

DESTIN, FLORIDA

Airport Sampling Report

October 2008



Prepared for
City of Destin



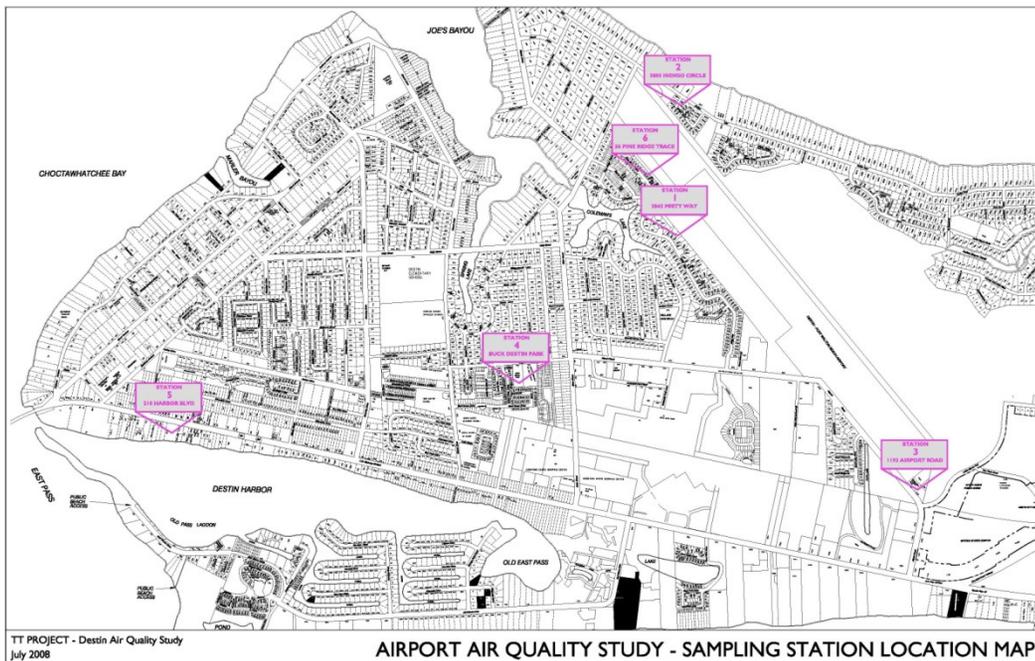
Destin Airport Sampling Report
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EXECUTIVE SUMMARY

Executive Summary

● Six Sampling Locations



- 1 Misty Way
- 2 Indigo Circle
- 3 Airport Road
- 4 Buck Destin Park
 - (Background)
- 5 Harbor Blvd.
 - (Background)
- 6 Pine Ridge Trace

Executive Summary

- Six Sampling Locations



Misty Way



Indigo Circle



Airport Boulevard



Buck Destin



Harbor



Pine Ridge Trace

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Executive Summary - General

- Samples Analyzed For:
 - Lead Particulate
 - Total Suspended Particulate
 - Organics (79 Different Compounds)
- Testing Conducted Over July 4th Weekend (July 4 - 6)
- Wind Direction Variable During Testing Period

Executive Summary - Results

- Air Quality in Destin is good when compared to State and Federal standards
- All parameters detected were below air quality and health risk standards

Executive Summary

- Organic Compounds and Lead Particulate Detected at All Sites
- Detected Organic Compounds Were From Aviation and Commercial Activity, and Fireworks Combustion
- Detected Organic Compounds Higher at Two Airport Sites Closest to Airport vs all other sites

Executive Summary

- No Organic Compound or Lead Particulate Sample Exceeded Any Health Standards ^{*1}
- July 4-6, 2008 Sampling Results Reflect:
 - Airport activity influenced adjacent sampling points
 - Impact of organics, including benzene, at Pine Ridge Trace
 - Results Below Regulatory Air Quality & Health Risk Standards ^{*1}

^{*1} Standards included NAAQS, EPA, OSHA, and ACGIH



REPORT

Destin Airport Sampling Report
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Contents

- Sampling Objectives
- Sampling Methodology
- Conclusions

Sampling Objectives

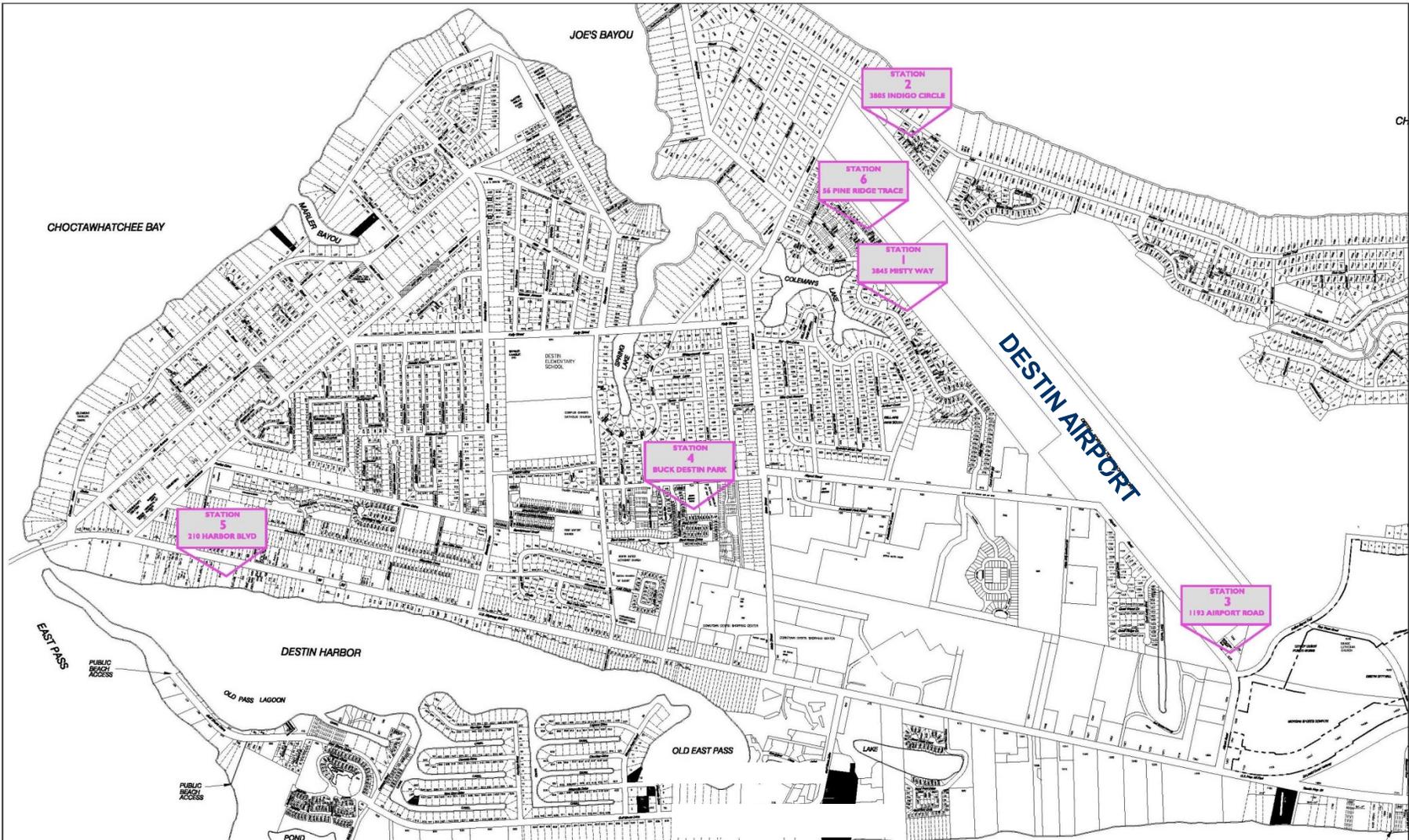
- Relate sample data to
 - Meteorological data (wind direction)
 - Airport activity data
 - Day or night operations

Sampling Objectives - Hypothesis

- Aviation fuel (Avgas) is different than gasoline or diesel fuel
- Air sampling can distinguish aircraft / airport operations versus cars, trucks, and other sources of air pollutants

Sampling Methodology

- Sample air in six Destin neighborhoods including adjacent to the airport
- To the extent possible, determine the impact of airport or other Destin activities on air quality
 - Compare neighborhood results to Destin background
 - Compare to air quality standards
 - Compare to health standards



TT PROJECT - Destin Air Quality Study
 July 2008

AIRPORT AIR QUALITY STUDY - SAMPLING STATION LOCATION MAP

Sampling Design - Sites



MISTY WAY



INDIGO CIRCLE



AIRPORT ROAD EMS

Sampling Design - Sites



BUCK DESTIN PARK

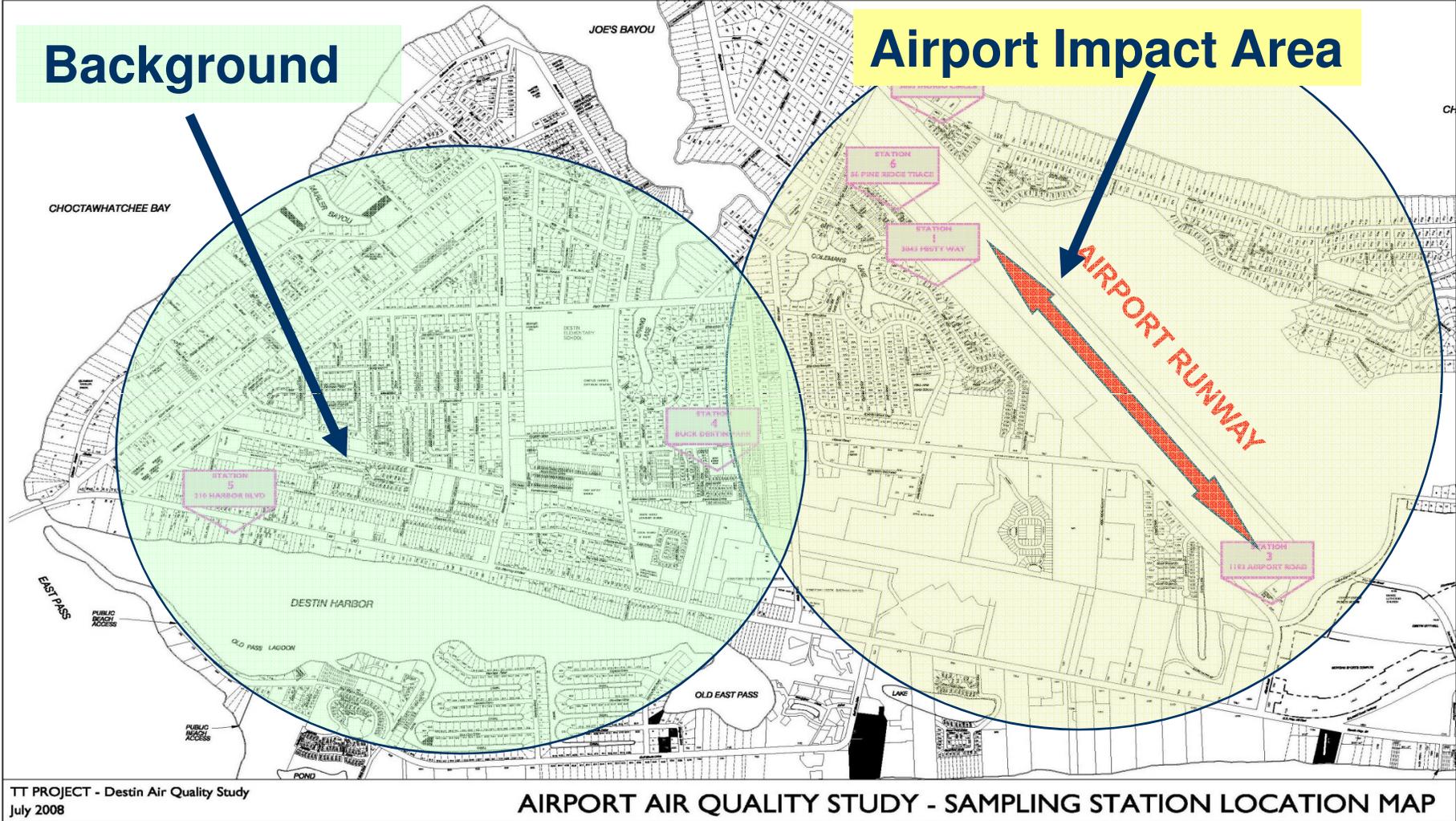


HARBOR BOULEVARD



PINE RIDGE TRACE

DESTIN BACKGROUND vs AIRPORT IMPACT

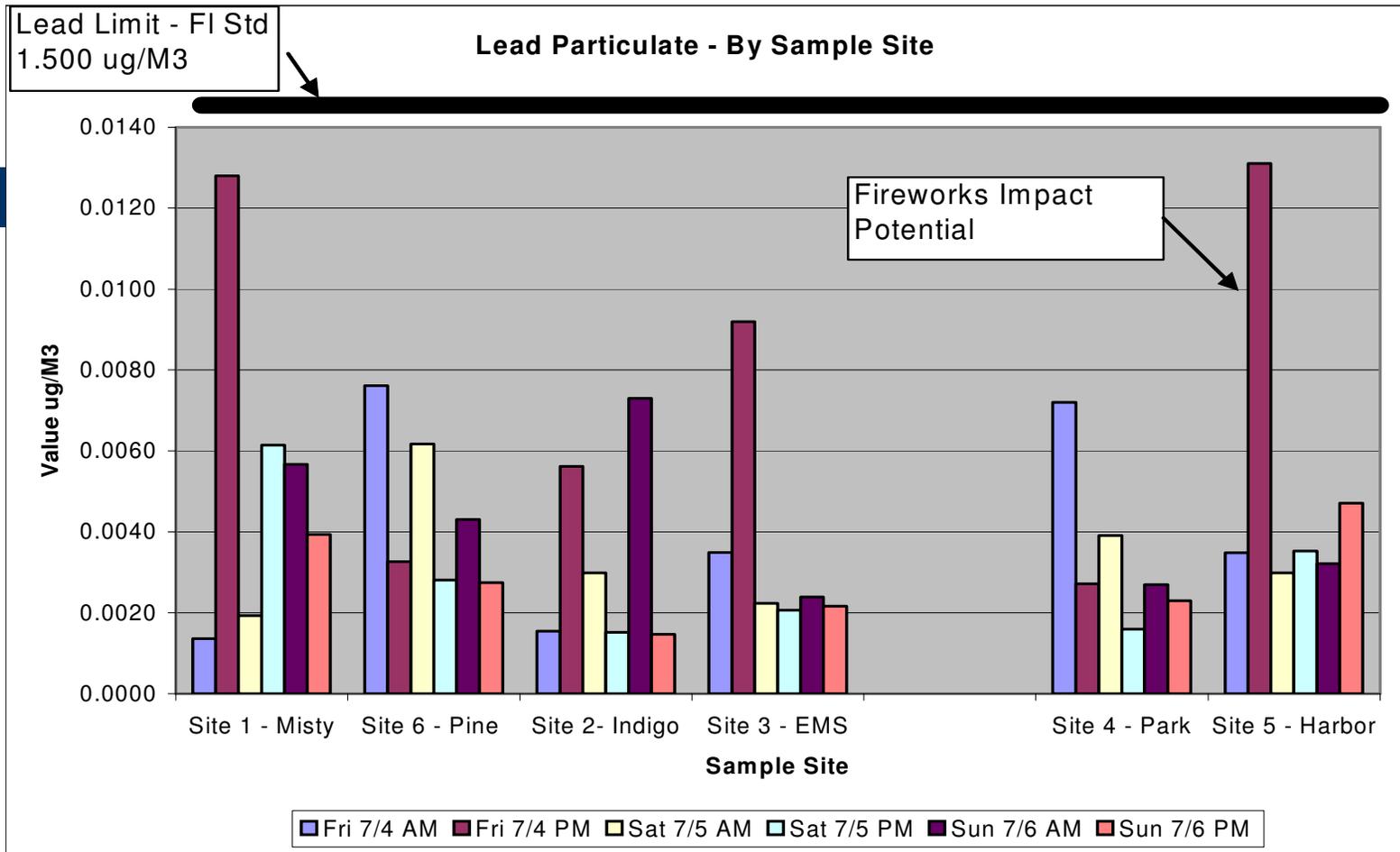


Visual Results Charts

- Charts for Lead Particulate, Total Suspended Particulate, and Organics
- One Series – Sample Date
- One Series by Sample Site
- Note higher lead levels on all sites Friday night (possibly due to fireworks)

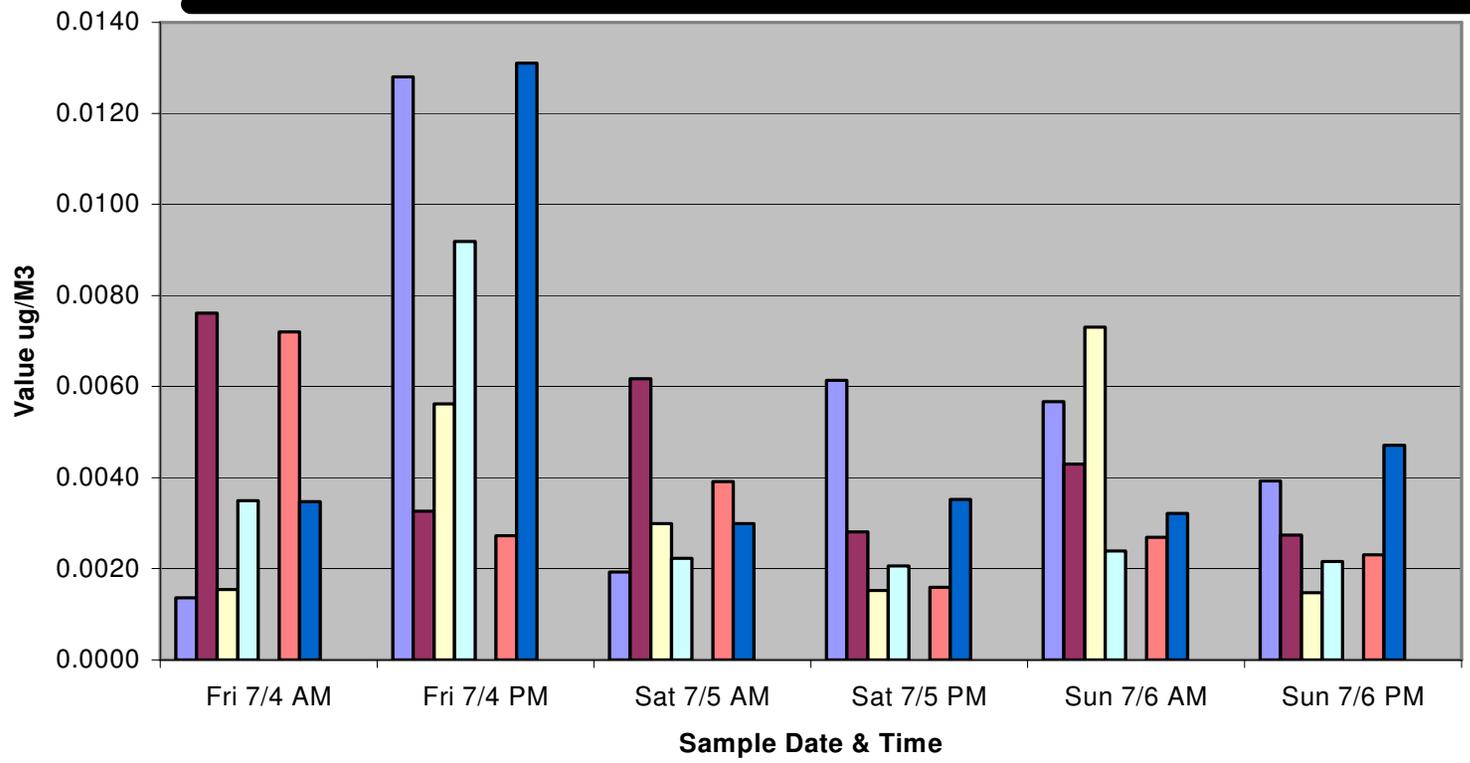
Visual Charts – Air Standards (EPA / Agency Air Concentrations)

- Lead Particulate Limit – 1.500 ug/M3
- Total Suspended Particulate Limit
 - 150 micrograms/cubic meter (ug/M3)
- Organics Limit
 - Lowest compound limit
 - Xylenes 110 ug/M3
 - Highest compound limit
 - Ethanol 1,900,000 ug/M3



Lead Limit - FI Std
1.500 ug/M3

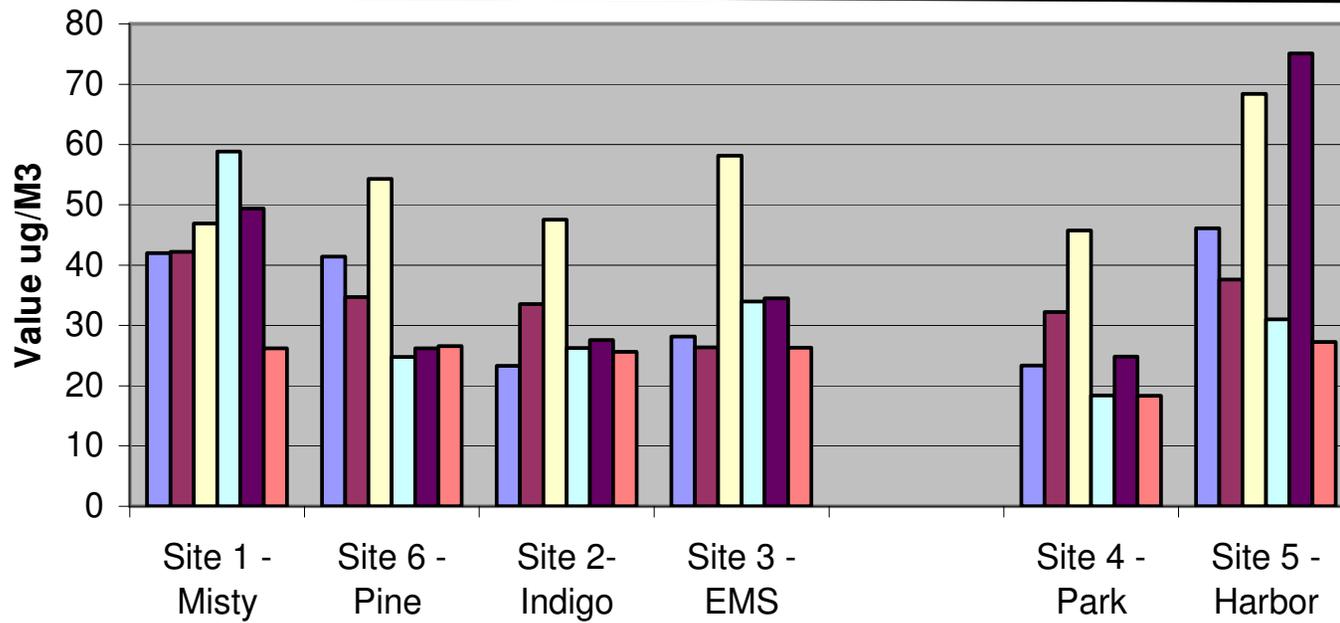
Lead Particulate - By Sample Date



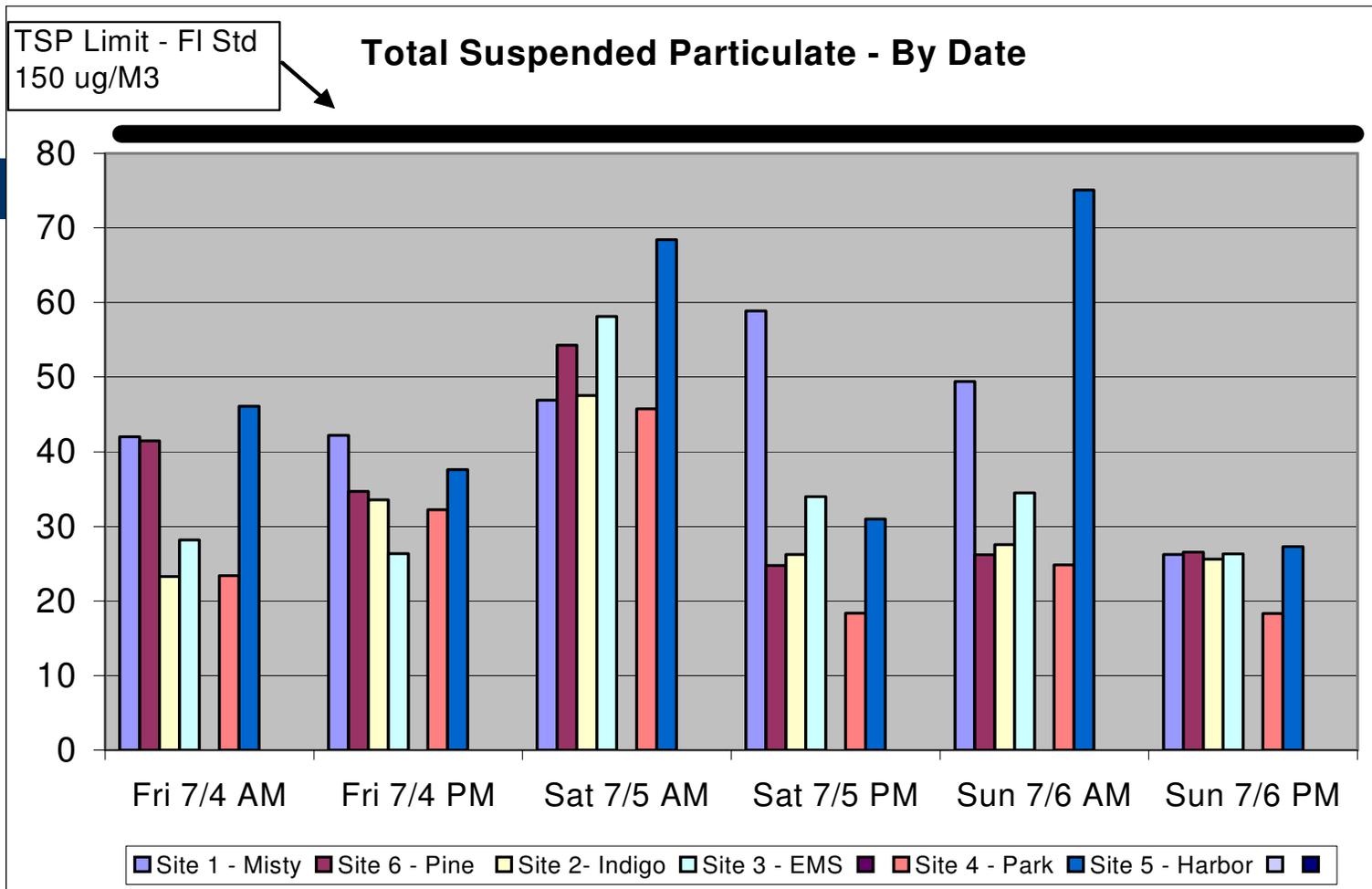
Legend: Site 1 - Misty (light blue), Site 6 - Pine (maroon), Site 2 - Indigo (yellow), Site 3 - EMS (cyan), Site 4 - Park (orange), Site 5 - Harbor (dark blue)

TSP Limit - FI
Std 150 ug/M3

Total Suspended Particulate - By Sample Site



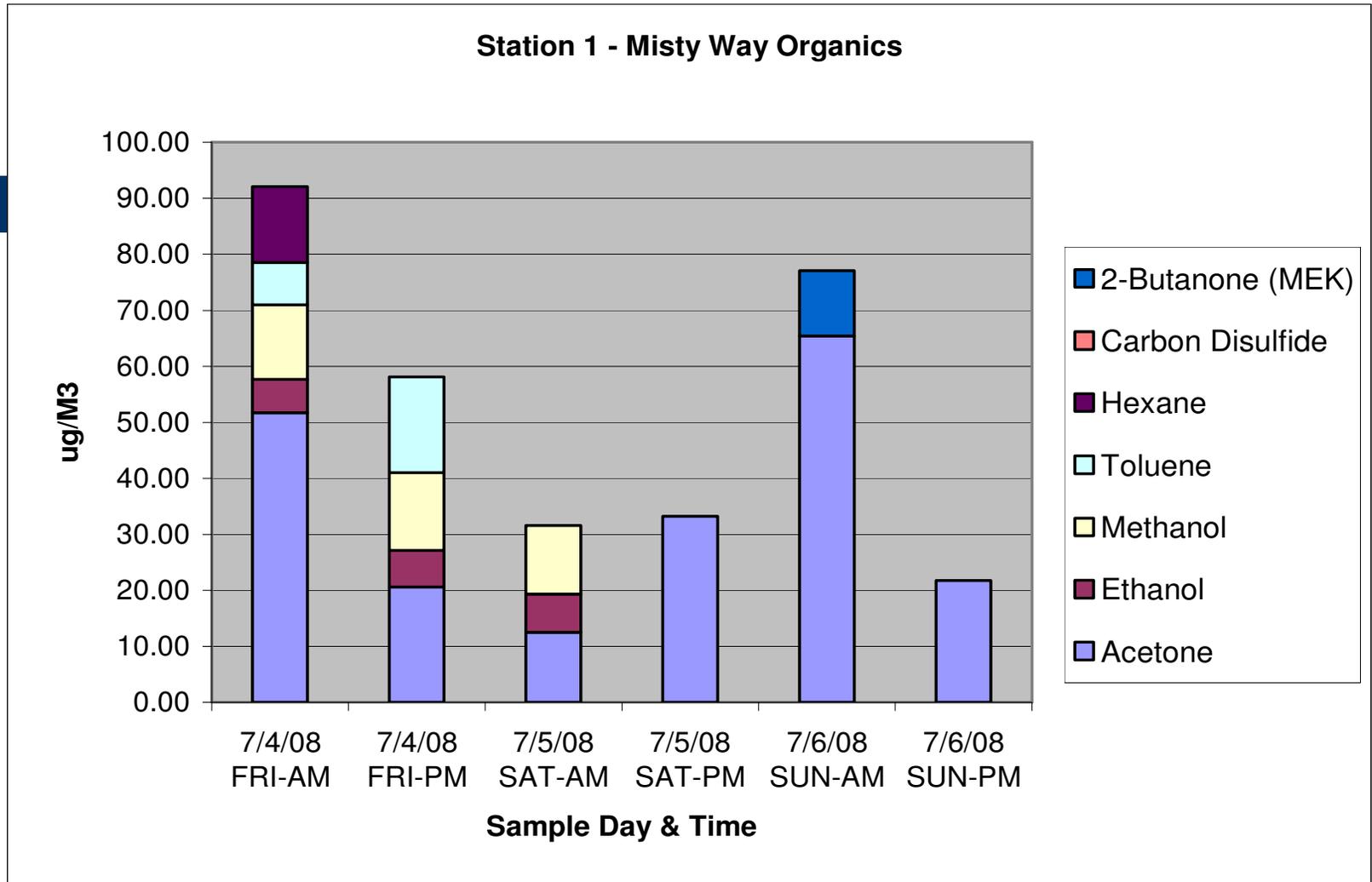
Legend: Fri 7/4 AM (blue), Fri 7/4 PM (maroon), Sat 7/5 AM (yellow), Sat 7/5 PM (cyan), Sun 7/6 AM (purple), Sun 7/6 PM (red)

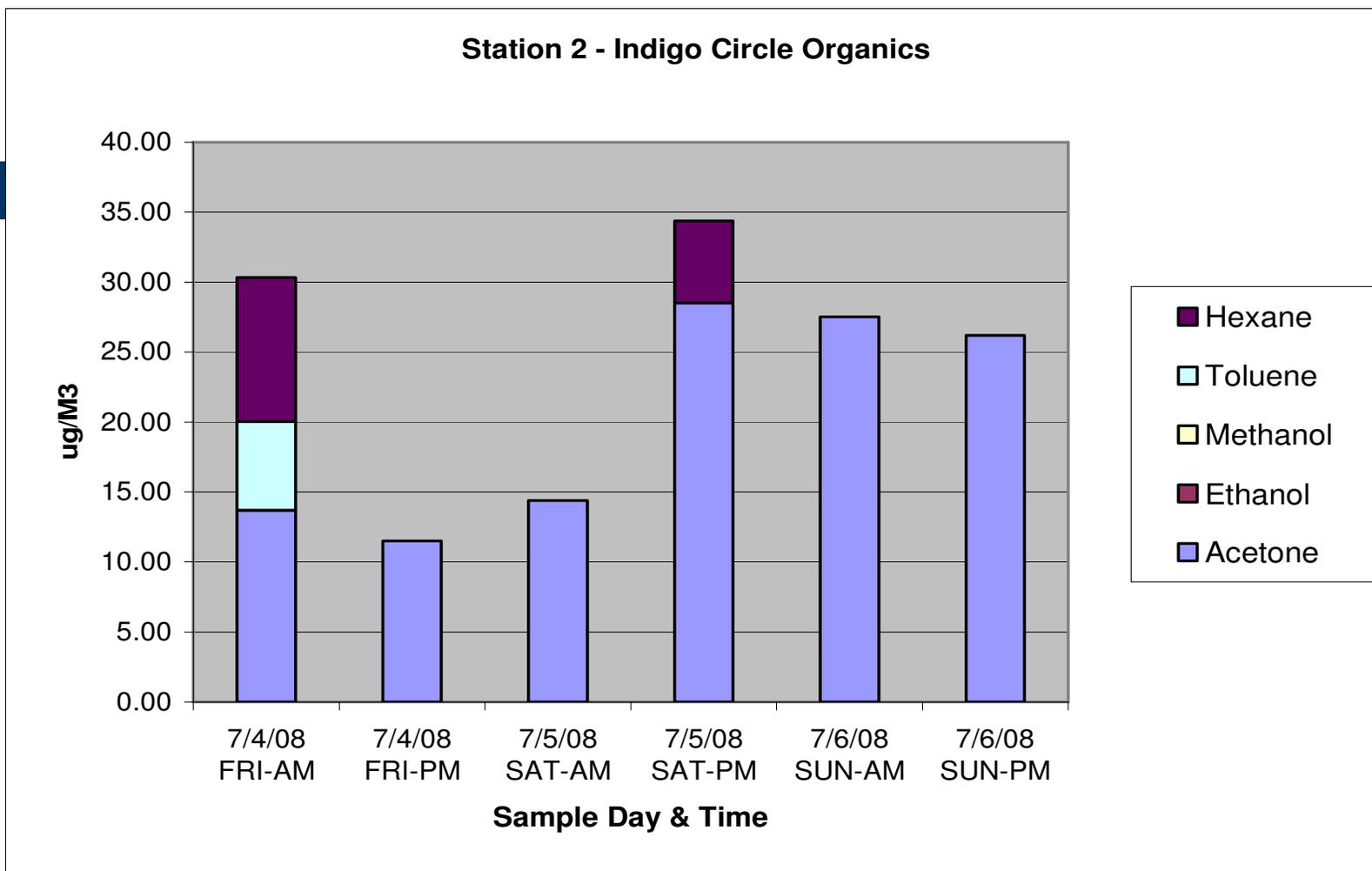


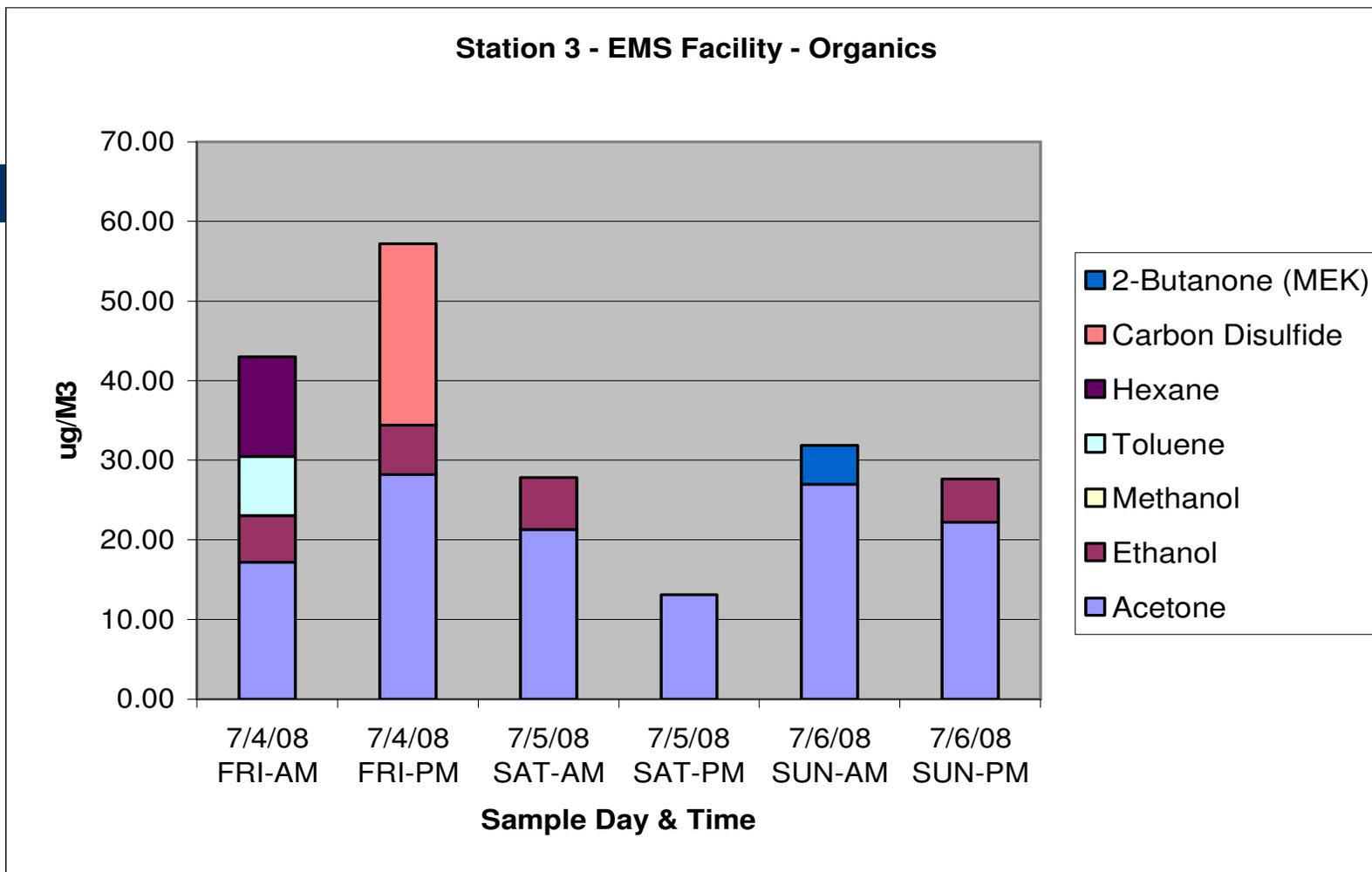
Visual Results Charts - Organics

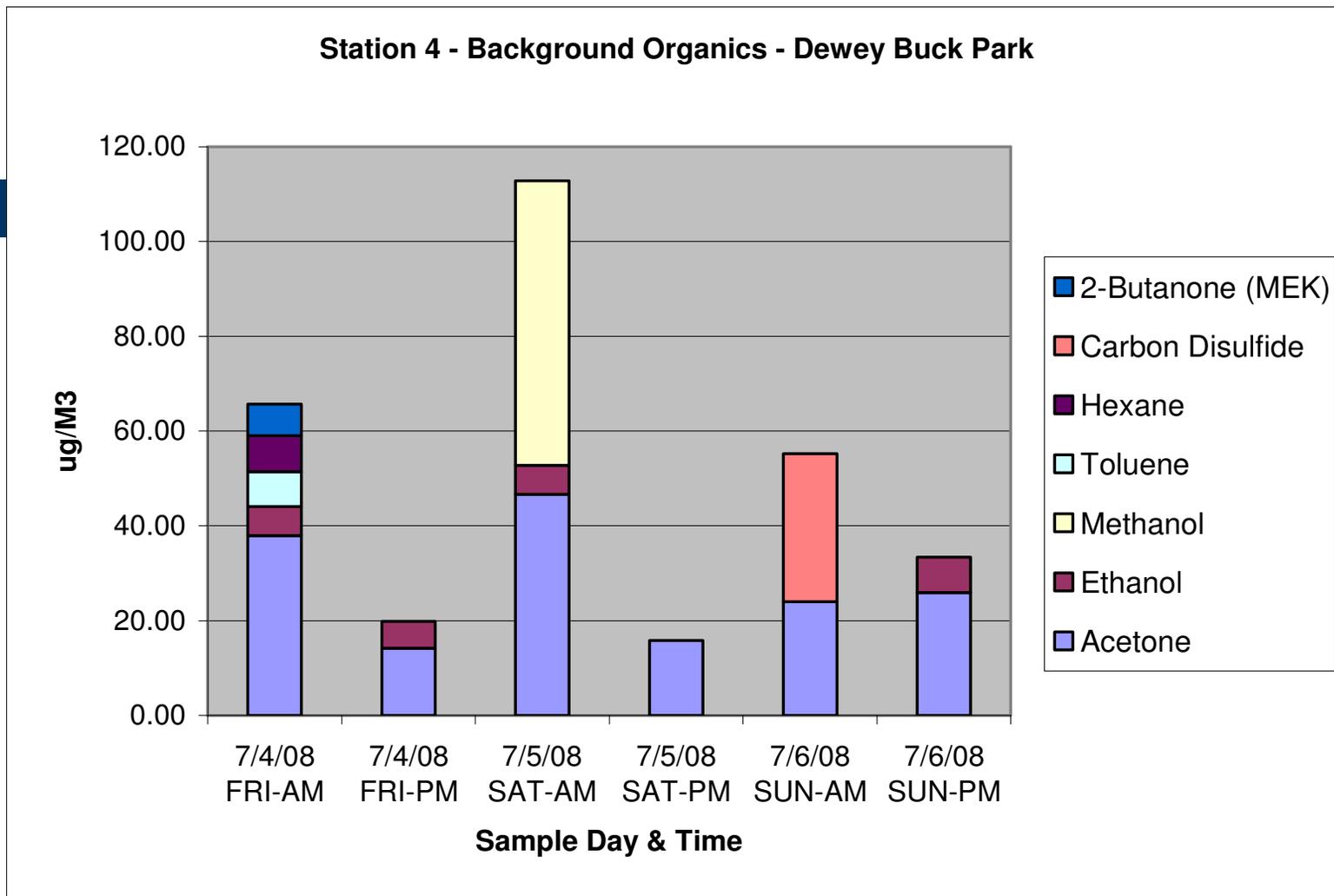
- Airport Site - Station 1 – Misty Way
- Airport Site – Station 2 – Indigo Circle
- Airport Site – Station 3 – EMS Facility
- Airport Site – Station 6 – Pine Ridge Trace
- Background Site – Station 4 – Buck Destin Park
- Background Site – Station 5 - Harbor

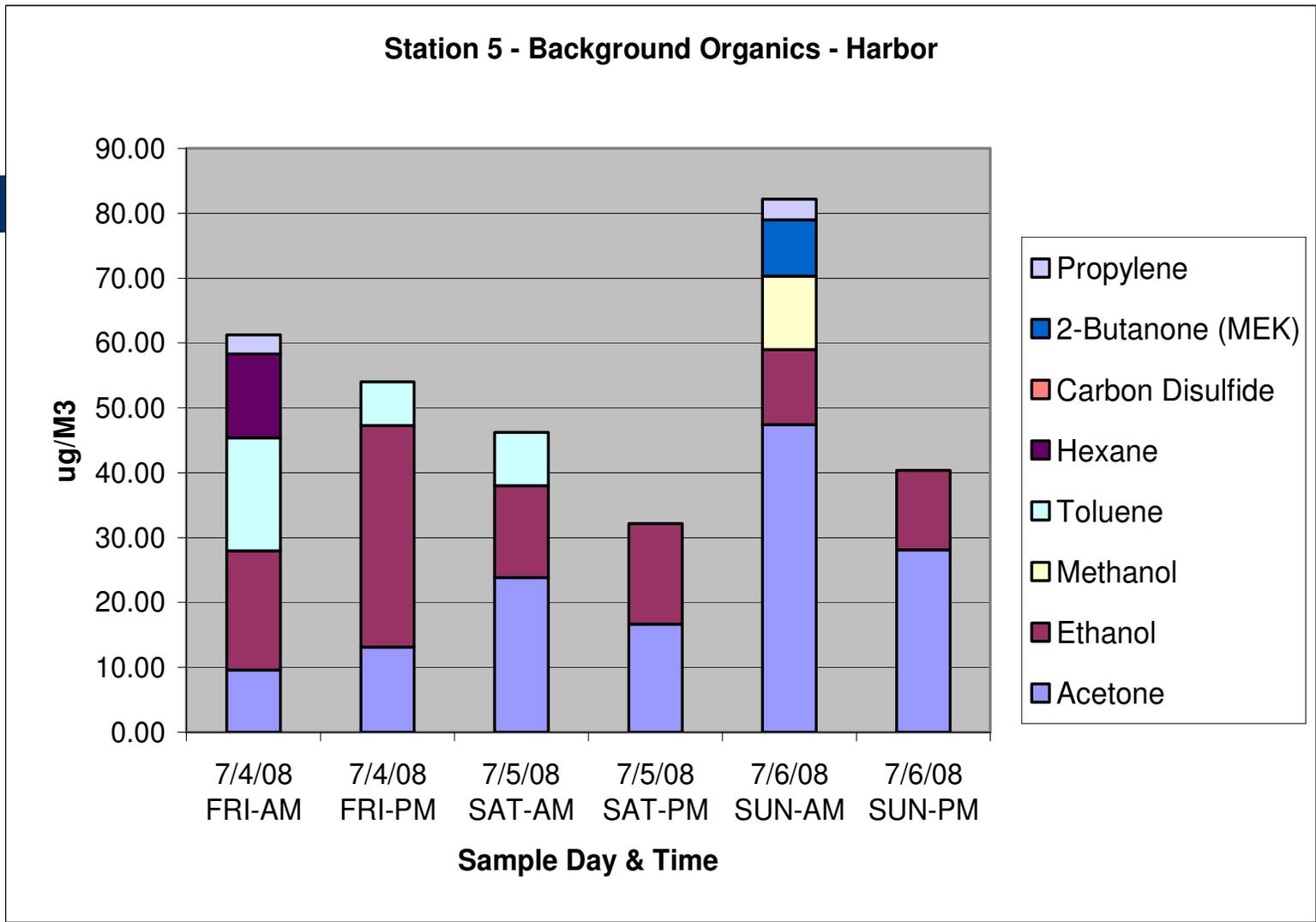
Station 1 - Misty Way Organics

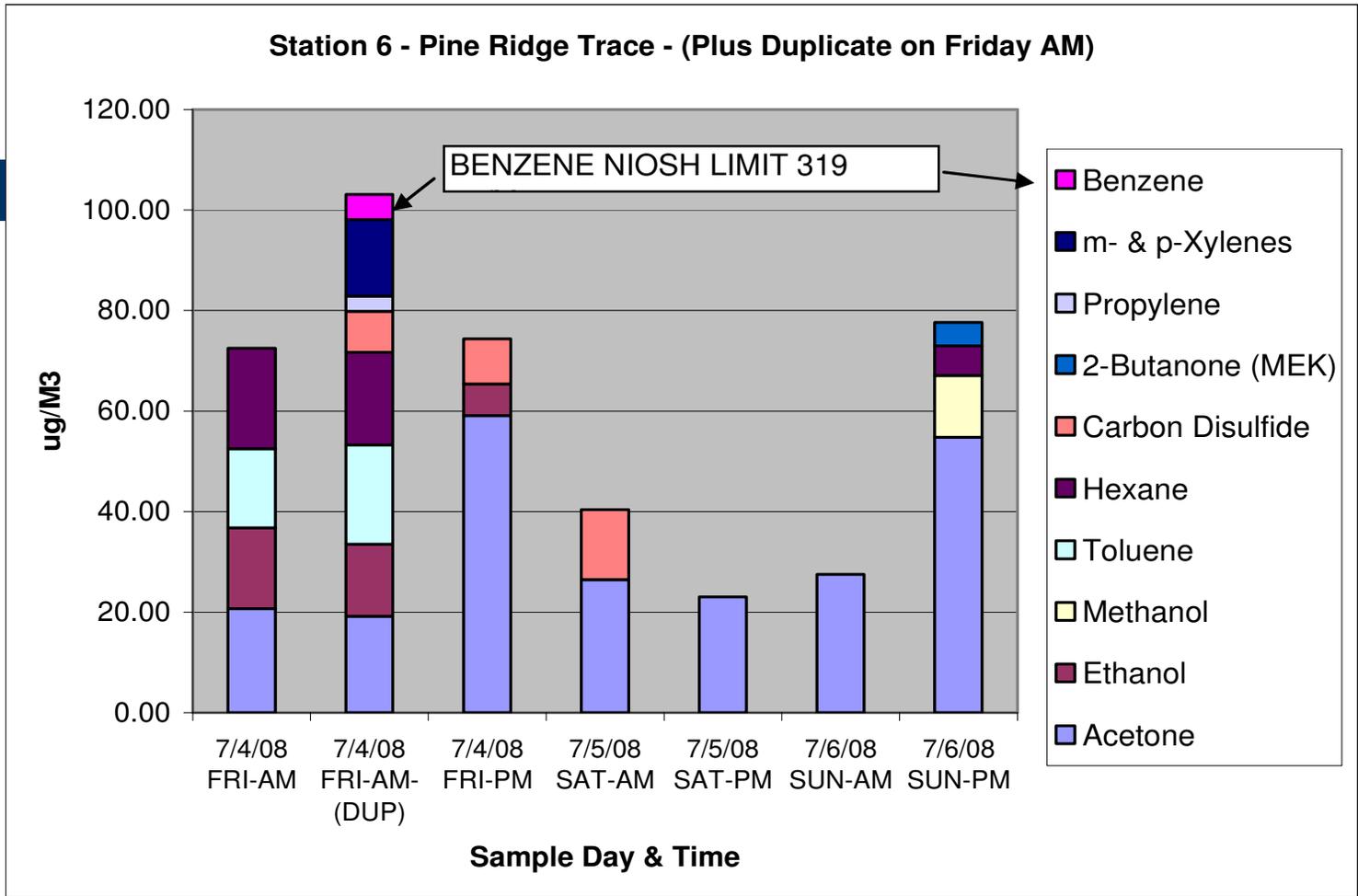












Sampling Design – Specific Pollutants Monitored

- Airport AVGAS Chemical Markers
 - Tetraethyl Lead
 - Ethylene Dibromide
 - Lead Particulate
- Aircraft emissions
 - Benzene
 - 1,3 Butadiene
- Florida/National Ambient Air Quality Chemicals
 - Total Suspended Particulate
 - Lead

Conclusions – Sampling Program

- Testing was conducted over July 4th weekend
- Wind direction was variable during each period
- Data from each sample represents a snapshot of potential impact of airport operations
- Air quality in Destin is good compared to national and state air quality standards

Conclusions – Sampling Program

- All parameters detected in air samples were below Air Quality and health risk standards
- Particulate Matter was detected in the air from all sites during all periods
- 10 Organic Compounds were detected at one or more sample sites

Study Comparison – 2007 Vs 2008 Flight Operation Data

Destin Airport - Flight Comparison Data Airport Sampling Report

Sample Day	Number of Flight Operations	
	April 2007	July 2008
Day 1	186	101
Day 2	228	127
Day 3	301	209
Day 4	237	0 (*1)
Day 5	203	

Note *1 - no flight operations prior to
7:00 am Monday Morning (end time of test)

Results

- Comparison to 2007 Testing
- Sample Values Versus Risk Standards
- Lead Particulate, Organic Compound, and Particulate Results (as Total Suspended Particulate)
 - Background (Harbor and Buck Destin Park)
 - Four Residences
 - Bar Charts of four criteria
 - Organics by sample station by sample day

Results – Airport Impact Assumption

- Wind direction variable during each 12 hour test
- Wind direction each of 12 hours used to determine probability of impact or no impact
 - Criteria probability range 0%, 50%, or 100%
 - Calm wind hours assigned 100% airport impact value
- Assume that sample obtained over 12-hour period was collected linearly over the 12-hours
- Impact percent and no-impact percent applied to determine values per site per day for comparison purposes.

Results – Organic Sampling

- 79 Organic Compounds Analyzed
- 69 Compounds were not-detected in any sample
- Comparison to 2007 Study
 - 10 organic compounds detected (2008)
 - 11 organic compounds detected (2007)
- ACETONE detected in most samples both years

Results – Number of Samples Above Detection Limit

COMPOUND	Frequency 2008	Frequency 2007
Acetone	37	35
Ethanol	20	23
Toluene	10	
Hexane	9	1
Methanol	6	34
2-Butanone (MEK)	5	26
Carbon Disulfide	5	1
Propylene	4	1
Benzene	1	
m- & p-Xylenes	1	
Vinyl Acetate		21
Chlorodifluoromethane		2
Isopropyl Alcohol		2
Methylene Chloride		1

Results - Organic Sample Vs Risk Standard

COMPOUND	MAX VALUE 2008 (ug/M3)	Risk Standard (ug/M3)	Frequency 2008
Acetone	65	3300	37
Ethanol	34	1,900,000	20
Toluene	20	400	10
Hexane	20	210	9
Methanol	60	1800	6
2-Butanone (MEK)	12	3000	5
Carbon Disulfide	31	730	5
Propylene	5	5100	4
Benzene	5	319 (*1) 1.3-4.5(*2)	1
m- & p-Xylenes	15	110	1
Note *1 - NIOSH REL Limit 0.1 PPM or 319 ug/M3			
Note *2 - US EPA. IRIS - Benzene.			

Note *2 Explanation:

Benzene concentrations are above the one in a million and one in 100,000 risk levels reported in IRIS. Although these levels are not regulatory health standards, they are used to estimate the increase in lifetime risk of individuals exposed to benzene.

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Results – Lead Particulate Background Data

	City Background - LEAD Particulate Average Values $\mu\text{g}/\text{M}^3$		
	Station 4 - Park	Station 5 - Harbor	Average Background
Total	0.0036	0.0034	0.0035
Day	0.0027	0.0046	0.0037
Night	0.0045	0.0022	0.0033
	FLORIDA AIR STANDARD 1.5 $\mu\text{g}/\text{M}^3$		

Note: Lead in Blank was ND

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Results – Lead Particulate Comparison Chart

	City Background Comparison to Other Stations - LEAD PARTICULATE $\mu\text{g}/\text{M}^3$							
	Average Background	Maximum Background	Maximum At Residence	Average of Residences	Average at Individual Residence			
					Station 1 - Misty Way	Station 2 - Indigo Circle	Station 3 - EMS	Station 6 - Pine Ridge Trace
Day	0.0037	0.0072	0.0076	0.0040	0.0030	0.0060	0.0039	0.0032
Night	0.0033	0.0092	0.0131	0.0051	0.008	0.0029	0.0029	0.0071
All Hours Airport Impact			0.0069	0.0027	0.003	0.0028	0.0018	0.0030
All Hours No Airport Impact	0.0035	0.0092	0.0071	0.0019	0.002	0.0017	0.0016	0.0025
AM Impact			0.0063	0.0023	0.002	0.0040	0.0021	0.0016
AM No Impact	0.0037	0.0072	0.0028	0.0017	0.001	0.0021	0.0018	0.0015
PM Impact			0.0071	0.0021	0.003	0.0014	0.0014	0.0031
PM No Impact	0.0033	0.0092	0.0069	0.0030	0.005	0.0015	0.0015	0.0040
	FLORIDA AIR STANDARD - 1.5 $\mu\text{g}/\text{M}^3$							

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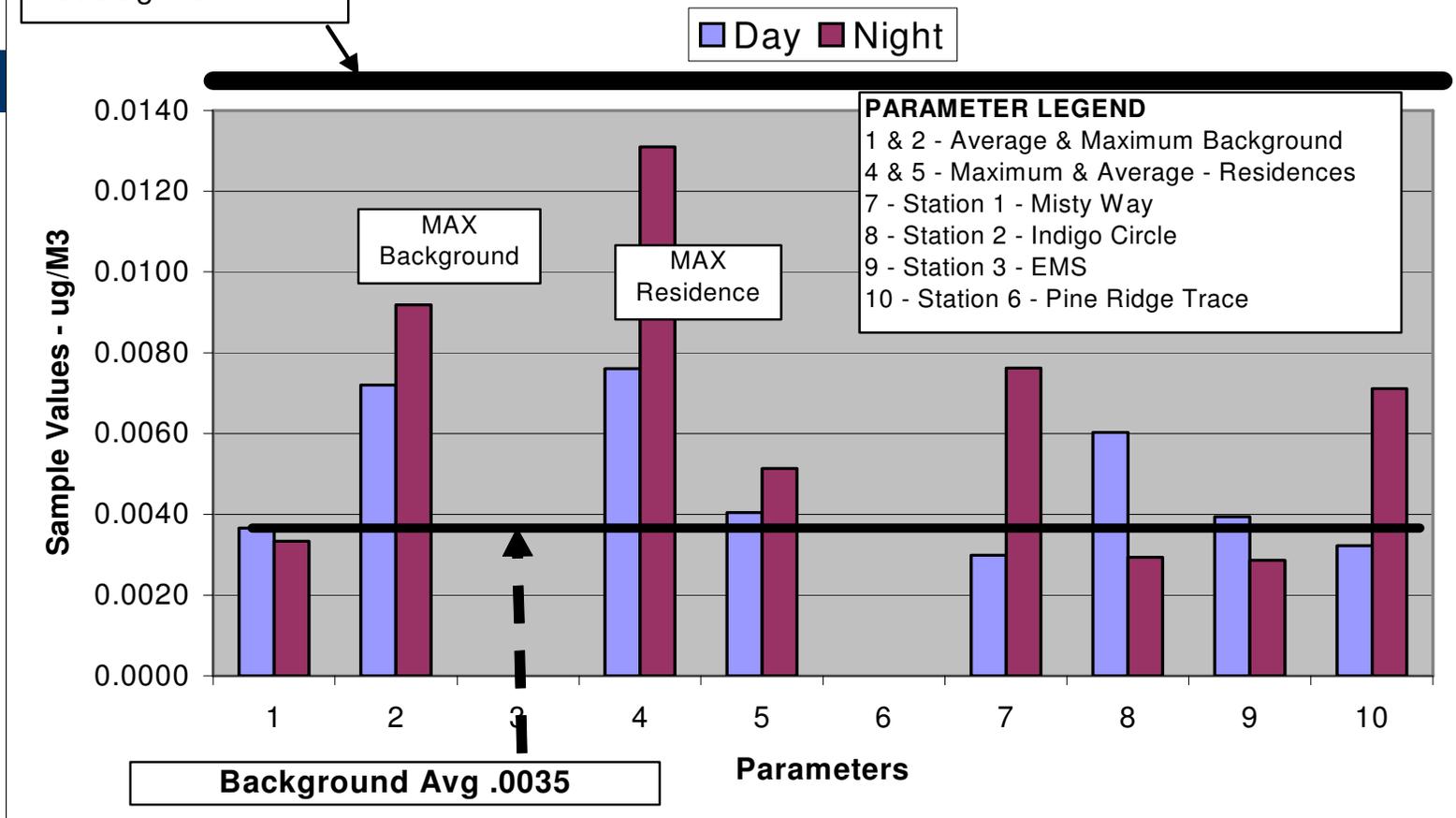
Results – Sample Locations Above Detection Limit

		SAMPLE SITE																																									
		FRI AM							FRI PM							SAT AM							SAT PM							SUM AM							SUM PM						
Compound	VOC	Misty Way	Indigo Circle	EMS	PARK	Harbor	Pine Ridge	Misty Way	Indigo Circle	EMS	PARK	Harbor	Pine Ridge	Misty Way	Indigo Circle	EMS	PARK	Harbor	Pine Ridge	Misty Way	Indigo Circle	EMS	PARK	Harbor	Pine Ridge	Misty Way	Indigo Circle	EMS	PARK	Harbor	Pine Ridge	Misty Way	Indigo Circle	EMS	PARK	Harbor	Pine Ridge						
Acetone	37	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#						
Ethanol	20	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#	#						
Methanol	6	#						#						#						#						#						#											
Toluene	10	#	#	#	#	#	#	#				#		#					#	#						#						#											
Hexane	9	#	#	#	#	#	#	#						#						#						#						#											
Carbon Disulfide	5						#			#		#							#												#												
2-Butanone (MEK)	5				#																					#		#		#							#						
Propylene	4					#	#																			#				#													
m- & p-Xylenes	1						#																																				
Benzene	1						#																																				

= NO ORGANICS DETECTED
 = ORGANIC DETECTED
 = Duplicate Sample - Pine Ridge Trace

Lead Limit - FI Std
1.500 ug/M3

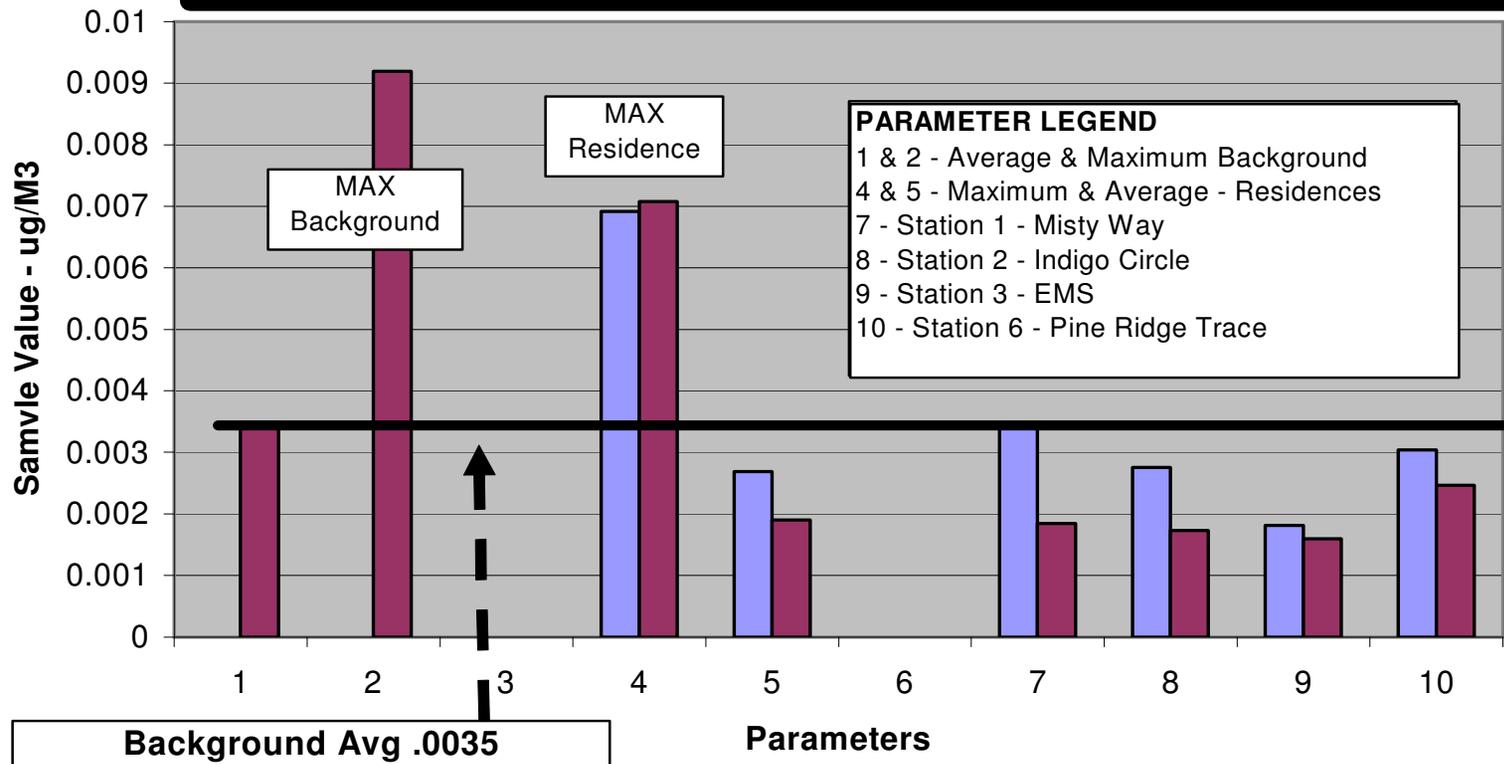
Lead Particulate - Day Vs Night



Lead Particulate - All Hr Airport Impact Vs No Impact

Lead Limit - FI Std
1.500 ug/M3

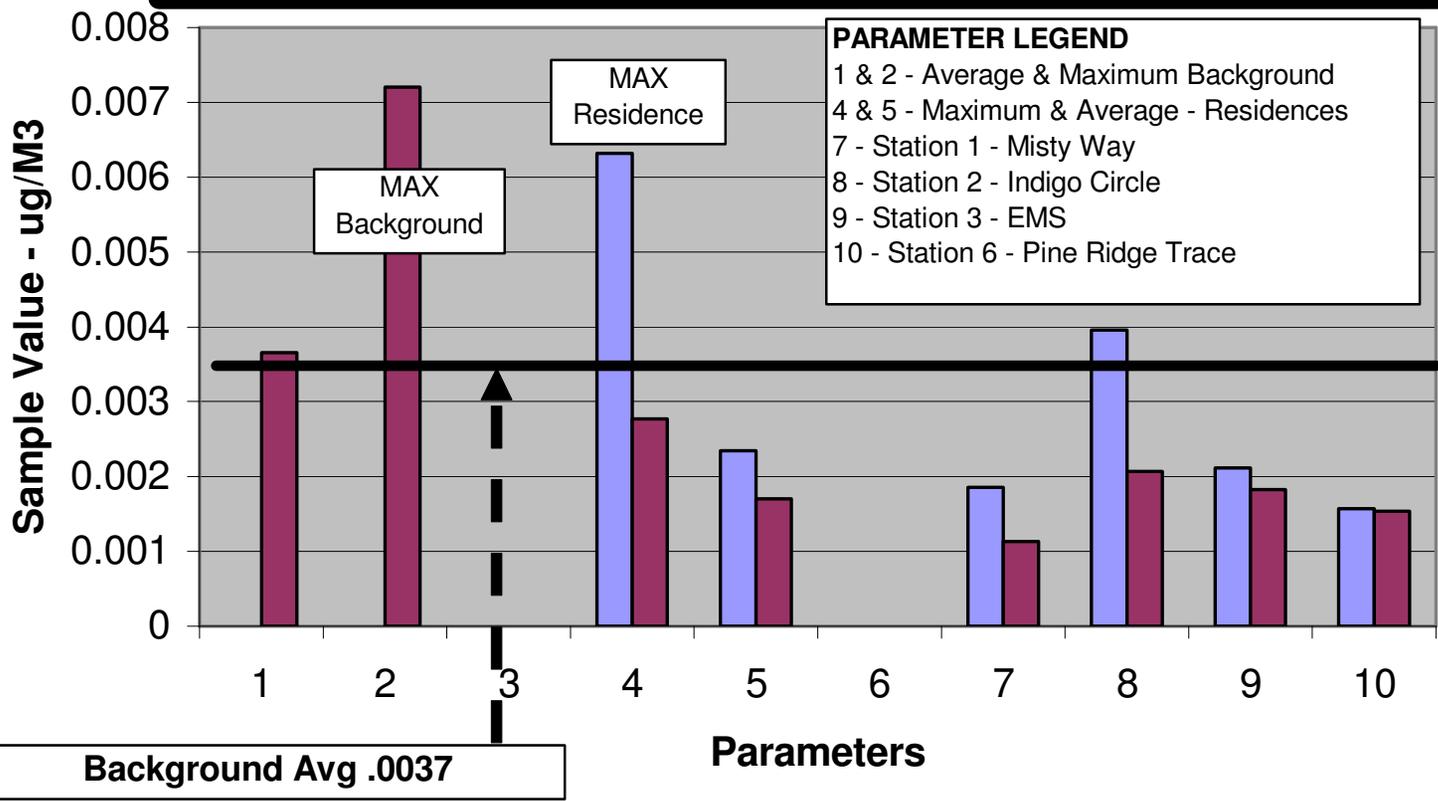
■ All Hours Airport Impact ■ All Hours No Airport Impact

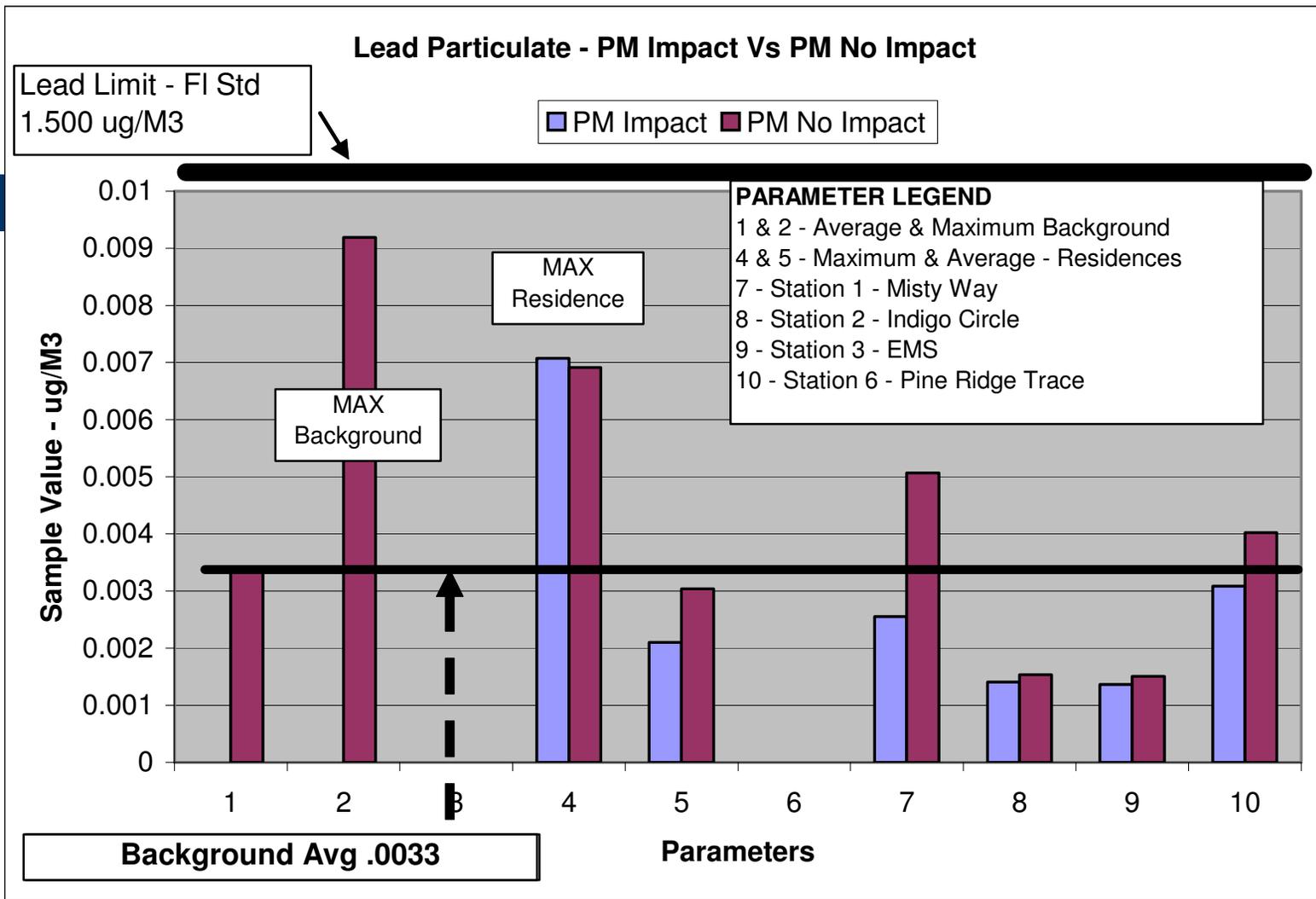


Lead Particulate - AM Impact Vs AM No Impact

Lead Limit - FI Std
1.500 ug/M3

AM Impact AM No Impact





Conclusions – Lead Particulate Sampling

- Airport site particulate lead maximum values and average values for both am and pm above back background avg.
- Airport site all hour particulate lead impact values higher than no impact values (but all below background average)
- No trend noted between airport impact versus no impact when am or pm periods were reviewed.
- Maximum sample value observed was 0.013 ug/M3 which is 100 times lower than the Florida Air Standard of 1.5 ug/M3

Results – Organic Background Data

	City Background - ORGANICS Average Values $\mu\text{g}/\text{M}^3$		
	Station 4 - Park	Station 5 - Harbor	Average Background
Total	50	52	51
Day	78	61	70
Night	23	42	33

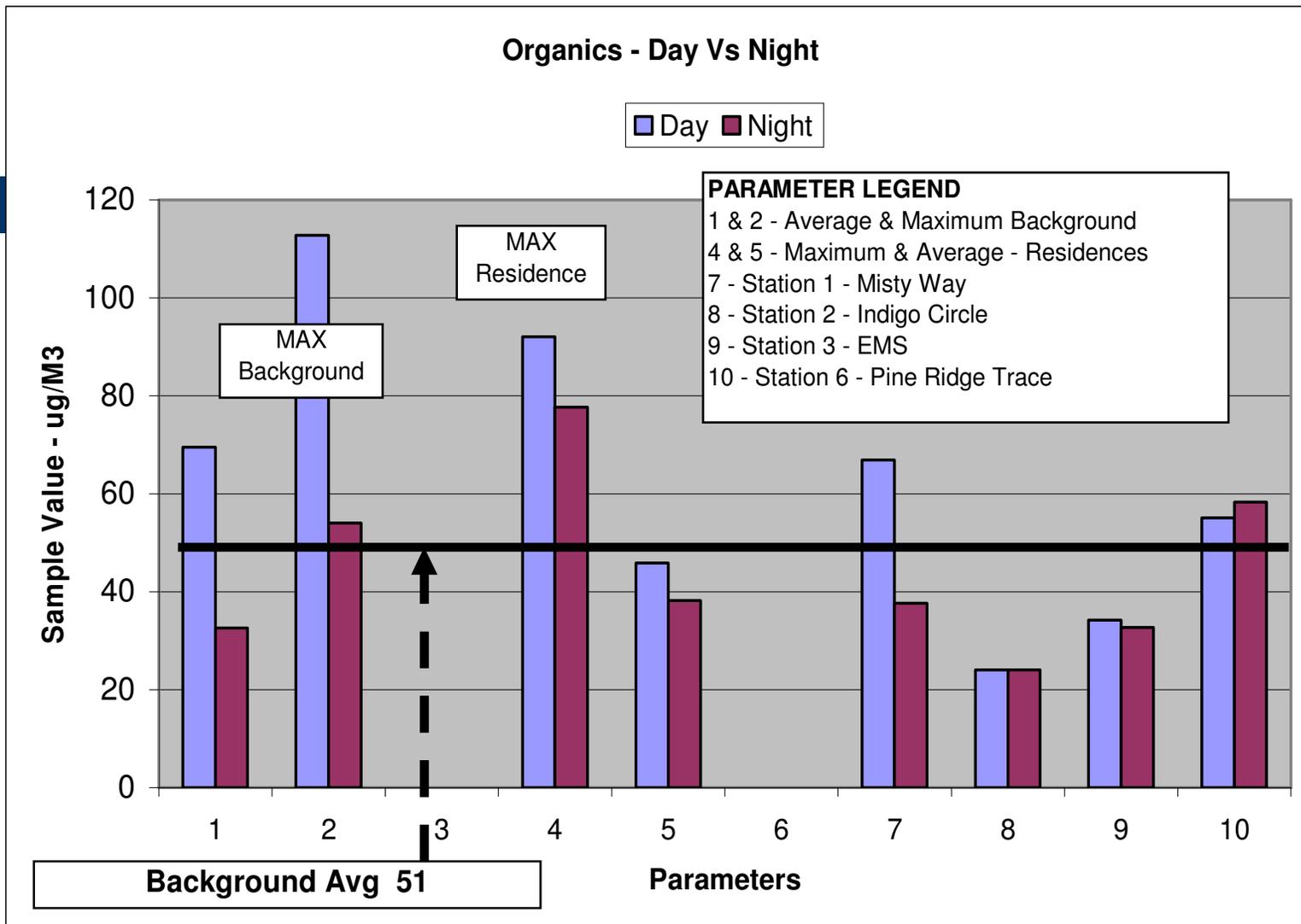
Note: Total Organics in VOC Blank was 7.

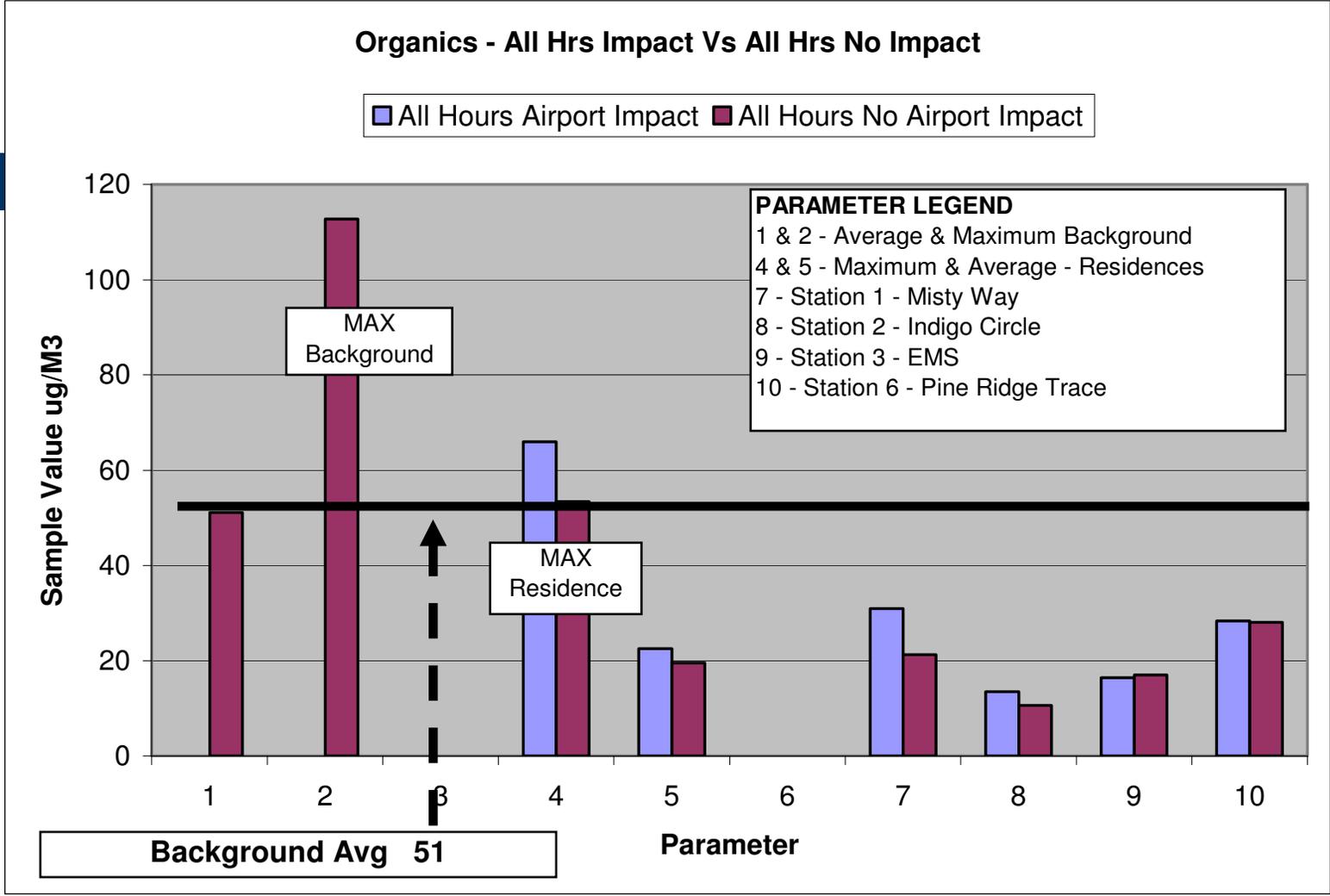
Results – Organic Comparison Chart

	City Background Comparison to Other Stations - ORGANICS $\mu\text{g}/\text{M}^3$							
	Average Background	Maximum Background	Maximum At Residence	Average of Residences	Average at Individual Residence			
					Station 1 - Misty Way	Station 2 - Indigo Circle	Station 3 - EMS	Station 6 - Pine Ridge Trace
Day	70	113	92	46	67	24	34	55
Night	33	54	78	38	38	24	33	58
All Hours Airport Impact			66	23	31	14	16	28
All Hours No Airport Impact	51	113	53	20	21	11	17	28
AM Impact			55	22	36	15	15	21
AM No Impact	70	113	53	24	31	9	19	34
PM Impact			40	15	12	12	15	20
PM No Impact	33	54	66	23	26	12	18	38

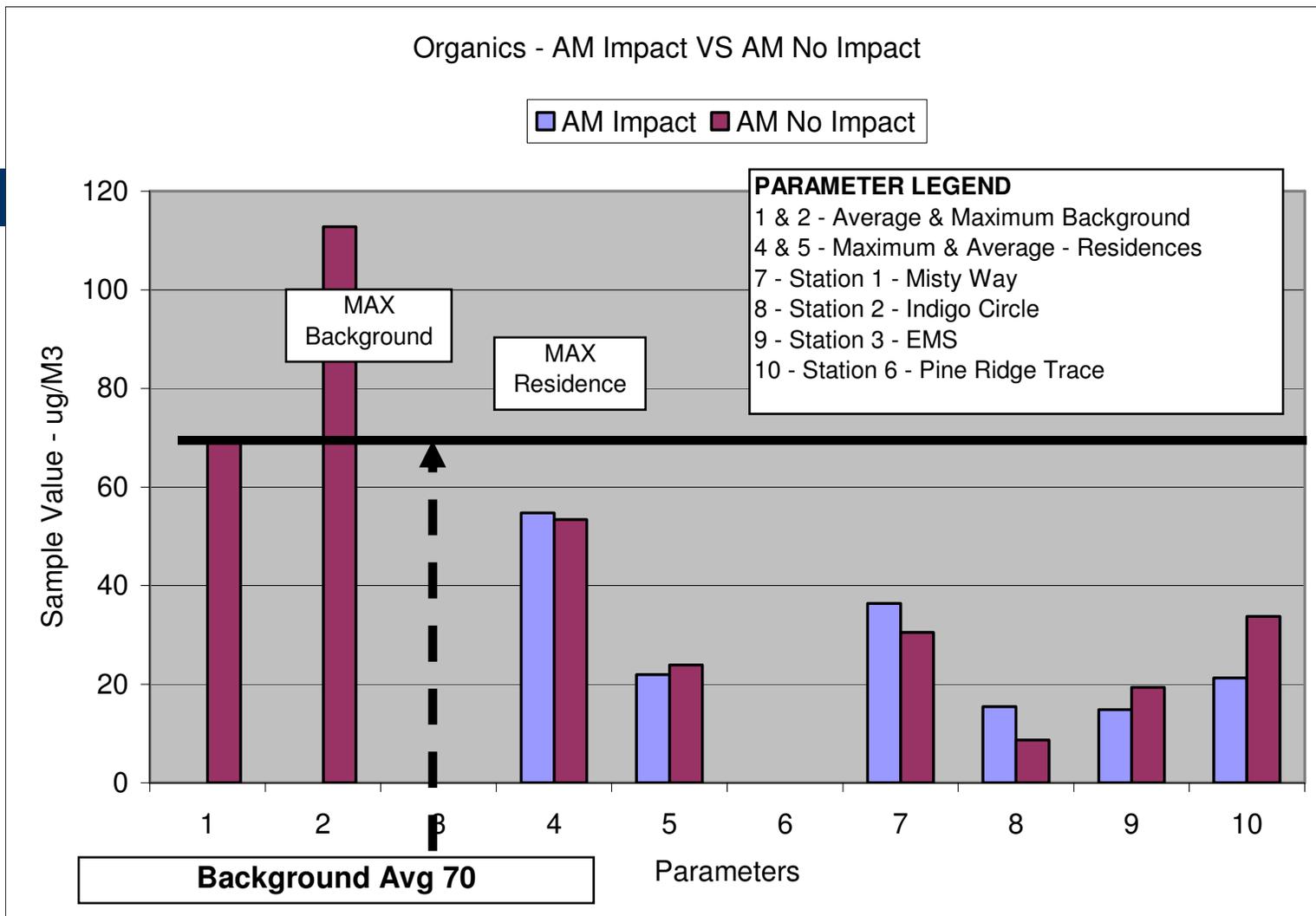
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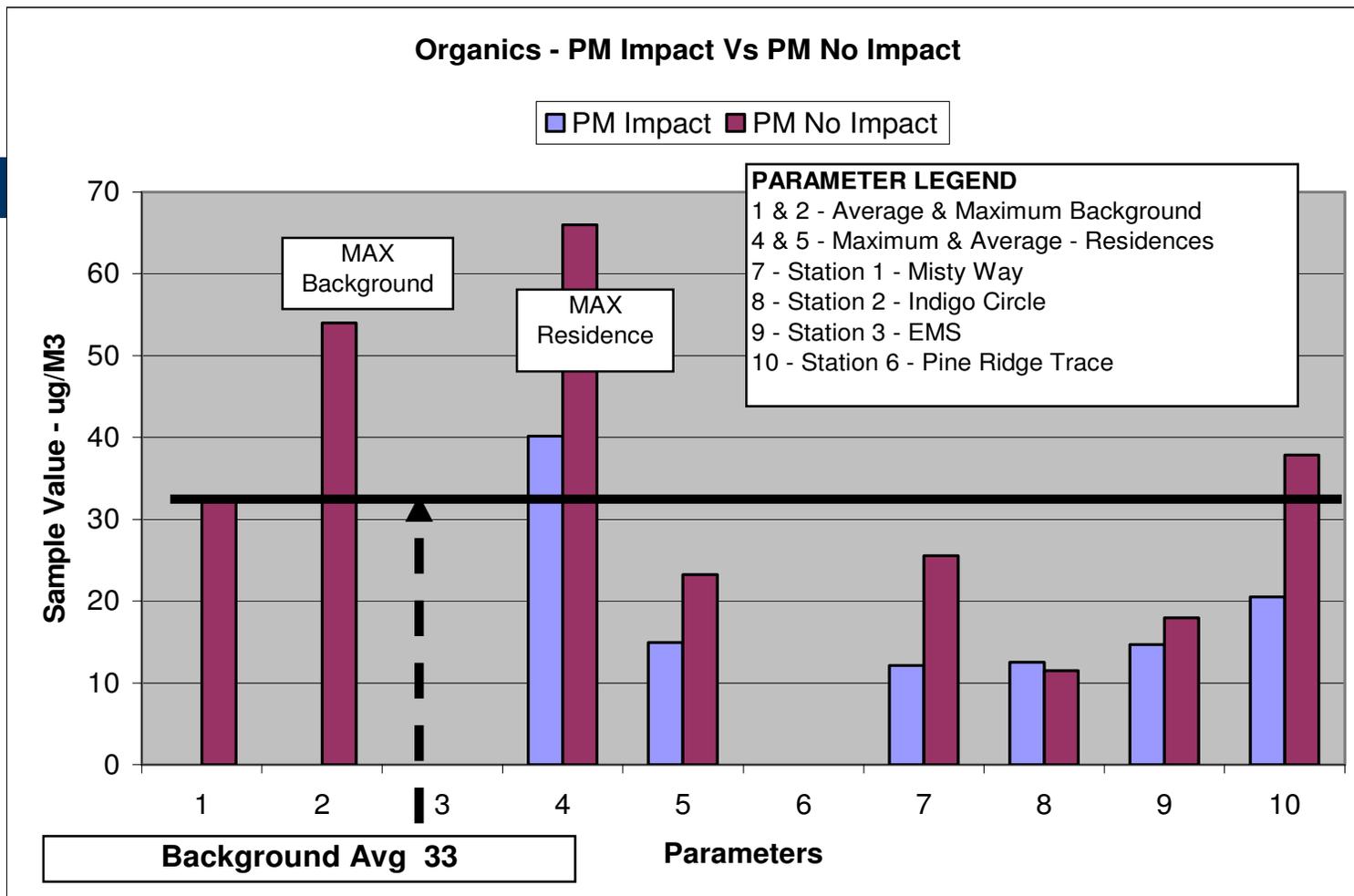
Organics - Day Vs Night





Organics - AM Impact VS AM No Impact





Conclusions – Organic Sampling

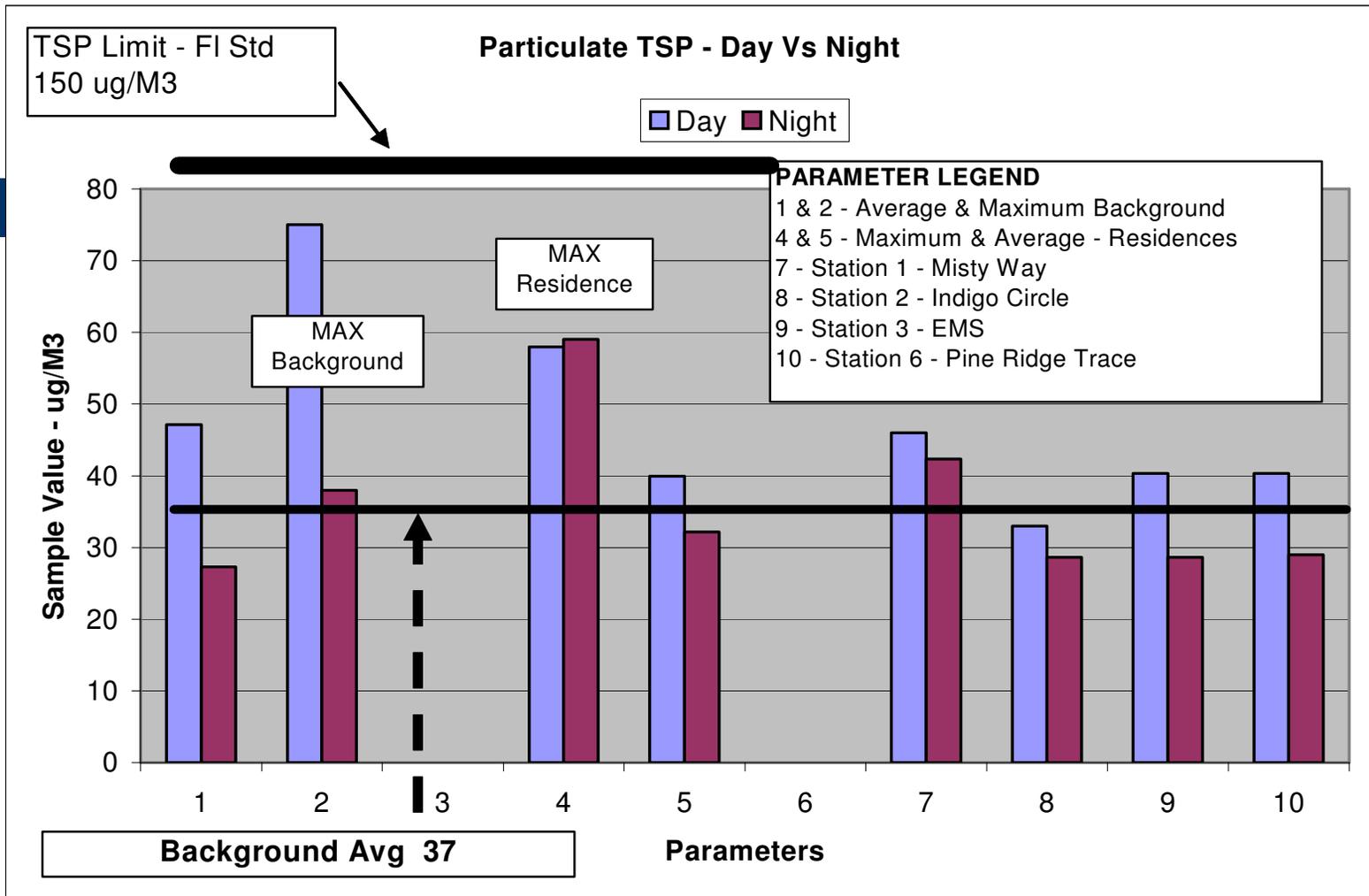
- Organic sample average values at airport sites were lower than the average background (Buck Destin Park and Harbor).
- Organic values at Misty Way and Pine Ridge Trace were higher than other airport sites for most sample days where airport impact was noted (but lower than background averages)
- Organic compounds observed that are related to jet fuel vapors and fireworks combustion products
- No organic compound exceeded any health standard

Results – Total Suspended Particulate Background

	City Background - TOTAL SUSPENDED PARTICULATE Average Values $\mu\text{g}/\text{M}^3$		
	Station 4 - Park	Station 5 - Harbor	Average Background
Total	27.0	47.5	37.3
Day	31.3	63.0	47.2
Night	22.7	32.0	27.3
	FLORIDA AIR STANDARD $150 \mu\text{g}/\text{M}^3$		

Results – Total Suspended Particulate Comparison Chart

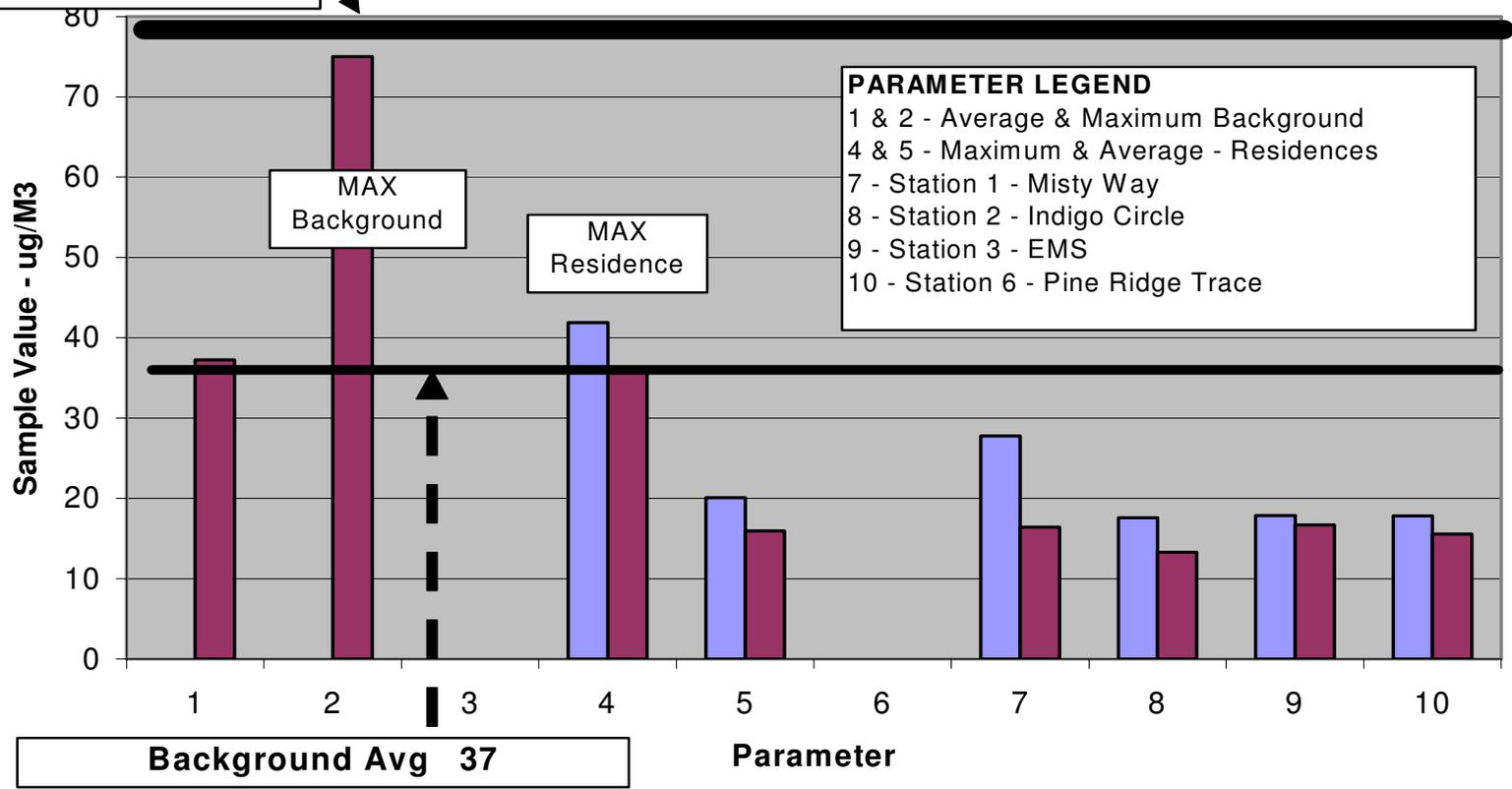
	City Background Comparison to Other Stations - TOTAL SUSPENDED SOLIDS (TSP) $\mu\text{g}/\text{M}^3$							
	Average Background	Maximum Background	Maximum At Residence	Average of Residences	Average at Individual Residence			
					Station 1 - Misty Way	Station 2 - Indigo Circle	Station 3 - EMS	Station 6 - Pine Ridge Trace
Day	47	75	58	40	46	33	40	40
Night	27	38	59	32	42	29	29	29
All Hours Airport Impact			42	20	28	18	18	18
All Hours No Airport Impact	37	75	36	16	16	13	17	16
AM Impact			35	20	25	20	19	18
AM No Impact	47	75	36	20	21	13	21	22
PM Impact			19	12	12	14	12	11
PM No Impact	27	38	42	20	30	15	17	18
	FLORIDA AIR STANDARD - 150 $\mu\text{g}/\text{M}^3$							

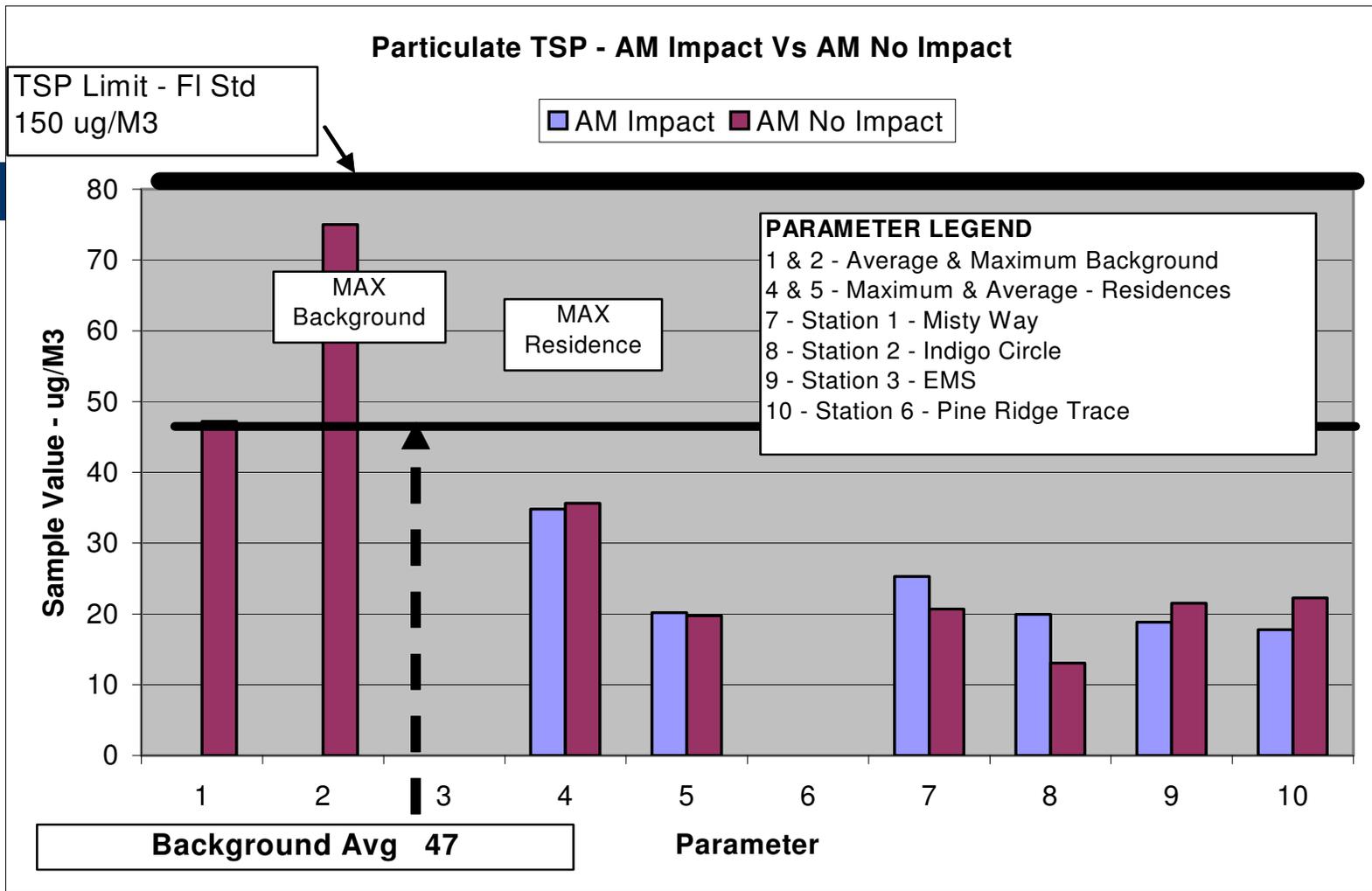


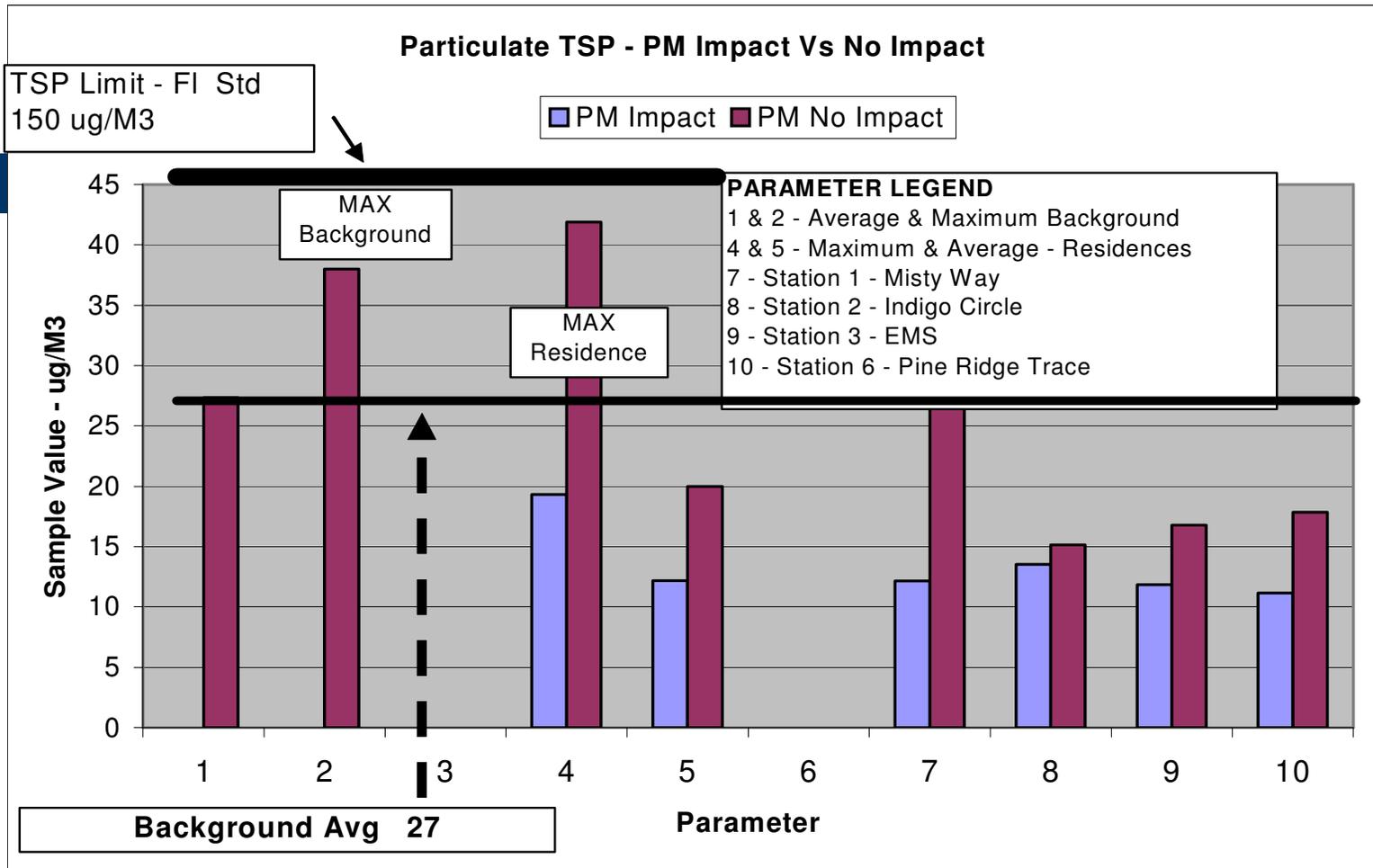
Particulate TSP - All Hr Impact Vs All Hr No Impact

TSP Limit - FI Std
150 ug/M3

■ All Hours Airport Impact ■ All Hours No Airport Impact







Conclusions – Total Suspended Particulate (TSP) Sampling

- TSP sample average values at airport sites higher during the day than night but were lower than the average background (Buck Destin Park and Harbor).
- TSP all hour airport impact sample average values at airport sites than all hour no-impact averages but were lower than the average background (Buck Destin Park and Harbor) for no-impact.
- Detected organic compounds were related to jet fuel vapors and fireworks combustion
- No organic compound exceeded any health standard

Conclusions – Organics Bar Charts

- Jet fuel contains hexane, toluene, and benzene
 - all were present in some of the airport sample sites
- No Tetraethyl lead present in any sample
- Fireworks emit hexane, carbon disulfide, toluene, and benzene (see US Army Ref. 3)
 - All were present in one or more airport samples
- Acetone was present in all samples
- No health standard was exceeded
- Benzene detected at one site only in the duplicate sample (Note – benzene above EPA IRIS risk level)

Conclusions – Organics Sampling

- Airport site averages am and pm below background
 - Misty Way and Pine Ridge Trace above background
 - Indicates potential airport operation impact on these locations
- Airport impact Organic compound levels were below Acetone was detected in the air from all sites during all periods
- Dust (Suspended Particulate) background air quality observed 18 to 75 ug/M³
 - [national average for PM10 - 150 ug/M³]
- Lead particulate – background air quality observed 0.0016 to 0.0092 ug/M³
 - [national average for lead particulate - 0.020 ug/M³]

Conclusions – Sampling Program

- Only 5 of the 109 organic chemicals were observed at multiple sites on multiple days and all were below national health standard levels
- Particulate lead was the only AVGAS chemical marker observed in any samples
- Airport Impact confirmed based on:
 - Particulate lead higher for downwind sites versus upwind sites
 - Total Suspended Particulate Comparison
- All Destin particulate lead levels are well below the ambient air quality standards (2.5 VS 1500) -600%