APPENDIX 15—AIR QUALITY REGULATIONS

AIR QUALITY REGULATIONS

The basic framework for controlling air pollutants in the United States is mandated by the 1970 Clean Air Act and its amendments, and the 1999 Regional Haze Regulations. The Clean Air Act addresses criteria air pollutants, state and national ambient air quality standards for criteria air pollutants, and the Prevention of Significant Deterioration (PSD) program. The Regional Haze Regulations address visibility impairment.

Pollutants

Criteria pollutants are those for which national standards of concentration have been established. Pollutant concentrations greater than these standards represent a risk to human health. Criteria pollutants include carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), sulphur dioxide (SO_2), particulate matter (PM-10, PM-2.5), and lead (Pb). Other pollutants of concern are hazardous air pollutants (HAP), a broad class of several pollutants including benzene, toluene, asbestos, beryllium, and hydrogen sulfide (H_2S).

CO is an odorless, colorless gas formed during any combustion process, such as operation of engines, fireplaces, and furnaces. High concentrations of CO affect the oxygen-carrying capacity of the blood and can lead to unconsciousness and asphyxiation.

NO_2 is a red-brown gas formed during operation of internal combustion engines. Such engines emit a mixture of nitrogen gases, collectively called nitrogen oxides (NOx). NO_2 can contribute to brown cloud conditions and can convert to ammonium nitrate particles and nitric acid, which can cause visibility impairment and acid rain.

O_3 is a faintly blue gas that is generally not emitted directly into the atmosphere but is formed from NOx and volatile organic compounds (VOC) emissions. As noted above, internal combustion engines are the main source of NO_x. Sources of VOC include oil vapors and terpene mist. The faint acrid smell common after thunderstorms is due to ozone formation by lightning. O_3 is a strong oxidizing chemical that can burn the lungs and eyes and damage plants.

SO_2 forms during combustion from trace levels of sulphur in coal or diesel fuel. It can convert to ammonium sulfate and sulphuric acid, which can cause visibility impairment and acid rain.

Particulate matter (i.e., soil particles, hair, pollen) is essentially the small particles suspended in the air, which settle to the ground slowly and may be resuspended if disturbed. Separate allowable concentration levels for particulate matter are based on the relative size of the particle:

- PM-10, particles with diameters less than 10 micrometers, are small enough to be inhaled and can cause adverse health effects.
- PM-2.5, particles with diameters less than 2.5 micrometers, are so small that they can be drawn deeply into the lungs and cause serious health problems. These particles are also the main cause of visibility impairment.

Before the wide use of unleaded fuel for automobiles, lead particles were emitted from tailpipes. Lead is not considered in this Environmental Impact Statement (EIS) because no proposed projects are expected to emit lead.

There are a wide variety of HAPs that have no applicable air quality standards but are typically evaluated for potential cancer risks from long-duration exposures. Wyoming maintains a concentration standard for H_2S.

Wyoming and National Ambient Air Quality Standards

Wyoming Ambient Air Quality Standards (WAAQS) and National Ambient Air Quality Standards (NAAQS) set the absolute upper limits for criteria air pollutant concentrations at all locations to which the public has access. The WAAQS and NAAQS are legally enforceable standards. Concentrations above the WAAQS and NAAQS represent a risk to human health (see Table A15-1).

The Environmental Protection Agency (EPA) has developed standards for each criteria pollutant for a specific averaging time. Short averaging times (1, 3, and 24 hours) address short-term exposure, whereas annual standards address long-term exposure. Annual standards are set to lower allowable concentrations than are short-term standards to recognize the cumulative effects of long-term exposure.

Table A15-1. National and Wyoming Ambient Air Quality Standards for Criteria Pollutants

Pollutant	Averaging Time	NAAQS ($\mu g/m^3$)	WAAQS ($\mu g/m^3$)
Carbon Monoxide (CO)	8 hour	10,000	10,000
	1 hour	40,000	40,000
Nitrogen Dioxide (NO_2)	Annual	100	100
Sulphur Dioxide (SO_2)	Annual	80	60
	24 hour	365	260
	3 hour	1300	695
Ozone (O_3)	8 hour	157	157
	1 hour	235	
Particulate Matter (PM_{10})	Annual	50	50
	24 hour	150	150
Fine Particulate Matter ($PM_{2.5}$)	Annual	65	
	24 hour	15	

Prevention of Significant Deterioration

The goal of the PSD program is to ensure that air quality in areas with clean air does not significantly deteriorate, while maintaining a margin for future industrial growth. Under PSD, each area in the United States is classified by the air quality in that region (see Table A15-2):

- **PSD Class I Areas.** Areas with pristine air quality, such as wilderness areas, national parks, and Indian reservations, are accorded the strictest protection. Only very small incremental increases in concentration are allowed to maintain the very clean air quality in these areas.
- **PSD Class II Areas.** Essentially, all areas that are not designated Class I are designated Class II. Moderate incremental increases in concentration are allowed, although the concentrations are not allowed to reach the concentrations set by Wyoming and federal standards (WAAQS and NAAQS).
- **PSD Class III Areas.** No areas have yet been designated Class III. Concentrations would be allowed to increase all the way up to the WAAQS and NAAQS.

Table A15-2. PSD Increments

Pollutant	Averaging Time	PSD Increment ($\mu g/m^3$)	
		Class I	Class II
Nitrogen Dioxide (NO_2)	Annual	2.5	25
Sulphur Dioxide (SO_2)	Annual	2	20
	24 hour	5	91
	3 hour	25	512
Particulate Matter (PM_{10})	Annual	4	17
	24 hour	8	30

In the Jack Morrow Hills region, there are four PSD Class I areas (Bridger, Fitzpatrick and Washakie Wilderness Areas, and Grand Teton National Park). There are also two special status Class II areas (Popo Agie Wilderness Area and the Wind River Roadless Area). The Jack Morrow Hills project area is also classified as PSD Class II.

Comparisons of potential NO_2 and SO_2 concentrations with PSD increments are intended only to evaluate a threshold of concern and do not represent a regulatory PSD Increment Consumption analysis. Consumption analyses are applied to large industrial sources and are solely the responsibility of the state and EPA.

Regional Haze Regulations

Visibility impairment is an indicator of air pollution concentration. Visibility can be defined as the distance one can perceive color, contrast, and detail. Fine particulate matter ($PM_{2.5}$) is the main cause of visibility impairment. Visual range, one of several ways to express visibility, is the farthest distance a person can see a landscape feature. Without human-caused visibility impairment, natural visual range would average about 150 miles in the Western United States and about 70 miles in the Eastern United States.

The Regional Haze Regulations were developed by EPA in response to the Clean Air Act Amendments of 1990. They are intended to maintain and improve visibility in PSD Class I areas across the United States so that visibility in these areas is returned to natural conditions. These regulations require states to demonstrate reasonable progress in maintaining or improving visibility in PSD Class I areas.

Figures A15-1 to A15-24 support the text found in Section 3.8.

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Figure A15-1. Mean Annual Concentrations of Nitrogen Compounds in Pinedale, Wyoming

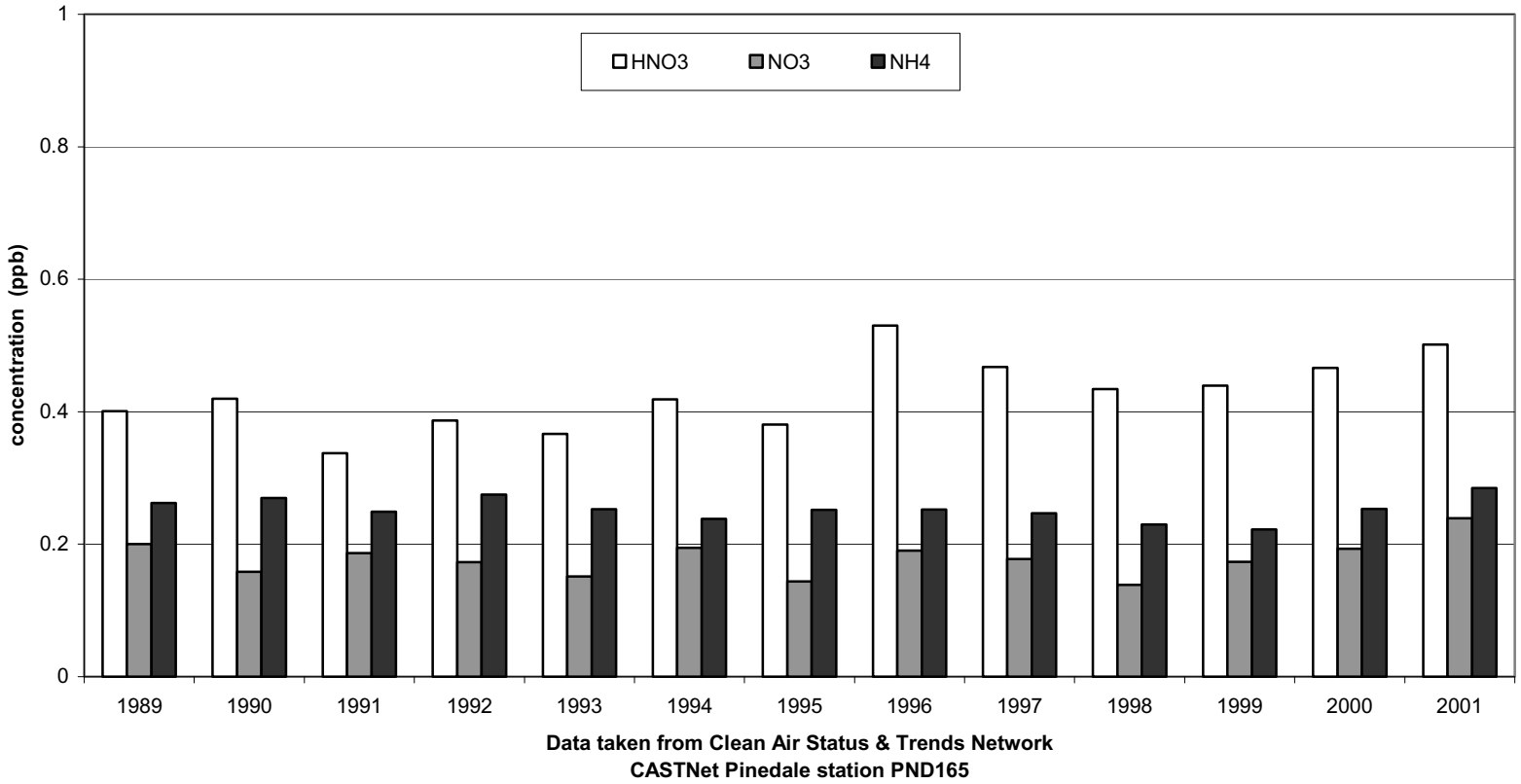

Figure A15-2. Mean Annual Concentrations of Sulfur Compounds in Pinedale, Wyoming

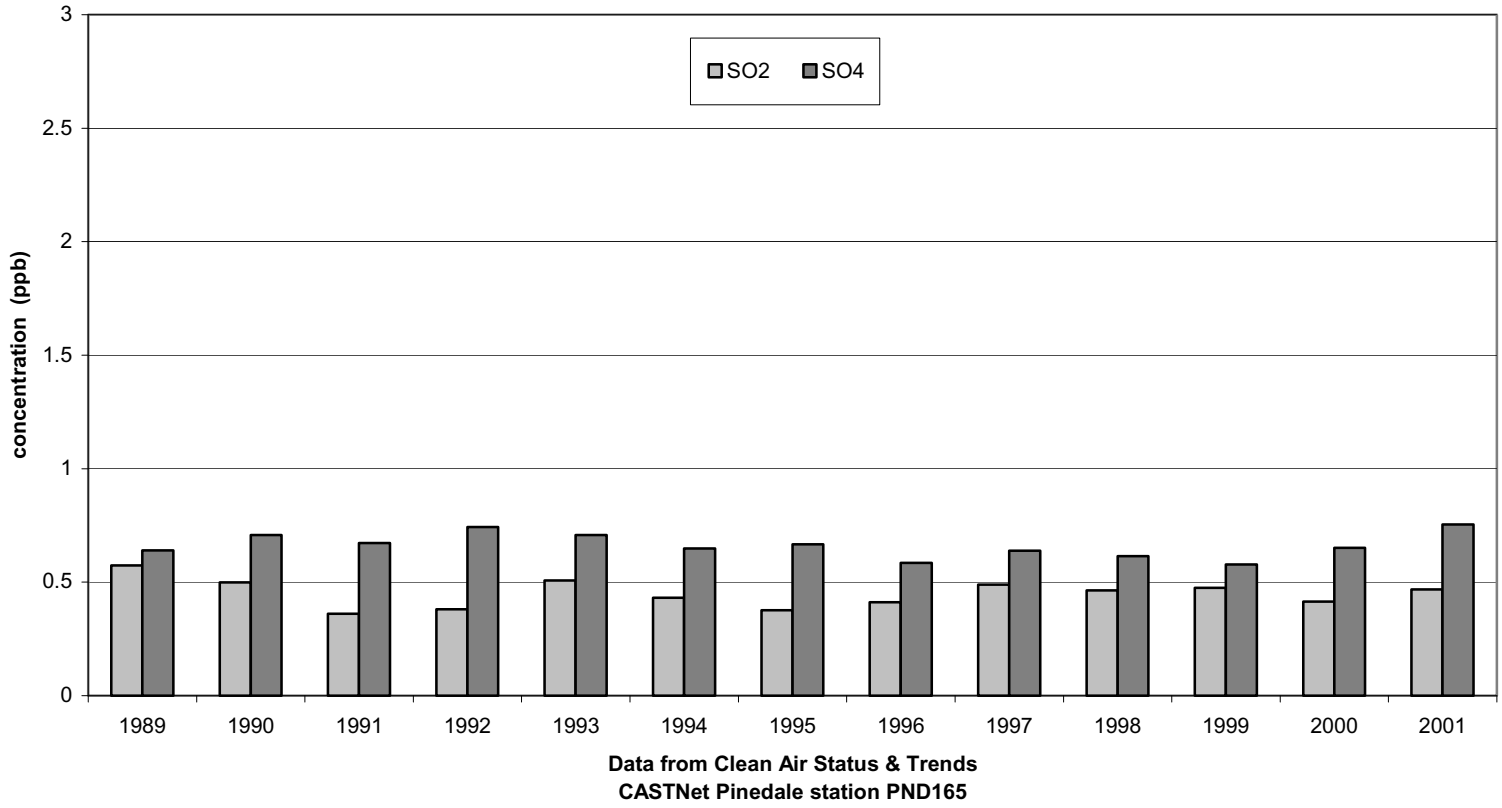

Figure A15-3. Mean Annual Ozone Concentration in Pinedale, Wyoming

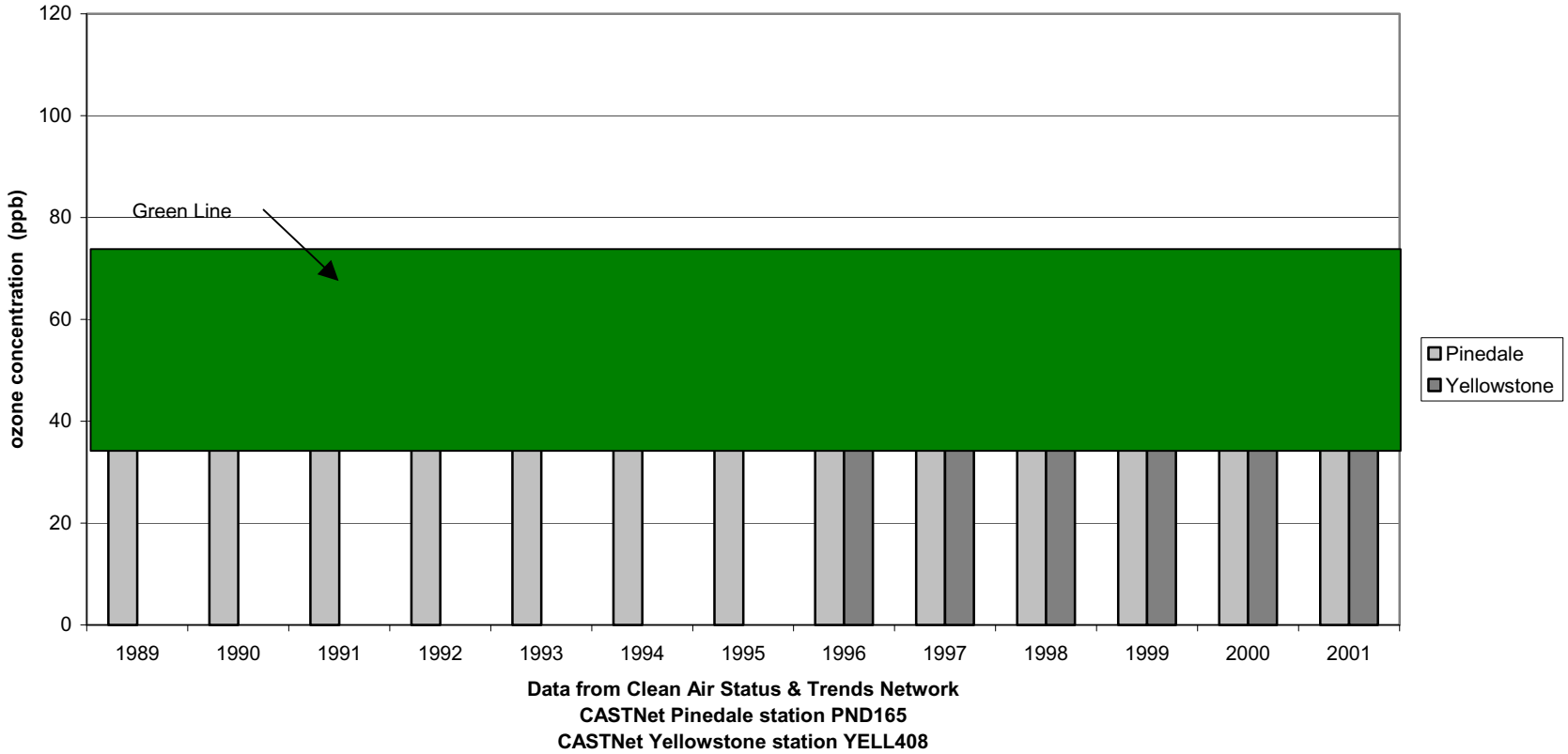

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Figure A15-4. Visibility in Bridger Wilderness

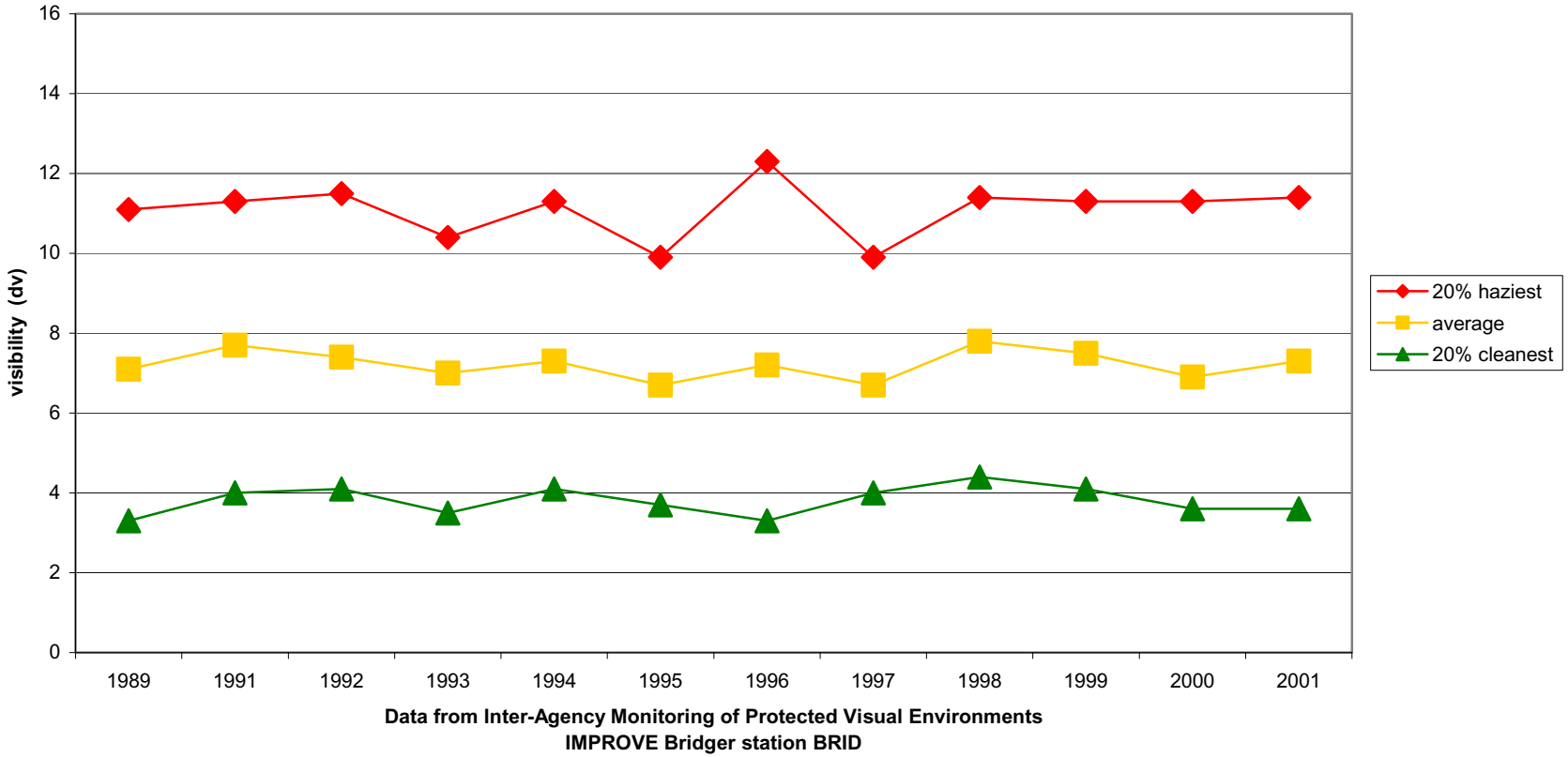

Figure A15-5. Precipitation pH in Pinedale, Wyoming

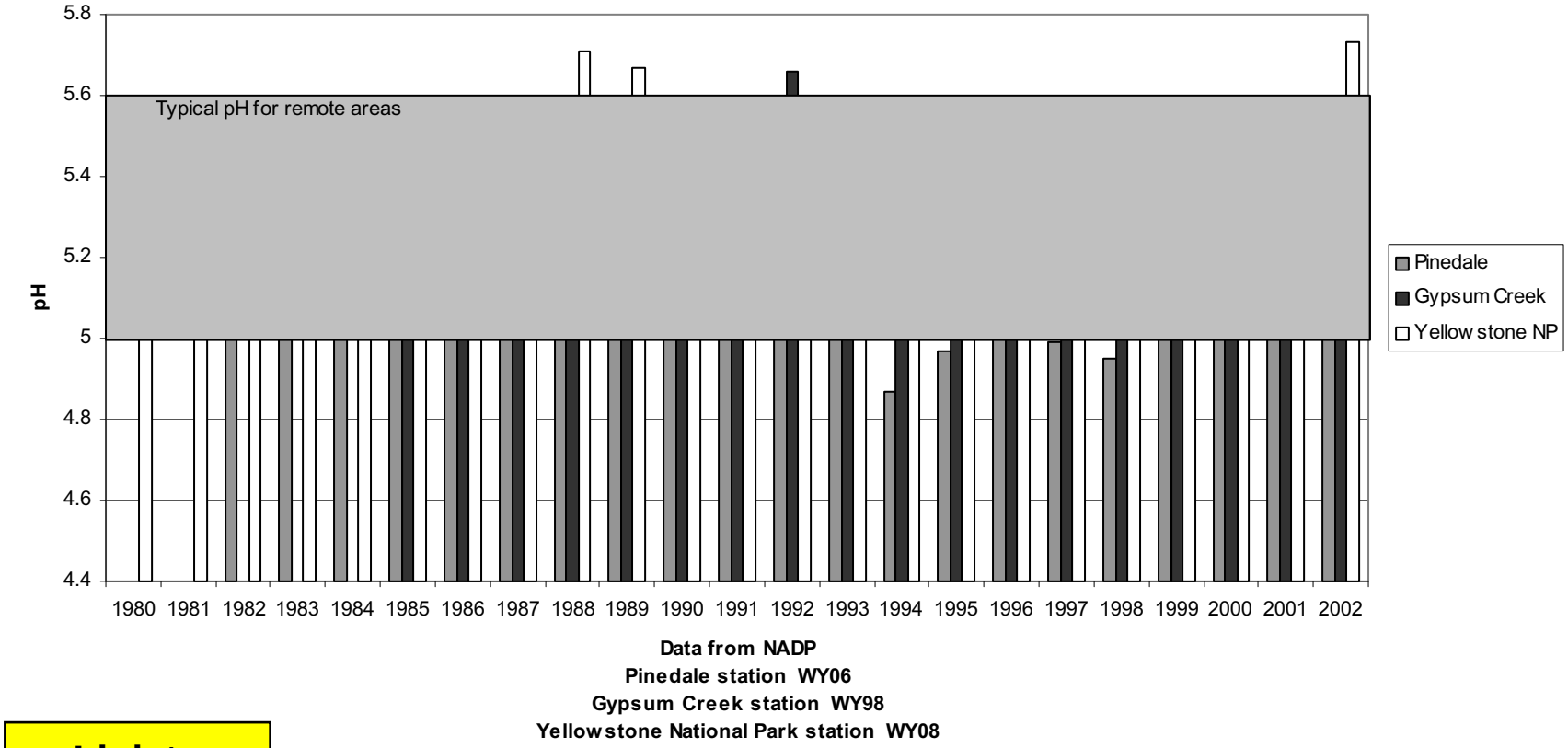

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Figure A15-6. Wet Deposition of Sulfur and Nitrogen Compounds in Pinedale, Wyoming

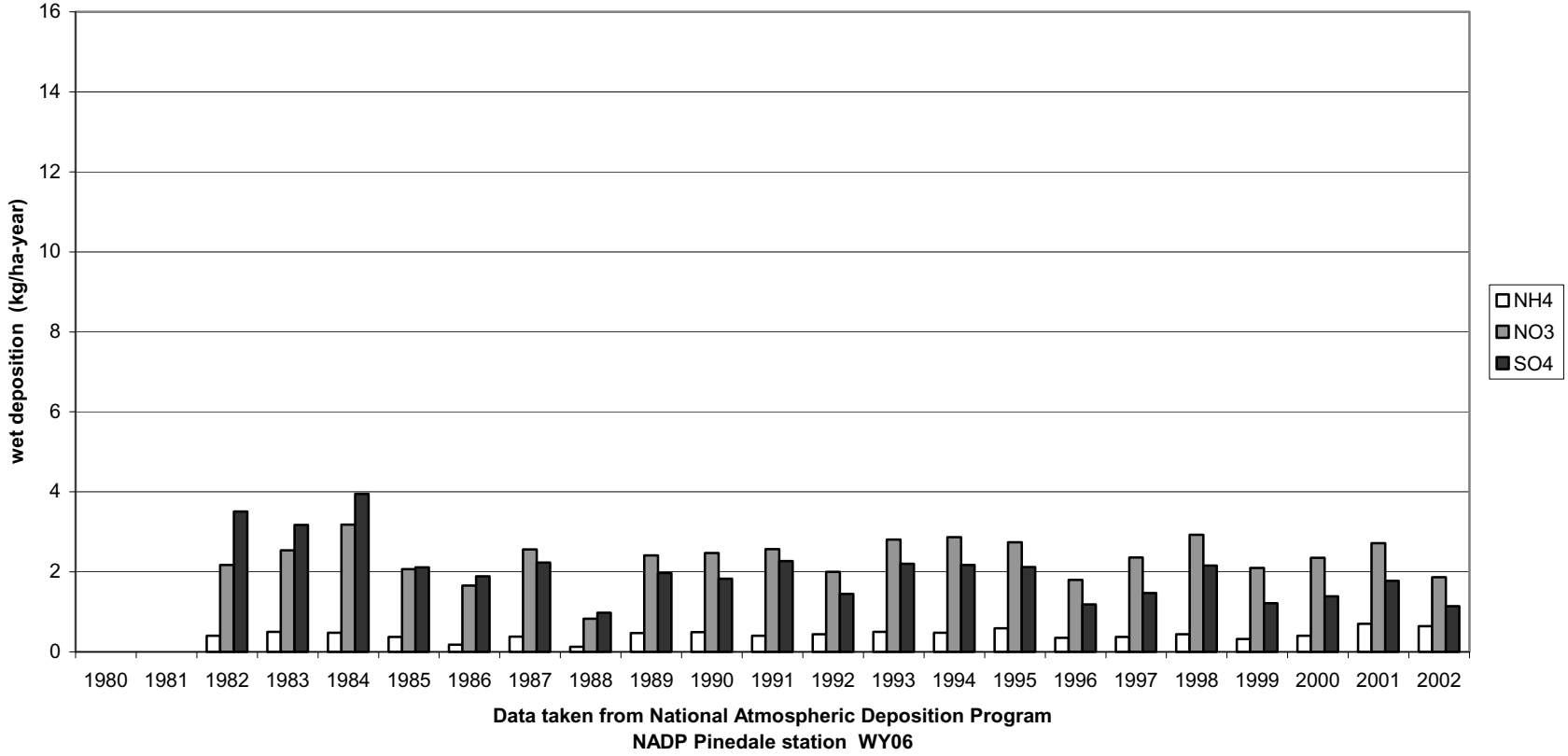

Figure A15-7. Mean Annual Dry Deposition of Sulfur and Nitrogen Compounds in Pinedale, Wyoming

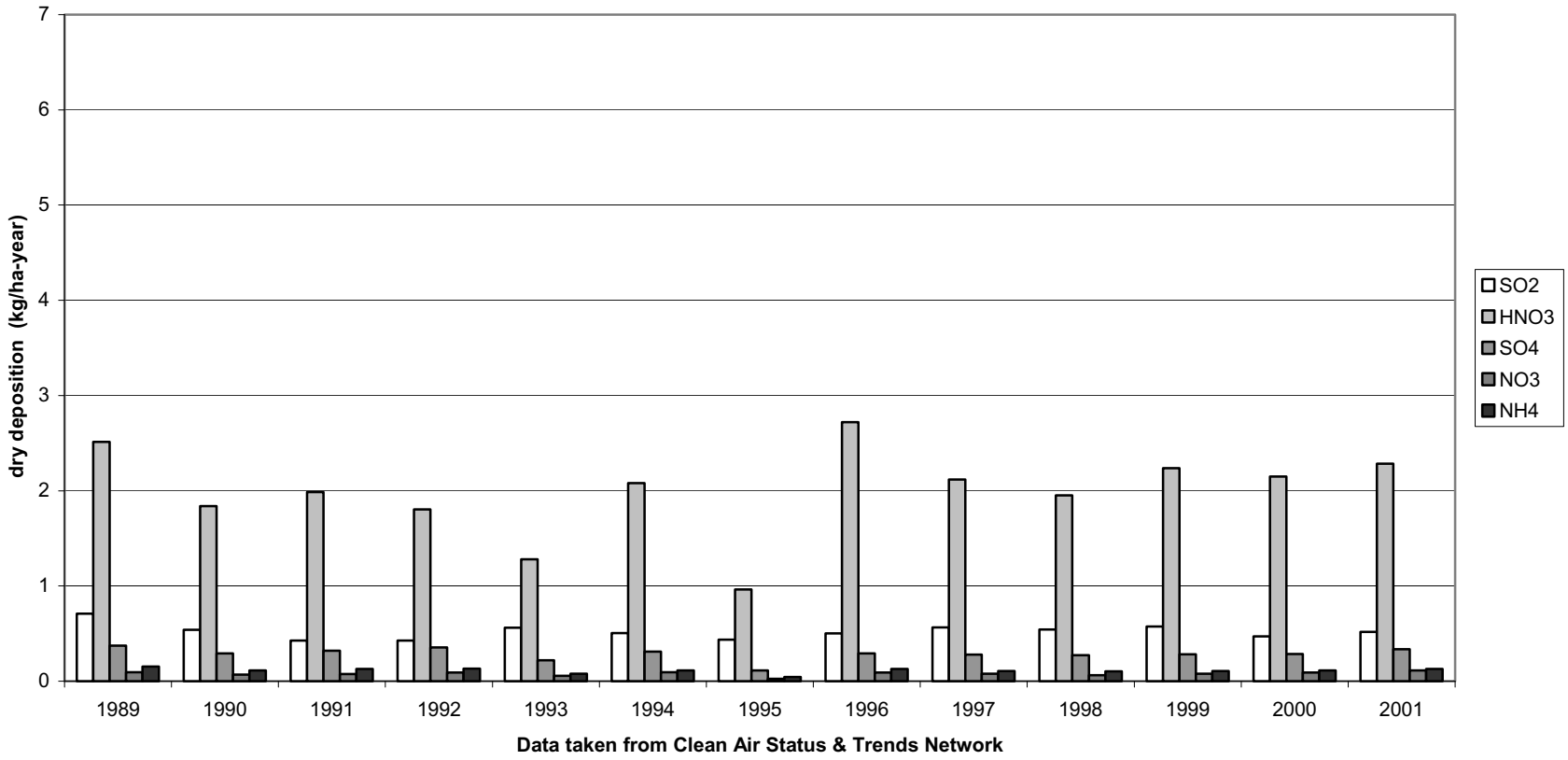

Figure A15-8. Total Nitrogen Deposition near Pinedale, Wyoming

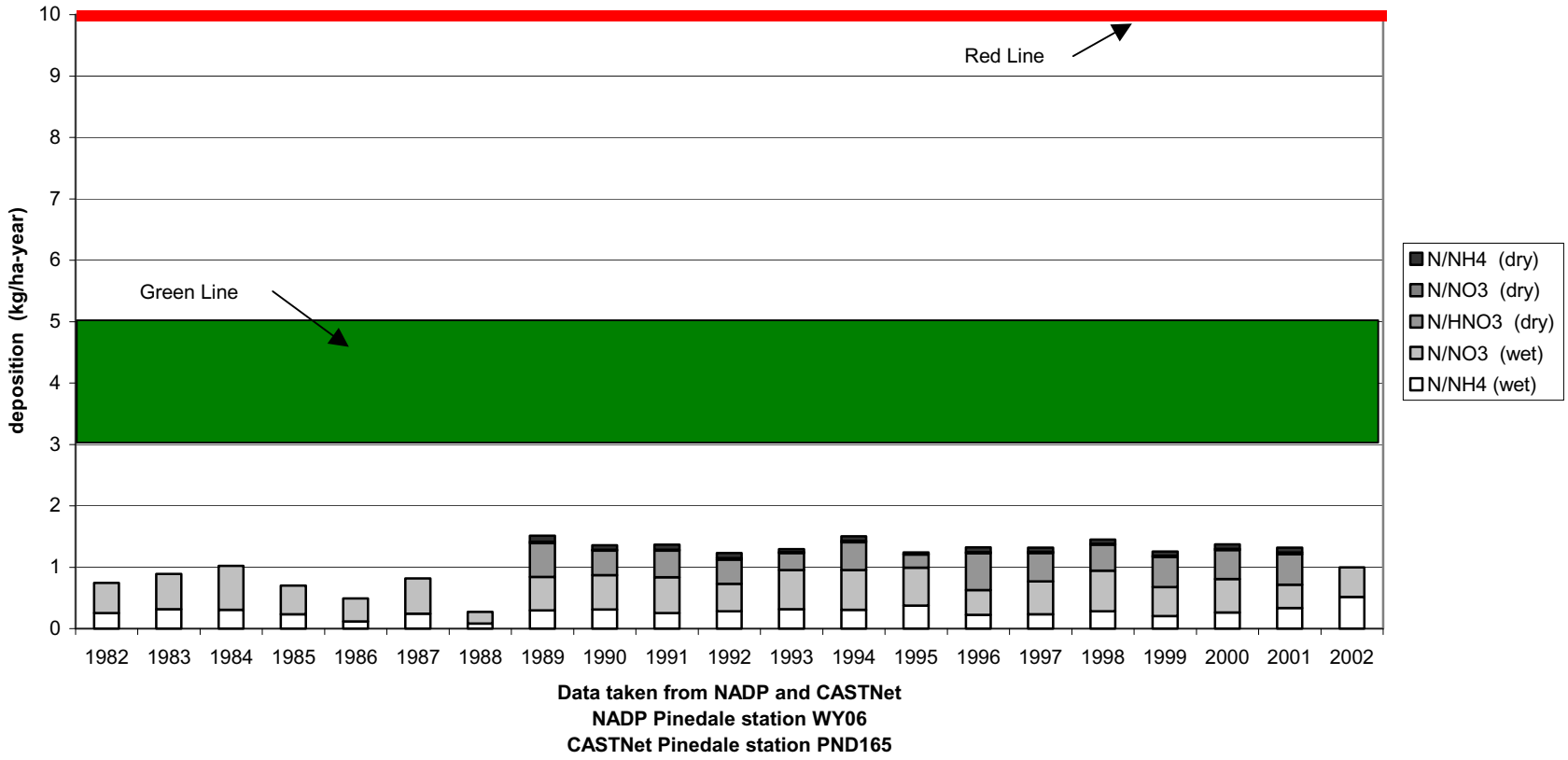

Figure A15-9. Total Sulfur Deposition near Pinedale, Wyoming

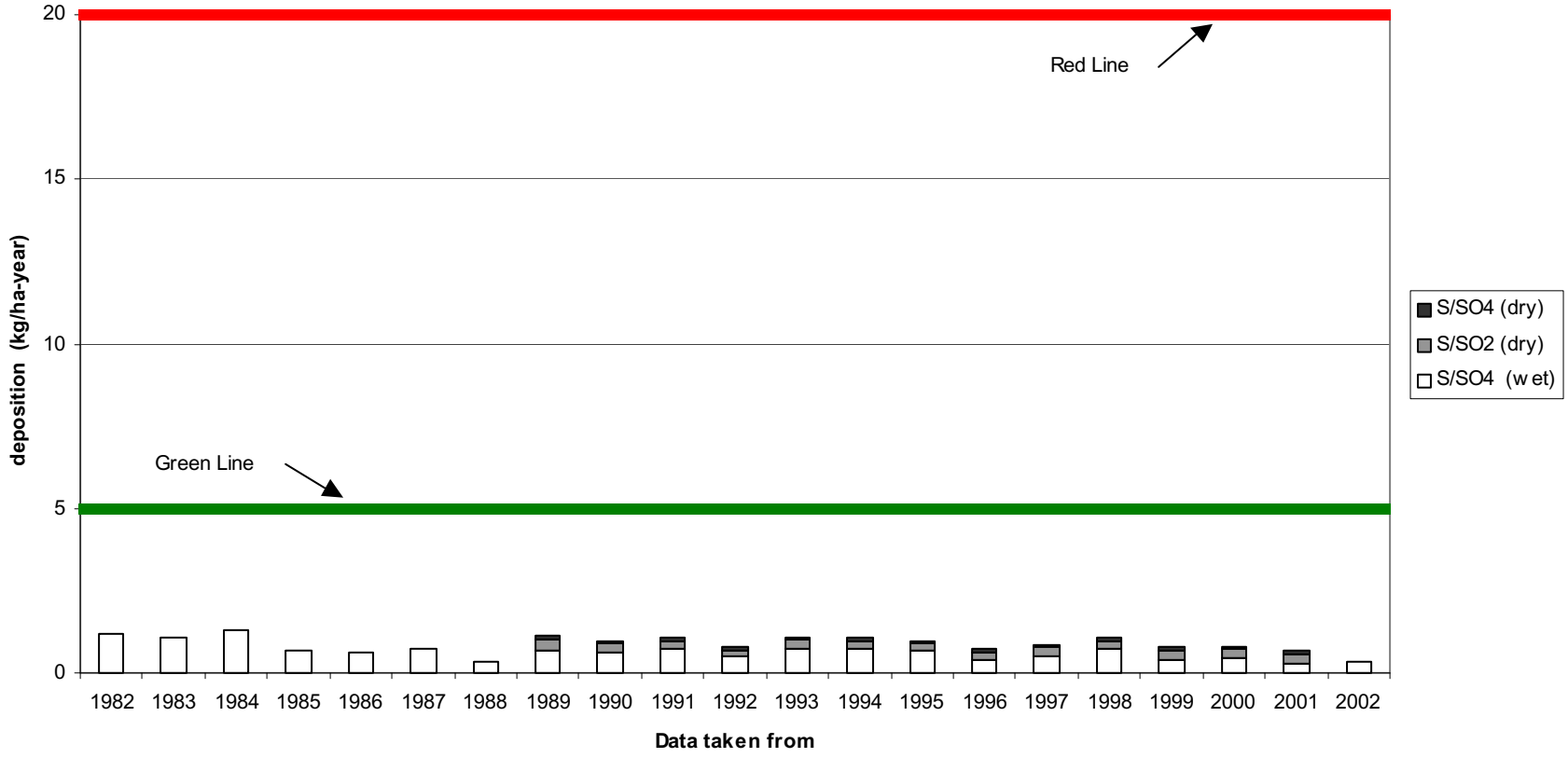

Figure A15-10. Potential Total Near-Field Concentrations near Jack Morrow Hills Area with respect to Wyoming Ambient Air Quality Standards

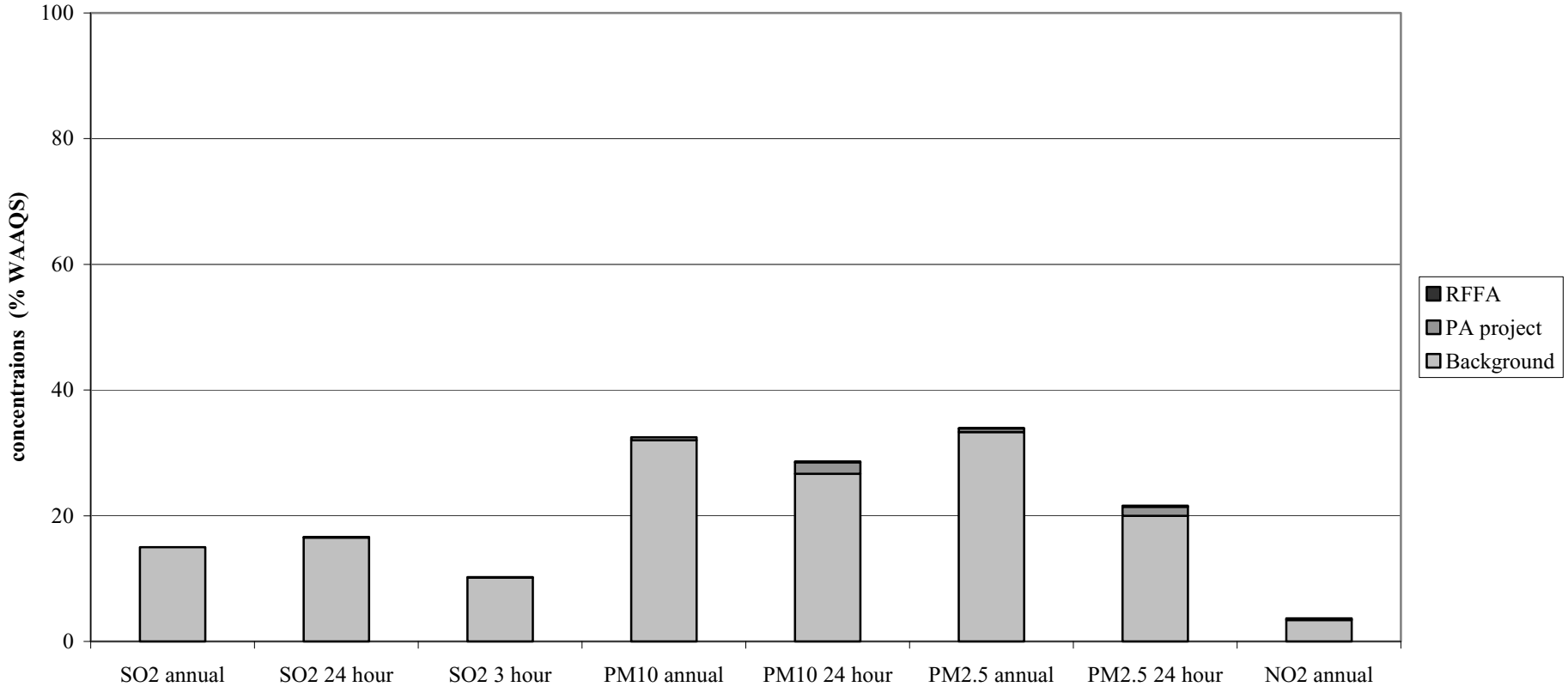

Figure A15-11. Far-Field Concentrations of Criteria Pollutants from the Pinedale Anticline Project

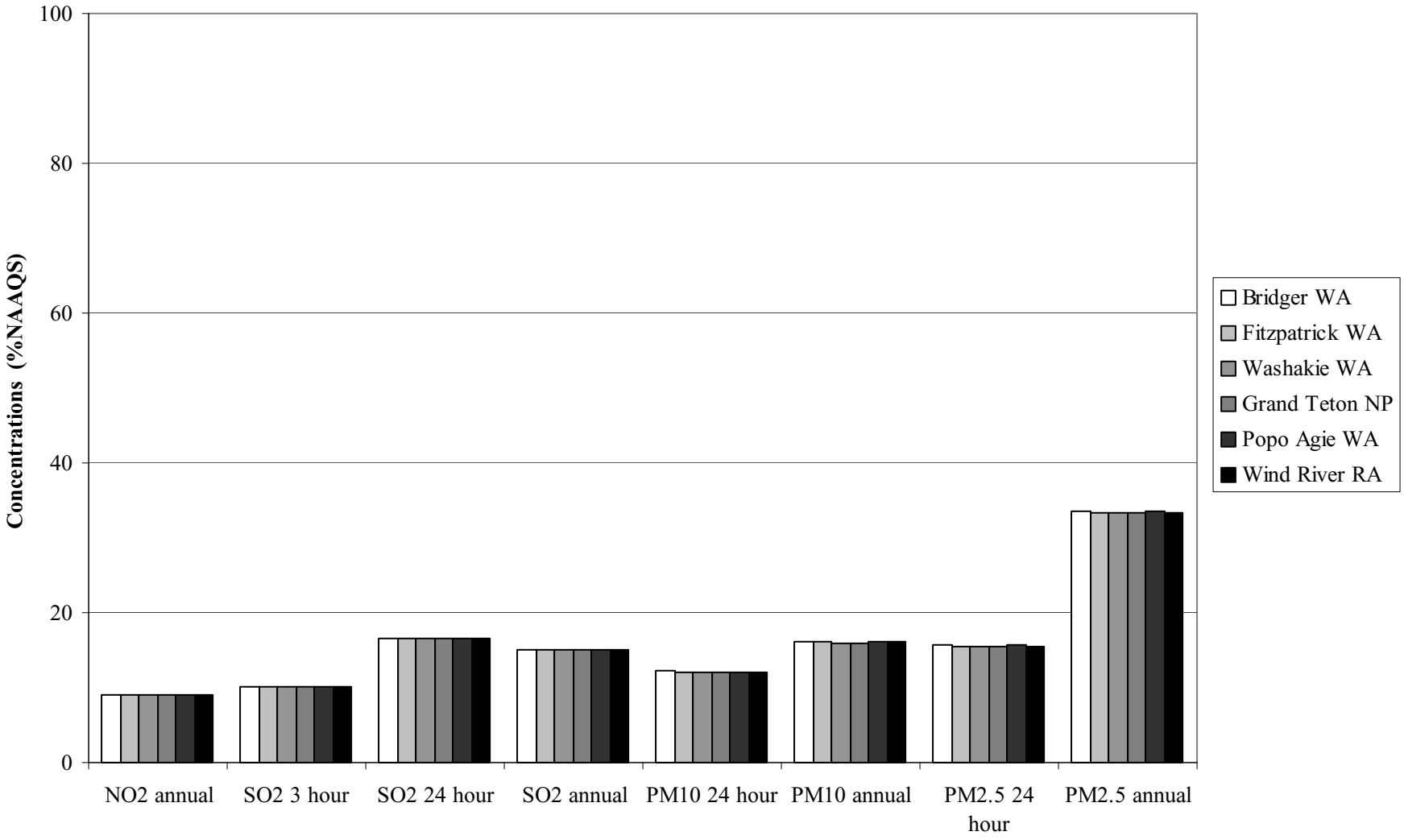

Figure A15-12. Potential Cumulative Far-Field Concentrations in Bridger Wilderness with respect to PSD Class I Increments

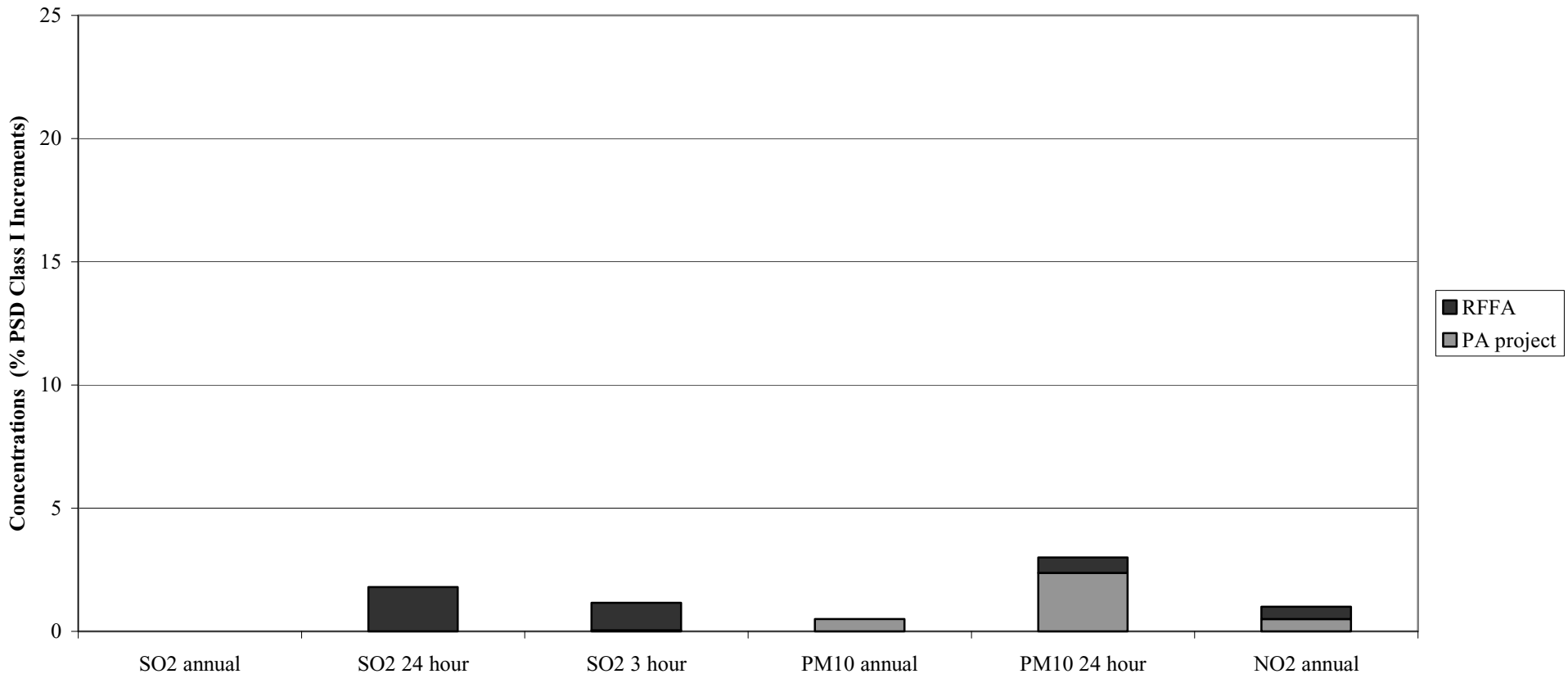

Figure A15-13. Air Quality Monitoring Sites

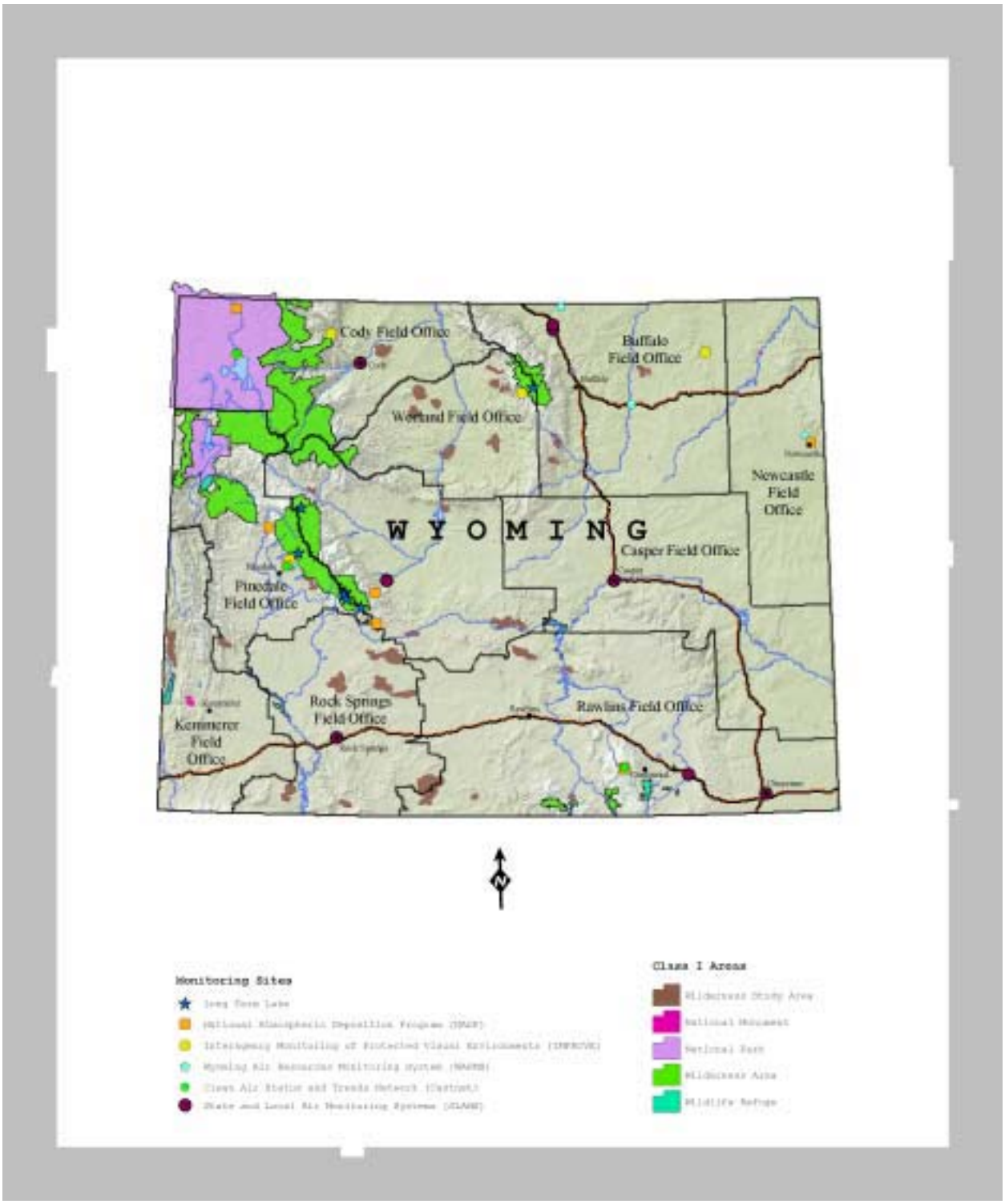

Figure A15-14. Potential Total Far-Field Concentrations in Bridger Wilderness with respect to Wyoming Ambient Air Quality Standards

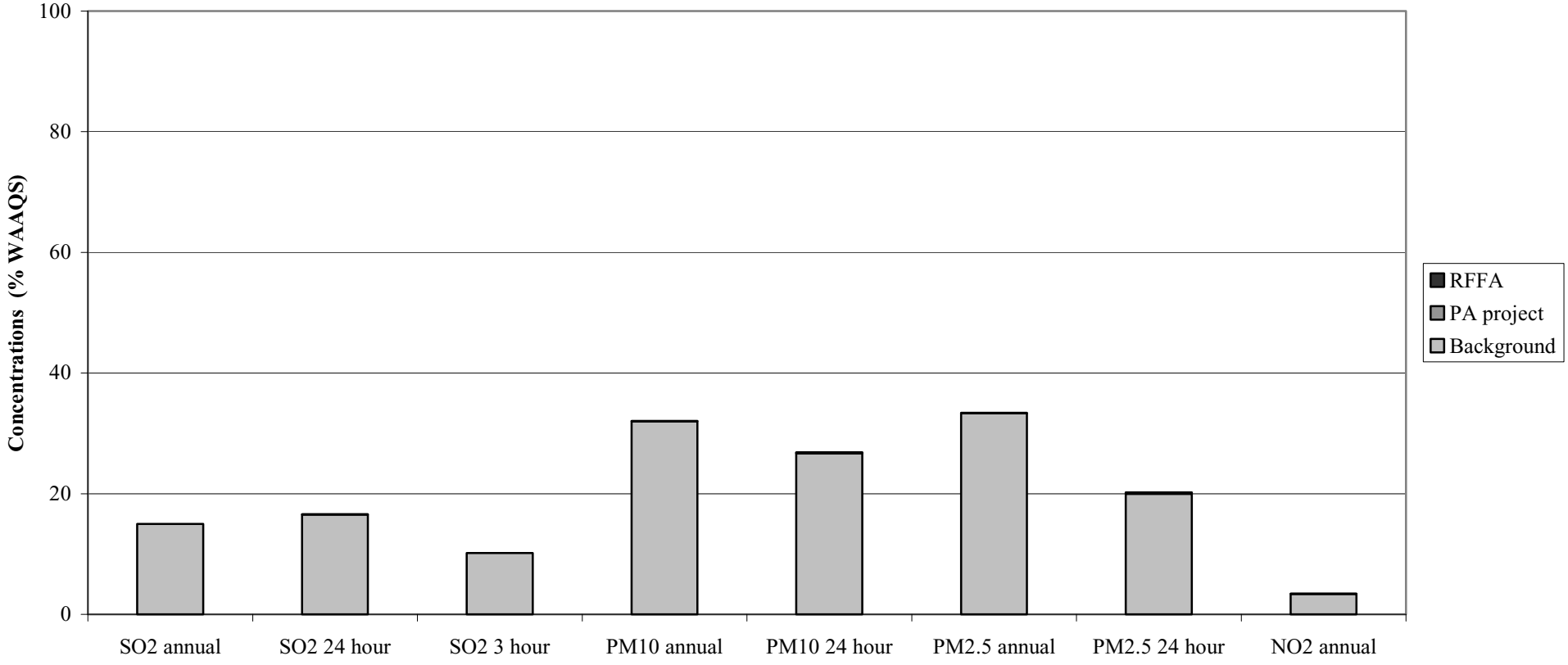

Figure A15-15. Precipitation pH at South Pass City, Wyoming

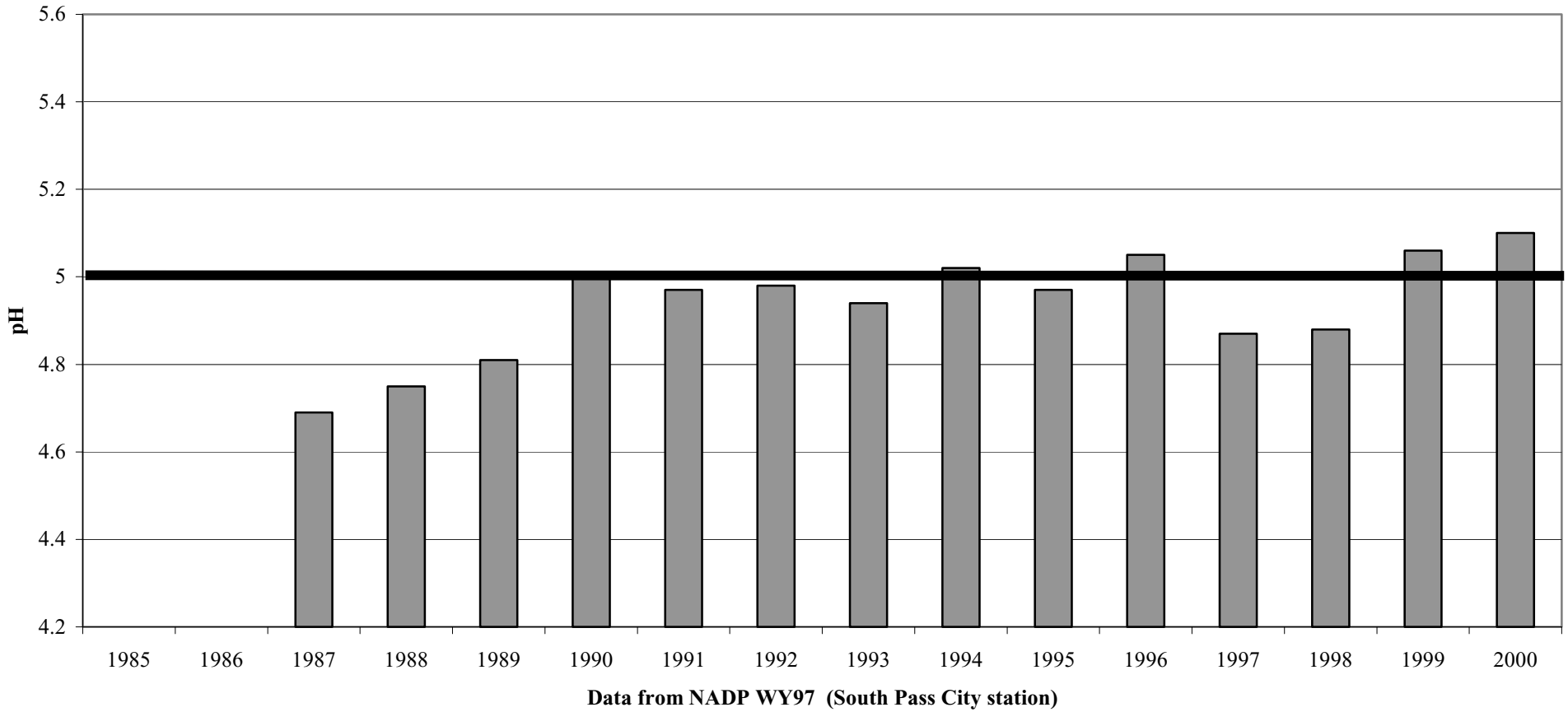

Figure A15-16. Precipitation pH near Gypsum Creek, Wyoming

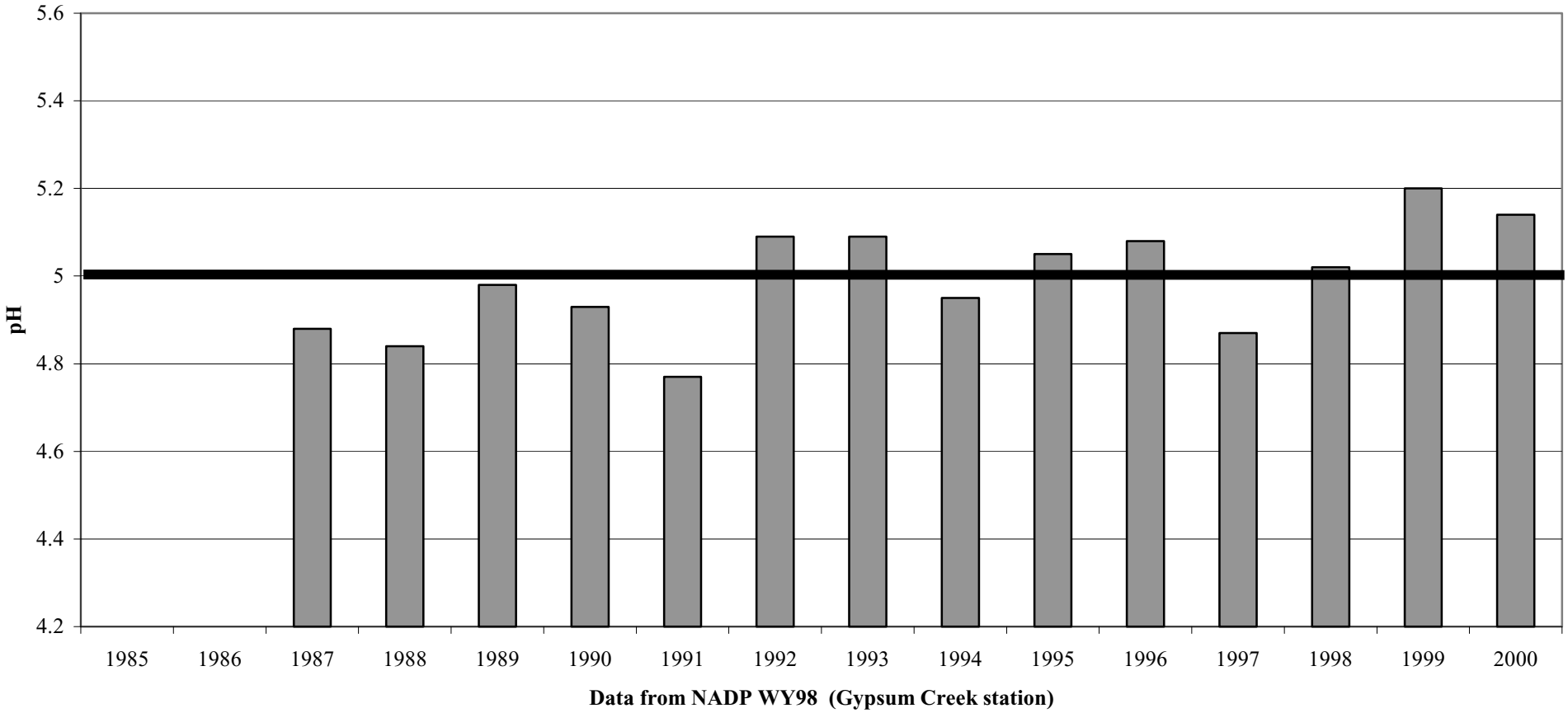

Figure A15-17. Precipitation pH near Sinks Canyon, Wyoming

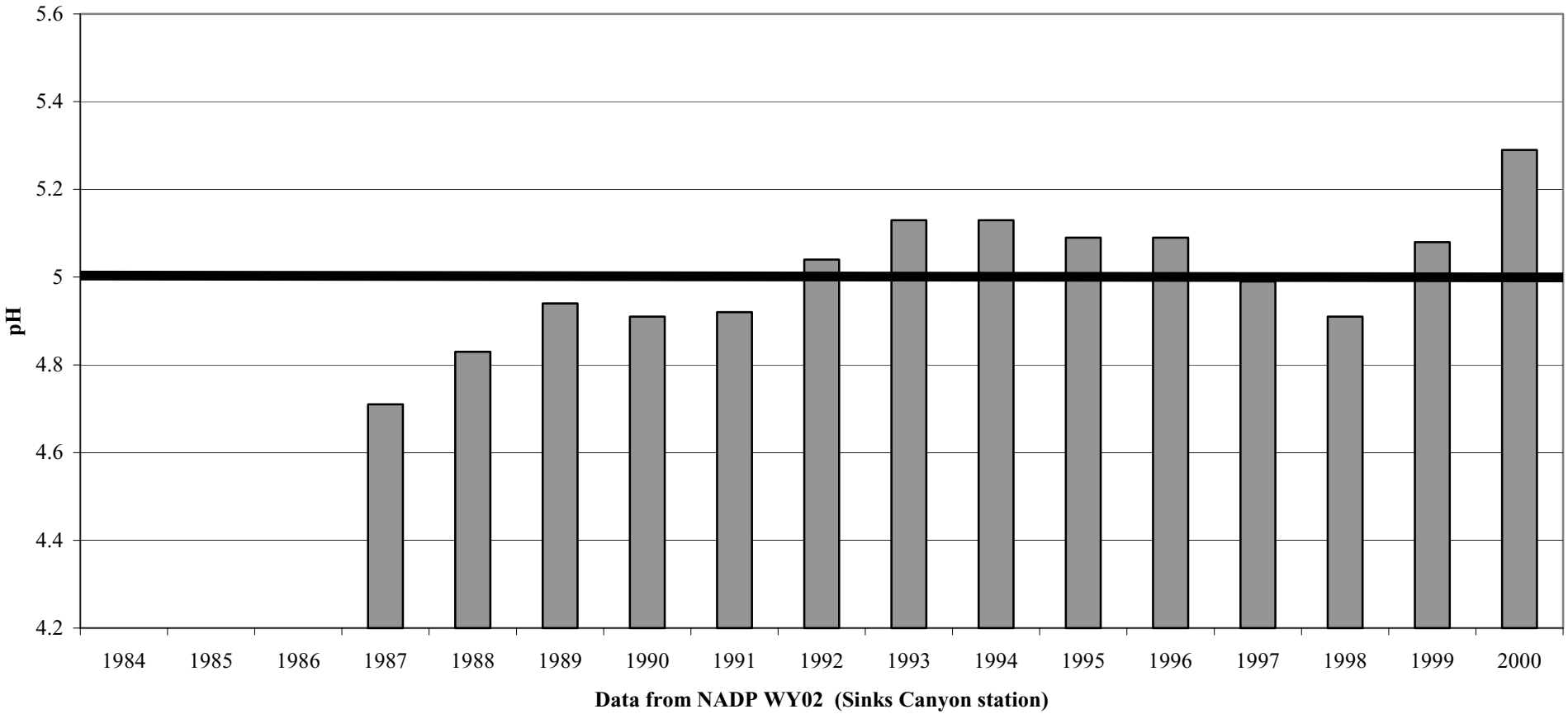

Figure A15-18. Wet Atmospheric Deposition near South Pass City, Wyoming

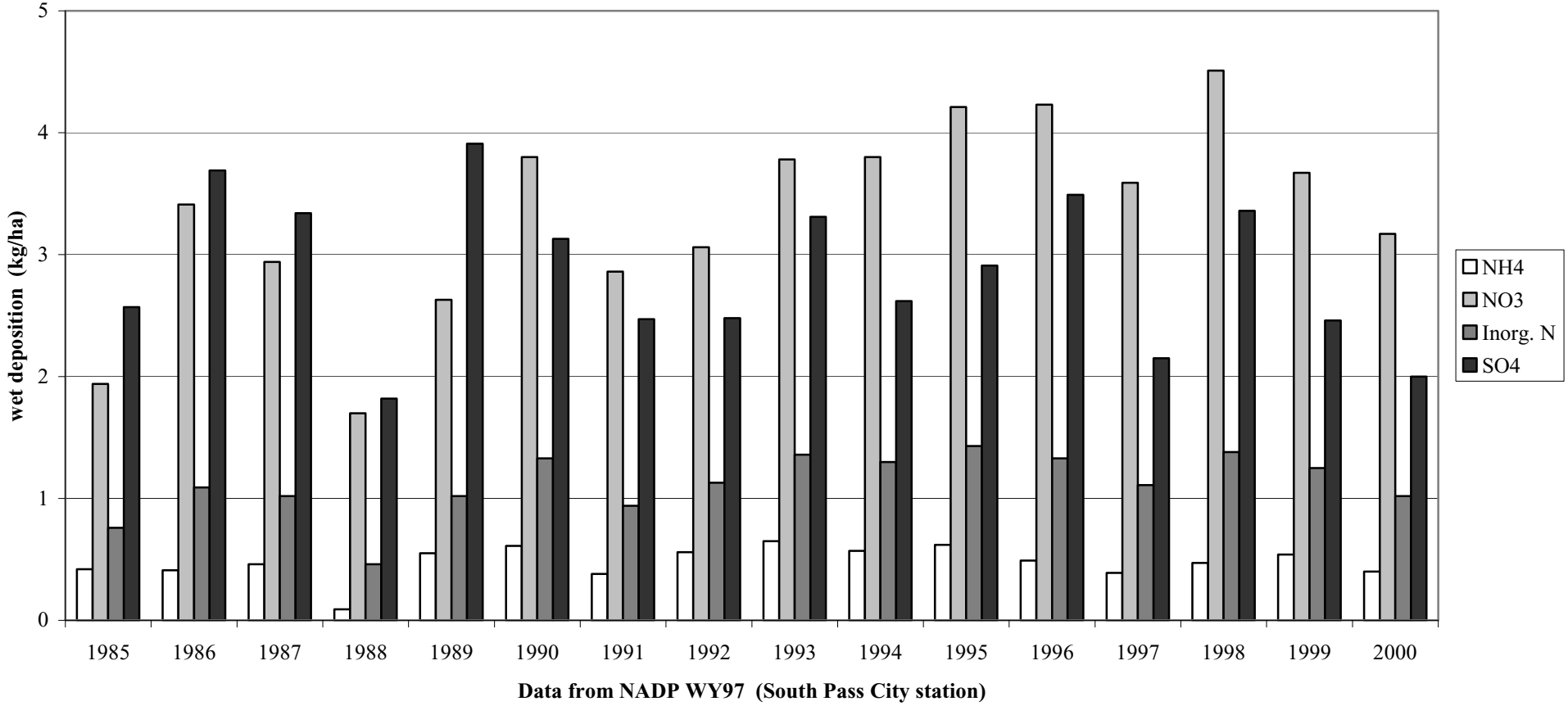

Figure A15-19. Wet Atmospheric Deposition near Gypsum Creek, Wyoming

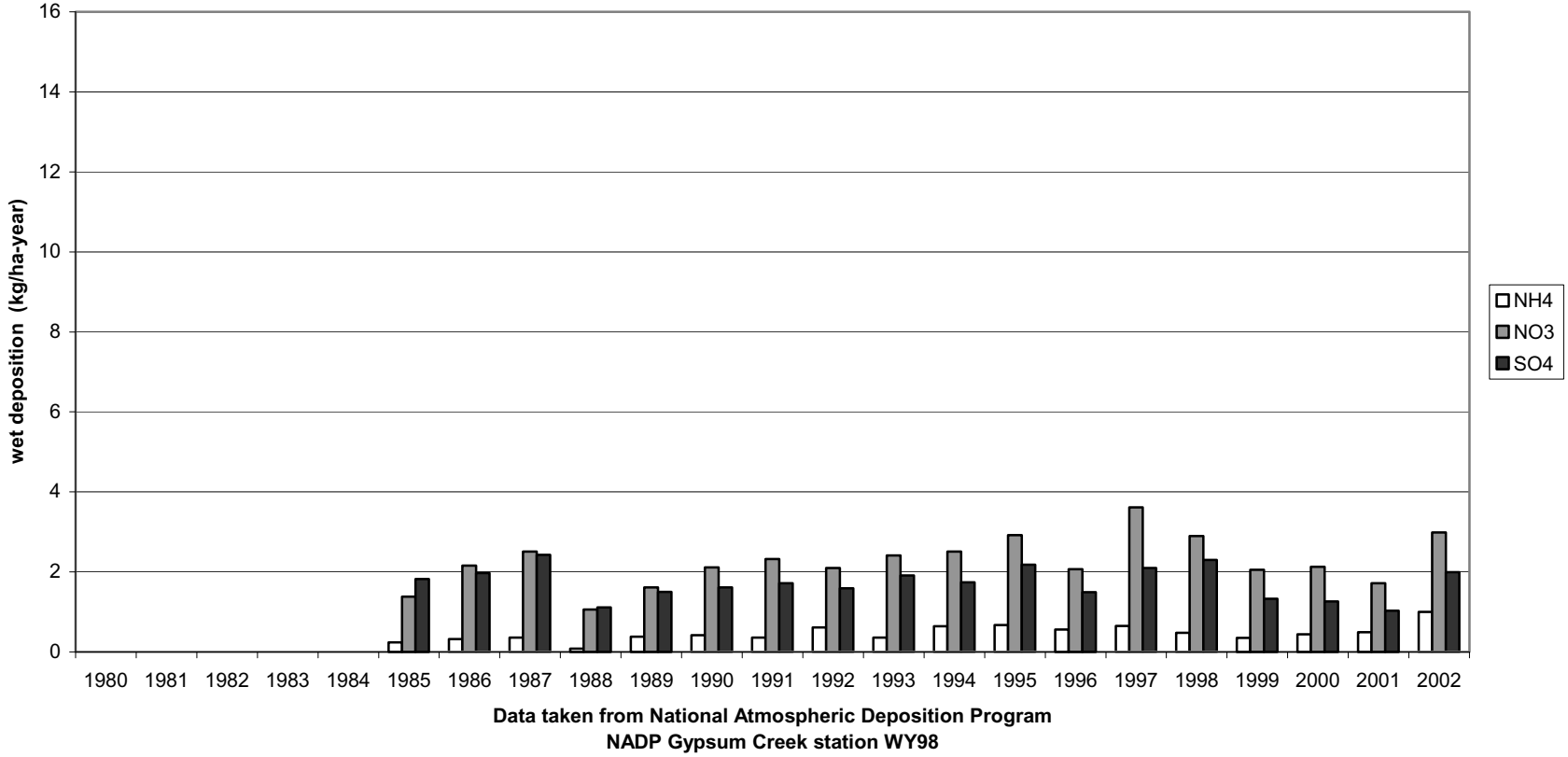

Figure A15-20. Wet Atmospheric Deposition near Sinks Canyon, Wyoming

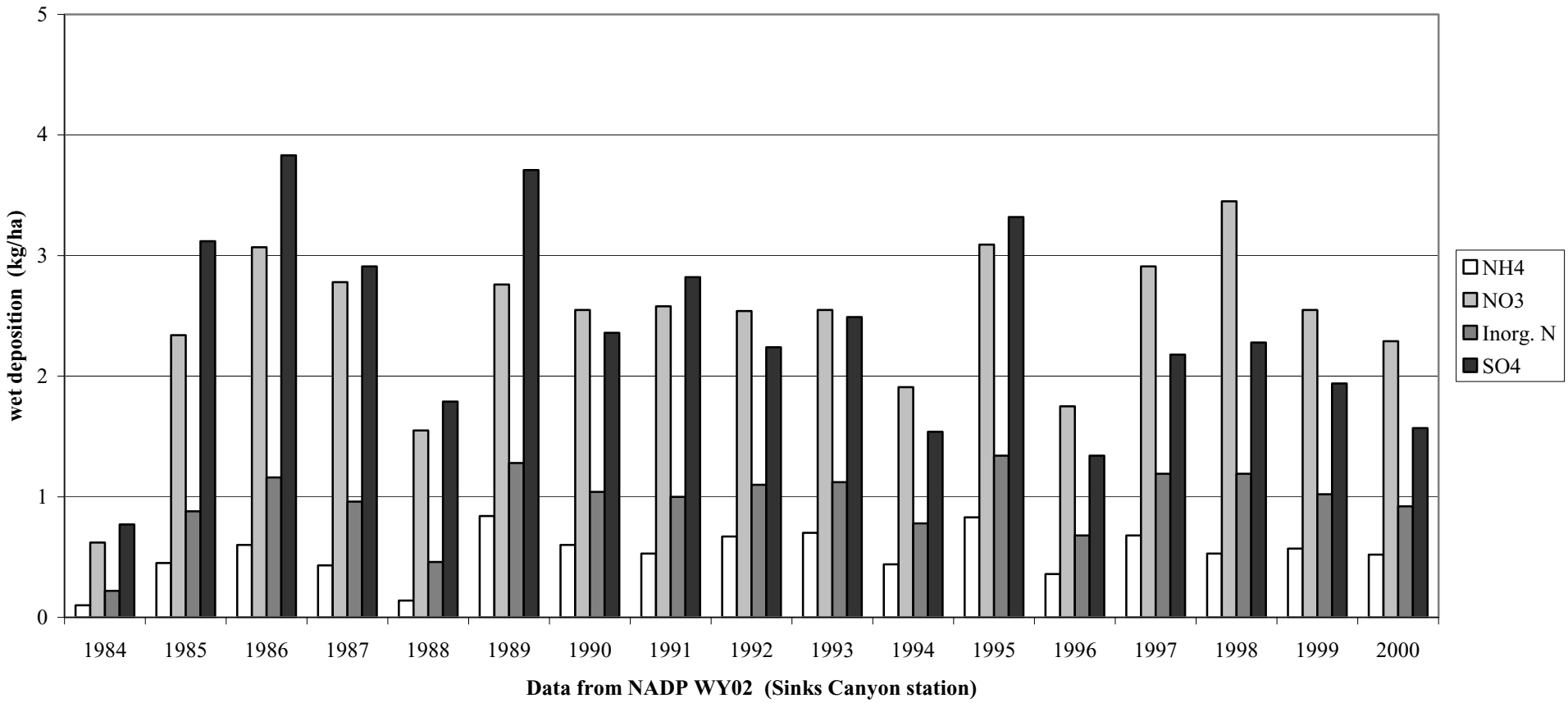

Figure A15-21. Particulate Matter Mean Annual Concentrations in Lander, Wyoming

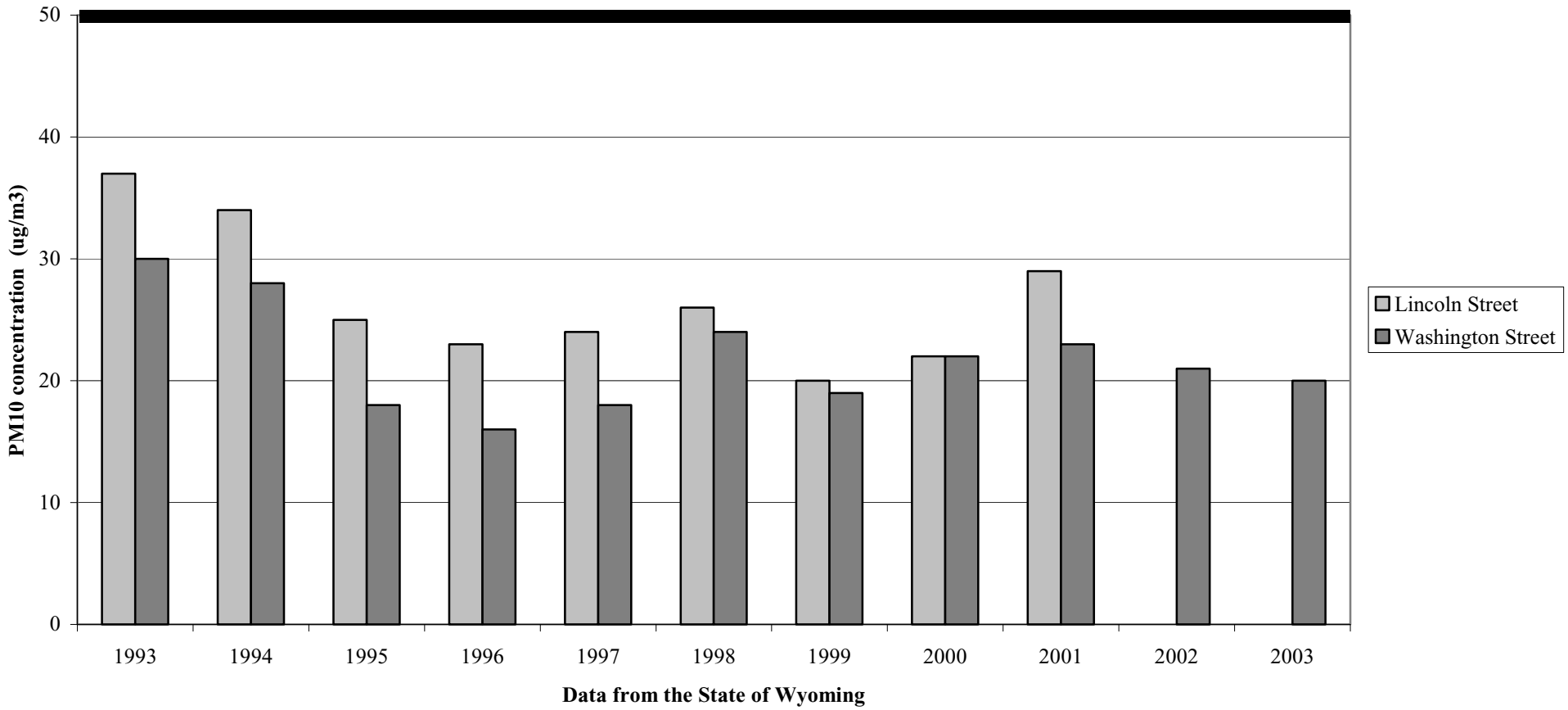

Figure A15-22. Particulate Matter 24-hour 99th Percentile Concentrations in Lander, Wyoming

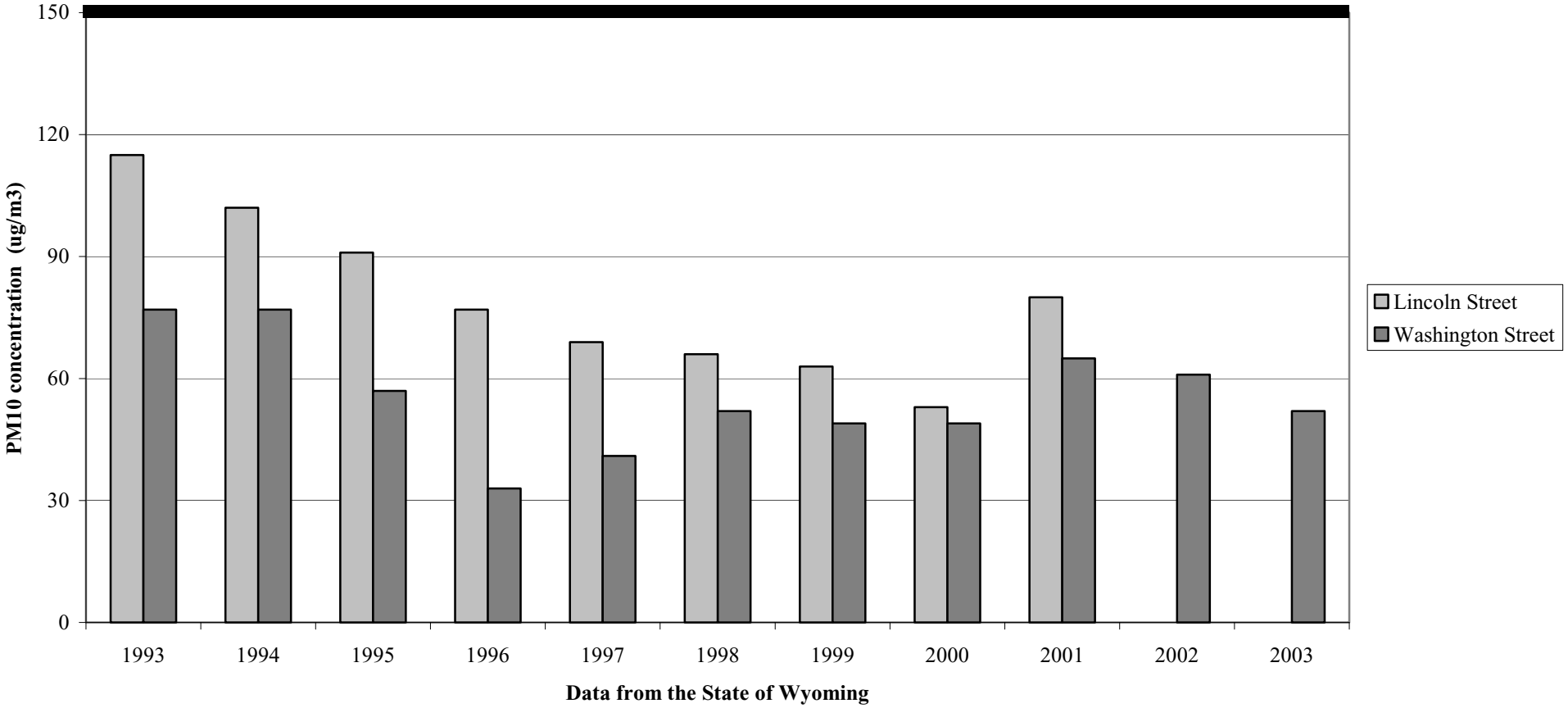

Figure A15-23. Particulate Matter Annual Mean Concentrations in Lander, Wyoming

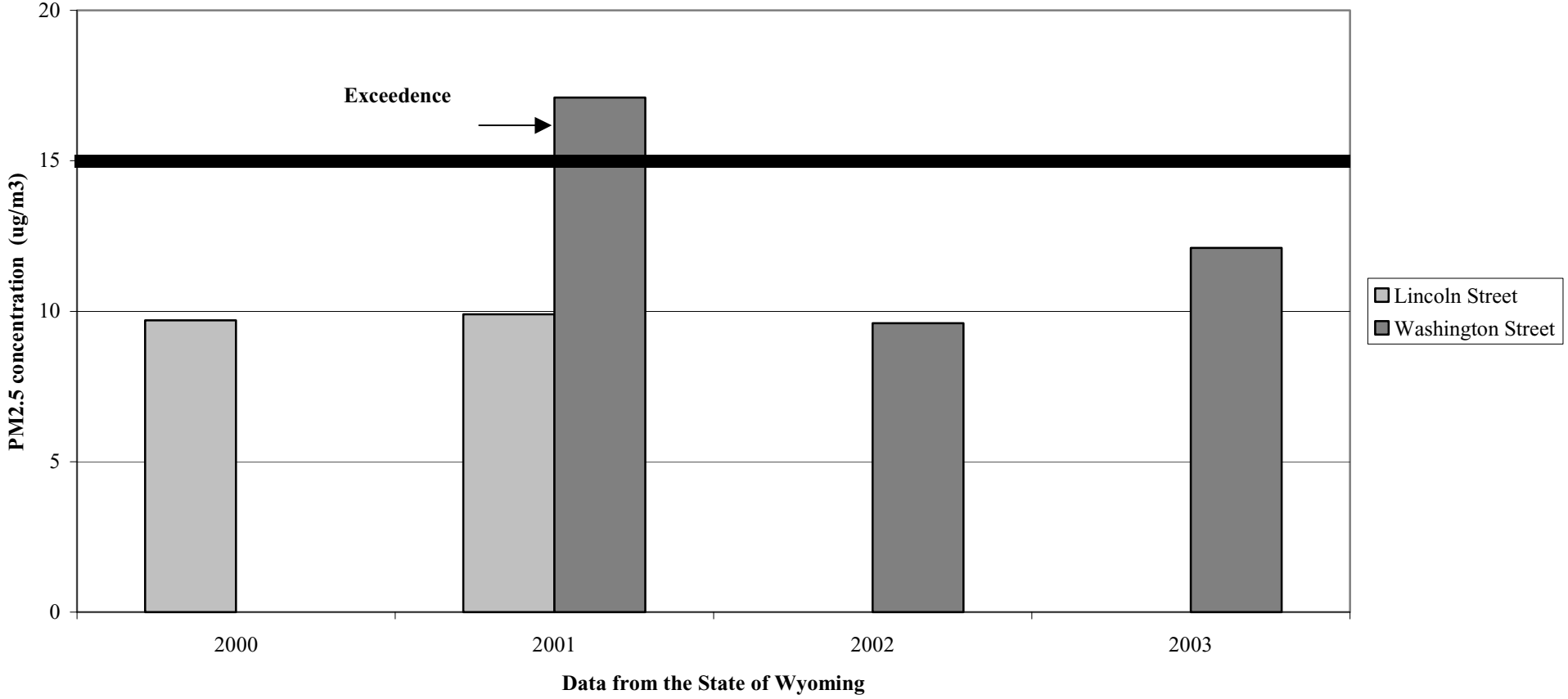
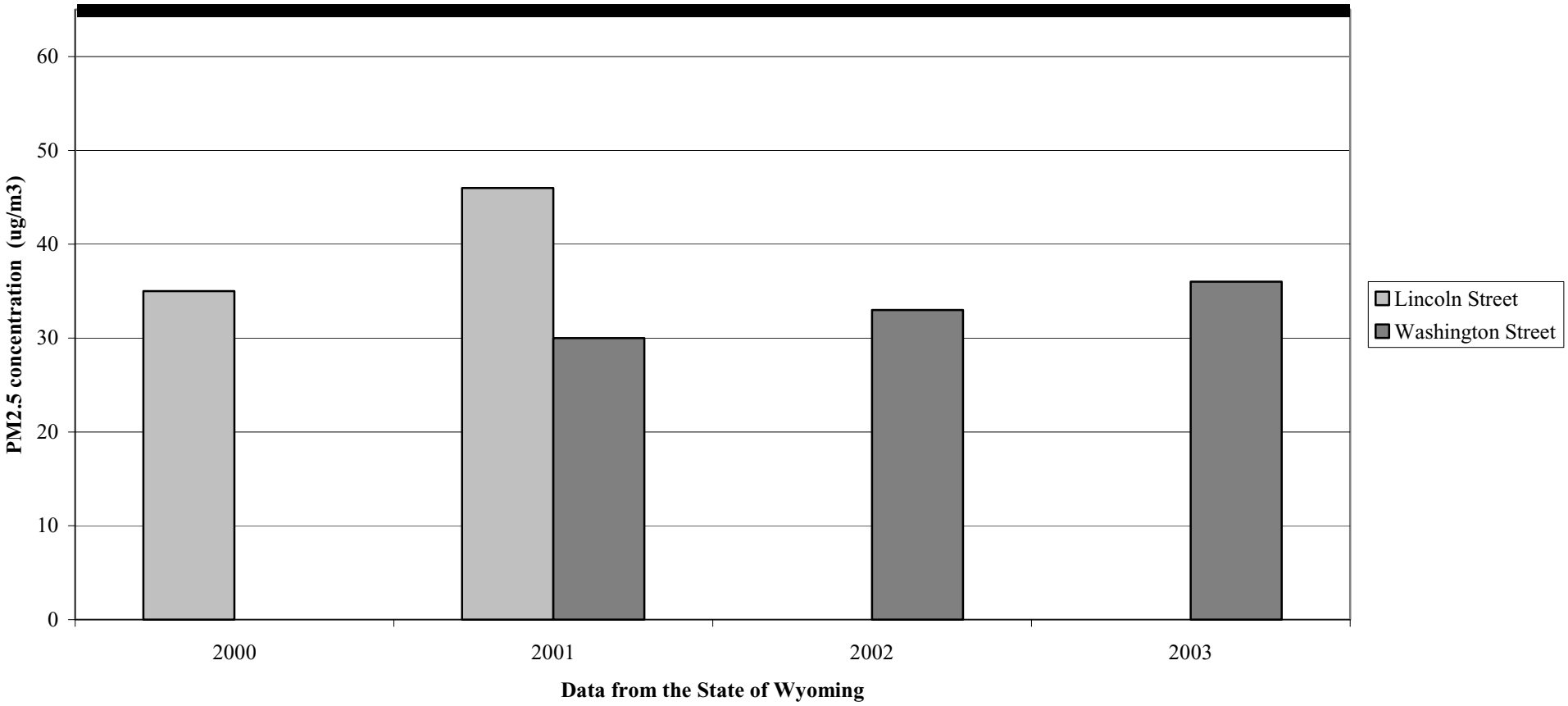
Figure A15-24. Fine Particulate Matter 24-hour 98 Percentile Concentrations in Lander, Wyoming