

CARB Continuous PM 2.5 Network Experience

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Continuous PM2.5 Monitor Deployments

- ARB Ambient Air Monitoring Sites
 - 13 Sites with BAM-1020 Monitors
- 3 Collocated BAM-1020 Sites
- 7 Sites with FRM and BAM

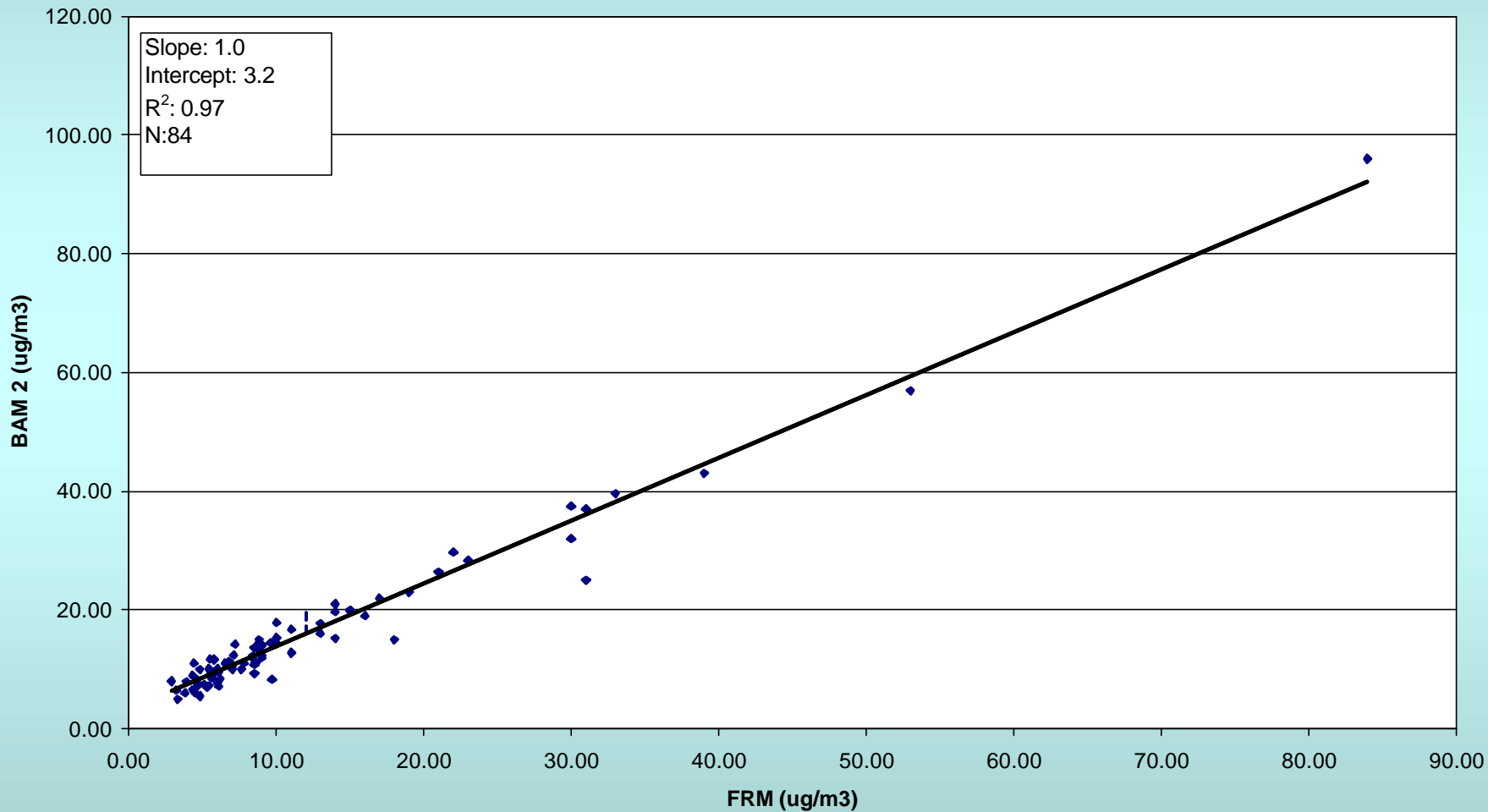
Data Analysis

- Slope is indicator of the bias of the BAM compared to the FRM
- Intercept is the offset between the BAM and FRM
- r^2 is the correlation coefficient of the linear regression between the two instruments

BAM-1020 Accuracy

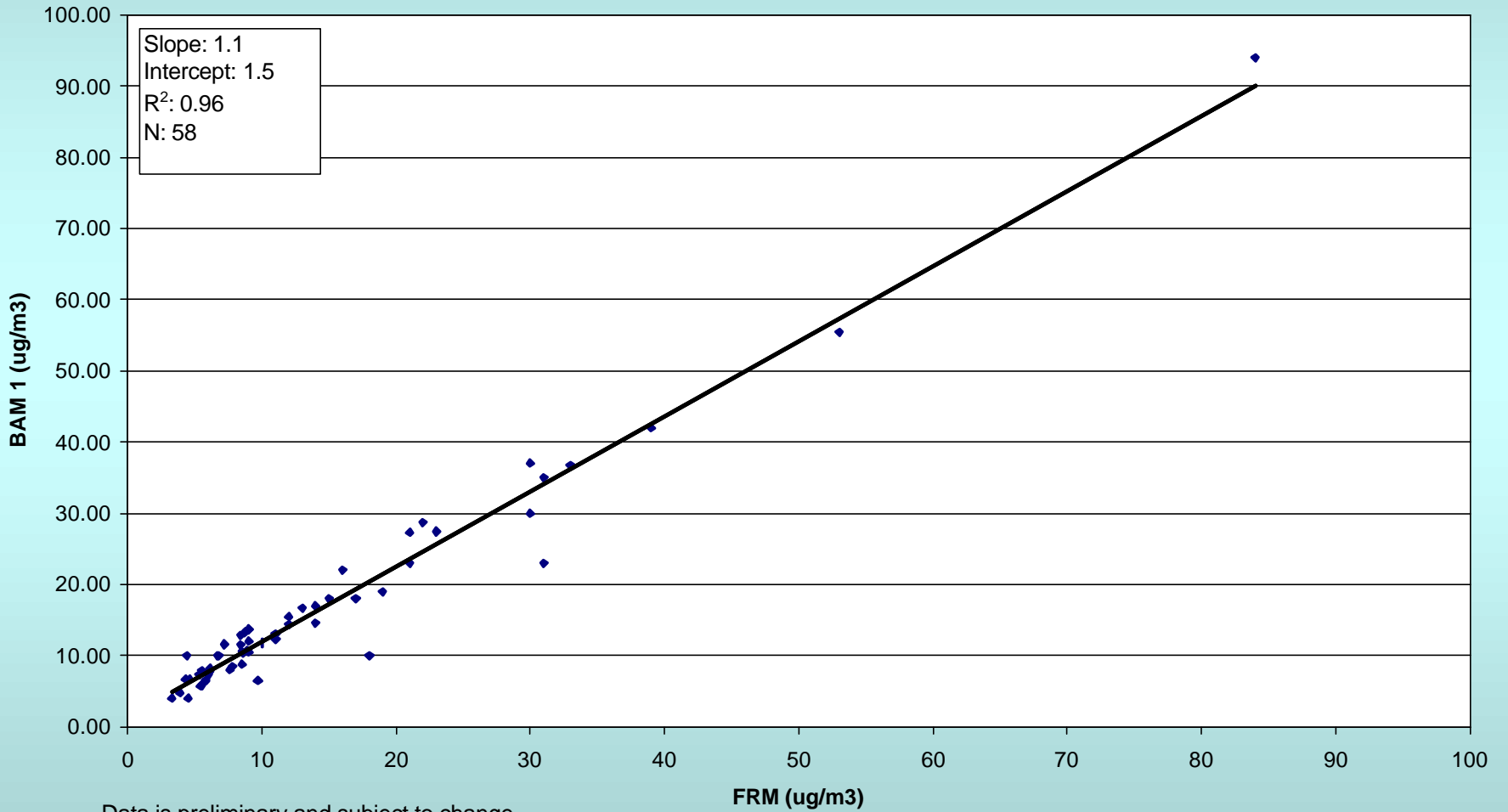
Site	BAM Unit	Slope	Intercept	r ²
South Lake Tahoe - Sandy Way	Primary	1.0	-0.49	0.84
Modesto - 14th St	Primary	1.1	2.9	0.96
Fresno - First St	Primary	1.0	4.5	0.92
Visalia - N Church St	Primary	1.0	5.0	0.88
Chico - Manzanita Ave	Primary	1.1	1.5	0.96
Chico - Manzanita Ave	Collocated	1.0	3.2	0.97
Bakersfield - California Ave	Primary	1.1	-4.9	0.87
Bakersfield - California Ave	Collocated	1.0	-4.3	0.83
Calexico - Ethel St	Primary	0.80	-0.56	0.77
Calexico - Ethel St	Collocated	1.1	4.8	0.84

**Chico - Manzanita Ave.
Met One BAM 2 (Model 1020) vs. PM2.5 FRM
March 3, 2002 - September 18, 2003**



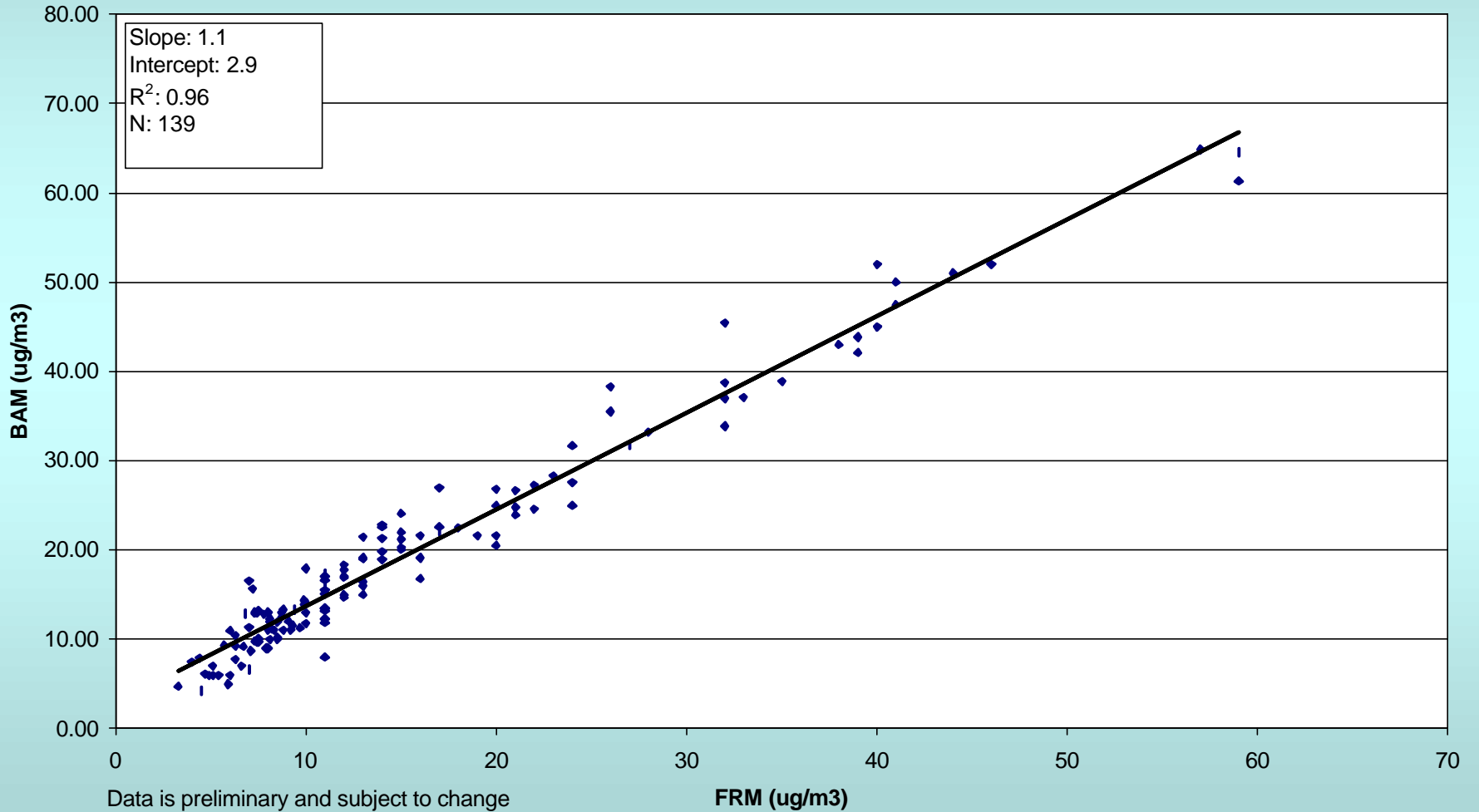
Data is preliminary and subject to change

Chico - Manzanita Ave
Met One BAM 1 (Model 1020) vs. PM2.5 FRM
April 2, 2002 - September 6, 2003

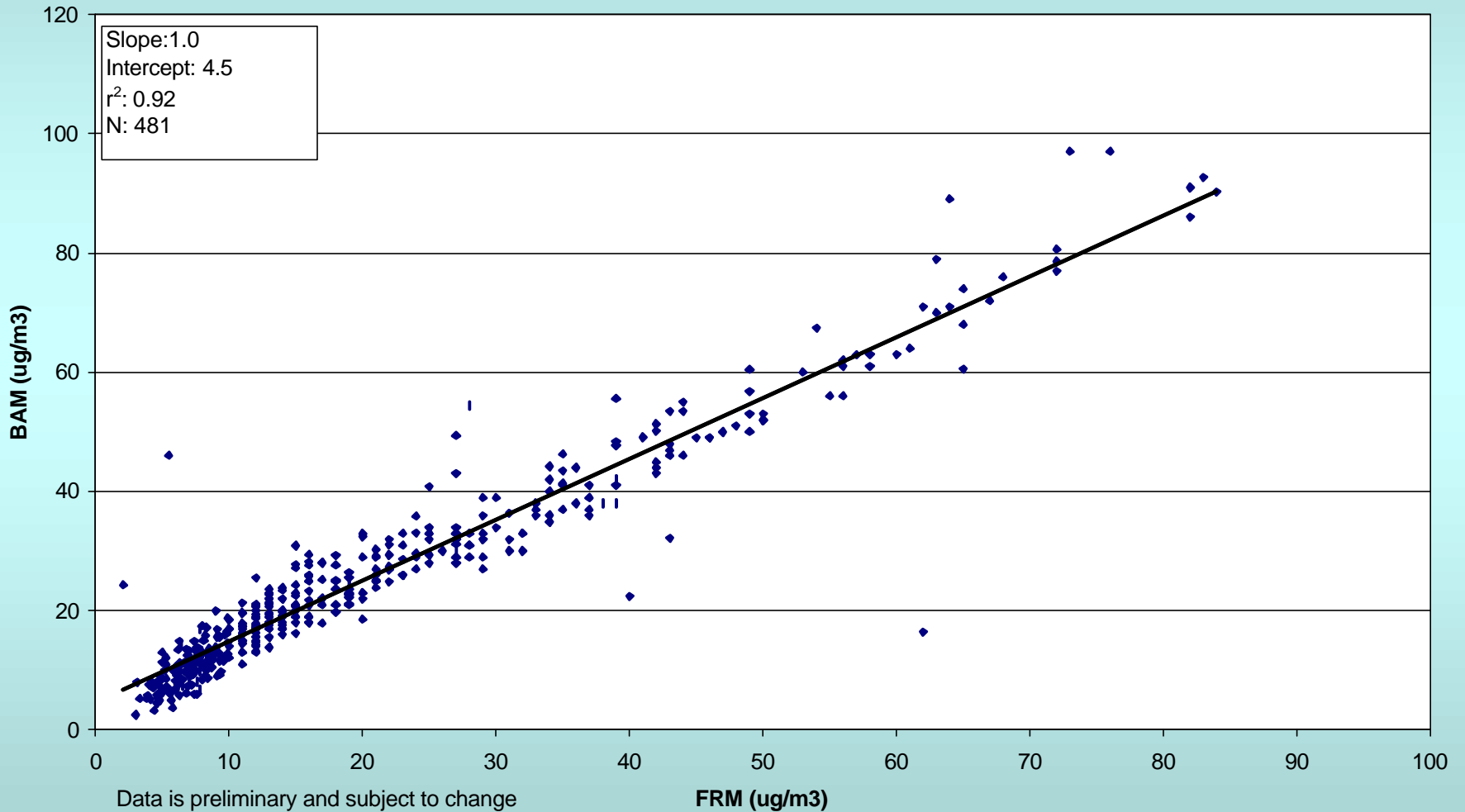


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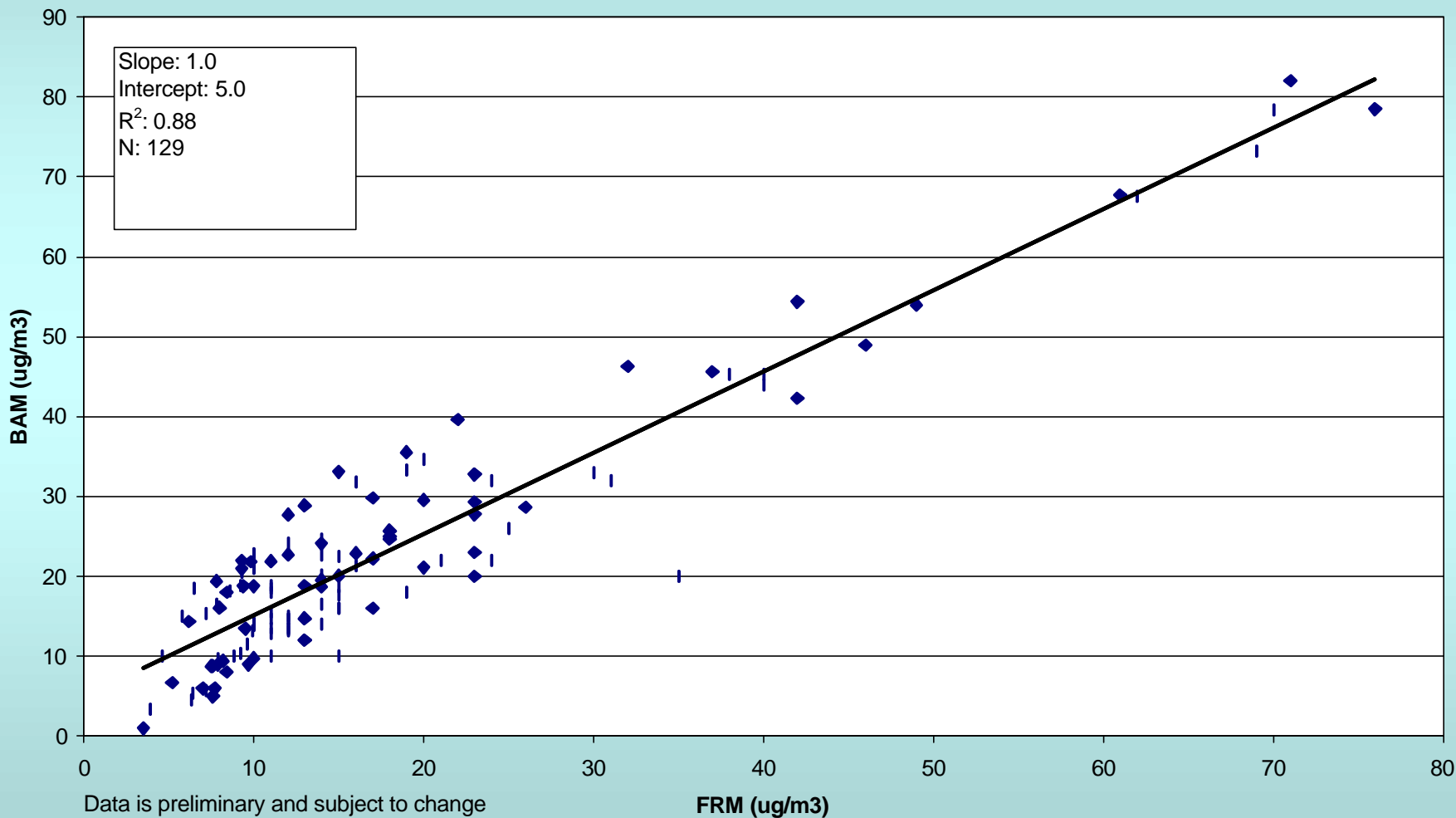
Modesto
Met One BAM (Model 1020) vs. PM2.5 FRM
January 2, 2002 - September 21, 2003



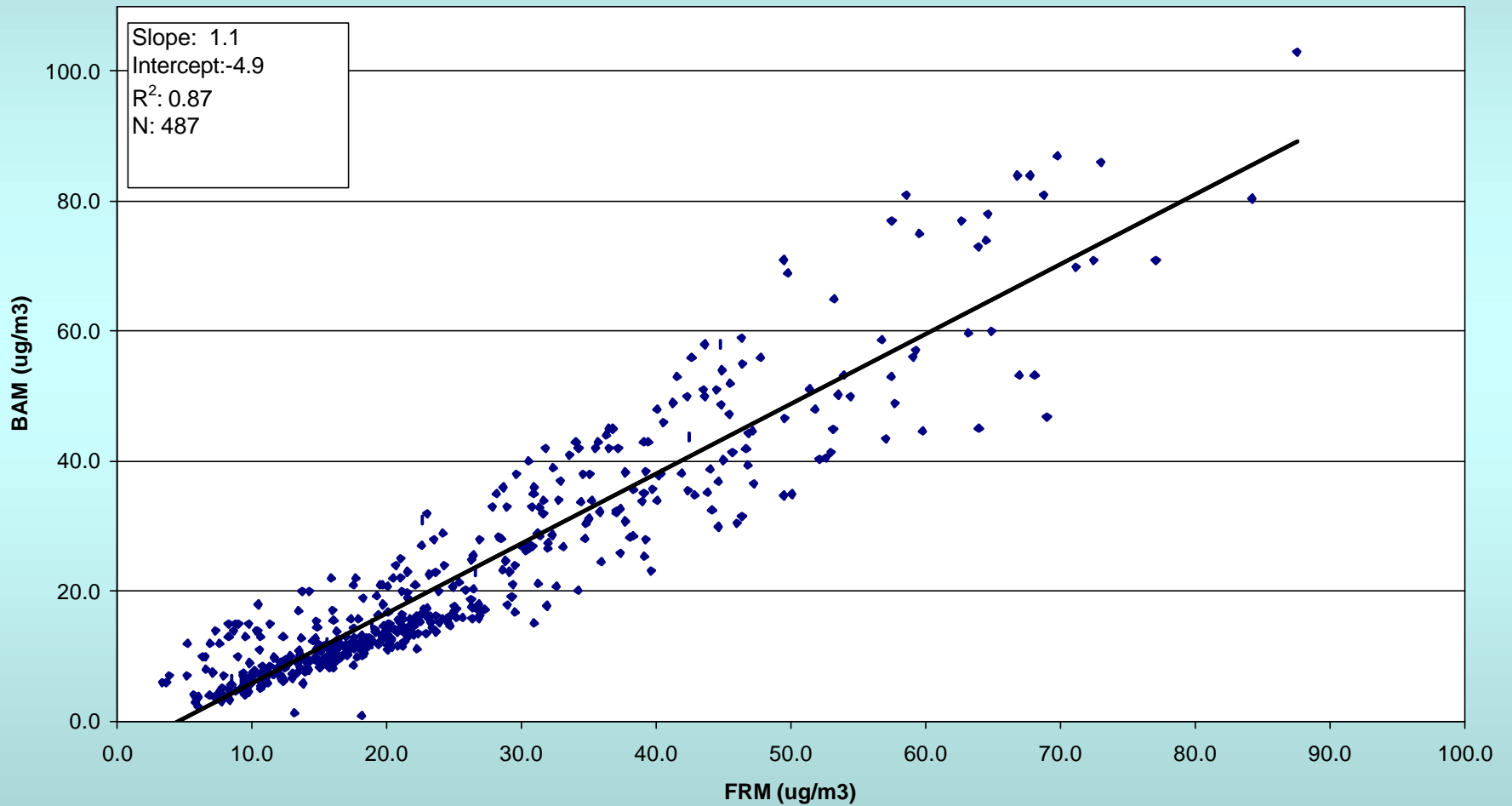
Fresno - First St.
Met One BAM (Model 1020) vs. Primary PM2.5 FRM
January 03, 2002 - September 13, 2003



Visalia - N Church St.
Met One BAM 1020 vs. PM2.5 FRM
January 2, 2002 - September 9, 2003

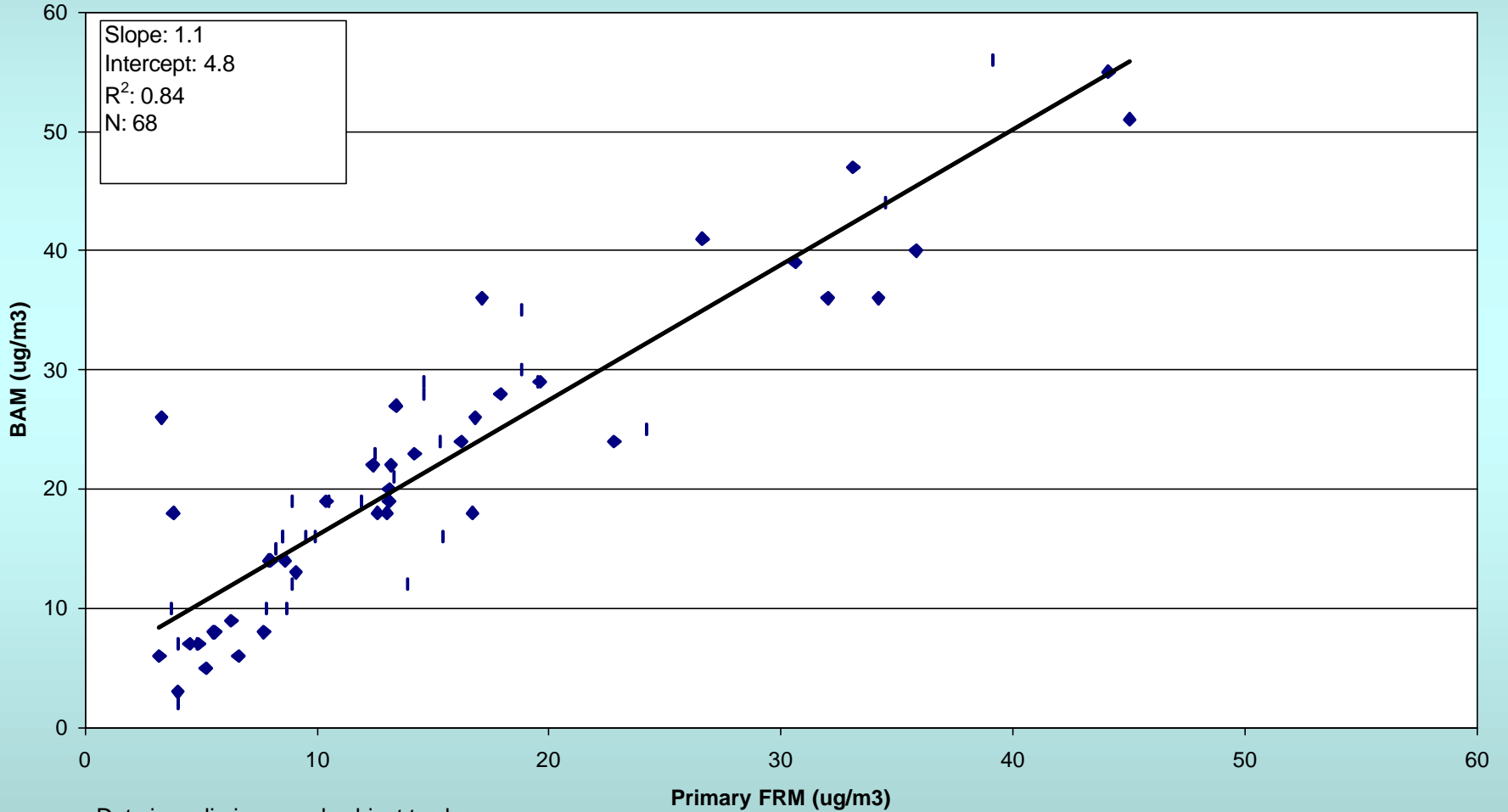


Bakersfield - California Ave.
Met One BAM 1 (Model 1020) vs. Primary PM2.5 FRM
December 1, 2001 - September 3, 2003



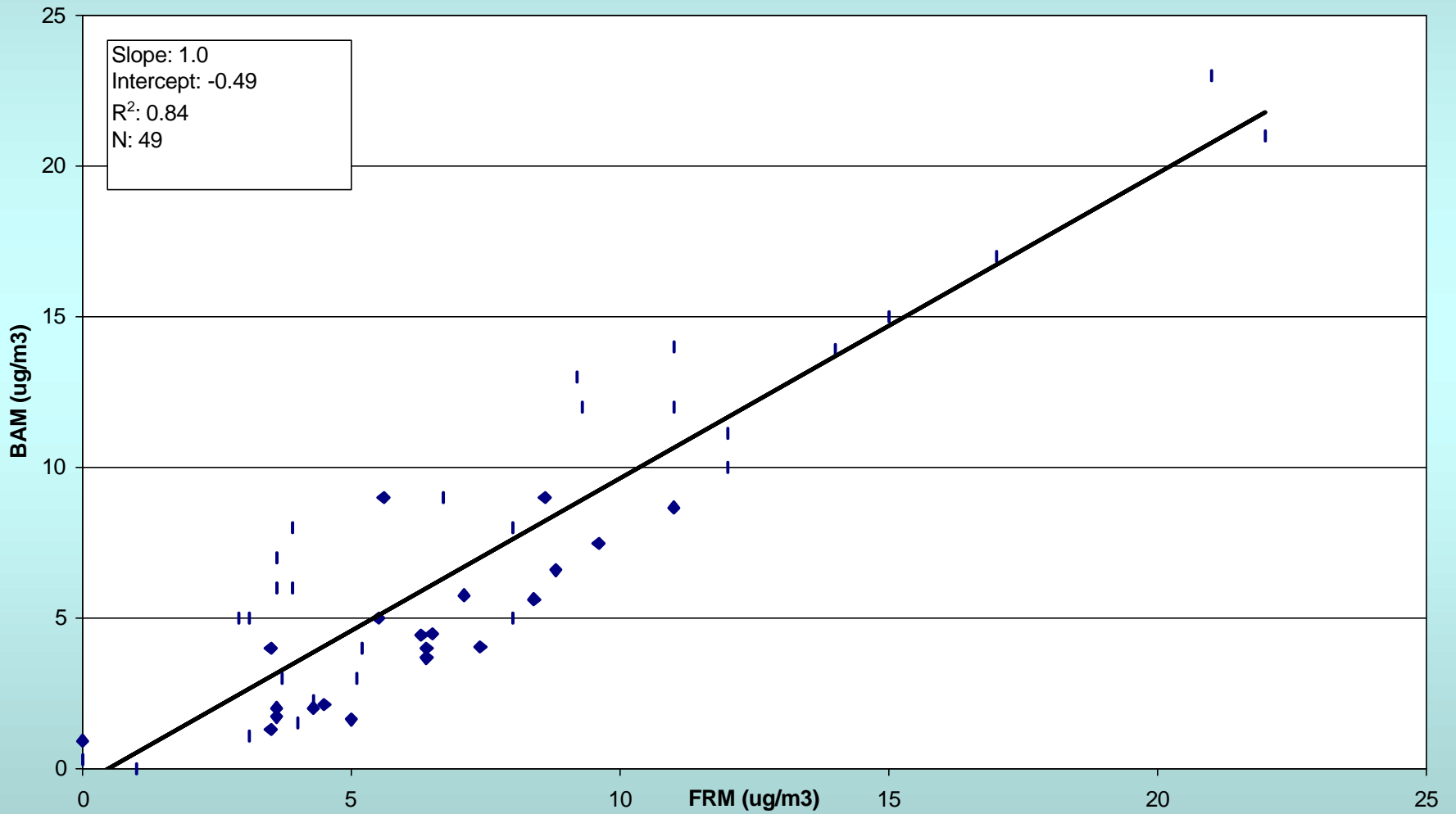
Data is Preliminary and subject to change

Calexico - Ethel Street
Met One BAM 2 (Model 1020) vs. Primary PM2.5 FRM
December 2002 - August 13, 2003

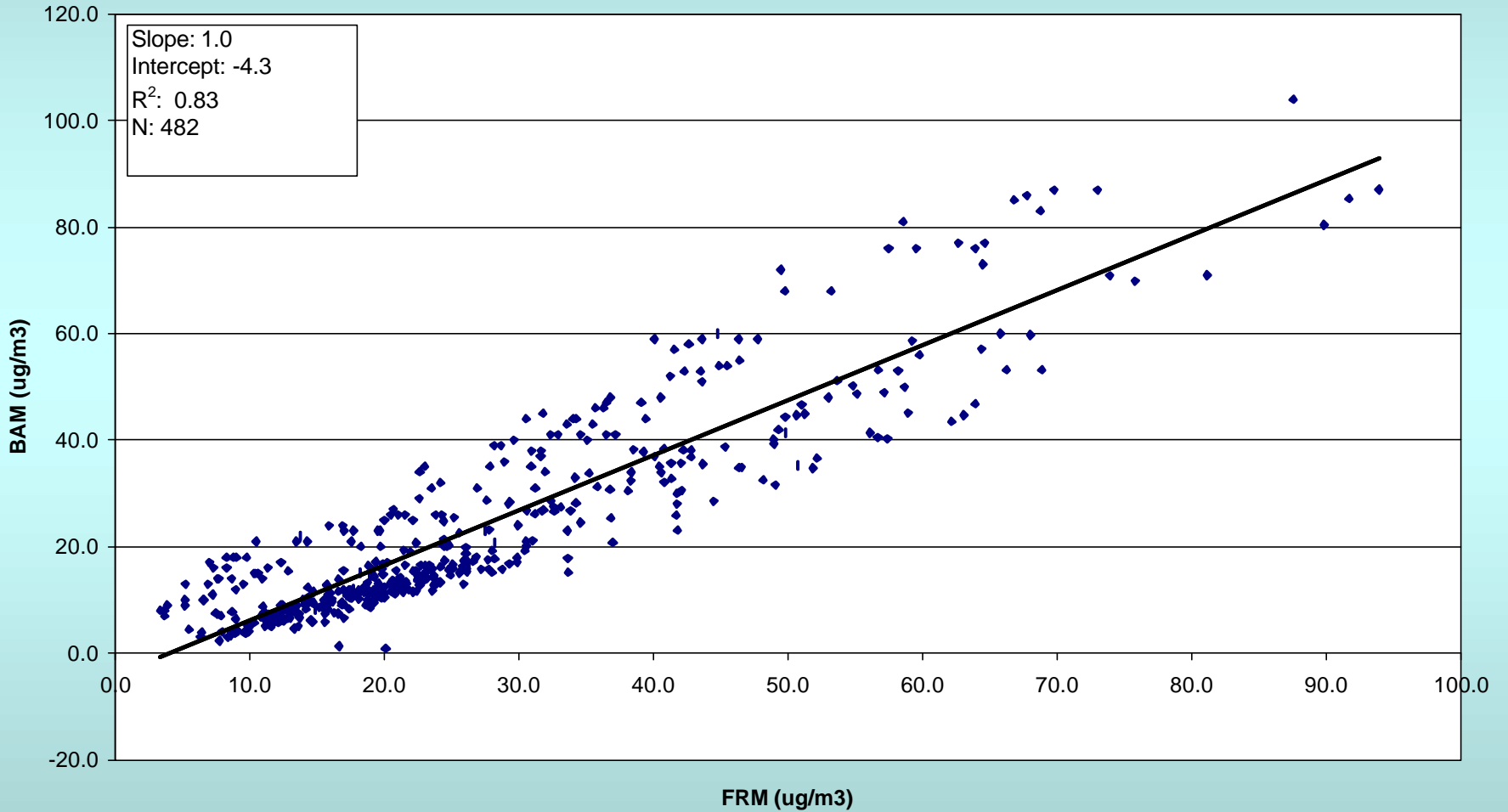


Data is preliminary and subject to change

Tahoe - Sandy Way
Met One BAM (Model 1020) vs. PM2.5 FRM
October 2002 - September 9, 2003

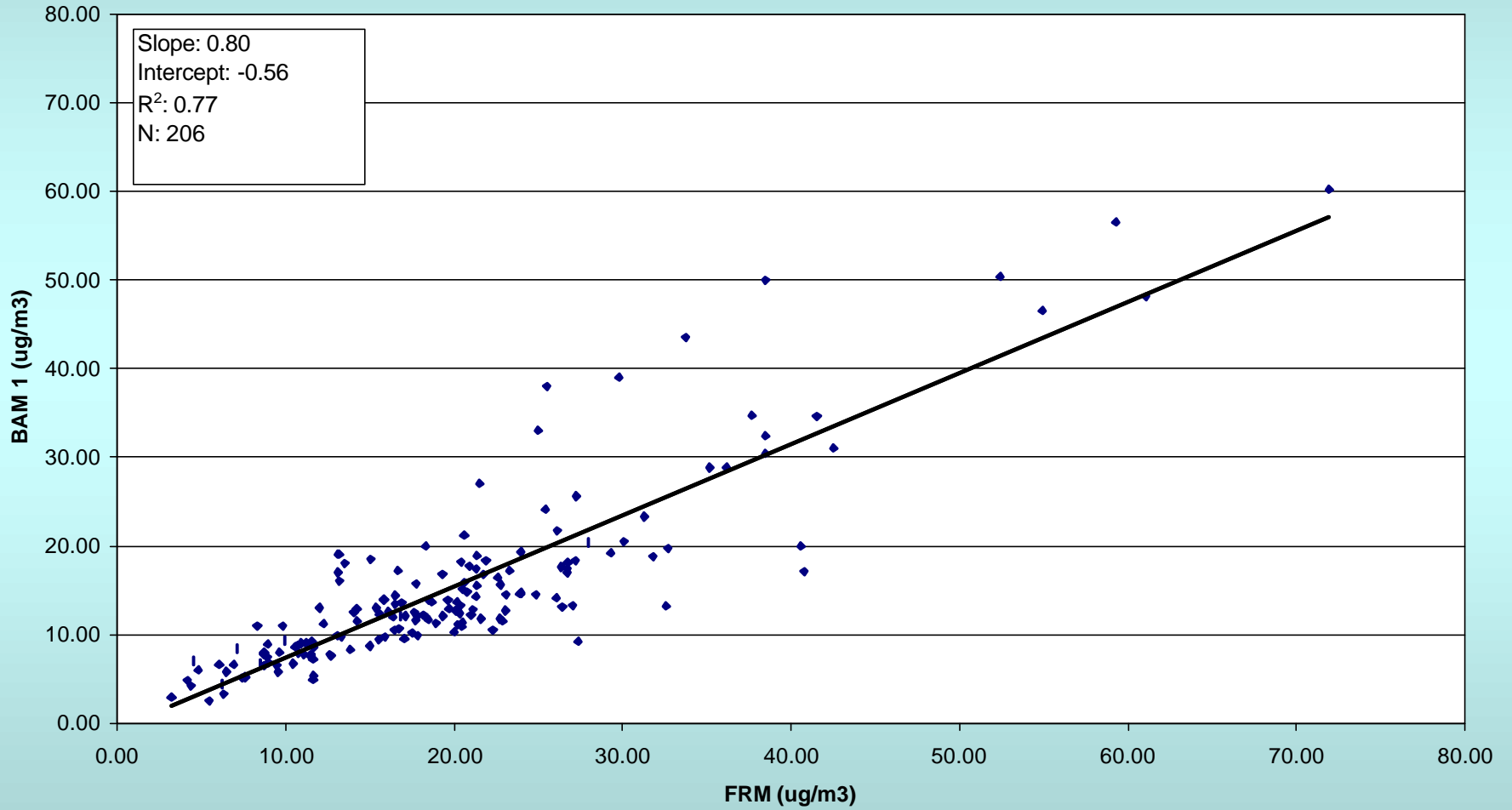


**Bakersfield - California Ave.
Met One BAM 2 (Model 1020) vs. Primary PM2.5 FRM
December 1, 2001 - September 3, 2003**



Data is Preliminary and subject to change

Calexico - Ethel Street
Met One BAM 1 (Model 1020) vs. Primary PM2.5 FRM
January 1, 2001 - August 13, 2003

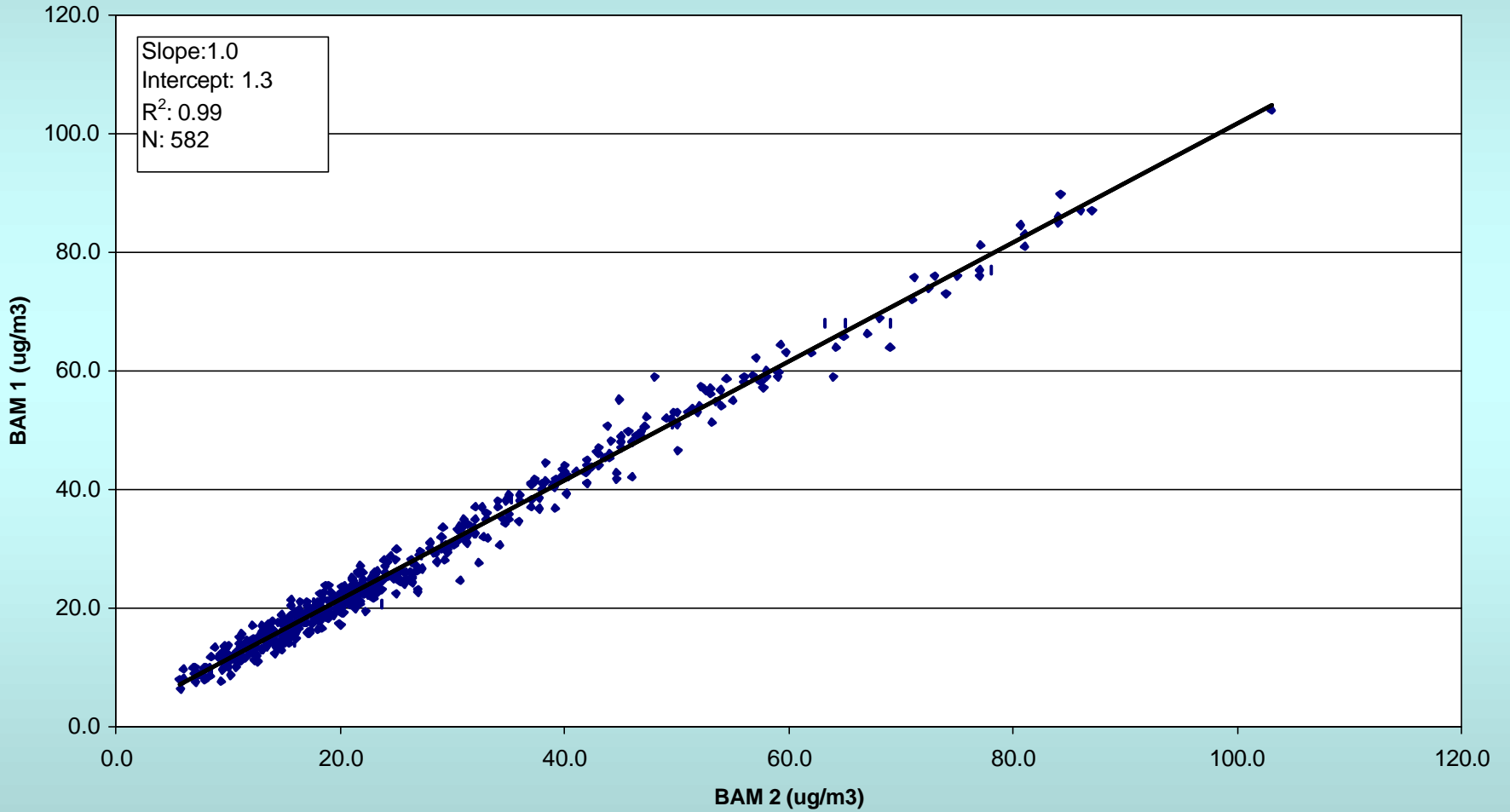


Data is preliminary and subject to change

BAM-1020 Precision

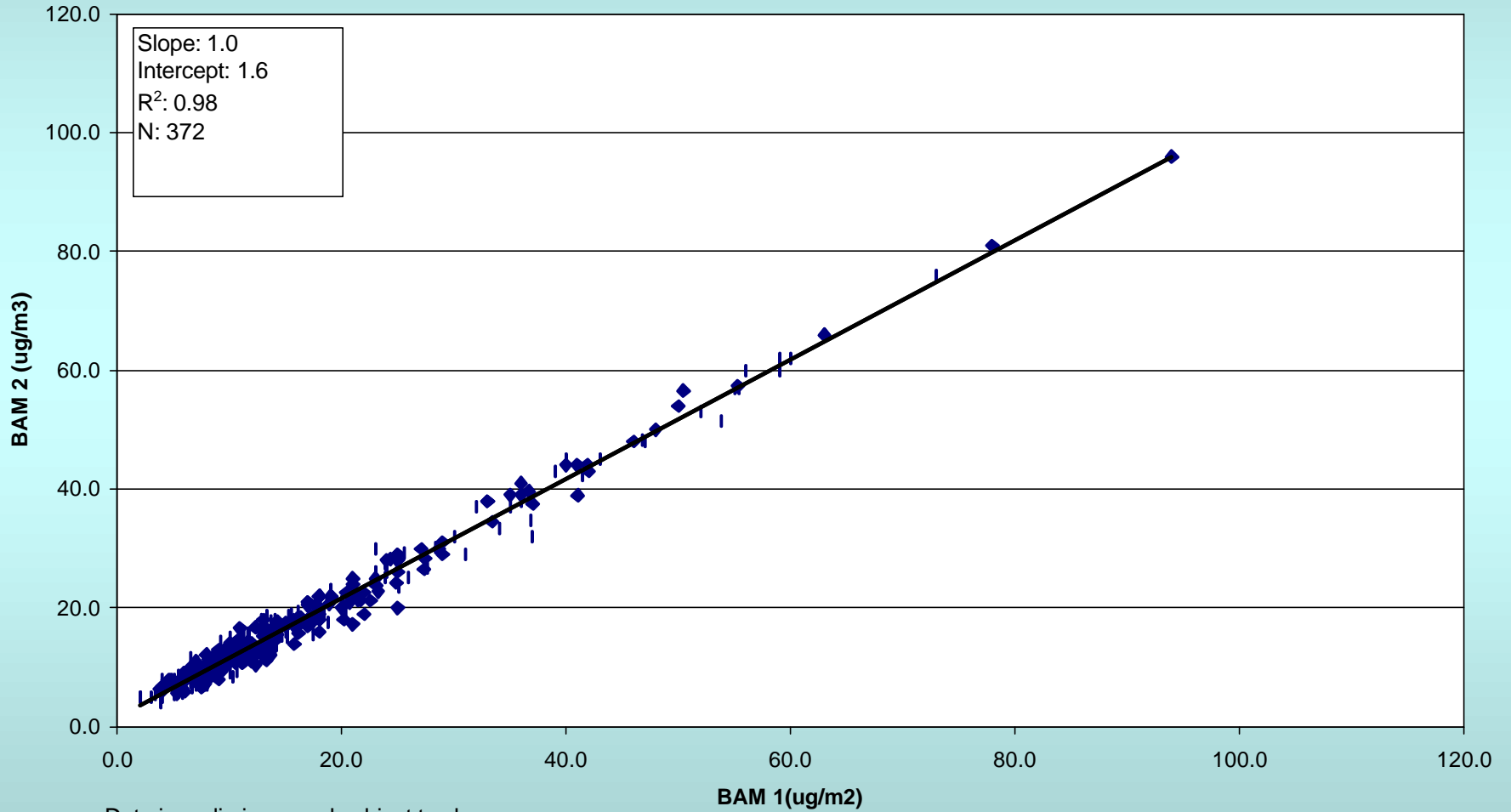
Site	Slope	Intercept	r^2
Chico - Manzanita Ave	1.0	1.6	0.98
Bakersfield - California Ave	1.0	1.3	0.99
Calexico - Ethel St	0.94	0.13	0.84

Bakersfield - California Ave
Primary vs. Collocated Met One BAM (Model 1020)
December 1, 2001 - September 3, 2003



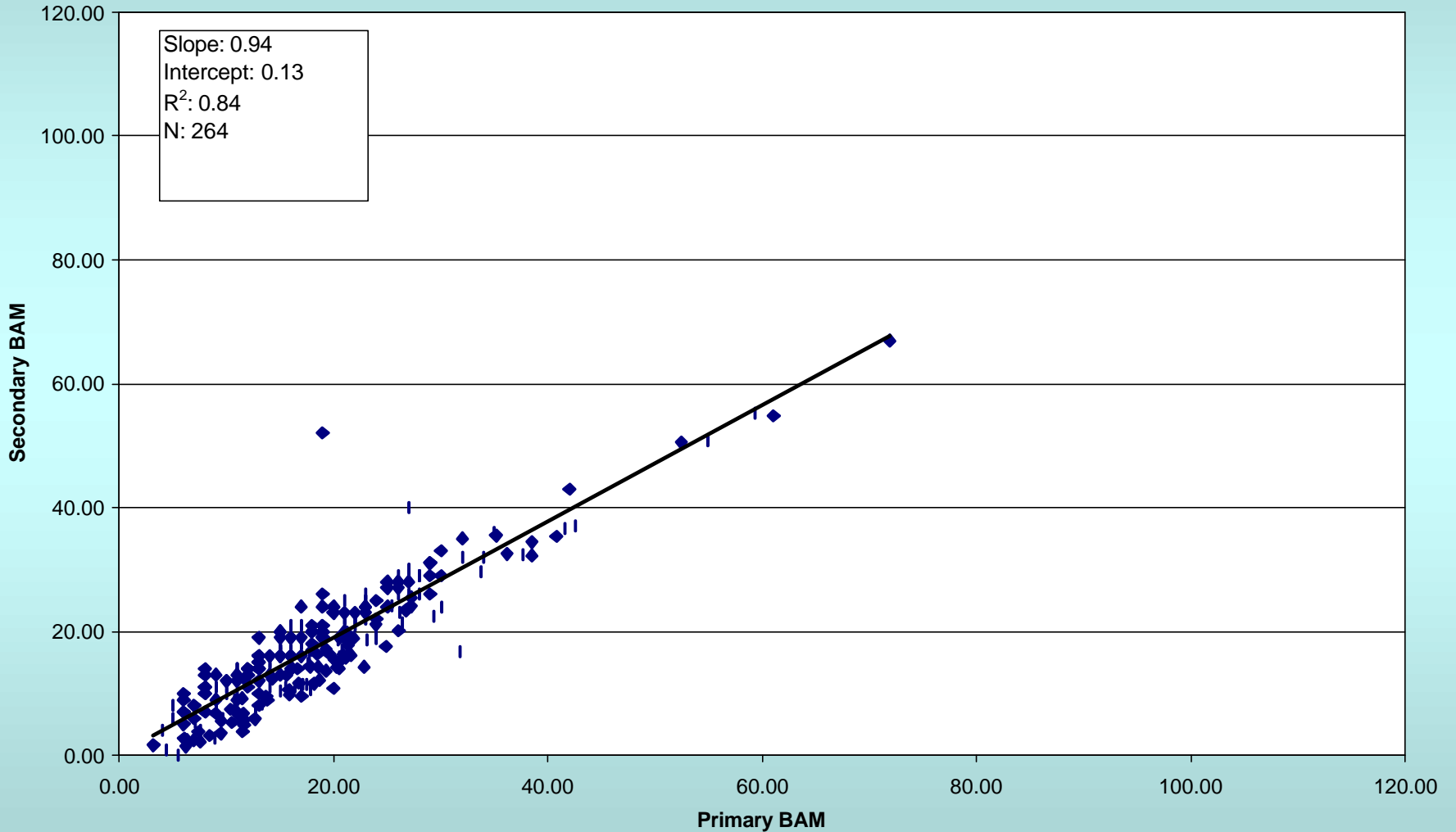
Data is Preliminary and subject to change

Chico - Manzanita Ave.
Primary vs. Collocated Met One BAM (Model 1020)
April 2, 2002 - September 30, 2003

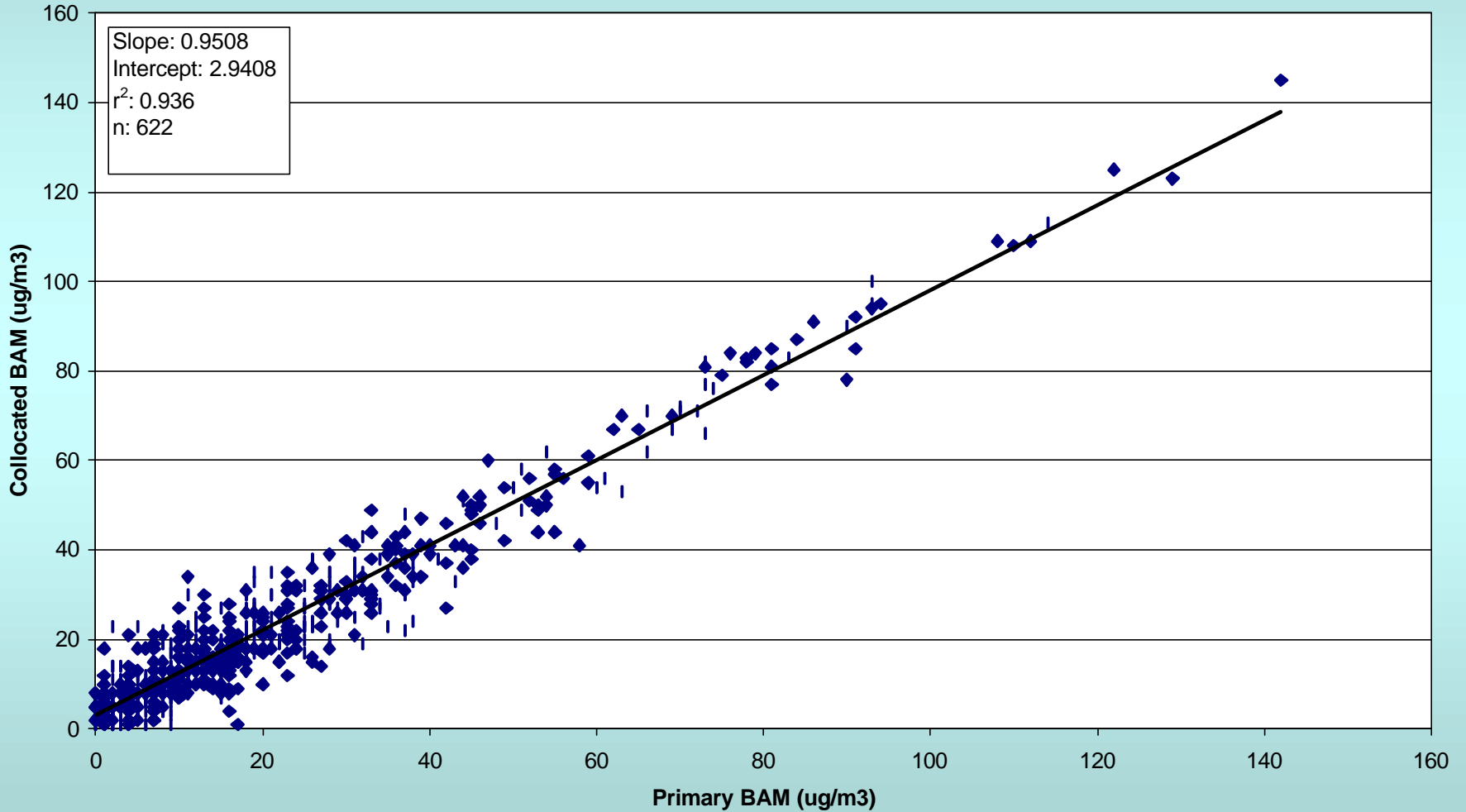


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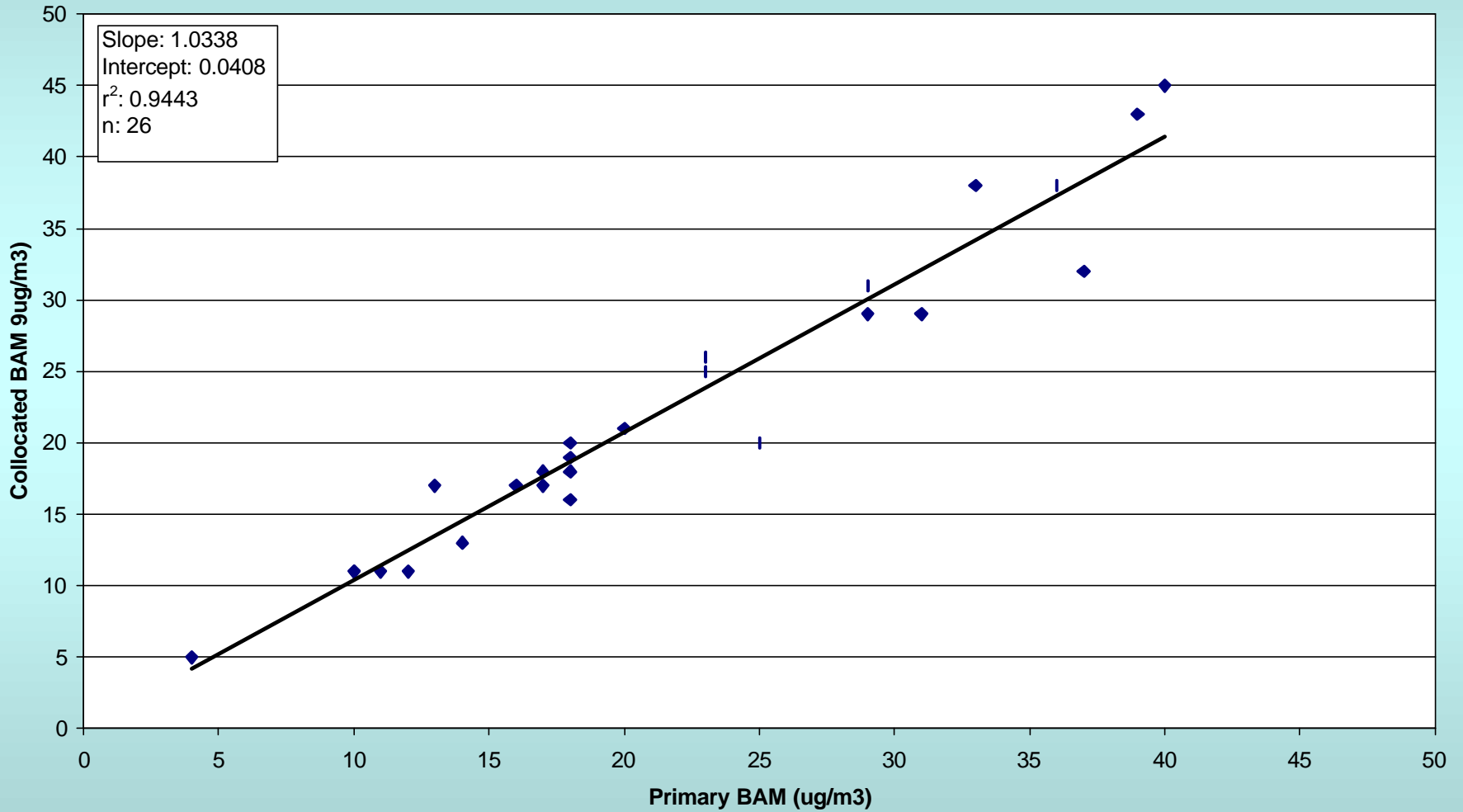
Calexico - Ethel Street
Primary vs. Collocated Met One BAM (Model 1020)
January 1, 2001 - August 13, 2003



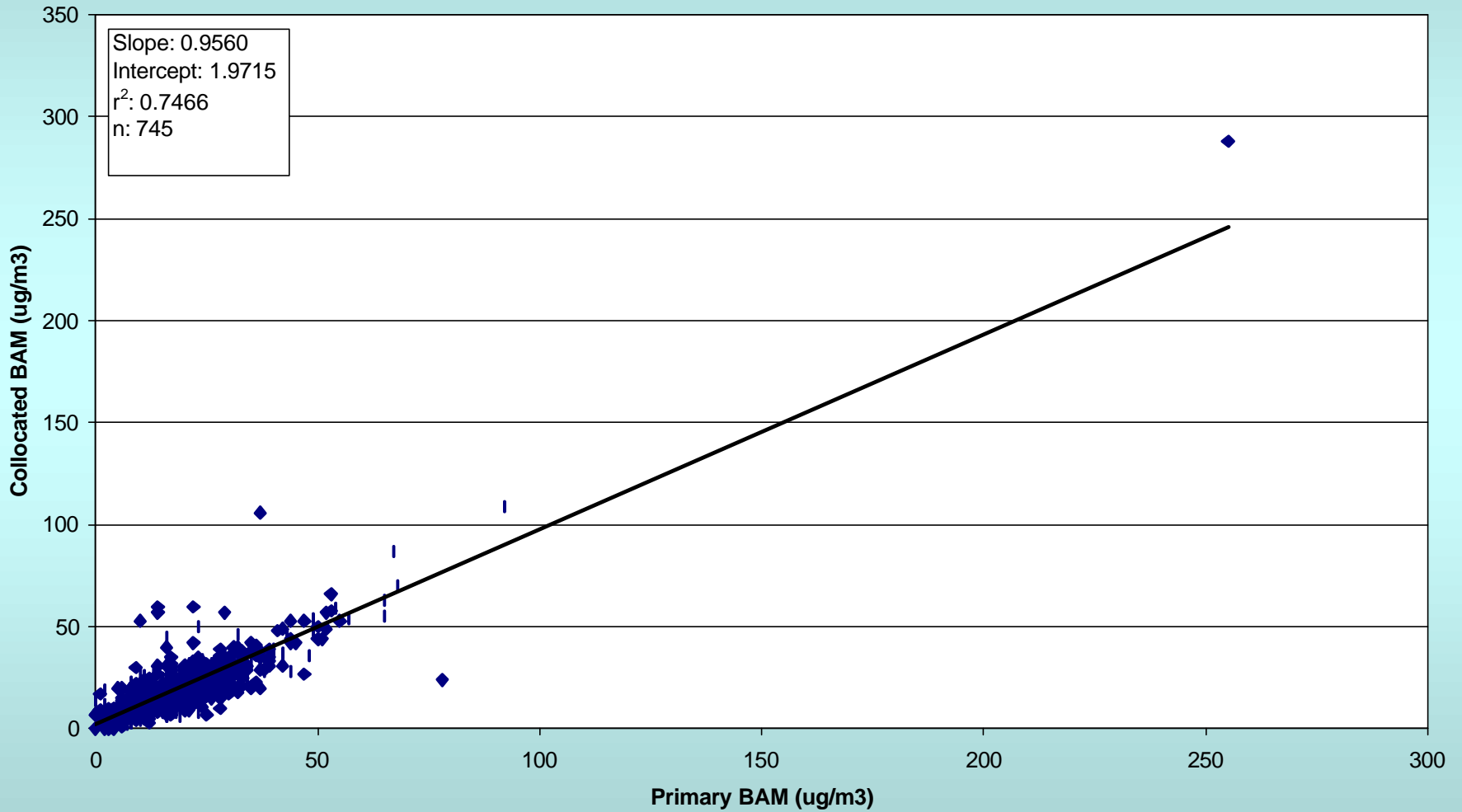
Chico - Manzanita Ave.
Primary vs. Collocated Met One BAM (Model 1020)
February 2003 - Hourly Data



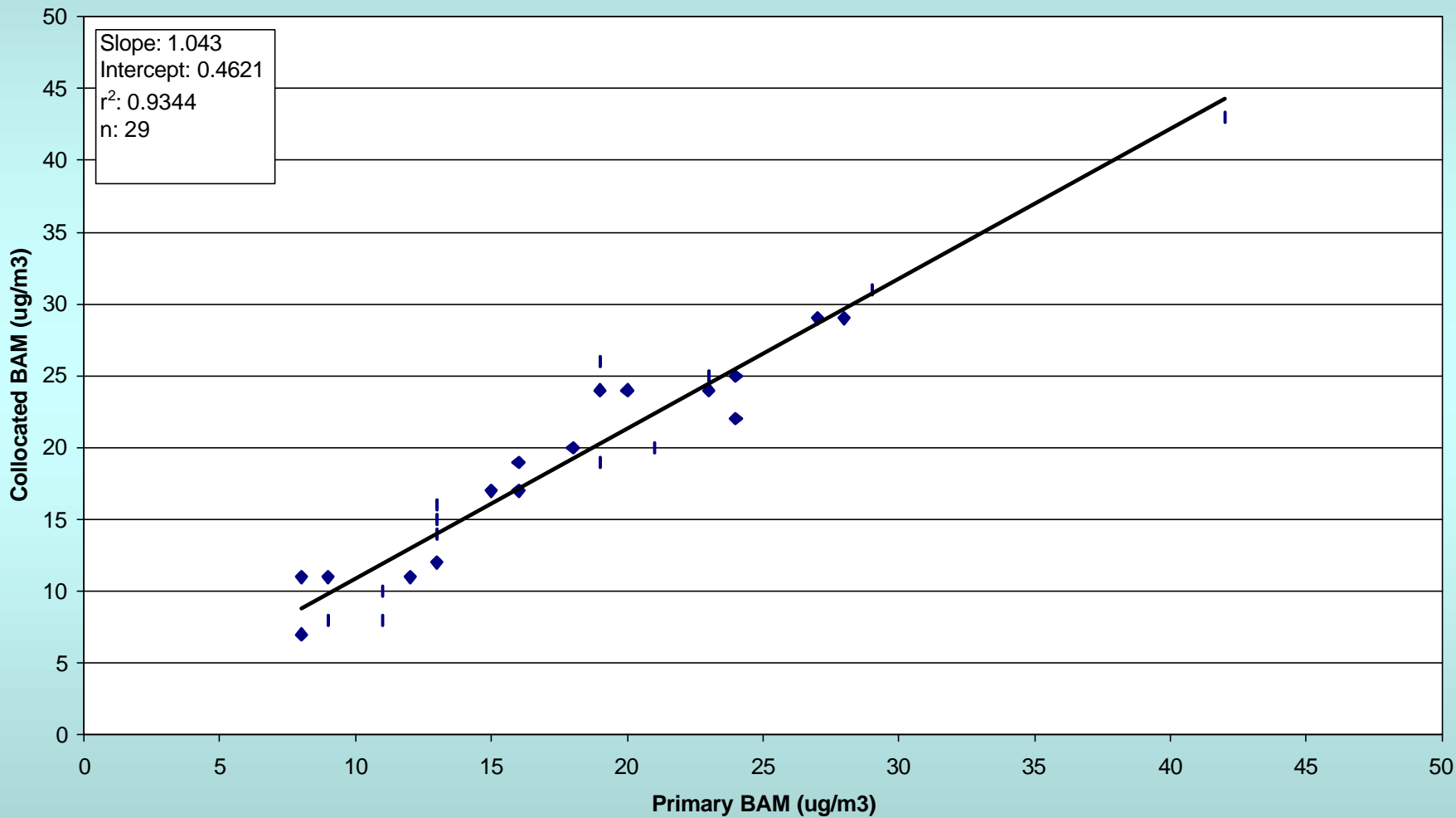
Chico - Manzanita Ave.
Primary vs. Collocated Met One BAM (Model 1020)
February 2003 - 24 Hour Average



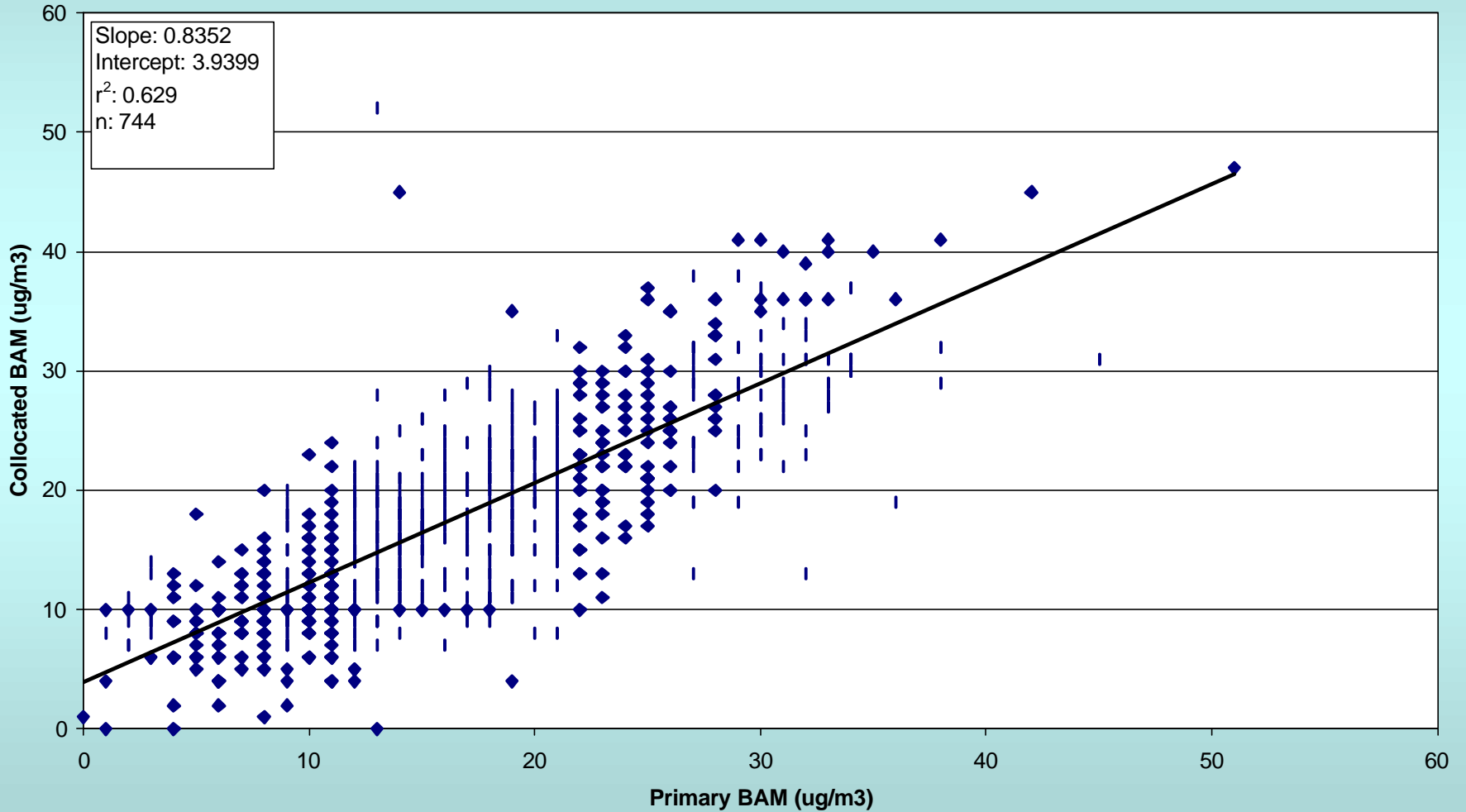
Calexico - Ethel Street
Primary vs. Collocated Met One BAM (Model 1020)
May 2003 - Hourly Data



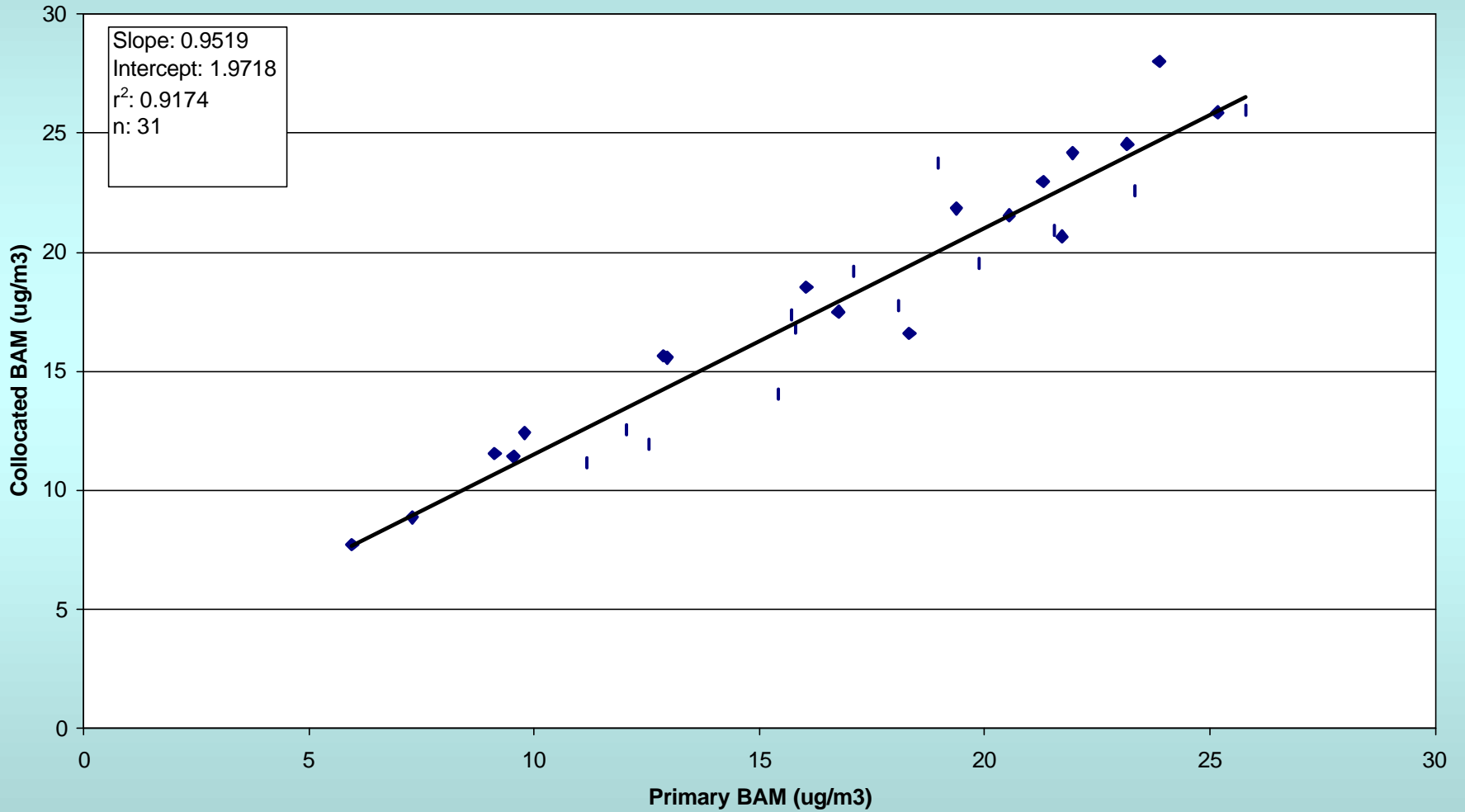
**Calexico - Ethel Ave.
Primary vs. Collocated Met One BAM (Model 1020)
May 2003 - 24 Hour Average**



Bakersfield California Ave
Primary vs. Collocated Met One BAM (Model 1020)
May 2003 - Hourly Data



Bakersfield - California Ave
Primary vs. Collocated Met One BAM (Model 1020)
May 2003 - 24 Hour Average



CARB BAM Data Capture

	Data Capture %	Data Capture %	Data Capture %
Chico-Manzanita Avenue	47%	92%	52%
Gridley-Cowee Avenue	93%	96%	85%
South Lake Tahoe-Sandy Way			95%
Fresno-1st Street	77%	98%	40%
Calexico-Ethel Street		91%	34%
Calexico-East		80%	63%
Bakersfield-5558 California Avenue	54%	93%	56%
Point Reyes	95%	89%	98%
Yosemite Village-Visitor Center		52%	
Modesto-14th Street	28%	82%	22%
Visalia-N Church Street	47%	62%	56%
San Nicolas Island-Building 98		76%	70%

BAM Maintenance

- Bi-Weekly Leak and Flow Checks are absolutely necessary to ensure proper operation
- failed leak and flow checks are associated with poor FRM correlation in ARB's experience

BAM Datalogger Review

- Review of the internal datalogger is important
- Reveals offsets between the BAM and the external data acquisition system
- Review of Q_{tot} (total volume sampled) hourly values helps detect flow problems
- Detailed Error codes are stored in the internal datalogger data

Summary

- Accuracy
 - Slopes from 0.80 to 1.1
 - Intercepts from -4.9 to 5.0
 - r^2 from 0.77 to 0.97
- Precision
 - Slopes from 0.94 to 1.0
 - Intercepts from 0.13 to 1.6
 - r^2 from 0.84 to 0.99

Summary

- The BAM-1020 Monitor is well-suited for PM-AQI, Prescribed Fire and Ag-Burn Forecasting, diurnal profiling, quantifying short term events, and characterizing atmospheric dynamics
- Is it good enough for regulatory determinations?