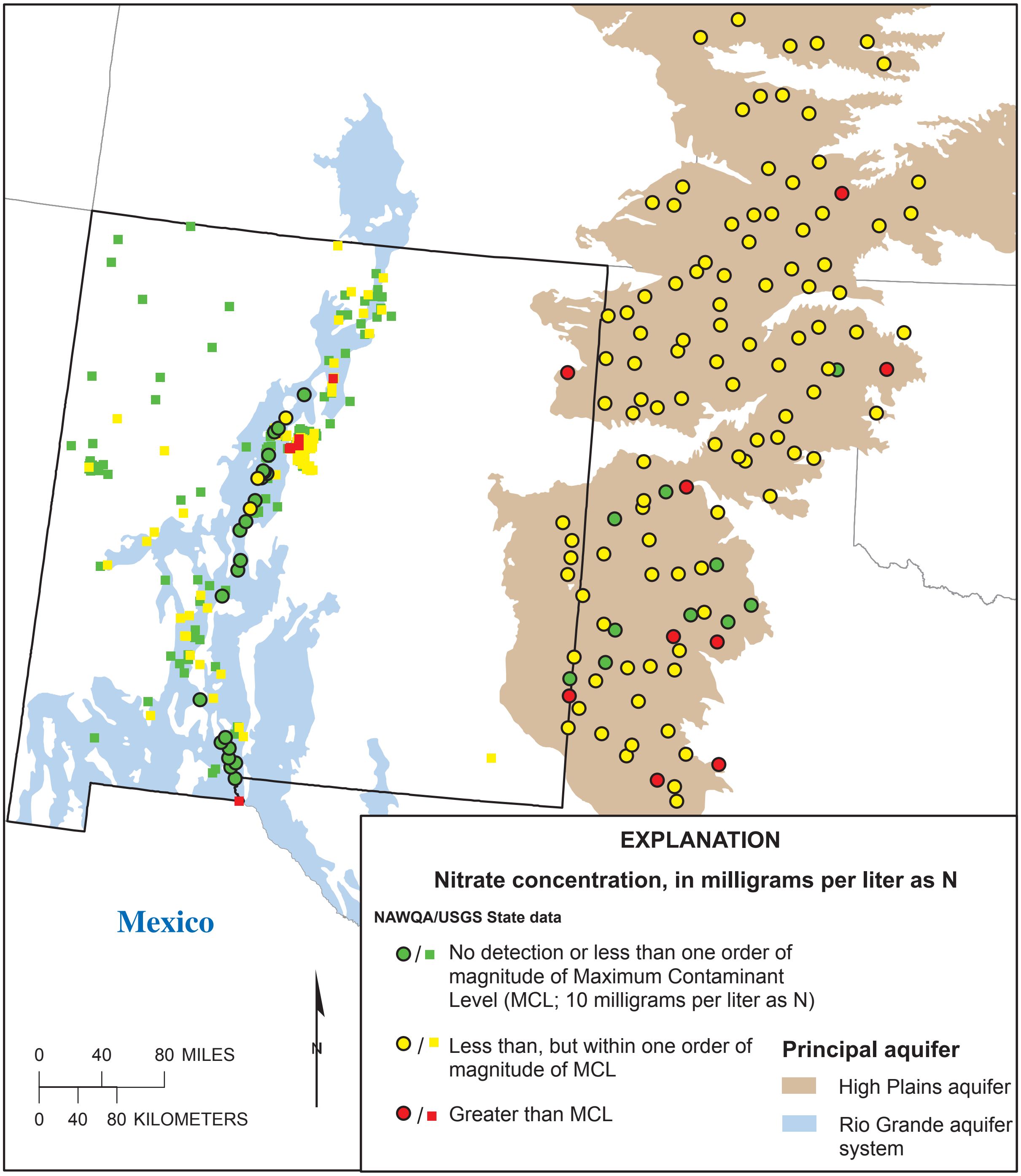
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

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

Figure NM10. Concentration of manganese in samples from domestic wells in New Mexico 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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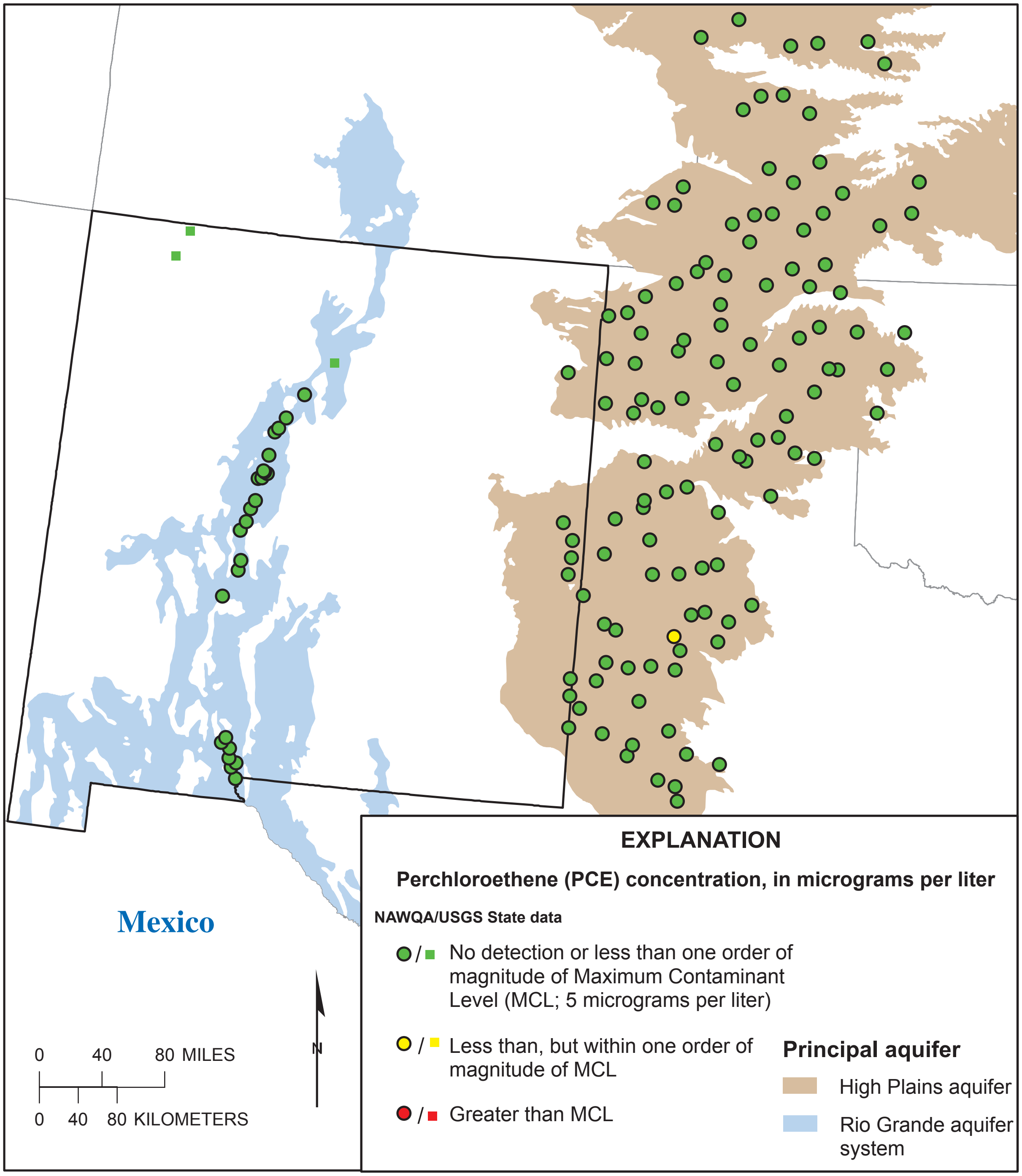
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

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

Figure NM11. Concentration of nitrate in samples from domestic wells in New Mexico 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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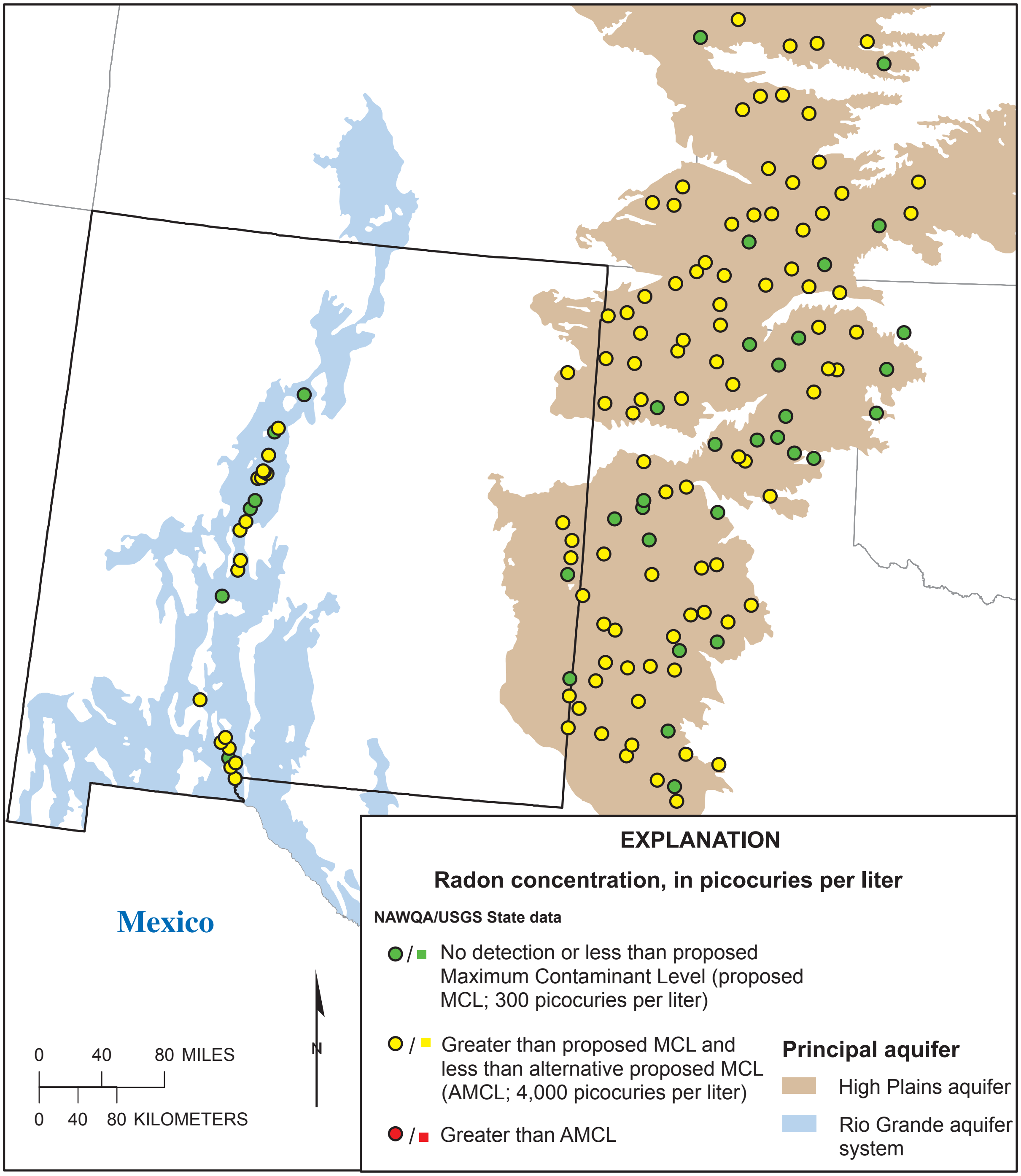
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

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

Figure NM12. Concentration of perchloroethene (PCE) in samples from domestic wells in New Mexico 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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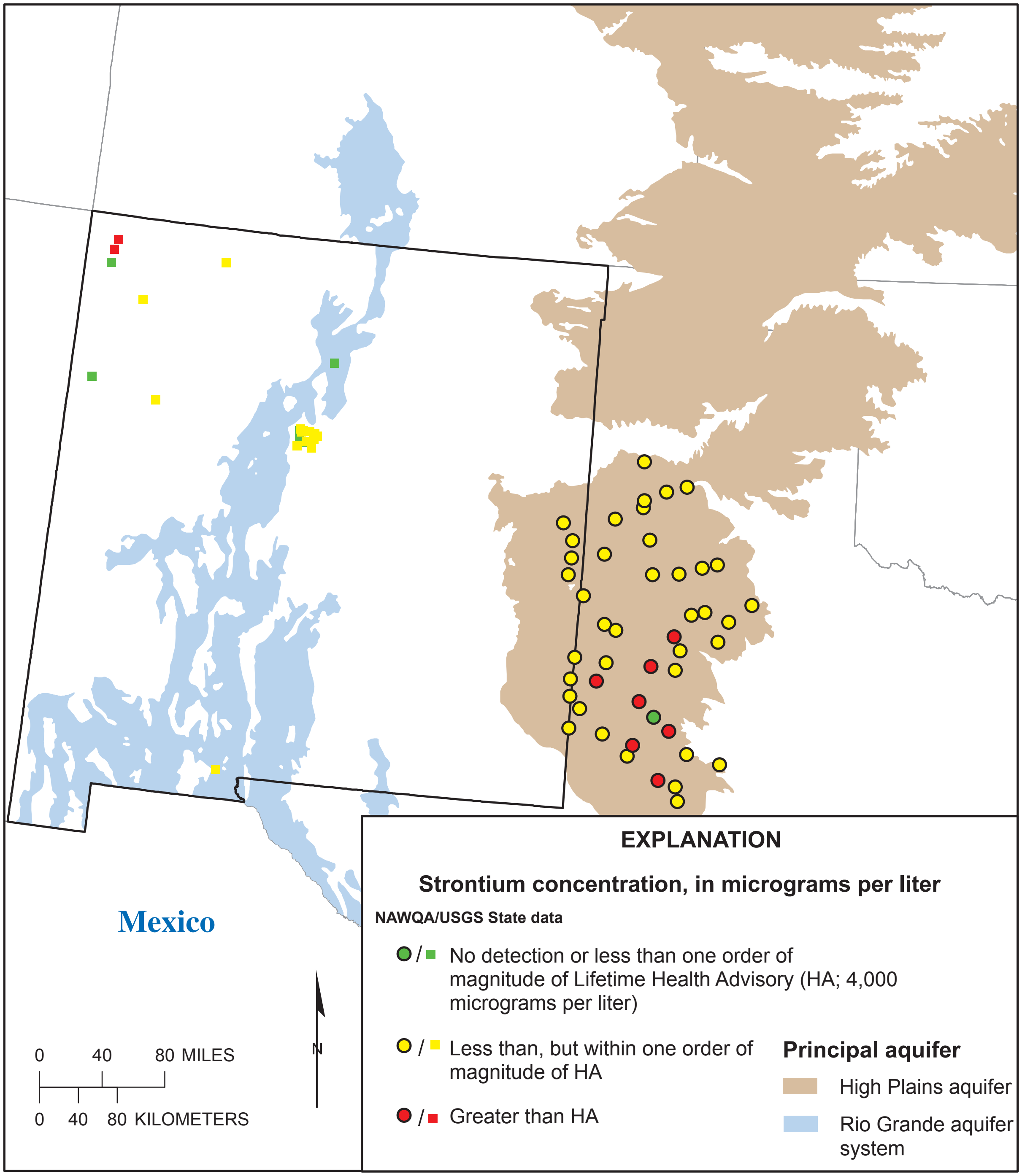
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

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

Figure NM13. Concentration of radon in samples from domestic wells in New Mexico and nearby States (from National Water-Quality Assessment (NAWQA) studies. No additional data were available from U.S. Geological Survey (USGS) State data in the National Water Information System (NWIS)).



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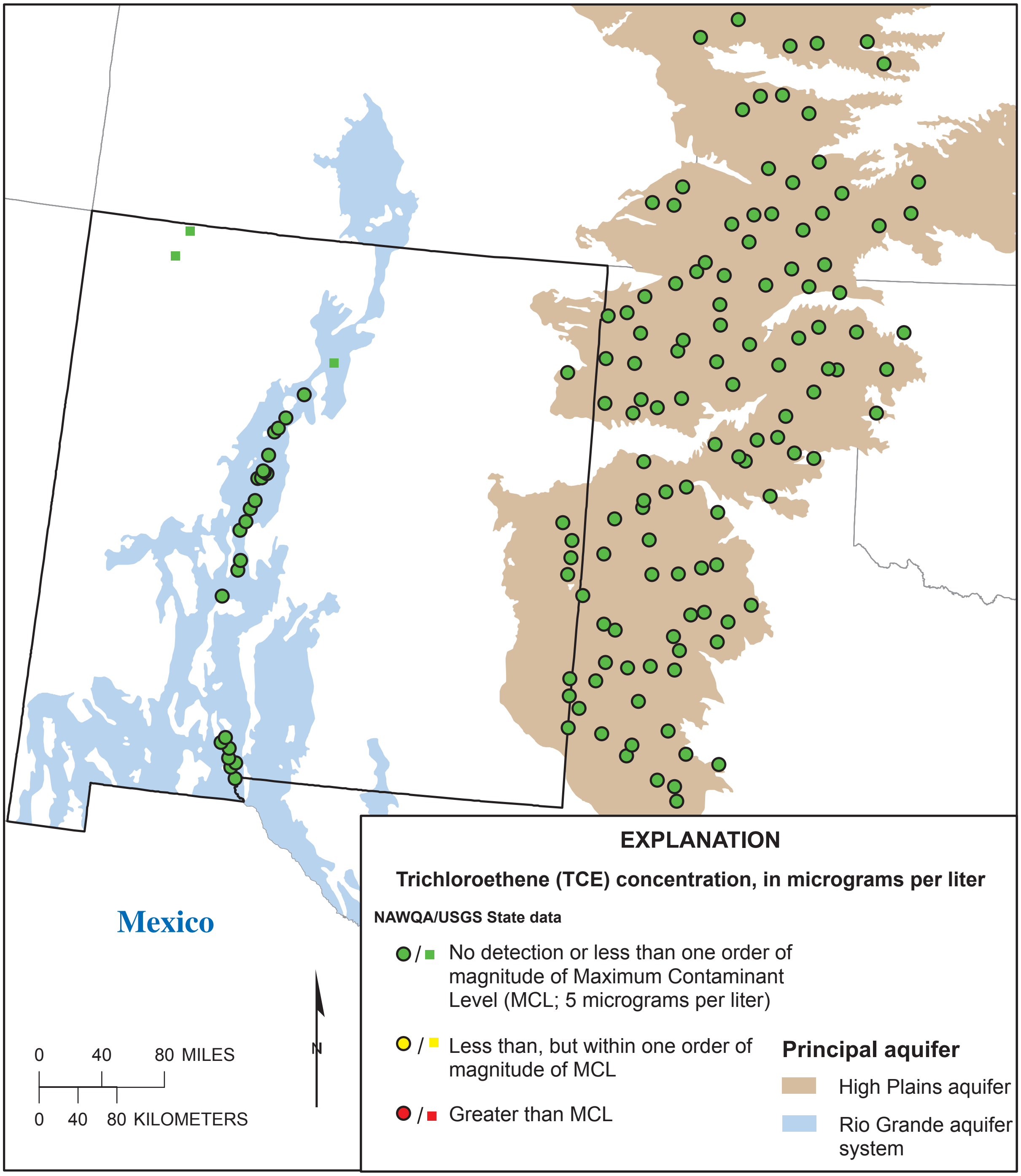
Albers Equal-Area projection
Standard Parallels 29°30' and 45°30', central meridian -96°

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

Figure NM14. Concentration of strontium in samples from domestic wells in New Mexico 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
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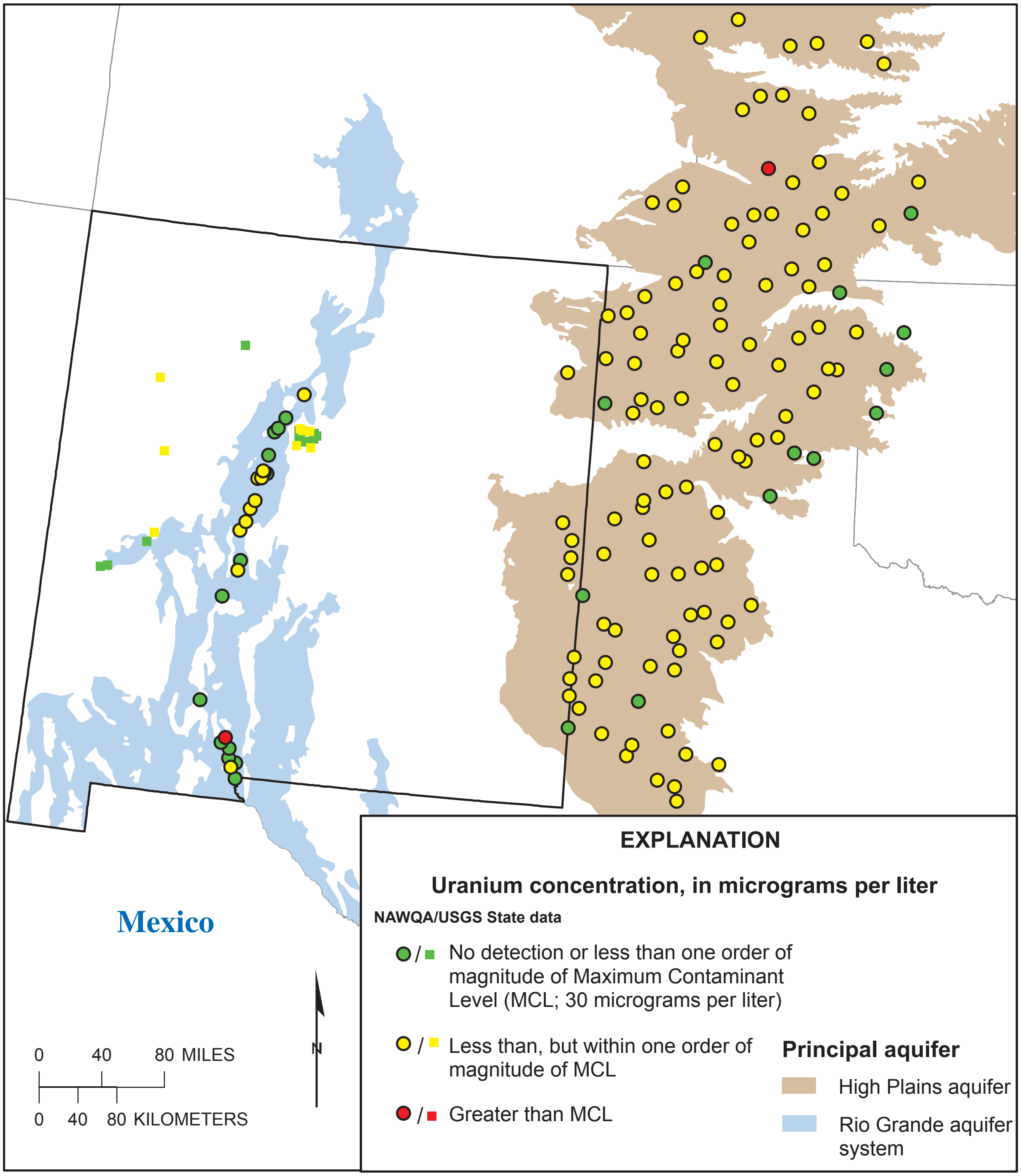
Standard Parallels 29°30' and 45°30', central meridian -96°

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

Figure NM15. Concentration of trichloroethene (TCE) in samples from domestic wells in New Mexico 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 NM16. Concentration of uranium in samples from domestic wells in New Mexico 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)).