CP190040
Public Participation Meeting Report

C. W. Matthews Contracting Company
Big Creek Asphalt Plant

3561 Peachtree Parkway
Suwanee, Forsyth County, Georgia 30024

C. W. Matthews Contracting Company

1600 Kenview Drive

Marietta, GA 30061

November 7, 2019

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1.0 EXECUTIVE SUMMARY

Notification of the public participation meeting letters were mailed to all residents within 500' of Parcel 139 010. A list of recipients are listed in Table #1, and a copy of the Certificate of Mailing is located in Section 4.0 Supportive Documentation. Also, attached are copies of the letters that were mailed, these can also be found in Section 4.0 Exhibit A. Signs were posted by Forsyth County at the intersection of Granite Lane and Peachtree Parkway, and at the quarry entrance gate at the end of Granite Lane.

The public participation meeting was held at 5:00 PM on October 29, 2019 at Forsyth Conference Center at Lanier Technical College – Forsyth Campus, 3410 Ronald Regan Boulevard, Cumming Georgia 30041. A copy of the sign in sheet for the meeting is attached as Exhibit B in Section 4.0. The meeting concluded at approximately 6:45 PM. The following concerns were voiced during the meeting and in social media after the media:

- Notification requirements for the public participation meeting
- Smells
- Noise
- Height
- Truck Volumes
- 24/7 Operations
- Distance to Residential Dwellings
- Health Effects of Asphalt Plants
- Air Pollution
- Sewer Usages
- DRI Approval being Expedited
- Proximity to Residential Areas

2.0 COMPOSITE SUMMARY OF CONCERNS

Below are responses to the public concerns that were provided at the public meeting and that we have seen posted through social media.

2.1 Notification Requirements for Public Participation Meetings

The question was asked regarding the procedure for the public participation meeting notifications. We informed the resident that letters were sent to property owners located within 500’ from the parcel that was requesting the Conditional Use Permits and that Forsyth County posted signs in advance of the meeting. The residence did not believe that a 500’ distance was large enough for notification.

2.2 Smells

Residence were concerned with smells coming from the plant during operation. We are planning on installing additional filter medias and exhaust systems to capture smells from the production equipment.

2.3 Noise

Noise was a concern due to the night time production and truck traffic. The truck volume that is entering and exiting through Granite Lane will remain the same. The new plant will have variable speed motors, trunnion drives, belts versus chain driven drives. This will assist in reducing the decibel levels by 12-18 decibels. We are also replacing our beeping backup alarms with white noise alarms to reduce in noise levels. In addition we are adding baffles to the wheeled loaders exhaust system to reduce the engine noise.

2.4 Height

Residents were concerned they will be able to see the silos from the surrounding area. The height of the new plant and the existing plant are virtually the same heights. A balloon was installed at the height of the proposed silo to determine if the silo will be visible from the surrounding area. The balloon could not be seen at the intersection of Granite Lane and Peachtree Parkway, nor could it at the intersection of Granite Lane and Commerce Way.

2.5 Truck Volumes

Residents were concerned with additional truck traffic with the plant. The existing and proposed plants will have the same production capacities at 400 tons per hour. The trucks will also be entering and exiting the facility via Granite Lane for both the new and proposed facility.

2.6 24/7 Operations

The residents were concerned that the 24/7 operation would impact quality of life. The current plant has the capability to operate 24/7 currently. The existing facility is not a continuous operation facility, nor is the proposed. The times and days of operation are dictated by the weather and the project requirements. Certain projects will only allow us to pave during the night time hours.

2.7 Distance to Residential Dwellings

The residence were concerned with the distance of the asphalt plant to residential dwellings. The existing plant is located approximately 100' from residential dwellings. The proposed plant will be over 300' from residential dwellings with a tree buffer between them. Copies of the existing and proposed layouts are included in Section 3.0 Supportive Documentation Exhibits C&D.

2.8 Health Effects of Asphalt Plants

Health effects from asphalt plant was a major concern. At the public participation meeting we informed the residences that we would provide information with this report to be posted on the counties web site of the risks associated from an asphalt plant. In Section 4.0 we have included Meet the Neighbors, Exhibit E, This information is provided by the plant manufacturer about asphalt facilities. In addition we have included Emissions Comparison: Asphalt Pavement Mixture Plants and Select Source Categories, Exhibit F. This report compares asphalt emission to things the residents come into contact with on a daily bases. The International Agency for Research on Cancer (IARC) evaluated research on paving employees that come into direct contact with asphalt all day as part of the work. Based on the IARC's finding the asphalt was categorized as a Group 2B "Is Possibly Carcinogenic to Humans". Other Group 2B classifications include gasoline engine exhaust, coffee, and cell phones. All items that the residence come into contact with in their daily lives. Please be advised that the study was conducted on individuals with direct contact with asphalt paving, the residences would be located approximately 400' away.

2.9 Air Pollution

The residences have been concerned about air pollution at the public participation meeting and on social media. The asphalt plant would be permitting through the Georgia Department of Natural Resources Environmental Protection Division (EPD). The permit requires that the emissions be under certain levels for the combustible materials for the asphalt plant production and fugitive dust for aggregate materials handling. The EPD requires testing to be completed after the asphalt plant begins production and every four years thereafter. A copy of the test results of a similar asphalt plant that has been operation for four years has been included in Section 4.0 Exhibit G. The test results were well below the minimum requirement of the EPD.

2.10 Sewer Usages

A concern that has been brought forward through social media after the public participation meeting is the amount of waste water that would be discharged into the county sewer system. Our asphalt plants do not use water as part of the production process, there for we would not be discharging wastewater into the county sewer system. The only water that we discharge to the sewer system is the restroom facilities for the 4-6 employees. At the proposed plant would not have the availability to tie into the county sewer system and is proposing to install a septic system for the restrooms.

2.11 DRI Approval being Expedited

An additional concern that has been brought up in social media is the expedited approval of the Developmental Regional Impact (DRI). The DRI was initiated with and expedited review due to the fact that there was an existing asphalt plant that was being relocated and would be the same size as the existing. The DRI is to review the availability of the existing infrastructure to accommodate a new development. A few of the items reviewed are the roads to access the property, water usage, sewer usage and the amount of waste material that would be generated for landfills.

2.12 Proximity to Residential Areas

The majority of the area areound the proposed location is CBD – Commercial Business District, Mine, and M-1 – Restrictive Industrial. The proposed parcel is currently zoned M-2 – Heavy Industrial. The zoning map for the proposed plant is shown in Exhibit H in Section 4.0.

3.0 APPLICANT REQUESTED ZONING CONDITIONS

We request that a 100’ undisturbed buffer be implemented on the south property line as shown on the Proposed Layout Exhibit D in Section 4.0.

4.0 SUPPORTIVE DOCUMENTATION

List of Supportive Documentation

Table #1 - List of Public Participation Letters Recipients
Exhibit A – Copies of Public Participation Letters Sent
Exhibit B – Copies of Certificate of Mailings for Letters
Exhibit C – Existing Plant Layout
Exhibit D – Proposed Plant Layout
Exhibit E – Meet the Neighbors
Exhibit F – Emissions Comparison: Asphalt Pavement Mixture Plants and Select Source Categories
Exhibit G – Compliance Test Report Hotmix Asphalt Baghouse
Exhibit H – Zoning Map
Exhibit I – Public Participation Power Point Presentation

Table #1 – List of Public Participation Letters Recipients

Parcel #	Name	Name 2	Address 1	Address 2
140 044	Jc Renaissance LLC		223 SAINT NICHOLAS CIR	SANDY SPRINGS GA 30327
140 003	Realco GA 001 LLC		194 SUMMERS ST	CHARLESTON WV 25301
140 059	Research Renaissance LLC	C/O Levin Prop Inc	223 SAINT NICHOLAS CIR	SANDY SPRINGS GA 30327 4983
139 259	Patrick J	Mcfadden	757 PEPPERVILLE AVE	JACKSONVILLE FL 32259
139 260	Lakepoint Meadow LLC		1080 SEALE DR	ALPHARETTA GA 30022
139 261	Vidyaa Balasubramaniyan &	Shanker Balakrishnan	3940 MADISON BRIDGE DR	SUWANEE GA 30024
139 262	Tal Tsfany &	Avital T Safani Hagit	3950 MADISON BRIDGE DR	SUWANEE GA 30024
139 263	Pia Holdings LLC		3960 MADISON BRG DR	SUWANEE GA 30024
139 264	Baiju Kolakulath &	Rekha Chathoth	3970 MADISON BRIDGE DR	SUWANEE GA 30024
139 265	Zhang Zuobin & Shihong Chen	C/O Tommy Tsang Cpa Assoc LLC	2000 CLEARVIEW AVE, STE 206	ATLANTA GA 30340
139 266	Dipen	Patel	3990 MADISON BRIDGE DR	SUWANEE GA 30024
139 267	Li	Ml	4010 MADISON BRG DR	SUWANEE GA 30024
139 268	Smart Holdings LLC		2495 MANOR VIEW	CUMMING GA 30041
139 269	Sunilkumar	Ramani	4030 MADISON BRIDGE DR	SUWANEE GA 30024
139 270	Qingxin	Wu	4040 MADISON BRIDGE DR	SUWANEE GA 30024
139 271	Yoonjin J	Hyun	4110 MADISON BRIDGE DR	SUWANEE GA 30024
139 272	139 272	Lorenz	4120 MADISON BRIDGE DR	SUWANEE GA 30024
139 273	Chunman	Yu	4130 MADISON BRIDGE DR	SUWANEE GA 30024
139 274	Rani Kumaran &	Senthil K Ganesan	2620 HERMITAGE DR	CUMMING GA 30041
139 275	Fang	Wang	1607 HEATHERLOCH DR	GASTONIA NC 28054 6450
139 276	Tao	Li	163 MAGNET	IRVINE CA 92618
139 294	Lakepoint @ Johns Creek	Townhome Asc Inc	2144 BUFORD HWY STE 110	BUFORD GA 30518
139 008	Jettison LLC		3350 RIVERWOOD PKWY, STE 750	ATLANTA GA 30339
139 255	Capkey Clifton Partners LLC		4401 NORTHSIDE PKWY STE 711	ATLANTA GA 30327
161 001	Woodland Partners Ltd	C/O Lee Hudson	780 JOHNSON FERRY RD STE 325	ATLANTA GA 30342

EXHIBIT A

COPIES OF PUBLIC PARTICIPATION LETTERS SENT

C. W. MATTHEWS CONTRACTING COMPANY
DRAWER 970
MARIETTA, GEORGIA 30061
TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Jc Renaissance LLC
223 SAINT NICHOLAS CIR
SANDY SPRINGS GA 30327

Re: Application Number CP190040

Dear Neighbor,

We would like to inform interested property owners that a Conditional Use Permit (CUP) application has been submitted to Forsyth County regarding property located off of Granite Lane. We are proposing to relocate our existing asphalt plant within the quarry property.

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Enclosed is a copy of the conceptual site plan depicting the subject property and the proposed project. Additional information about this application may be obtained at http://estatus.forsythco.com.

If you have any questions, comments or concerns, please contact me at 770-422-7520.

With kindest regards,

Brian Johnson, CPESC
Environmental Manager

Enclosures (2)

C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Realco GA 001 LLC
194 SUMMERS ST
CHARLESTON WV 25301

Re: Application Number CP190040

Dear Neighbor,

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MARIETTA, GEORGIA 30061

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October 16, 2019

Research Renaissance LLC
C/O Levin Prop Inc
223 SAINT NICHOLAS CIR
SANDY SPRINGS GA 30327 4983

Re: Application Number CP190040

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1080 SEALE DR
ALPHARETTA GA 30022

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Vidyaa Balasubramaniyan &
Shanker Balakrishnan
3940 MADISON BRIDGE DR
SUWANEE GA 30024

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October 16, 2019

Pia Holdings LLC
3960 MADISON BRG DR
SUWANEE GA 30024

Re: Application Number CP190040

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Rekha Chathoth
3970 MADISON BRIDGE DR
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C/O Tommy Tsang Cpa Assoc LLC
2000 CLEARVIEW AVE, STE 206
ATLANTA GA 30340

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Li
Ml
4010 MADISON BRG DR
SUWANEE GA 30024

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2495 MANOR VIEW
CUMMING GA 30041

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TELEPHONE (770) 422-7520
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October 16, 2019

Sunilkumar
Ramani
4030 MADISON BRIDGE DR
SUWANEE GA 30024

Re: Application Number CP190040

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Wu
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A public participation meeting will be held on October 29, 2019 at 5:00 p.m. at Forsyth Conference Center at Lanier Technical College - Forsyth Campus, 3410 Ronald Regan Blvd., Cumming GA 30041. This meeting is not the public hearing. Its purpose is to provide neighbors and interested parties the opportunity to meet with the applicant, ask questions and voice concerns regarding this application.

Enclosed is a copy of the conceptual site plan depicting the subject property and the proposed project. Additional information about this application may be obtained at http://estatus.forsythco.com.

If you have any questions, comments or concerns, please contact me at 770-422-7520.

With kindest regards,

Brian Johnson, CPESC
Environmental Manager

Enclosures (2)

C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

139 272
Lorenz
4120 MADISON BRIDGE DR
SUWANEE GA 30024

Re: Application Number CP190040

Dear Neighbor,

We would like to inform interested property owners that a Conditional Use Permit (CUP) application has been submitted to Forsyth County regarding property located off of Granite Lane. We are proposing to relocate our existing asphalt plant within the quarry property.

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C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Chunman
Yu
4130 MADISON BRIDGE DR
SUWANEE GA 30024

Re: Application Number CP190040

Dear Neighbor,

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C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Rani Kumaran &
Senthil K Ganesan
2620 HERMITAGE DR
CUMMING GA 30041

Re: Application Number CP190040

Dear Neighbor,

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C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Fang
Wang
1607 HEATHERLOCH DR
GASTONIA NC 28054 6450

Re: Application Number CP190040

Dear Neighbor,

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Enclosures (2)

C. W. MATTHEWS CONTRACTING COMPANY
DRAWER 970
MARIETTA, GEORGIA 30061
TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Tao
Li
163 MAGNET
IRVINE CA 92618

Re: Application Number CP190040

Dear Neighbor,

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Enclosures (2)

C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Lakepoint @ Johns Creek
Townhome Asc Inc
2144 BUFORD HWY STE 110
BUFORD GA 30518

Re: Application Number CP190040

Dear Neighbor,

We would like to inform interested property owners that a Conditional Use Permit (CUP) application has been submitted to Forsyth County regarding property located off of Granite Lane. We are proposing to relocate our existing asphalt plant within the quarry property.

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Brian Johnson, CPESC
Environmental Manager

Enclosures (2)

C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Jettison LLC
3350 RIVERWOOD PKWY, STE 750
ATLANTA GA 30339

Re: Application Number CP190040

Dear Neighbor,

We would like to inform interested property owners that a Conditional Use Permit (CUP) application has been submitted to Forsyth County regarding property located off of Granite Lane. We are proposing to relocate our existing asphalt plant within the quarry property.

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Environmental Manager

Enclosures (2)

C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Capkey Clifton Partners LLC
4401 NORTHSIDE PKWY STE 711
ATLANTA GA 30327

Re: Application Number CP190040

Dear Neighbor,

We would like to inform interested property owners that a Conditional Use Permit (CUP) application has been submitted to Forsyth County regarding property located off of Granite Lane. We are proposing to relocate our existing asphalt plant within the quarry property.

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Environmental Manager

Enclosures (2)

C. W. MATTHEWS CONTRACTING COMPANY

DRAWER 970

MARIETTA, GEORGIA 30061

TELEPHONE (770) 422-7520
FAX (770) 422-1068

October 16, 2019

Woodland Partners Ltd Partnership
C/O Lee Hudson
780 JOHNSON FERRY RD STE 325
ATLANTA GA 30342

Re: Application Number CP190040

Dear Neighbor,

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Brian Johnson, CPESC
Environmental Manager

Enclosures (2)

EXHIBIT B

COPIES OF CERTIFICATE OF MAILINGS FOR LETTERS

UNITED STATES POSTAL SERVICE®

Accountable Mail

Name and Address of Sender

Check type of mail or service
- ☐ Adult Signature Required
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery (COD)
- ☐ Insured Mail
- X Priority Mail
- ☐ Priority Mail Express
- ☐ Registered Mail
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation
- ☐ Signature Confirmation Restricted Delivery

U.S. POSTAGE PAID
ACWORTH, GA
30101
OCT 17, 19
AMOUNT
$3.28
R2306Y151885-05

USPS Tracking/Article Number	Addressee (Name, Street, City, State, & ZIP Code™)	Postage	(Extra Service) Fee	Handling Charge	Actual Value if Registered	Insured Value	Due Sender if COD	ASR Fee	ASRD Fee	RD Fee	RR Fee	SC Fee	SCRD Fee	SH Fee
1.	Jc Renaissance LLC 223 SAINT NICHOLAS CIR SANDY SPRINGS GA 30327													
2.	Realco GA 001 LLC 194 SUMMERS ST CHARLESTON WV 25301													
3.	Research Renaissance LLC C/O Levin Prop Inc 223 SAINT NICHOLAS CIR SANDY SPRINGS GA 30327 4983													
4.	Patrick J Mcfadden 757 PEPPERVILLE AVE JACKSONVILLE FL 32259													
5.	Lakepoint Meadow LLC 1080 SEALE DR ALPHARETTA GA 30022													
6.	Vidyaa Balasubramaniyan & Shanker 3940 MADISON BRIDGE DR SUWANEE GA 30024													
7.	Tal Tsfany & Avital T Safani Hagit 3950 MADISON BRIDGE DR SUWANEE GA 30024													
8.	Pia Holdings LLC 3960 MADISON BRG DR SUWANEE GA 30024													

Handling Charge - if Registered and over $50,000 in value

Adult Signature Required · Adult Signature Restricted Delivery · Restricted Delivery · Return Receipt · Signature Confirmation · Signature Confirmation Restricted Delivery · Special Handling

Total Number of Pieces Listed by Sender	Total Number of Pieces Received at Post Office	Postmaster, Per *(Name of receiving employee)*
8	8	Charles Howe

PS Form **3877**, January 2017 *(Page 1 of 2)*
PSN 7530-02-000-9098

Complete in Ink

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UNITED STATES POSTAL SERVICE

Accountable Mail

Name and Address of Sender

Check type of mail or service
- ☐ Adult Signature Required
- ☐ Priority Mail Express
- ☐ Adult Signature Restricted Delivery
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- ☐ Certified Mail
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1.	Baiju Kolakulath & Rekha Chathoth 3970 MADISON BRIDGE DR SUWANEE GA 30024													
2.	Zhang Zuobin & Shihong Chen C/O Tommy 2000 CLEARVIEW AVE, STE 206 ATLANTA GA 30340													
3.	Dipen Patel 3990 MADISON BRIDGE DR SUWANEE GA 30024													
4.	Li MI 4010 MADISON BRG DR SUWANEE GA 30024													
5.	Smart Holdings LLC 2495 MANOR VIEW CUMMING GA 30041													
6.	Sunilkumar Ramani 4030 MADISON BRIDGE DR SUWANEE GA 30024													
7.	Qingxin Wu 4040 MADISON BRIDGE DR SUWANEE GA 30024													
8.	Yoonjin J Hyun 4110 MADISON BRIDGE DR SUWANEE GA 30024													

Handling Charge - if Registered and over $50,000 in value

Adult Signature Required

Adult Signature Restricted Delivery

Restricted Delivery

Return Receipt

Signature Confirmation

Signature Confirmation Restricted Delivery

Special Handling

Total Number of Pieces Listed by Sender	Total Number of Pieces Received at Post Office	Postmaster, Per (Name of receiving employee)
8	8	Charles Howe

PS Form **3877**, January 2017 *(Page 1 of 2)* **Complete in Ink**

PSN 7530-02-000-9098

UNITED STATES POSTAL SERVICE

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Name and Address of Sender

Check type of mail or service

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- ☐ Adult Signature Restricted Delivery
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- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery (COD)
- ☐ Insured Mail
- X Priority Mail
- ☐ Priority Mail Express
- ☐ Registered Mail
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation
- ☐ Signature Confirmation Restricted Delivery

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Postma

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U.S. POSTAGE PAID
ACWORTH, GA
30101
OCT 17, 19
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R2306Y151885-05

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1.	139 272 Lorenz 4120 MADISON BRIDGE DR SUWANEE GA 30024			Handling Charge - if Registered and over $50,000 in value				Adult Signature Required	Adult Signature Restricted Delivery	Restricted Delivery	Return Receipt	Signature Confirmation	Signature Confirmation Restricted Delivery	Special Handling
2.	Chunman Yu 4130 MADISON BRIDGE DR SUWANEE GA 30024													
3.	Rani Kumaran & Senthil K Ganesan 2620 HERMITAGE DR CUMMING GA 30041													
4.	Fang Wang 1607 HEATHERLOCH DR GASTONIA NC 28054 6450													
5.	Tao Li 163 MAGNET IRVINE CA 92618													
6.	Lakepoint @ Johns Creek Townhome Asc Inc 2144 BUFORD HWY STE 110 BUFORD GA 30518													
7.	Jettison LLC 3350 RIVERWOOD PKWY, STE 750 ATLANTA GA 30339													
8.	Capkey Clifton Partners LLC 4401 NORTHSIDE PKWY STE 711 ATLANTA GA 30327													

Total Number of Pieces Listed by Sender	Total Number of Pieces Received at Post Office	Postmaster, Per *(Name of receiving employee)*
8	8	Charles Howe

Complete in Ink

UNITED STATES POSTAL SERVICE®

Accountable Mail

Name and Address of Sender

Check type of mail or service

- ☐ Adult Signature Required
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery (COD)
- ☐ Insured Mail
- X Priority Mail
- ☐ Priority Mail Express
- ☐ Registered Mail
- ☐ Return Receipt for Merchandise
- ☐ Signature Confirmation
- ☐ Signature Confirmation Restricted Delivery

UNITED STATES POSTAL SERVICE
0000

U.S. POSTAGE PAID
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OCT 17, 19
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USPS Tracking/Article Number	Addressee (Name, Street, City, State, & ZIP Code™)	Postage	(Extra Service) Fee	Handling Charge	Actual Value if Registered	Insured Value	Due Sender if COD	ASR Fee	ASRD Fee	RD Fee	RR Fee	SC Fee	SCRD Fee	SH Fee
1.	Woodland Partners Ltd Partnership C/O Lee 780 JOHNSON FERRY RD STE 325 ATLANTA GA 30342													
2.														
3.														
4.														
5.														
6.														
7.														
8.														

Handling Charge - if Registered and over $50,000 in value

Adult Signature Required

Adult Signature Restricted Delivery

Restricted Delivery

Return Receipt

Signature Confirmation

Signature Confirmation Restricted Delivery

Special Handling

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1	1	Charlee Howe

PS Form **3877**, January 2017 *(Page 1 of 2)*
PSN 7530-02-000-9098

Complete in Ink

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EXHIBIT C

EXISTING PLANT LAYOUT

Existing Site

9/20/2019, 11:12:22 AM

Forsyth County Boundary

Tax Parcels

1:4,514

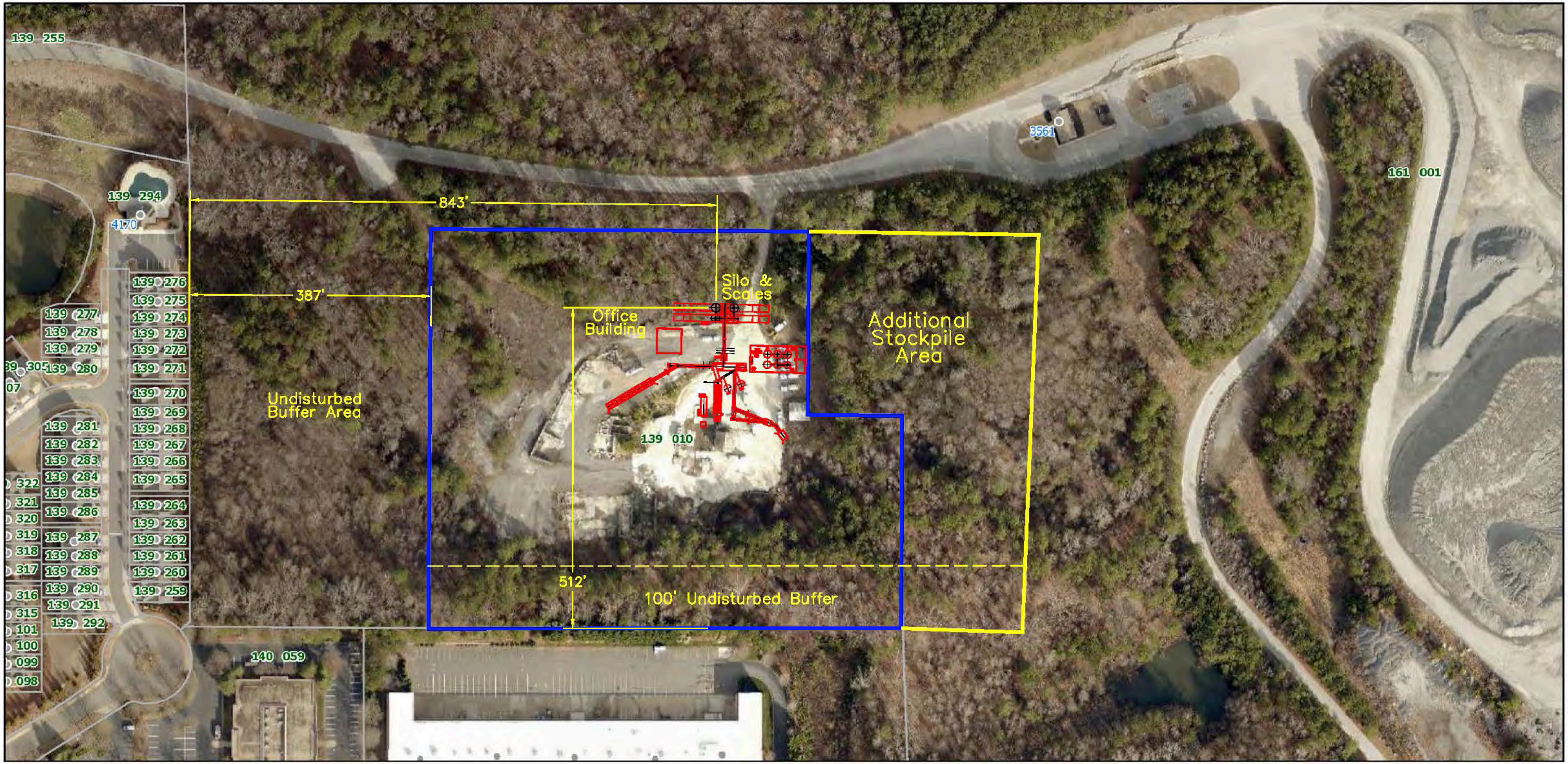
0 0.04 0.09 0.18 mi

0 0.05 0.1 0.2 km

EXHIBIT D

PROPOSED PLANT LAYOUT

Proposed Site



9/20/2019, 11:13:26 AM

Forsyth County Boundary

Tax Parcels

Site Address

1:2,257

0 0.02 0.04 0.09 mi

0 0.04 0.07 0.14 km

Web AppBuilder for ArcGIS

City of Johns Creek, GA, Forsyth County GIS, BuildingFootprintUSA, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA |

EXHIBIT E

MEET THE NEIGHBORS

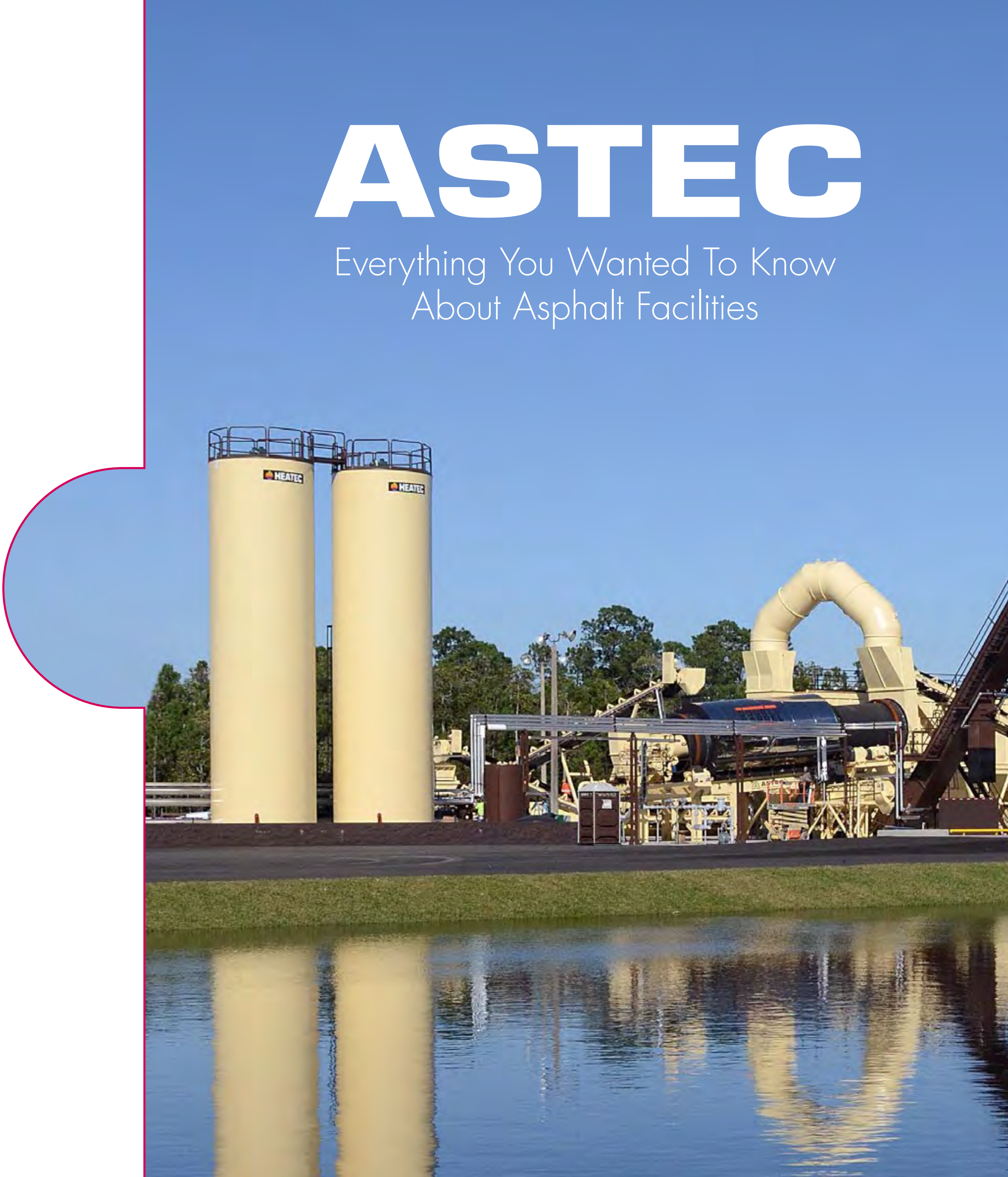
ASTEC

MEET THE NEIGHBORS

Everything You Wanted To Know About Asphalt Facilities

ASTEC

Everything You Wanted To Know
About Asphalt Facilities




ASTEC
ASTEC

ASTEC

WHAT IS

ASPHALTIC CEMENT?

Asphaltic cement is a highly viscous, black substance comprised of a complex mixture of hydrocarbons. Some asphaltic cement comes from natural asphalt lakes such as the La Brea Tar Pits. Most of the asphaltic cement used in road building is actually a by-product of crude oil refining. Asphaltic cement is the residual material remaining after lighter fractions, or grades of oils, have been distilled from crude oil. It can be further processed for use in paving mixtures or other industries such as roofing. Asphaltic cement is a thermoplastic, which means it is hard at ambient temperatures, but thick and sticky when heated. It may be referred to as “binder” or bitumen (a term commonly used outside North America). It is the material in pavement that coats aggregate and glues (or binds) the mix together. Eighty percent of the asphaltic cement used in the United States is for paving mixtures.

ASPHALT

IS TAR THE SAME AS ASPHALT CEMENT?

No. Tar is a black or brown mixture comprised of hydrocarbons and free carbon. It typically results from the destructive distillation of organic matter. Though it can be produced from petroleum, most often it is produced from coal as a by-product of coke production. It was once used to seal roadways, roofing shingles, and wooden ship hulls. However, since the 1970s, asphaltic cement has completely replaced the use of tar in paving mixtures.

WHAT IS ASPHALT PAVEMENT?

Pavement is a hard, smooth surface that facilitates vehicular and pedestrian transportation. It consists of a highly controlled mixture of asphaltic cement and aggregate. Prior to placement, this mixture is referred to as asphaltic concrete, or bituminous concrete. Mix can be further classified as Hot Mix Asphalt (HMA) or Warm Mix Asphalt (WMA) based on the mix temperature at which it is produced. Typical paving mixtures contain 95% aggregate and 5% asphaltic cement. Asphalt pavements produced at temperatures below 300°F are referred to as Warm Mix Asphalt (WMA). Paving mixtures produced at temperatures between 300°F and 350°F are termed Hot Mix Asphalt (HMA).

WHAT IS THE DIFFERENCE BETWEEN HMA AND WMA?

Hot Mix Asphalt is asphaltic concrete produced at mix temperatures of 300°F and higher. Warm Mix Asphalt is asphaltic concrete produced at mix temperatures below 300°F. WMA is produced by modifying the viscosity of the asphalt cement, typically by mechanically foaming the binder through water injection. This allows the mixing process to be conducted at lower temperatures. Production of WMA reduces energy consumption, which results in lower emissions.

ASTEC

HOW MANY ASPHALTIC CONCRETE FACILITIES **ARE IN THE UNITED STATES?**

According to the EPA industry estimates, there are approximately 4,000 asphaltic concrete production facilities operating throughout the country.

WHY ARE SO MANY **FACILITIES NEEDED?**

Considering how large the United States is, there really are not a lot of facilities. This amounts to only one facility per 950 square miles. Approximately 2.68 million miles of U.S. roadways are paved, ninety-four percent of which are surfaced with asphaltic concrete. Road maintenance and new construction projects require between 650 and 750 million tons of asphaltic concrete each year. Asphaltic concrete must be laid quickly after being loaded into the haul truck, because it hardens as it cools. Cooling occurs during transport from the facility to the paving site. The haul distance needs to be as short as possible to minimize the amount of heat lost during transport, because mixes become harder to lay down by a paving machine and compact with rollers as they cool. Ambient air temperature greatly effects how long the mix is "workable" and can be properly installed on the roadway. In addition, trucking is a large part of road maintenance and construction costs. Minimizing haul distances lowers road paving costs to the community.

FACILITIES

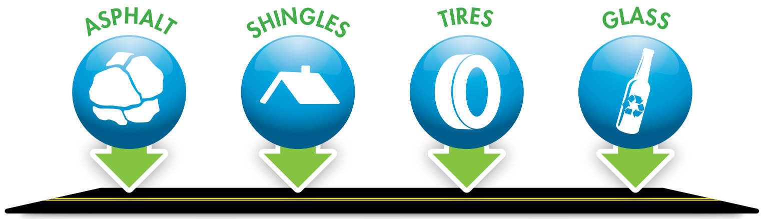
HOW IS ASPHALTIC **CONCRETE MADE?**

Aggregate is divided and placed into bins according to size. Depending on the mixture of aggregate called for, the bins automatically meter out the appropriate volume of each size needed onto a conveyor belt. The belt deposits the aggregate into a rotary dryer. This machine tumbles and veils the aggregate through hot air to dry it thoroughly. A fuel burner is located at one end of the drum to provide a flame for heat. It is necessary to remove the moisture from the aggregate so the asphaltic cement will adhere to the rock. Remember, water and asphalt do not mix. After drying, the aggregate is then coated with heated asphaltic cement and thoroughly mixed. Production of asphaltic paving mixtures does not entail harmful chemical reactions.

ASTEC

CAN ASPHALTIC CONCRETE PAVEMENT **BE RECYCLED?**

Asphaltic concrete pavement is completely recyclable. Before repaving an existing road, the upper asphaltic concrete surface is milled off. The removed material is called Reclaimed (or Recycled) Asphalt Pavement (RAP) and is added to new mix while it is being made at the asphaltic concrete facility. Recycling asphaltic concrete pavement reduces the quantity of new material required, lessens environmental impacts from the facility, and minimizes disposal of old pavement in community landfills. Asphaltic concrete pavement is the most widely recycled product in the U.S., both in terms of tonnage and percentage. Over 99% of asphaltic concrete pavement removed from roadways during maintenance is recycled each year. Other recyclable products, such as glass, rubber tires, and recycled asphalt shingles (RAS), are used in the production of hot mix asphalt. Paving mixtures containing RAP are referred to as recycled asphalt mix (RAM). Advances in technology are leading to increased RAP usage.



WHAT POLLUTANTS ARE EMITTED DURING **THE PRODUCTION PROCESS?**

The burners of most aggregate dryers run on fuel oils or natural gas. These fuels are hydrocarbons (compounds containing hydrogen and carbon atoms) and produce carbon dioxide (CO_2) and water (H_2O) during complete combustion. However, no actual combustion process ever completely burns all of the fuel. Thus, the exhaust stream will include water, particulate matter, products of combustion, and unconsumed nitrogen and oxygen molecules from the air. The products of combustion generally include carbon monoxide (CO), oxides of nitrogen (NOx), sulfur dioxide (SO_2), and hydrocarbons. These hydrocarbons can fall into several categories, including volatile organic compounds (VOCs). All of these pollutants are measured in the exhaust stream in parts per million (ppm). Pollutant emission rates depend on fuel type and aggregate source, as well as plant design. Modern asphalt facility burners are extremely efficient and, therefore, typically produce low emission rates.

VOC emissions may also result from heating the asphalt cement. Many of the compounds generated during the mixing process are incinerated by the dryer burner and are not exhausted into the atmosphere.

RECYCLING

IS ASPHALTIC CEMENT A TOXIC HAZARD TO **ANYTHING IN THE ENVIRONMENT?**

No. Asphaltic cement is insoluble and does not react with water. In fact, asphaltic concrete has been used to line surfaces of fish hatchery ponds and community water reservoirs. For example, the Metropolitan Water District of Southern California has used hot mix asphalt liners in its reservoirs for over four decades. Asphaltic cement is also used to seal potable water supply pipes. Another important use of asphaltic concrete is industrial retention ponds and landfill liners. Asphaltic liners prevent harmful substances from leaching into the soil and possibly contaminating ground water.

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IS AN ASPHALTIC CONCRETE FACILITY A LARGE SOURCE OF EMISSIONS?

No. In fact, studies show that emissions from the asphalt paving industry have decreased over 97% since 1970, despite a 250% increase in production. All emission concentrations from asphaltic concrete production facilities are well below the established threshold limit values set forth by the American Conference of Governmental Industrial Hygienists. The EPA delisted asphaltic concrete production facilities from the Maximum Available Control Technology standard in February, 2002, because such facilities are not major sources of air pollutants. The asphalt paving industry continues to develop new technologies to further minimize emissions during mix production and paving operations. Mix production facilities must be permitted through local or state air quality agencies. The permits establish operating limits for the facilities to strictly control emission rates generated during mix production in order to prevent degradation of ambient air quality.

WHAT IS "PARTICULATE MATTER"?

Particulate matter is a term used to denote microscopic liquid or solid particles much smaller than the diameter of human hair. Particle size is measured in microns, which is equal to one-millionth of a meter. Particulate matter results from the drying process at an asphaltic concrete production facility. In the case of such facilities, the particulate is almost entirely stone dust. Stone dust is a valuable part of the product that the facility owner does not want to lose. It is collected by a large air filtering unit called a baghouse and returned to the mixer for inclusion in the paving mixtures.

DO ASPHALTIC CONCRETE FACILITIES CAUSE CANCER?

Numerous agencies worldwide have conducted extensive testing on asphaltic cement fumes from paving and roofing applications. The International Agency for Research on Cancer classified asphaltic cement fumes from occupational exposure as Group 2B. This designation is used for substances, mixtures, and exposure circumstances for which there is limited evidence of carcinogenicity in humans. Other items designated as Group 2B include aloe vera (whole leaf extract) and cell phones (radio frequency electromagnetic fields).

The American Conference of Governmental Industrial Hygienists has designated asphalt cement fumes as A4, which are agents not classifiable as a human carcinogen due to lack of data indicating evidence of carcinogenicity.

IF THERE IS NO DANGER OF CANCER, WHY HAVE THERE BEEN SO MANY STUDIES?

Hundreds of tests have been conducted primarily because of the apparent similarity of asphalt to tar. What the tests have proven is that these are two completely different materials from completely different sources and with completely different health effects. Coal tar does have some harmful health effects. Those same effects have not been found to be associated with asphaltic cement.

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CLEAN AIR

WHAT IS A BAGHOUSE?

A baghouse is a large air filtering device that removes particulate matter from the aggregate drying process in an asphaltic concrete production facility. A large fan on the outlet end of the baghouse pulls dust-laden air from the drying drum into the filter unit. Hundreds of long cylindrical cloth bags hang in rows within the filter section. The air is pulled through the bags and dust particles collect on the bags' outer surface. Filtered air is released into the atmosphere through the exhaust stack. Collected dust is periodically removed from the bags and conveyed to the mixer to be added to the asphalt pavement mixture. Baghouses filter out virtually all of the particulates from the air stream (over 99.9%). The Clean Air Act states that asphaltic concrete production facilities cannot emit more than 0.04 grains (grain = 1/7000th of a pound) of particulate matter per dry standard cubic foot of air. Most baghouses routinely emit less than half of the federal allowable particulate matter. Many states have enacted particulate emission standards for asphaltic concrete facilities that are more stringent than the Clean Air Act.

ARE ASPHALTIC CONCRETE FACILITIES EMISSIONS REGULATED?

The Clean Air Act of 1990 requires that all stationary emission sources obtain air permits in order to operate, including asphaltic concrete production facilities. An air permit contains the operating conditions that must be met by the facility. Particulate emissions and opacity are regulated on a federal basis, though many state and regional air quality agencies have implemented tighter requirements. Individual states and local authorities regulate other pollutants, including the products of combustion. Facilities must maintain extensive records to demonstrate compliance with those regulations. This includes production and fuel consumption rates from which emission levels can be calculated. Failure to comply with operating permit conditions results in fines and/or facility shut down.

ARE ASPHALTIC CONCRETE FACILITIES TESTED?

Federal requirements in the Clean Air Act mandate that all permitted emission sources must be stack tested within 180 days of startup. Many states require testing in as little as 60 days after initial startup. Subsequent testing requirements are determined by individual states and permitting authorities. For example, some states require yearly testing, while others may only require the initial test, as long as permit operating conditions are met.

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WHERE CAN ASPHALTIC CONCRETE FACILITIES BE LOCATED?

While zoning ordinances vary significantly across the U.S., most facilities must be placed on property zoned for industrial usage. In addition, the majority of facilities must obtain special land use permits. Such permits contain specific requirements with which the facility must comply. These mainly include operating hours and noise levels to name a few.

WHAT CAUSES THE ODORS ASSOCIATED WITH THE PRODUCTION OF ASPHALTIC CONCRETE?

The most common odor detected at an asphaltic concrete facility comes from the hydrocarbons driven off the liquid asphalt cement at elevated temperatures. Overheating materials during the drying process is the primary cause. As fuel has become more and more expensive, most owners and operators have become more aware of the cost of overheating materials and have learned to control temperature with greater precision. The fumes, known as “blue smoke,” have a characteristic petroleum-type odor. Blue smoke forms as the hydrocarbons condense in the ambient air. Its formation is highly dependent on temperature and the facility configuration. Minimizing opportunities for the fumes to enter the ambient air and lowering mix/storage temperatures decreases odor levels from the facility. Odors are largely eliminated during the production of WMA, because the mix temperature is lower than the boiling point of the hydrocarbons.

PERMITS

WHAT ARE THE DIFFERENT TYPES **OF FACILITIES IN USE TODAY?**

Modern asphaltic concrete facilities fall into two categories: batch and drum mix facilities. As the name implies, batch facilities make individual batches of material. All the ingredients for the batch are fed into a mixer. When mixing is complete, the mixer is emptied, most often into a waiting haul truck. Batch facilities usually have smaller hourly production capacities than drum mix facilities. They are suitable for small production runs or frequent changes in mix type.

Drum mix facilities operate on a continuous basis. The mix is stored in storage silos and discharged into haul trucks as needed. They can be either parallel-flow or counterflow, which is an indication of the material flow versus the airflow within the drum. Material moves in the same direction as the airflow in a parallel-flow drum, whereas the material moves against the airflow in a counterflow drum. Modern drum mix facilities almost exclusively include counterflow drums, because they use less fuel and generate lower hydrocarbon emissions than parallel-flow drums.

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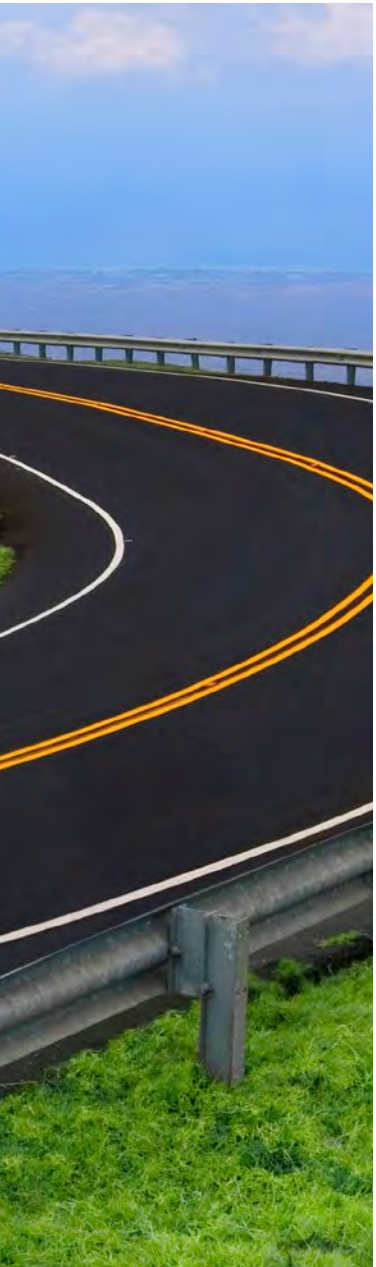
ARE ALL PAVEMENTS THE SAME?

No. Asphaltic paving mixtures are designed according to the traffic they will handle. Therefore, an interstate paving mixture will be very different from one used for a residential driveway. Differences may include types and sizes of aggregate, as well as the grade of liquid asphalt cement selected. Additionally, some paving mixtures may contain various recycled products, while others are comprised entirely of virgin materials.

IS THE BINDER USED IN PAVEMENT THE SAME AS IN ROOF APPLICATIONS?

No, though they are both by-products of petroleum refining. Paving asphaltic cement is typically softer and more pliable than roofing asphaltic cement. Also, liquid cement at asphaltic concrete production facilities is not heated to temperatures as high as in roofing applications. That means that emissions and odors produced by paving operations are lower and not the same compound species as those produced by roofing operations.

PAVEMENT



CAN ASPHALTIC CONCRETE BE USED FOR ANYTHING OTHER THAN ROADWAYS?

Yes! Asphaltic concrete is used in a variety of applications. Because it is a non-toxic, impermeable material, asphaltic concrete is commonly used to line fish hatchery ponds, commercial water reservoirs, landfills, and industrial retention ponds. It is also used to pave recreational paths (for running & bicycling), golf cart paths, airport runways, and tennis courts. Asphaltic concrete has been used in commercial livestock applications, such as paving feedlots and lining barn and poultry house floors for easy cleaning. Additional uses include creation of sea walls and dikes to manage beach erosion. Specially designed permeable paving mixtures are increasingly being used to manage storm water. These porous pavements allow water to drain through them. Contaminants on the surface are drawn though the mixture where they are filtered through a rock sub-base, thus using natural processes to cleanse the water.

WHAT CAUSES NOISES ASSOCIATED WITH THE PRODUCTION OF ASPHALTIC CONCRETE?

There are a few common sources of noise emanating from a hot or warm mix facility. Some are derived directly from the mix production components, including the burner and exhaust fan. Others are generated from movement of the product, including trucks and loaders. Recent advancements in asphalt mix production equipment design have drastically reduced sound levels. Astec has worked to reduce sound from the mix process by providing quieter components in a facility. Likewise, some facility owners have initiated on-site quiet operations and practices for movement of the product. It is often possible to participate in conversations using normal speaking tones while adjacent to most facility components at new facilities.

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WHAT HAPPENS
IF THE ASPHALTIC CEMENT SPILLS?

Asphaltic cement is hard at ambient temperatures and liquid only when heated. It is kept hot at an asphaltic concrete production facility so that it can be mixed with the aggregate to form pavement. Should the asphaltic cement spill onto the ground, it will quickly harden because it is no longer being heated. Once completely set, it can be picked up and disposed of. For additional safety, asphalt storage tanks, as well as the facility fuel tanks, are typically set-up within a concrete wall to contain spills should they ever occur.

WHAT EQUIPMENT MAKES UP AN
ASPHALTIC CONCRETE FACILITY?

There are several components found at asphaltic concrete production facilities, whether they are a batch or continuous mix plant. Aggregate is separated according to size and fed, usually by a front-end loader, into cold feed bins. These bins are used to meter the virgin aggregate to the dryer. The dryer is used to drive off the surface moisture and heat the aggregate in preparation for mixing with the asphaltic cement. Mixing may occur within a variety of devices, depending on the type of facility. Environmental controls include a baghouse, which is typically preceded by a primary collector such as a cyclone or inertial separator. Dust augers return the collected particulate matter to the mixer. Liquid asphalt cement is stored in heated tanks that are connected via piping to the mixer. Finished mix is held in storage silos, which are typically insulated and heated to maintain product temperature until it is loaded into a haul truck. Mix can often be stored for days before discharge.

WILL AN ASPHALTIC CONCRETE FACILITY
AFFECT GROUNDWATER?

No. Asphaltic concrete production facilities do not generate industrial wastewater, because water is not required during the production process. Storm water discharge permits and retention ponds may be required in some locations to handle runoff from rainfall. Stack emissions from a facility do not contaminate groundwater.

COMPONENTS

WILL THIS FACILITY AFFECT **MY PROPERTY VALUE?**

Most asphaltic concrete production facilities are located within community regions zoned for industrial use, away from residential land uses. On occasion, such facilities may be constructed near residential properties. Many erroneous claims of dramatic property devaluation abound on the Internet based on a flawed "study" conducted by an environmental organization. However, legitimate studies conducted by licensed real estate professionals in communities across the United States consistently show that the installation of an asphaltic concrete production facility in a community does not cause a decrease in surrounding land use property values. In fact, many neighborhoods have been built adjacent to existing facilities.

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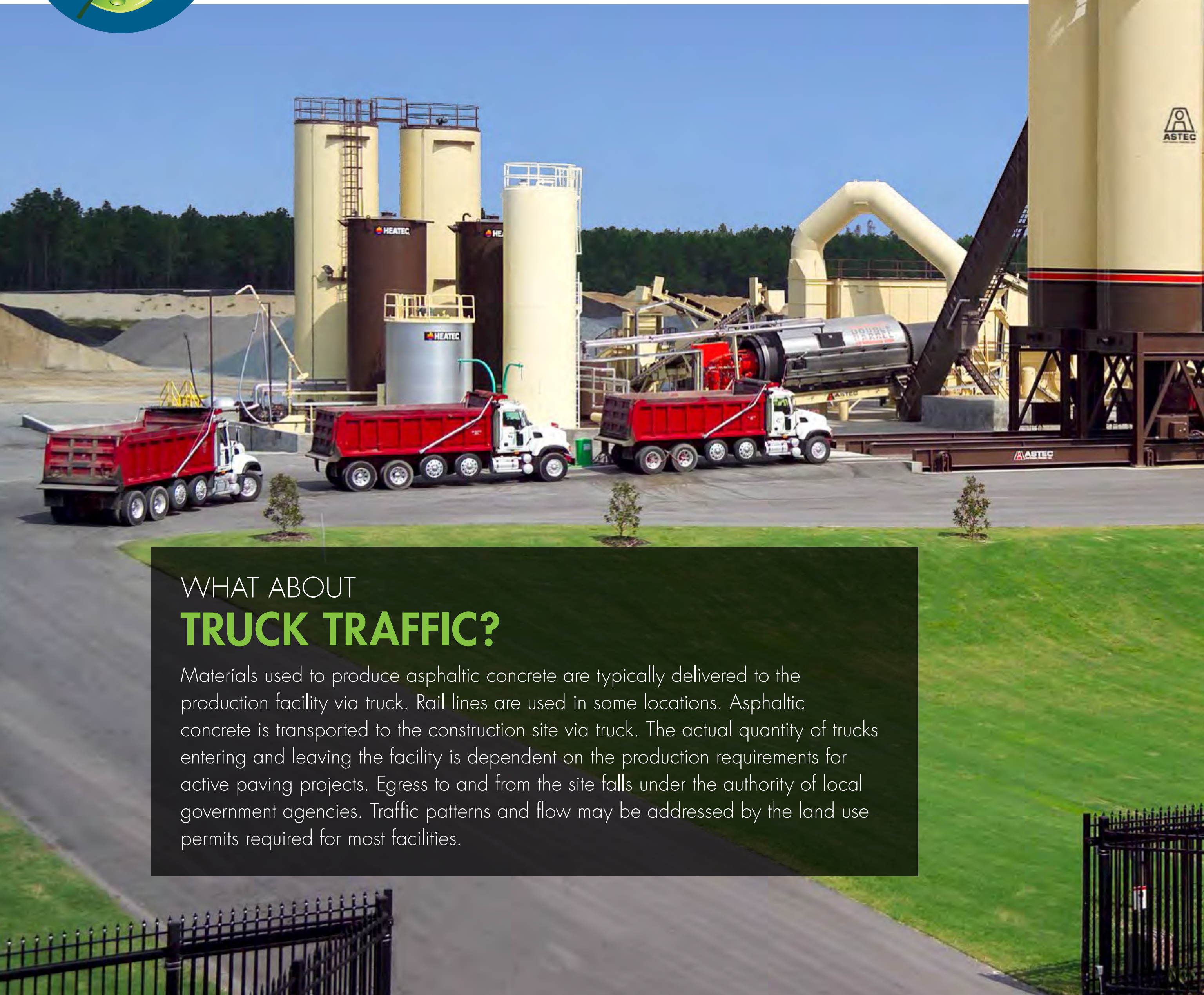

WHAT ABOUT

TRUCK TRAFFIC?

Materials used to produce asphaltic concrete are typically delivered to the production facility via truck. Rail lines are used in some locations. Asphaltic concrete is transported to the construction site via truck. The actual quantity of trucks entering and leaving the facility is dependent on the production requirements for active paving projects. Egress to and from the site falls under the authority of local government agencies. Traffic patterns and flow may be addressed by the land use permits required for most facilities.

PRODUCTION

DO ASPHALTIC CONCRETE FACILITIES **OPERATE CONTINUALLY?**

No. Though asphaltic concrete production facilities can operate on a continual basis, mix production is highly dependent on weather conditions and product demand for paving projects. Facilities operate at their highest capacity during the summer, when paving conditions are most favorable. Facilities located in temperate climates may operate year-round, while those located in colder climates shut down during winter months. Routine equipment maintenance is typically scheduled during the shut down. Some facilities may operate at night, as many paving projects on busy thoroughfares must occur when there will be the least commuter impact.

WHAT ARE SOME **BENEFITS OF ASPHALTIC CONCRETE?**

There are many benefits to using asphaltic concrete. Road construction and reconditioning projects can be completed faster and at lower cost when paving with asphaltic concrete. Studies show that asphalt pavements have a lower life cycle cost (cost of installation and maintenance over the life of the product) than Portland cement concrete pavement and are engineered to last decades with little to no maintenance. This generates savings to taxpayers for road construction and maintenance projects in a community. Asphaltic concrete pavements are smoother to drive on, which results in greater fuel efficiency, less vehicular wear and tear, and a quieter ride.


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Please contact Astec Engineering at 423.867.4210
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EXHIBIT F

EMISSIONS COMPARISON: ASPHALT PAVEMENT MIXTURE PLANTS AND SELECT SOURCE CATEGORIES

SANBORN HEAD

Building Trust. Engineering Success.

EMISSIONS COMPARISON: ASPHALT PAVEMENT MIXTURE PLANTS AND SELECT SOURCE CATEGORIES

Prepared for the National Asphalt Pavement Association

File No. 4197.02

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List of Abbreviations

APM	Asphalt Pavement Mixture
AQIA	Air Quality Impact Assessment
CHIEF	EPA Clearinghouse for Inventories and Emission Factors
CO	Carbon Monoxide
EPA	U.S. Environmental Protection Agency
NAPA	National Asphalt Pavement Association
NHEXAS	National Human Exposure Assessment Survey
NO_x	Nitrogen Oxides
NYSERDA	New York State Research and Development Authority
PAH	Polycyclic Aromatic Hydrocarbons
PM	Particulate Matter
SO_x	Sulfur Oxides
THC	Total Hydrocarbons
VOC	Volatile Organic Compounds

1.0 INTRODUCTION AND SUMMARY

The purpose of this report is to evaluate emissions and air quality impacts from asphalt pavement mixture (APM) plants, providing comparisons to other sources of air pollutant emissions commonly found in both urban and rural areas. The report updates and expands preceding work. In September 2001, Clayton Group Services (Clayton) released a study sponsored by the National Asphalt Pavement Association (NAPA) that compared air emissions from a continuous drum APM plant (having an annual production of 200,000 tons) to air emissions emitted from seven common source categories: residential fireplaces, residential wood stoves, bakeries, gasoline filling stations, barbeque grills, lawn mowers, and fast-food restaurants. Following their study, Clayton summarized their findings in a document titled "Emission Comparison: Continuous Drum Asphalt Plant and Selected Source Categories" (The Clayton Report), which used available emission factors, combined with available activity data to calculate emission estimates from an APM plant and each source category. Using these emission estimates, Clayton quantified the impacts of an APM plant by comparing the APM plant emission estimations to the number of sources in each category that had comparable calculated emissions (*i.e*, 13 residential fireplaces, 12 gas filling stations, *etc.*).

To obtain emission factor data, Clayton conducted searches through the U.S. Environmental Protection Agency's (EPA) AP-42 emission factor data, as well as related references. Where U.S. EPA data did not exist, Clayton performed searches into peer reviewed literature, journal articles, and state-sponsored emission studies. Clayton recognized that sources outside of the U.S. EPA were potentially not as reliable; however, they were still useful to provide adequate data to perform emission estimation calculations and comparisons.

The Clayton Report was developed as a tool to help interpret the magnitude of emissions from a typical APM plant, with a goal of developing information to assist in community-based discussions on local environmental issues. As such, the document has been a reliable reference since its publication in 2001.

In September 2017, Sanborn, Head & Associates Inc. (Sanborn Head), at the request of NAPA, performed a review of the Clayton report. We reviewed the report for accuracy and provided any updates and/or corrections that had occurred since its original issuance in September 2001. Throughout our review, we found that some updated emission factor data had become available in the past 15 years as there had been a push to make sources "cleaner" and reduce pollutant emission rates from many sources. Additionally, since 2001, more source categories had been introduced into communities as interest had expanded into different consumer products. While most, if not all, of the source categories investigated in 2001 are still common sources, and are still useful in comparison studies, there are several "new" source categories that are of interest today. We found that with the addition of new source categories there came an increase of air emissions and possibly "new" pollutants that were not investigated in 2001. We compiled our information in 2017 and built upon the original Clayton report, updating previous data as appropriate and adding a new source category (breweries) for comparison. Table 1 provides a summary of the changes to emission factors and comparisons. We also added a section on air quality impacts from APM plants and exposure comparisons to key pollutants associated with APM plants. These new sections are intended to provide better perspective on potential exposure to pollutants released from APM plants. This report thus serves as an update and expansion of the Clayton Report. The following sections will describe our review of the methodology of the Clayton Report and our approach to updating or improving assumptions and calculations.

2.0 EMISSION ESTIMATES

The emission comparison methodology involves several steps. First, emissions are evaluated from a "typical" APM plant. Other common candidate source categories that emit similar pollutants to APM plants are considered and literature searches conducted to identify emission factors and activity data. Finally, the emission factors and activity data for each category are used to determine annual emissions for comparison to emissions from a typical APM plant. In deriving annual emission estimates for each source category, an attempt is made to develop the number of the sources similar to the emission levels from a typical APM plant. That approach in essence showed the number of sources in each category that would have emissions comparable to emissions from an asphalt plant (for example: 20 residential fireplaces, two gas filling stations, three fast-food restaurants).

To acquire data for the analysis, information searches included the U.S. EPA's Clearinghouse for Inventories and Emission Factors (CHIEF) on the U.S. EPA Technology Transfer Network, U.S. EPA's home page information sources function, California South Coast Air Quality Management District home page information sources function, and the U.S. EPA Research Triangle Park library. Where possible, U.S. EPA references are used (such as AP-42 document sections, Locating & Estimating documents, and other laboratory research reports) to enhance the uniformity and credibility of the results. These references tend to base emission estimates on a larger data set than would a journal article or a government-sponsored emissions study.

Emission estimates were determined for each source category by combining emission factors with reasonably available activity data (throughput, consumption, *etc.*). With one exception, emission factors for the various source categories were obtained from U.S. EPA publications and were based on multiple source measurements. The one exception is the selected emission factor for fast food restaurants, which came from a peer-reviewed journal and was based on data from one source test.

In conducting the updated report, we found that most of the U.S. EPA's emission factors used in the Clayton Report remain valid, though the U.S. EPA has made minor updates to numerous emission factors for continuous drum APM plants. References cited by Clayton were investigated to evaluate any updates and/or additions that may have been made since 2001. We were able to find most of the original referenced documents and validate the data used in the Clayton Report, and noted that very few of the original documents had been updated. Therefore, we performed a further investigation to determine whether any additional literature reviews or government sponsored emission studies were available that published reliable emission factor information. Relevant data were found for fast food restaurants and auto refueling. All updates and/or changes are reflected in source-specific report sections and tables.

We expanded three parts of the original investigation: 1) we considered additional source categories not evaluated in the original report; 2) we considered additional pollutants that may not have been thoroughly investigated or compared against in the original report; and 3) we conducted a screening level air quality impact assessment to evaluate the potential exposure of pollutants from an APM plant relative to typical indoor and outdoor background air quality (see Section 4.0). As a result, we added breweries as a new source to investigate as they have recently become very popular in communities and are operated and frequented throughout all seasons. Of the additional pollutants we investigated, formaldehyde was of increased interest as it has recently garnered a lot of attention from the U.S. EPA and is now a common pollutant to investigate when performing air emission evaluations. PAHs were investigated to further understand any additional impacts that they may have in a community. With these additions, additional emission estimate calculations were performed and compared to the calculated emission estimates of an APM plant.

Asphalt Pavement Mixture Plants

The Clayton Report referenced a draft AP-42 Section 11.1 for APM plants, but U.S. EPA (2004) had finalized the section by the September 2001 report date. As such, the final Clayton Report did not account for some changes in the final AP-42 Section 11.1 for APM plants. Upon review, small adjustments were necessary in the overall emission table for APM plants, and these changes are reflected in Table 1 of this updated report. Also, in late 2000, the U.S. EPA published an *Emission Assessment Report* for Hot-Mix Asphalt Plants to help characterize the emissions from the production of APM. The report included emission factor tables for an oil-fired drum mix plant, and broke emissions into two categories; drier stack emissions and several types of fugitive emissions. While the Clayton Report did not reference the U.S. EPA's Assessment Report, there was an attempt to implement the U.S. EPA's method of including fugitive emissions in the calculations for the criteria pollutants. It appears only dryer stack emissions were considered in the calculations for all other pollutants listed in the report. Evaluating the information provided by the U.S. EPA and comparing it to the information from the Clayton Report, it is clear that in most situations, the addition of the fugitive emissions does not have a large impact on the overall calculated emissions. In some cases, however, the fugitive emissions play a greater role and increase the overall calculated emission by factors of two or more.

For simplicity and consistency, we adopted the emission estimates developed by the U.S. EPA (2000) in characterizing a typical APM plant. Table 2 provides the updated APM plant emissions, and also provides overall (stack plus fugitive) emission comparisons with the original Clayton Report. The ratios of U.S. EPA: Clayton emissions reflect the degree of similarity or difference between the two sources. Many of the ratios are near unity, indicating no significant difference or change between the finalized U.S. EPA *Emission Assessment Report* and the Clayton Report. Ratios for some pollutants, however, differ substantially from one another. For a few pollutants, notably particulate matter (PM) and benzene, ratios less than one indicate that emissions in the U.S. EPA *Emission Assessment Report* are lower than those assumed in the Clayton Report. For pollutants such as toluene and most PAHs, however, the Clayton Report assumed lower emissions than presented in the U.S. EPA *Emission Assessment Report*.

We conducted a similar review and update of emission estimates for the other source categories APM plants are compared against. The text and information presented in many of the following sections came directly from the original Clayton Report, but we edited or expanded based upon new information. Additionally, a section for breweries was added due to an increase of information and relevancy found in our research.

For simplicity, use of Clayton in the following sections refers to the work of the original 2001 emissions comparison report.

Residential Fireplaces

Clayton used the AP-42 emission factor for residential fireplaces to calculate emissions from residential fireplaces and assumed an average wood use per household from a U.S. EPA-sponsored wood stove study from November 1987. We reviewed the AP-42 emission factors referenced, and agree with both the emission factor, and the assumption made on wood use, as we found no updates since 2001. However, we did make one correction in the emission factor table issued by Clayton. The PM_{10} emissions for 13 households presented by Clayton were incorrect by a factor of ten. The calculated emissions are 0.485 tons/yr based on the emission factor used. Table 3 provides a compilation of the emission estimates for residential fireplaces. Using the most recent emission estimates for a typical APM plant, we found that the corrected emission estimation comparison between an APM plant and the number of households with fireplaces should be 20, based on the revised VOC emission total for an APM plant from the U.S. EPA *Emission Assessment Report*.

We added emission comparisons for two additional pollutants to Table 3 using information from the literature we identified in 2017, which supplements U.S. EPA AP-42 data. Li (2007) reports a formaldehyde emission factor of 1.94 lb/ton wood for wood stoves (which we judge equally applicable to fireplaces). Additionally, we use an arsenic mass fraction of 6.6 mg/kg measured in wood ash (NYSERDA, 2013) in combination with the PM emission factor of 34.6 lb/ton wood to derive an arsenic emission factor of 0.000228 lb/ton wood.

Residential Wood Stoves

Similar to the references and assumptions made for emissions from a fireplace, Clayton used the same wood use per household and the appropriate AP-42 emission factor to calculate emissions from residential wood stoves. We confirm and agree with the assumptions made as the emission factors have not been updated since 2001, and we were not able to find any additional research regarding annual household wood usage. We did, however, find discussion of the improvements made on wood stoves in the past 15 years. New residential wood stoves likely release substantially less particulate matter (and possibly other pollutants) than reflected in the current AP-42 emission factors.

Notwithstanding, there have been no recent updates to AP-42, and the use of emission factors from non-catalytic wood stoves to calculate emissions for criteria pollutants, PAHs, and metals, combined with the use of emission factors from conventional wood stoves to calculate emissions from organic pollutants, is still relevant when comparing emissions from residential wood stoves to an APM plant. Table 4 summarizes the emission factors and calculations for residential wood stoves. We added an available TOC emission factor and set the number of households in Table 4 to 19 to match emissions of benzene to those of an APM plant.

We also performed additional research to enhance the credibility of results. For example, we found a 2007 Canadian study of five conventional wood stoves citing emission factors of particulate matter (PM) and carbon monoxide (CO) similar in magnitude to the published AP-42 values. Specifically, Li (2007) found average PM and CO emission factors of 17.8 lb/ton and 204.8 lb/ton, respectively, which are quite comparable to the AP-42 emission factors of 19.6 lb/ton (PM) and 140.8 lb/ton (CO). The mean benzene emission factor of 1.660 lb/ton measured by Li (2007) is also similar to the 1.938 lb/ton AP-42 emission factor.

Emission comparisons were added to Table 4 for two additional pollutants using information from the literature to supplement AP-42 data. Li (2007) reports a formaldehyde emission factor of 1.94 lb/ton wood. Additionally, we used an arsenic mass fraction of 6.6 mg/kg measured in wood ash (NYSERDA, 2013) in combination with the PM emission factor of 19.6 lb/ton wood to derive an arsenic emission factor of 0.000129 lb/ton wood.

One caveat on both the Li (2007) study and the AP-42 emission factors is that they reflect data from older vintage wood stoves. The average measured PM emission rate in the Li (2007) study of 21 g/hr is considerably greater than the 4.5 g/hr limit that U.S. EPA set for certification on stoves sold after May 15, 2015 (U.S. EPA, 2015). Even prior to this compliance date, most wood heaters on the market were capable of meeting the 4.5 g/hr limit, based on test certification data collected after U.S. EPA established initial New Source Performance Standards (NSPS) in 1988 (U.S EPA, 2017a).).

Examining the PM emission factors from AP-42 and the Li (2007) study in contrast with the NSPS and certification data, we believe that AP-42 emission factors for wood stoves may overestimate PM emissions for most wood stoves sold in the past few decades. We thus advise caution in the use of emissions comparisons between wood stoves and asphalt pavement mixture plants with respect to PM. We are not aware of emissions data on other pollutants that can be used to evaluate the relevancy of AP-42 emission factors to current and recent wood stove models, though conjecturally, one would expect trends for PM-associated pollutants such as PAHs and arsenic to be similarly lower than in AP-42, assuming that the composition of particles generated during combustion is similar in old and new stoves.

Bakeries

Clayton developed an emission estimation comparison between an APM plant and one medium sized commercial bakery (based on annual bread production). The annual production of bread used in the calculations was 17,308 tons of bread baked per year and the emission factor was obtained from an AP-42 support document. We confirm the accuracy of the approach that was taken in the bakery comparison and agree that the emission calculation is a conservative estimation of the VOC emissions derived from bread baking at one medium sized bread bakery. Table 5 summarizes the calculations. We caution, though, that comparisons with bakery emissions be made with clarity. The medium-sized bakery considered in the calculations is sizable and representative of a commercial enterprise that produces about 95,000 pounds of bread per day, which is considerably larger than a typical neighborhood bakery.

Barbeque Grills

Clayton's TOC emission factor for barbeque grills was obtained from a non-U.S. EPA document that we reviewed and remains valid today. We performed additional investigation to find a more relevant emission factor, but nothing applicable was found. Table 6 summarizes the emission calculations for barbecue grilling, which are based on a grill cooking time of 30 minutes and use of the grill 20 times per year. Using these two assumptions, TOC emissions from an APM plant are comparable to 336 households using barbeque grills.

Lawn Mowers

The lawn mowers used in the Clayton emission estimation are 2-stroke, gasoline powered mowers. The emission factors were obtained from a document titled "Emission Study Report for Non-Road Engines and Vehicles" (U.S. EPA, 1991) and are expressed as gram of pollutant per horsepower-hour (g/hp-hr). We concur with the reasonableness of the assumptions made in the Clayton Report regarding approximate hours of operation per year (50 hours) and the use of horsepower rating at 30% load. Emission calculations are summarized in Table 7 and are presented for 211 lawnmowers to match the emissions of TOC from a typical APM plant. We added additional emission factors for CO, NO_x, and SO_x to Table 7 (also obtained from the U.S. EPA (1991) document).

However, an important caveat regarding the calculations for lawn mowers is the lessening relevance of the emission factors. The U.S. EPA developed stringent emission limits for nonroad engines that have been phased in over time such that new lawn mowers now release roughly 50 times lower hydrocarbons, two times lower CO, and 30–100 times lower PM than the models considered by Clayton at the time of the original report. Even allowing for the gradual replacement of old lawn mowers with new ones, aggregate emissions from lawn mowers have likely decreased substantially, making the emissions comparisons for TOC and PM much less relevant than in the past. As CO emissions have only dropped by a factor of 2, the Clayton Report's comparisons for aldehydes (another product of incomplete combustion) likely remain of greater contemporary relevance.

Auto Refueling

Upon review of the Clayton Report section on auto refueling, we identified more recent information from the U.S. EPA (2008) to update emission estimates. AP-42 section 5.2, issued in June 2008, provided estimates of VOC emissions from auto refueling in its Table 5.2-7. Assuming typical Stage 1 and Stage 2 controls, VOC emissions from (i) filling the underground storage tank, (ii) breathing and emptying of the underground tank, (iii) vehicle refueling, and (iv) spillage total 372 mg/l. Assuming the same throughput of 50,000 gal/month, we added a total VOC emission estimate equal to:

$$\text{VOC emissions} = \left(\frac{372\text{ mg}}{\text{l}}\right)\left(\frac{3.7854\text{ l}}{\text{gal}}\right)\left(\frac{50000\text{ gal}}{\text{mo}}\right)\left(\frac{12\text{ mo}}{\text{yr}}\right)\left(\frac{\text{lb}}{453600\text{ mg}}\right)\left(\frac{\text{ton}}{2000\text{ lb}}\right) = 0.93\ \frac{\text{ton}}{\text{yr}}$$

AP-42 section 5.2 states that TOC emissions are essentially the same as VOC emissions.

Recent measurements of the composition of gasoline vapors (Chin & Batterman, 2012) indicate that gasoline vapors contain 5.4% benzene, 13.5% toluene, 2.7% ethylbenzene, and 12.0% xylenes (by mass). Multiplying these percentages by the total VOC emissions estimate yields annual emissions estimates of 0.05 tons benzene, 0.13 tons toluene, 0.025 tons ethylbenzene, and 0.11 tons xylenes from a typical filling station (summarized in Table 8a).

The original emission estimates for auto refueling (filling stations) are reproduced in Table 8b based on the methodologies in the Clayton (2001) report. Table 8a estimates have been labeled as revised based on the dependence on more recent data. However, the revised estimates also depend on two sources of data, introducing some additional uncertainty. Hence, the original emission estimates in Table 8b remain valuable for comparison in gauging the level of uncertainty.

Fast Food Restaurants

Clayton constructed emissions estimates for fast food restaurants based on a published paper on emissions from meat cooking (Rogge *et al*., 1991) and interviews of a local fast-food restaurant chain to determine an average annual meat consumption. In our review, we found emission factors from fast food restaurants were difficult to quantify as there were not a lot of available or consistent data on emission factors and emission estimation calculations. The restaurant chain Clayton contacted owned eight (8) franchise restaurants. The emission factors referenced were for TOC and various PAHs. As a result, Clayton calculated emission estimations based off an approximation of pounds of hamburger cooked in a week. We verified the calculations based on the assumptions made in this approach, and the calculations of emissions are summarized in Table 9a. We also did additional research into available fast food restaurant data. We found a document published by the U.S. EPA (Lee, 1999) that quantified emissions from Street Vendor Cooking Devices (charcoal grilling) in Mexico. The study measured levels of PM, VOCs, aldehydes, CO, NO_x, THC, and other pollutants. The study concluded that emissions of PM and organic pollutants were the result of cooking meat (charcoal did not contribute to the emissions). Using the emission factors listed in the Lee (1999) study we performed alternative calculations for comparison against the original Clayton estimates. Table 9b presents calculations based on the alternative emission factors. Despite originating from a study of charcoal cooking (in a less controlled cooking environment), the TOC and total PAH emission factors that overlap with Table 9a are within a factor of 2 of the original estimates (though 60–80% higher). Allowing for some potential overestimation by the alternative emission factor method in Table 9b, the new estimates afford emission factors for additional pollutants not available in the original Table 9a estimates.

It is important to note that the estimations in Tables 9a and 9b may be inaccurate for at least three reasons: 1) only hamburger was considered when performing emission calculation estimations; 2) there were no control devices considered when performing these calculations; and 3) neither set of measurements from meat cooking was collected from fast food restaurant style cooking. Many restaurants may employ some sort of control (besides venting) as well as have additional food items listed on their menu. Also, the assumed amount of hamburger in the calculations may be overestimated, but this compensates for the lack of consideration of a diversified menu.[1] Based on these factors, we view the two sets of estimates as providing some information on the degree of uncertainty inherent in the calculations.

3.0 NEW EMISSION COMPARISONS

Clayton developed a comparison of air pollution emissions for various source categories based on specific pollutants or groups of pollutants. The pollutants that Clayton used for comparison include the following: TOCs, VOCs, PM, toluene, benzene, PAHs, benzo[*b*]fluoranthene, benzo[*a*]pyrene, fluoranthene, and pyrene. We added some additional pollutants to this list, as reflected in Tables 3 though 9b. We also developed an additional source category (breweries), described as follows.

Breweries

As beer brewing has become an increasingly popular endeavor, more literature and documentation have become available on emissions generated at both large- and small-scale brewing operations. In 1996, the U.S. EPA published VOC emission factors emitted during different parts of the beer brewing process. The U.S. EPA listed the numerous VOC emission sources during the beer brewing process, including but not limited to the following: mash tuns, cereal cookers, brew kettles, hot wort settling tanks, yeast storage, fermenters, grain holding tanks, and packaging operations. To obtain an overall VOC emission factor for comparison to APM plants, we added the emission factors for all the processes into one emission factor totaling 44.4 lb/1000 bbl for small-scale breweries (producing less than 60,000 barrels of beer (bbl) annually).[2] Using the VOC emission factor, we calculated emission estimations for small-scale breweries and compared those to the VOC emissions from an APM plant. We discovered that the annual VOCs from an APM plant are comparable to about four small-scale commercial breweries (assuming an annual production of 60,000 barrels of beer). In making a comparison, a small commercial brewery would emit about

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[1] The Clayton Report assumes that a fast food restaurant cooks 146,692 lbs of meat (hamburger) per year. As another estimate on the amount of "meat" processed, there are reported to be 14,146 McDonald's restaurants in the U.S. (Statista, 2017)) and these restaurants use one billion lbs/yr of beef (Lubin & Badkar, 2011). So the amount of beef used by the average restaurant is 1,000,000,000 lbs / 14,146 = 70,691 lb/yr, which is about half the amount assumed in the Clayton Report. But there has been no accounting for the cooking of anything else on the menu, so the Clayton estimate might be reasonable for total food cooked.

[2] It should be noted that the definition of a "small" brewery varies widely among different trade groups, but the U.S. EPA threshold of 60,000 bbl is used in this report.

27% of the VOCs released by an APM plant (assuming the brewery produced 60,000 bbl/yr). Calculations for the brewery source category are included in Table 10.

Emissions Summary

Table 11 summarizes emission comparisons for various pollutants released from APM plants and the different selected source categories that were investigated. The table includes all the pollutants from the Clayton report and three that we added (arsenic, ethylbenzene, and toluene). As previously discussed, we have also included the "Fast Food Restaurant — Alternative" and "Gasoline Filling Stations — Revised" source categories that use different approaches to estimating emissions. In these cases, differences from the original estimates based on the Clayton (2001) methodologies are mostly thought to reflect uncertainty in the emission estimates.

4.0 EXPOSURE COMPARISONS FOR PARTICULATE MATTER, FORMALDEHYDE, PAHS AND BENZENE

Pollutant emissions that impact people to the greatest degree often occur indoors and outdoors near ground level. In both cases, dilution/dispersion processes are limited, and exposure levels can be elevated relative to other pollution sources. Several examples of typical, elevated exposures to pollutants are presented based on published measurements and information. Typical air pollutant concentrations that result under common conditions are compared to the concentrations of pollutants likely to result from emissions from a typical APM plant.

We extended emission comparisons to examine relative *exposures* to particulate matter, formaldehyde, polycyclic aromatic hydrocarbons (PAHs), and benzene, as these contaminants are commonly found in the indoor air of homes due to indoor emission sources. Particulate matter is released from many sources including household dust, cooking, and wood burning in fireplaces and wood stoves. Formaldehyde is a common component of resins used in building products such as pressed board, and off-gassing from new construction can lead to indoor air concentrations 10–100 times above typical outdoor levels. PAHs are a product of incomplete combustion and are emitted indoors through the use of wood burning stoves and cook stoves (gas or electric). Benzene is present in gasoline, and homes with attached garages have been found to have concentrations elevated above outdoor levels. All of these chemicals are also found in cigarette smoke and in the byproducts of combustion sources (such as cooking and heating sources, burning candles, *etc.*).

Screening Level Air Quality Impact Assessment

A screening-level air quality impact assessment (AQIA) was conducted to estimate worst-case air quality impacts of particulate matter, formaldehyde, PAHs, and benzene from a typical APM plant. Projected air quality impacts serve as a better estimate of air pollutant exposure than simple quantification of emissions. Although site-specific conditions for an individual APM plant may differ from the assumptions used in our analysis, the conservative assumptions built into screening-level methods tend to overestimate (bias high) projected air quality impacts. Thus, the results are generally applicable as a conservative estimate of exposure to pollutants within close proximity to an APM plant.

Air toxics emissions data for APM plants are obtained from the U.S. EPA (2000) *Emission Assessment Report*. The emission estimates are based on a typical drum mix plant fired by natural gas producing 200,000 tons of APM per year. Emissions from loadout, yard activities, asphalt cement storage tank venting, and APM silo venting are combined as fugitive emissions. Fugitive emissions, by dint of elevated temperatures and distributed from various points, are assumed to be spread through volume source 40 feet in height and length and 150 feet in width, with an average release height of 20 feet.

Screening-level dispersion modeling using the U.S. EPA SCREEN3 model (as implemented in the Lakes Environmental (2017) SCREEN View freeware) is used to estimate worst-case 1-hour average impacts of these four air pollutants. Ground-level air quality impacts are estimated at a location 1,000 feet from the dryer stack, unless indicated otherwise. Drier stack emissions are modeled as a point source using the following parameters for a typical APM plant, as culled from stack test reports and communications with equipment vendors:

- A drier stack height of 30 feet, adjacent to a baghouse approximately 12 feet wide, 70 feet long, and 27 feet high; and
- A stack diameter of 4 feet, with effluent at a temperature of 240°F and velocity of 57 fps (feet per second).

Exposure Comparisons

Results of the air quality impact assessment were compared to average U.S. background concentrations predicted in the 2011 National Air Toxics Assessment (U.S. EPA, 2017b) and expected indoor air quality to determine the relative impact that emissions from an APM plant have on the surrounding community. The results for particulate matter, formaldehyde, PAHs, and benzene are presented below.

Particulate matter (PM) is regulated by U.S. EPA based on the particle size based on the knowledge that particles smaller than 10 μm aerodynamic diameter (PM_{10}) are "respirable" and penetrate deep into the respiratory tract, and particles smaller than 2.5 μm ($PM_{2.5}$) can reach the alveoli (air sacs) where oxygen and carbon dioxide exchange with the blood occurs. Various studies indicate greater concern over the potential adverse health effects of $PM_{2.5}$ in ambient air.

To evaluate the potential particulate matter impacts of APM plant emissions, we consider releases of PM_{10}, which both includes and overestimates $PM_{2.5}$. The screening-level air dispersion modeling predicts a PM increase of 0.3 $\mu g/m^3$ in ambient air due to APM plant emissions at a distance of 1,000 feet from the dryer stack. This represents a 4% increment to the average level of $PM_{2.5}$ of 8 $\mu g/m^3$ present in ambient air in the United States.[3] In the absence of indoor sources, PM levels in homes and offices tend to be lower than outdoor

[3] EPA's on-line air trends report (U.S. EPA, 2017c)indicates an average $PM_{2.5}$ concentration of 7.8 $\mu g/m^3$ in the U.S. in 2016 (which rounds to 8 $\mu g/m^3$).

levels. However, certain sources, such as cigarette smoking and cooking, lead to higher levels. As an example, a recent study of homes heated by wood stoves found an average $PM_{2.5}$ level of 29 μg/m³ in indoor air (Semmens *et al.*, 2015). Figure 1 compares these values.

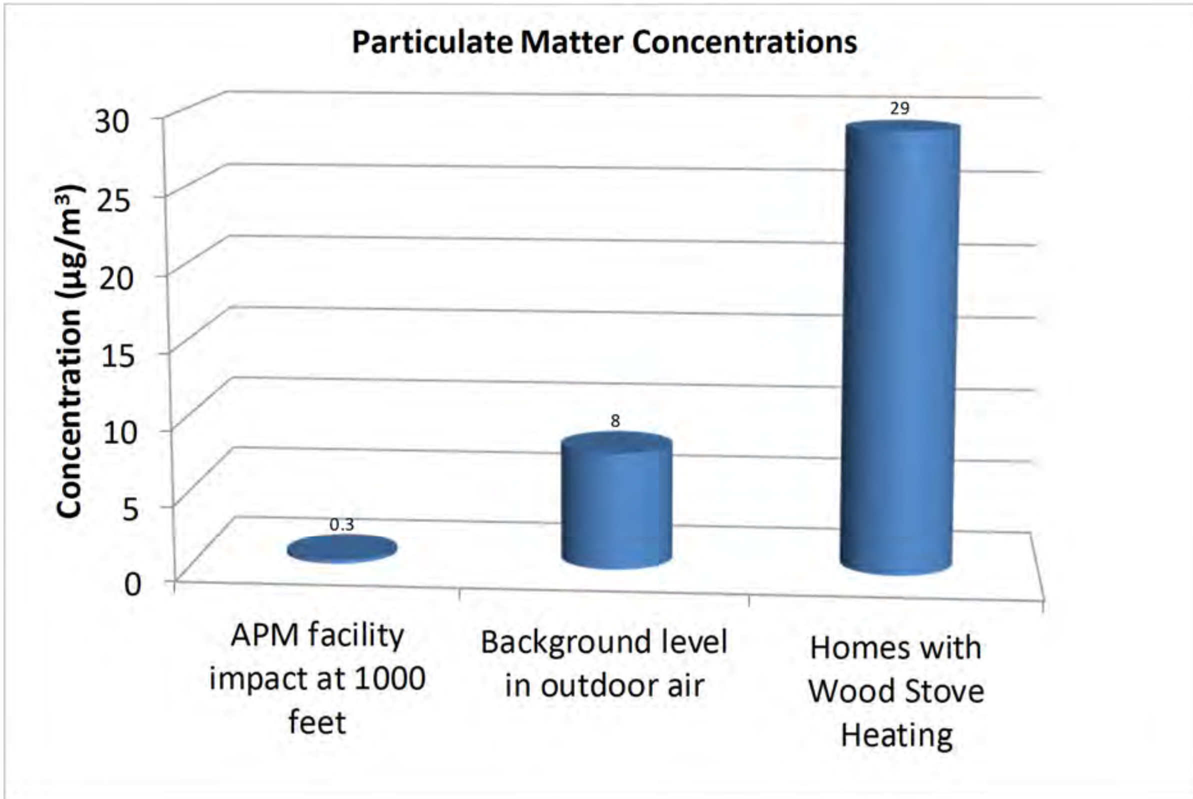

Figure 1 Comparison of sources of exposure to particulate matter

The subsequent chart (Figure 2) compares the formaldehyde concentrations that result from a typical APM facility, the background level in the United States, and the typical indoor concentration for conventional homes. The modeled formaldehyde impact at 1,000 feet from a 200,000 ton/year gas-fired drum mix APM plant (a typical size) is on the order of 0.1 μg/m³, while the typical background level measured in the United States is approximately 1.5 μg/m³. Based on a 2007 indoor air survey conducted in the United States, the 50th percentile formaldehyde concentration measured in the 234 homes was 20 μg/m³, which is approximately 200 times the impact from a typical APM (Liu *et al.*, 2007).

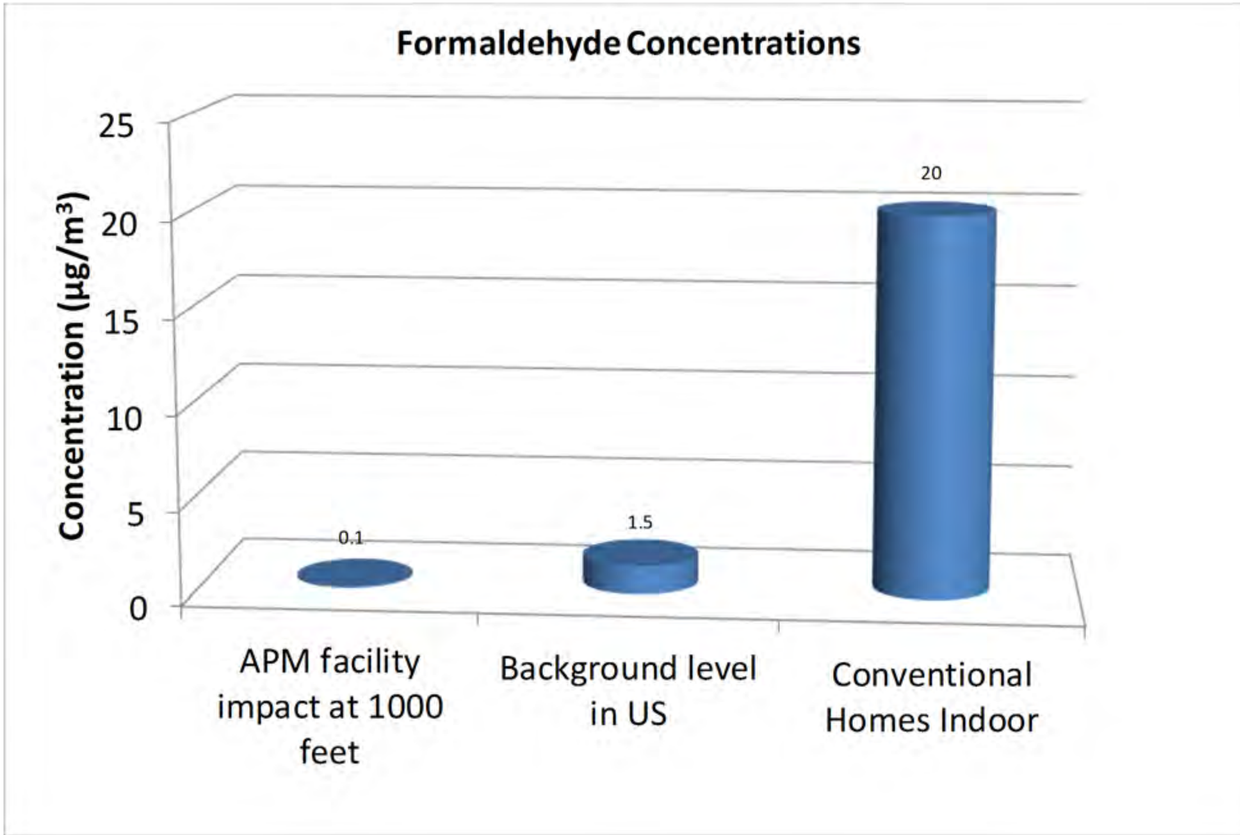

Figure 2 Comparison of sources of exposure to formaldehyde

Indoor air is also commonly contaminated by PAHs, which come not only from infiltration or intrusion of outdoor air but also from indoor emission sources such as cooking and domestic heating with fuel stoves and open fireplaces. Even in airtight stoves with a flue, elevated indoor levels of PAHs can result from intrusion of outdoor air and/or leakage from wood-burning appliances.

The following chart (Figure 3) compares the PAH concentrations from a typical APM facility to outdoor and indoor air concentrations in urban areas across the United States. Concentrations are expressed as benzo[*a*]pyrene equivalents. The modeled range of PAH impacts, 0.00009–0.0003 µg/m^3, represents distances of 250 and 3,000 feet from the typical 200,000 ton/year natural gas fired drum mix APM facility. Based on two studies that measured outdoor and indoor air quality at ten Chicago area homes and 55 residences in Los Angeles, California, Houston, Texas, and Elizabeth, New Jersey, the measured PAH concentrations ranged from 4 to 180 ng/m^3 in outdoor air and from 2 to 350 ng/m^3 in indoor air, which is approximately 10 to 2,000 times the impact from a typical APM (Li *et al.*, 2005; Naumova *et al.*, 2002).

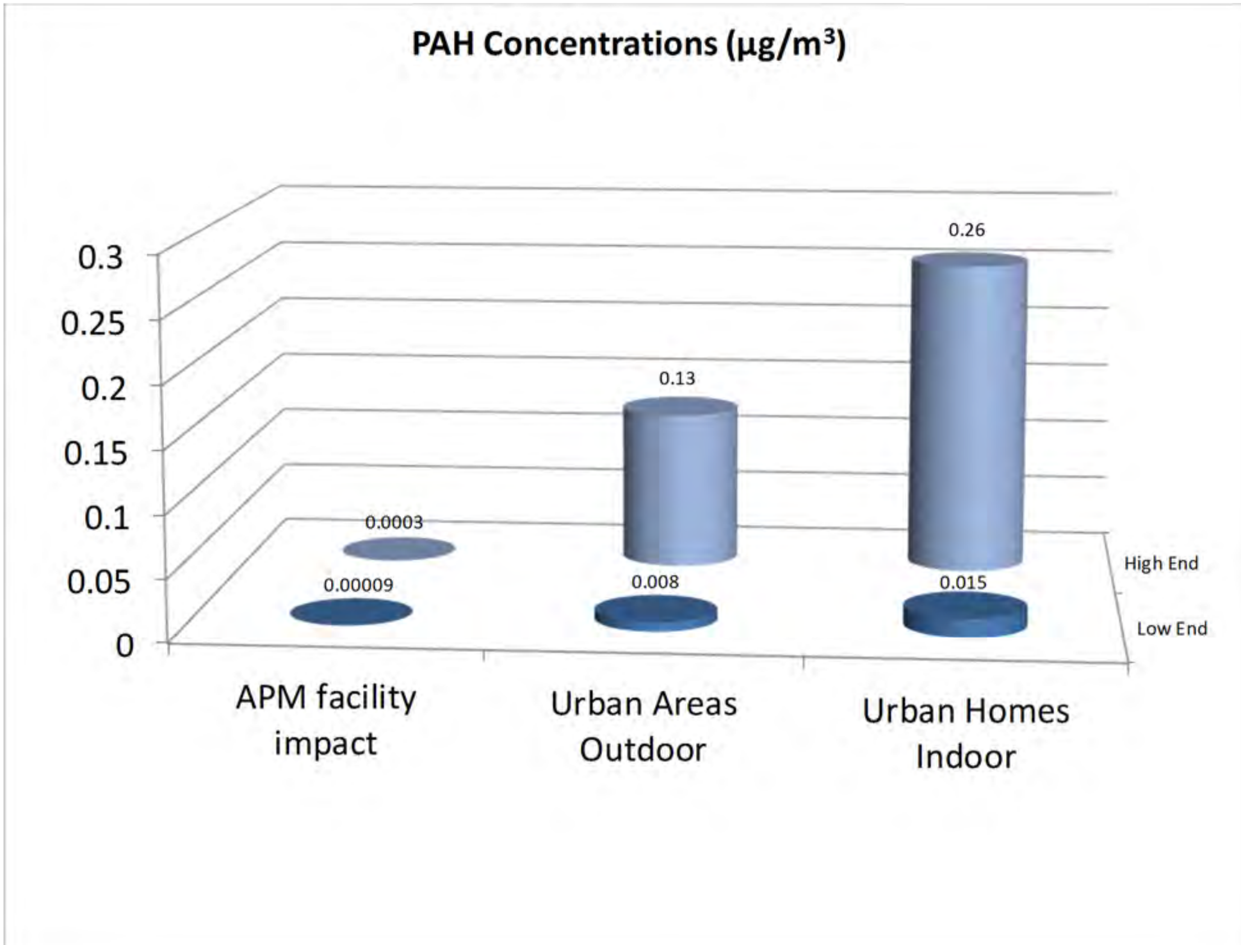

Figure 3 Comparison of sources of exposure to polycyclic aromatic hydrocarbons (PAHs)

The following chart (Figure 4) compares the benzene concentrations from a typical APM facility to outdoor and indoor air concentrations in areas across the United States. Concentrations are expressed as benzo[*a*]pyrene equivalents. The modeled range of PAH impacts, 0.005–0.02 µg/m^3, represents distances of 250 and 3,000 feet from the typical 200,000 ton/year natural gas fired drum mix APM facility. The outdoor concentrations are the highest and lowest statewide averages from the U.S. EPA National Air Toxics Assessment (NATA) study, which range from 0.3 µg/m^3 (Montana) to 1.4 µg/m^3 (District of Columbia). Benzene concentrations in outdoor air vary with proximity to roads and traffic density — a study in New York City measured an average concentration of 0.6 µg/m^3 in a low traffic area, and an average of 1.3 µg/m^3 in a high traffic area (NYC Health, 2011) The National Human Exposure Assessment Survey (NHEXAS) found higher concentrations of benzene indoors than outdoor, with the median and 90th percentile indoor air concentrations measured at 1.7 µg/m^3 and 18.1 µg/m^3, respectively, in homes in Arizona (Robertson *et al.*, 1999) Concentrations of benzene encountered in specific microenvironments, such as gasoline filling stations, can be even higher.

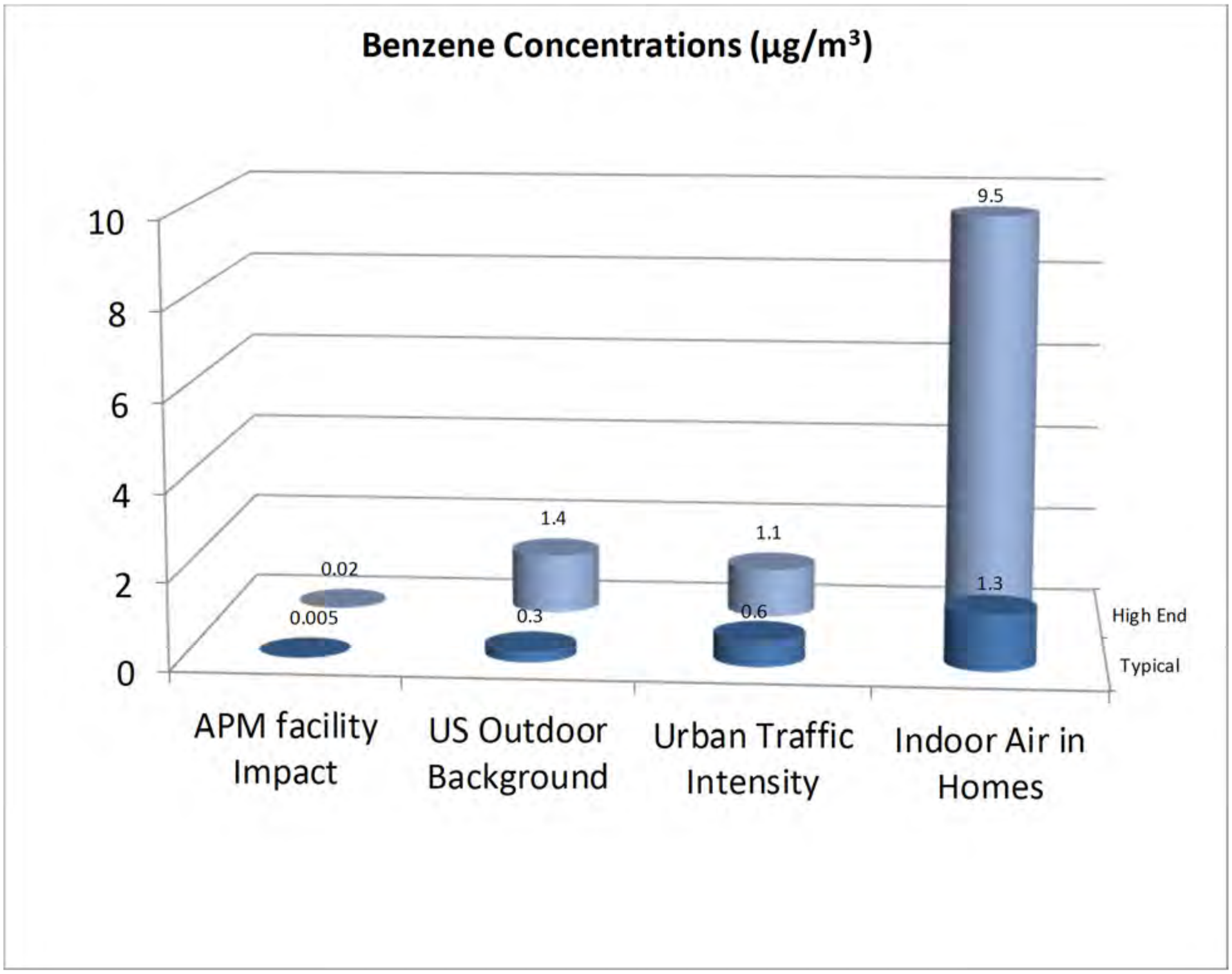

Figure 4 Comparison of sources of exposure to benzene

The overall commonalities of the comparisons of Figure 1 through Figure 4 are that the incremental concentrations of pollutants added by emissions of an APM facility are small compared to the levels typically present in outdoor air due to other sources, and that exposure levels indoors (where people spend the bulk of their time) can be many times greater and account for the majority of air pollutant exposure.

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TABLES

Table 1
Summary Update to Emission Estimates

Table # in Report	Emission Source Category	Changes and Updates from Original 2001 Clayton Report
2	Asphalt Pavement Mixture (APM) Plant	Emission factors updated for consistency with the U.S. EPA (2000) Emission Assessment Report, with most changes to fugitive emission estimates
3	Residential Fireplaces	PM10 emission estimate corrected and emission factor added for arsenic
4	Residential Wood Stoves	Emission factors developed for arsenic and formaldehyde
5	Bakeries	No updates to methodology
6	Barbeques	No updates to methodology
7	Lawn Mowers	Emission factors added for CO, NOx, and SO2
8	Auto Refueling	Methodology updated to 2008 changes to U.S. EPA AP42 emission factors and list of pollutants expanded
9a and 9b	Fast Food Restaurants	No changes to original calculations but second alternative method developed with expanded pollutant list
10	Breweries	New section/emission estimates
11	Emission Comparison Summary	Comparisons updated and expanded in response to emission updates within source categories

Table 2
Asphalt Pavement Mixture (APM) Plant Emission Estimates and Comparison with Previous Estimates

Pollutant	Previous Clayton 2001 Emission Estimates tons/yr	Revised APM Plant Emission Estimates			Ratio of Previous 2001 Clayton Emission Estimates to Revised Emission Estimates
		Drier Stack Emissions tons/yr	Fugitive Emissions tons/yr	Total (Drier Stack and Fugitive) tons/yr	
PM	3.4	2.3	0.1	2.4	0.72
CO	14	13	0.3	13	0.94
CO_2	3200	N/A	N/A	-	-
NOx	5.8	5.5	0	5.5	0.95
SO_2	1.1	1.1	0	1.1	1.0
TOC	4.9	4.4	1.7	6.1	1.2
CH_4	1.2	N/A	N/A	-	-
VOC	3.2	3.2	1.7	4.9	1.5
Isooctane	0.004	0.004	1.3E-05	0.0040	1.0
Benzene	0.051	0.039	6.7E-04	0.040	0.78
Ethylbenzene	0.024	0.024	0.0019	0.026	1.1
Formaldehyde	0.25	0.31	0.079	0.39	1.6
Toluene	0.015	0.29	0.0019	0.29	19
Xylenes	0.020	0.020	0.0056	0.026	1.3
2-Methylnaphthalene	0.0074	0.017	0.0022	0.019	2.6
Acenaphthene	1.4E-04	1.4E-04	2.1E-04	3.5E-04	2.5
Acenaphthylene	8.6E-04	0.0022	1.4E-05	0.0022	2.6
Anthracene	2.2E-05	3.1E-04	5.7E-05	3.7E-04	17
Benzo(a)anthracene	2.1E-05	2.1E-05	2.1E-05	4.2E-05	2.0
Benzo(a)pyrene	9.8E-07	1.0E-06	7.9E-07	1.8E-06	1.8
Benzo(b)fluoranthene	1.0E-05	1.0E-05	2.9E-06	1.3E-05	1.3
Benzo(g,h,i)perylene	1.1E-05	4.0E-06	6.5E-07	4.7E-06	0.42
Benzo(k)fluoranthene	4.1E-06	4.1E-06	7.5E-07	4.9E-06	1.2
Chrysene	1.8E-05	1.8E-05	9.0E-05	1.1E-04	6.0
Fluoranthene	6.1E-05	6.0E-05	5.5E-05	1.2E-04	1.9
Fluorene	3.8E-04	0.0011	5.2E-04	0.0016	4.3
Indeno(1,2,3-cd)pyrene	7.0E-07	7.0E-07	1.6E-07	8.6E-07	1.2
Naphthalene	0.0090	0.065	9.3E-04	0.066	7.3
Phenanthrene	7.6E-04	0.0023	7.4E-04	0.0030	4.0
Pyrene	5.4E-04	3.0E-04	1.6E-04	4.6E-04	0.85
Total PAHs	0.019	0.088	0.0050	0.093	4.9
Arsenic	5.60E-05	5.50E-05	N/A	5.5E-05	0.98
Barium	5.80E-04	N/A	N/A	-	-
Cadmium	4.10E-05	4.10E-05	N/A	4.1E-05	1.0
Chromium	5.50E-04	5.50E-04	N/A	5.5E-04	1.0
Hexavalent chromium	4.50E-05	4.50E-05	N/A	4.5E-05	1.0
Copper	3.10E-04	N/A	N/A	-	-
Lead	0.0015	0.0015	N/A	0.0015	1.0
Manganese	7.70E-04	7.50E-04	N/A	7.5E-04	0.97
Mercury	2.60E-04	2.60E-04	N/A	2.6E-04	1.0
Nickel	0.0063	0.0063	N/A	0.0063	1.0
Selenium	3.50E-05	3.50E-05	N/A	3.5E-05	1.0
Zinc	0.0061	N/A	N/A	-	-

Notes:

Emission estimates were made for an oil-fired drum-mix plant with a production of 200,000 tpy HMA.
Emission estimates based on U.S. EPA (2000) emssion assessment report.

N/A - indicates emission estimates not available in U.S. EPA (2000)

Table 3
Residential Fireplace Emission Estimates

Pollutant	Emission Factor	Units	Reference	Emissions per household (ton/yr)	Emissions for 20 households (ton/yr)
PM10	34.6	lb/ton	AP42 Section 1.9 (U.S. EPA, 1996a)	0.037	0.75
CO	252.6	lb/ton		0.27	5.5
CO_2	3400	lb/ton		3.7	73
NOx	2.6	lb/ton		0.0028	0.056
N_2O	0.3	lb/ton		3.2E-04	0.0065
SOx	0.4	lb/ton		4.3E-04	0.0086
VOC	**229**	**lb/ton**		**0.25**	**4.9**
POM	0.016	lb/ton		1.7E-05	3.5E-04
Aldehydes	2.4	lb/ton		0.0026	0.052
Arsenic	0.000228	lb/ton	NYSERDA (2013)	2.5E-07	4.9E-06

Calculations & Assumptions

Throughput of an average fireplace: Assume that the same amount of wood is burned in the average woodstove as in the average family fireplace, or approximately 1 cord of wood per year.

Arsenic emission factor based on the PM10 emission factor and an arsenic content in ash of 6.6 mg/kg (NYSERDA, 2013)

Reference: Equation from U.S. EPA (1987) is as follows:

1. Calculate an average wood use by calculating an average of the mean wood use values for all stove types using scale weighing and woodpile measurements.

Average wood use per household = (0.64+0.85+0.53+0.91+0.67+0.85+0.46+0.89)/8
Average wood use per household = 0.725 dry kg of wood/ heating degree day (HDD)

2. Convert wood use from dry kg/1000 HDD to tons dry wood use/year
(a) Convert from kg to tons dry kg/1000
0.725 HDD X 2.205 lb/kg X 1 ton/2000 lb
= 7.99E-04 dry ton wood X 2,700 HDD
(b) Convert from 1000 HDD to year

Assume that the Vermont and upstate New York region has three times as many HDD as the rest of the country. The reference reported 8,000 to 9,000 HDD/yr. Therefore, assume that there are 2,700 HDD/year.

7.99E-04 dry ton wood X 2,700 HDD

= 2.16 dry ton wood/yr

Boldface indicates pollutant with an emissions total equal to an APM plant

Table 4
Residential Wood Stove Emission Estimates

Pollutant	Emission Factor	Units	Reference	Emissions per household per year (tons/year)	Emissions for 19 households (ton/yr)
PM10	19.6	lb/ton	AP42 Section 1.10 (1996)	0.021	0.40
CO	140.8	lb/ton		0.15	2.9
SOx	0.4	lb/ton		4.3E-04	0.0082
TOC	28	lb/ton		0.030	0.57
TNMOC	12	lb/ton		0.013	0.25
CH_4	16	lb/ton		0.017	0.33
Ethane	1.47	lb/ton		0.0016	0.030
Ethylene	4.49	lb/ton		0.0048	0.092
Acetylene	1.124	lb/ton		0.0012	0.023
Propane	0.358	lb/ton		3.9E-04	0.0073
Propene	1.244	lb/ton		1.3E-03	0.026
i-Butane	0.028	lb/ton		3.0E-05	5.7E-04
n-Butane	0.056	lb/ton		6.0E-05	0.0011
Butenes	1.192	lb/ton		0.0013	0.024
Pentenes	0.616	lb/ton		6.6E-04	0.013
Benzene	**1.938**	**lb/ton**		**0.0021**	**0.040**
Furan	0.342	lb/ton		3.7E-04	0.0070
Furfural	0.486	lb/ton		5.2E-04	0.010
Methyl ethyl ketone	0.29	lb/ton		3.1E-04	0.0059
2-Methylfuran	0.656	lb/ton		7.1E-04	0.013
2,5-Dimethylfuran	0.162	lb/ton		1.7E-04	0.0033
Toluene	0.73	lb/ton		7.9E-04	0.015
o-Xylene	0.202	lb/ton		2.2E-04	0.0041
Acenaphthene	0.01	lb/ton		1.1E-05	2.1E-04
Acenaphthylene	0.032	lb/ton		3.5E-05	6.6E-04
Anthracene	0.009	lb/ton		9.7E-06	1.8E-04
Benzo(b)fluoranthene	0.004	lb/ton		4.3E-06	8.2E-05
Benzo(g,h,i)fluoranthene	0.028	lb/ton		3.0E-05	5.7E-04
Benzo(g,h,I)perylene	0.02	lb/ton		2.2E-05	4.1E-04
Benzo(a)Pyrene	0.006	lb/ton		6.5E-06	1.2E-04
Benzo(e)Pyrene	0.002	lb/ton		2.2E-06	4.1E-05
Biphenyl	0.022	lb/ton		2.4E-05	4.5E-04
Chrysene	0.01	lb/ton		1.1E-05	2.1E-04
Dibenzo(a,h)anthracene	0.004	lb/ton		4.3E-06	8.2E-05
7,12-Dimethylbenz(a)Anthracene	0.004	lb/ton		4.3E-06	8.2E-05
Fluoranthene	0.008	lb/ton		8.6E-06	1.6E-04
Fluorene	0.014	lb/ton		1.5E-05	2.9E-04
Indendo(1,2,3-cd)pyrene	0.02	lb/ton		2.2E-05	4.1E-04
9-Methylanthracene	0.004	lb/ton		4.3E-06	8.2E-05
12-Methylbenz(a)anthracene	0.002	lb/ton		2.2E-06	4.1E-05
1-Methylphenanthrene	0.03	lb/ton		3.2E-05	6.2E-04
Naphthalene	0.144	lb/ton		1.6E-04	0.0030
Perylene	0.002	lb/ton		2.2E-06	4.1E-05
Phenanthrene	0.118	lb/ton		1.3E-04	0.0024
Pyrene	0.008	lb/ton		8.6E-06	1.6E-04
Total PAHs	0.501	lb/ton	Sum from Acenapthene through Pyrene	5.4E-04	0.010
Cadmium	2.00E-05	lb/ton	AP42 Section 1.10 (U.S. EPA, 1996b)	2.2E-08	4.1E-07
Manganese	1.40E-04	lb/ton		1.5E-07	2.9E-06
Nickel	2.00E-05	lb/ton		2.2E-08	4.1E-07
Arsenic	1.29E-04	lb/ton	NYSERDA (2013)	1.4E-07	2.7E-06
Formaldehyde	1.94	lb/ton	Li (2007)	0.0021	0.040

Calculations & Assumptions:

Noncatalytic woodstove type assumed for criteria pollutants, PAHs and metals. Conventional stove type assumed for organic pollutants

Assume same wood use as calculated for fireplace calculations, which is 2.16 dry tons of wood/year

Arsenic emission factor based on the PM10 emission factor and an arsenic content in ash of 6.6 mg/kg (NYSERDA, 2013)

Boldface indicates pollutant with an emissions total equal to an APM plant

Table 5
Bakery Emission Estimates

Pollutant	Emission Factor	Units	Ref #	Emissions (ton/yr) (from equation)
VOC	6.9	lb/ton	AP42 Section 9.9.6 (1997)	60

Calculations & Assumptions:

Reference for values in equation and bread production: U.S. EPA (1992).

From the model ovens listed in the ACT, the one with medium-sized production and the largest emission factor was chosen, that is, model oven number 23. In addition to listing values for the variables in the emission factor equation, the ACT listed the emission factor and annual VOC emissions. These numbers were used.

AP-42 Equation:

VOC= 0.95Yi+0.195ti-0.51S-0.86ts+1.90

lb VOC per ton baked bread; Y i= initial baker's % of yeast; t i= total yeast action time in hours; S = final (spike) baker's % of yeast; ts = spiking time in hours

The variables for model oven no. 23 are: oven size=6X10^6 BTU/hr, Bread production = 17,308 tons /yr, Y=4.25, S=0, ti=5.15, ts=0, VOC emission factor (lbs/ton) = 6.9 and VOC Emissions (tons/yr) = 60

Emissions from bakery are 12 times greater than a typical asphalt plant

Table 6
Barbeque Emission Estimates

Pollutant	Emission Factor	Units	Ref #	Emissions per Household per year (tons/yr)	Emissions for Neighborhood of 336 Households (tons/yr)
TOC	0.0605	lb/min	Radian (1990)	0.018	6.1

Calculations & Assumptions:

Cooking time (min) on barbeque grill	30
Number of times per year using grill	20

Single household emissions

0.0605 lb/min * 30 min/event * 20 events/yr

= 36.3 lb/yr

= 0.01815 tons/yr

Table 7
Lawn Mower Emission Estimates

Pollutant	Emission Factor	Units	Reference	Emissions per Household per year (tons/yr)	Emissions for Neighborhood of 211 Households (tons/yr)
TOC	**437**	**g/hp-hr**	U.S. EPA (1991b)	**0.029**	**6.1**
PM	7.7	g/hp-hr		5.1E-04	0.11
Aldehydes	2	g/hp-hr		1.3E-04	0.028
CO	923.4	g/hp-hr		0.061	13
NOx	0.29	g/hp-hr		1.9E-05	0.0040
SO_2	0.54	g/hp-hr		3.6E-05	0.0075

Calculations & Assumptions:

Ave horsepower rating @ 30% load	1.2
Ave hours per year of operation	50

Calculation for TOC

(437 g/hp-hr * 1.2 hp * 50 hrs/yr) /(454 g/lb *2000 lb/ton)

= 0.02888 tons/yr

Boldface indicates pollutant with an emissions total equal to an APM plant

Table 8a
Auto Refueling Emission Estimates - Revised

Pollutant	Emission Factor	Units	Reference	Annual Emissions (tons/yr)
VOC	372	mg/l	AP42 Section 5.2 (U.S. EPA, 2008) with TOC = VOC	0.93
TOC	372			0.93
Benzene	5.4%	% of VOC emissions	Chin and Batterman (2012)	0.050
Toluene	13.5%			0.13
Ethylbenzene	2.7%			0.025
Xylene	12.0%			0.11

Calculations & Assumptions:

Throughput: Locating and Estimating document reported that the average filling station's throughput is 50,000 gallons per month.

$$\text{VOC emissions} = \left(\frac{372\ \text{mg}}{\text{l}}\right)\left(\frac{3.7854\ \text{l}}{\text{gal}}\right)\left(\frac{50000\ \text{gal}}{\text{mo}}\right)\left(\frac{12\ \text{mo}}{\text{yr}}\right)\left(\frac{\text{lb}}{453600\ \text{mg}}\right)\left(\frac{\text{ton}}{2000\ \text{lb}}\right) = 0.93\ \frac{\text{ton}}{\text{yr}}$$

Chin and Batterman (2012) report gasoline vapors contain 5.4% Benzene, 13.5% Toluene, 2.7% Ethylbenzene, and 12.0% Xylene

Benzene emissions = 5.4% * 0.93 tons/yr = 0.050 tons/yr

Toluene emissions = 13.5% * 0.93 tons/yr = 0.13 tons/yr

Ethylbenzene emissions = 2.7% * 0.93 tons/yr = 0.025 tons/yr

Xylene emissions = 12.0% * 0.93 tons/yr = 0.11 tons/yr

Table 8b
Auto Refueling Emission Estimates - Original

Pollutant	**Emission Factor**	**Units**	**Reference**	**Annual Emissions (tons/yr)**
Benzene	0.099	lb/1000 gal	U.S. EPA (1998a)	0.030
Toluene	139.9	mg/l	U.S. EPA (1994a)	0.35
Xylene	5.5	mg/l	U.S. EPA (1994b)	0.014
Total "VOC"			Sum of three compounds	0.39

Calculations & Assumptions:

Throughput: Locating and Estimating document reported that the average filling station's throughput is 50,000 gallons per month.

Benzene emissions = 0.099 lb/1000 gal * 50000 gal/mo * 12 mo/yr * 1 ton/2000lb

= 0.0297 tons/yr

Toluene emissions = 139.9 mg/l * 3.7854 l/gal * 50000 gal/mo * 12 mo/yr * 1 g/1000 mg * 1 lb/453.593g * 1 ton/2000 lb

= 0.350 tons/yr

Toluene emissions = 5.5 mg/l * 3.7854 l/gal * 50000 gal/mo * 12 mo/yr * 1 g/1000 mg * 1 lb/453.593g * 1 ton/2000 lb

= 0.0138 tons/yr

Table 9a
Fast-Food Restaurant Emission Estimates - Original

Pollutant	Emission Factor	Units	Reference	Emissions (tons/yr)
TOC	2,405	mg/kg	Rogge *et al* (1991)	0.18
2-Methylfuran	16.1	mg/kg		0.0012
Benzo(a)anthracene	0.29	mg/kg		2.1E-05
Benzo(b)fluoranthene	0.21	mg/kg		1.5E-05
Benzo(a)Pyrene	0.19	mg/kg		1.4E-05
Benzo(e)Pyrene	0.19	mg/kg		1.4E-05
Fluoranthene	0.35	mg/kg		2.6E-05
Pyrene	0.74	mg/kg		5.4E-05
Total PAHs				0.0013

Calculations & Assumptions:

To calculate throughput:

Clayton (2001) called Walker Holdings Group on 9/11/00. They own 8 Wendy's restaurants in the NC/southern VA area. Mr. Bert Walker reported that only data for their drive-thru sales were readily available.

Mr. Walker reported that the average (for 8 Wendy's) drive thru activity was 2,821 cars per week.

He added that the average check per car was $4.12.

Assumptions:

The same amount of sales occurred on foot (in the restaurant) as by the drive-thru.

The average sale consisted of one burger (plus fries and drink and other side dishes)

The average burger weighed 0.5 pound.

Throughput calculation:

Weekly number of sales = 2821*2 = 5642

Number of "half-pounders" sold = 5642

Weekly number of pounds of hamburger cooked = 5642 burgers/week * 0.5 lb/burger = 2821 lb/week

Annual mass of hamburger cooked at the average fast-food restaurant = weekly mass * 52

= 2821 lb/week * 52 weeks/year = 146692 lbs of hamburger cooked/yr

To calculate annual emissions:

TOC Emissions:

TOC Emissions = 2405 mg/kg * 0.4536 kg/lb * 146692 lb/yr * 1 g/1000mg * 1 lb/453.593g * 1 ton/2000lb

= 0.18 tons/year

Table 9b
Fast-Food Restaurant Emission Estimates - Alternative

Pollutant	Emission Factor	Units	Reference	Emissions (tons/yr)
TOC	4280	mg/kg	Lee (1999)	0.31
VOC	851	mg/kg		0.062
NOx	3140	mg/kg		0.23
PM10	8746	mg/kg		0.64
CO	162700	mg/kg		12
Aldehydes	874.6	mg/kg		0.064
Formaldehyde	394.1	mg/kg		0.029
Benzene	420.9	mg/kg		0.031
Toluene	160.9	mg/kg		0.012
Ethylbenzene	31.4	mg/kg		0.0023
Xylene	54.6	mg/kg		0.0040
Phenanthrene	1.12	mg/kg		8.2E-05
Fluoranthene	0.45	mg/kg		3.3E-05
Pyrene	0.34	mg/kg		2.5E-05
Naphthalene	21.1	mg/kg		0.0015
2-Methylnaphthalene	3.90	mg/kg		2.9E-04
Acenaphthylene	1.18	mg/kg		8.7E-05
Fluorene	0.43	mg/kg		3.2E-05
Total PAHs	28.5	mg/kg	Sum from Phenanthrene through Fluorene	0.0021

Calculations & Assumptions:

To calculate throughput:

Assume the same amount of meat coooked per year - 146692 lbs - estimated in the original analysis (see Table 9a)

To calculate annual emissions:

Use emission factors from grilling study by Lee (1999) as listed in table

Assume (as reported in Lee, 1999) THC = TOC, NO = NOx, and PM = PM10

TOC Emissions = 4280 mg/kg * 0.4536 kg/lb * 0 lb/yr * 1 g/1000mg * 1 lb/453.593g * 1 ton/2000lb

= 0.31 tons/year

Table 10
Brewery Emission Estimates

Pollutant	Emission Factor (lb/1000 bbl)	Units	References	Emissions (ton/yr) from a 60,000 bbl/year brewery
VOC	44.4	lb/bbl	AP42 Section 9.12.1 (U.S. EPA. 1996c); U.S. EPA (1996d); Radian (1992b)	1.3

Calculations & Assumptions:

VOC emissions from AP-42 Section 9.12.1 for Malt Beverages

Processes in Table 9.12.1-2 summed together for a sterilized bottle filling line

Volume of production (small brewery) = 60,000 barrels (bbl) per year based on AP-42 Section 9.12.1 background document (U.S. EPA, 1996d) estimate for the upper range of a small brewery

Table 11
Emission Comparison Table

Pollutant	Equivalent No. of a Selected Category	Selected Source Category
Arsenic	220	Residential Fireplaces
	390	Residential Woodstoves
Benzene	19	Residential Woodstoves
	1	Gasoline Filling Stations - Original
	1	Gasoline Filling Stations - Revised
	1	Fast Food Restaurant - Alternative
Ethylbenzene	1	Gasoline Filling Stations - Revised
	6	Fast Food Restaurant - Alternative
Formaldehyde	150	Residential Fireplaces
	190	Residential Woodstoves
	2900	Lawnmowers
	7	Fast Food Restaurant - Alternative
PM	65	Residential Fireplaces
	110	Residential Woodstoves
	4700	Lawnmowers
	2	Fast Food Restaurant - Alternative
TOC	470	Residential Woodstoves
	340	Barbecue Grills
	210	Lawnmowers
	35	Fast Food Restaurant - Original
	10	Fast Food Restaurant - Alternative
Total PAHs/POMs	5400	Residential Fireplaces
	180	Residential Woodstoves
	70	Fast Food Restaurant - Original
	21	Fast Food Restaurant - Alternative
Toluene	1700	Residential Woodstoves
	1	Gasoline Filling Stations - Original
	2	Gasoline Filling Stations - Revised
	12	Fast Food Restaurant - Alternative
VOC	20	Residential Fireplaces
	1/12	Bakery
	4	Breweries
	13	Gasoline Filling Stations - Original
	5	Gasoline Filling Stations - Revised
	39	Fast Food Restaurant - Alternative
Xylenes	120	Residential Woodstoves
	2	Gasoline Filling Stations - Original
	1/4	Gasoline Filling Stations - Revised
	3	Fast Food Restaurant - Alternative

Notes:
1. Typical emissions from an asphalt plant in tons/year (from the US EPA (2000) Emission Assessment Report):
  - TOC: 6.1
  - VOC: 4.9
  - PM: 2.4
  - Benzene: 0.03967
  - Toluene: 0.29187
  - Ethylbenzene: 0.025937
  - Xylenes: 0.025648
  - Total PAHs: 9.34E-02
  - Formaldehyde: 0.38896
  - Arsenic: 5.50E-05

EXHIBIT G

COMPLIANCE TEST REPORT HOTMIX ASPHALT BAGHOUSE

ADVANCED INDUSTRIAL RESOURCES, INC.

COMPLIANCE TEST REPORT
HOT MIX ASPHALT BAGHOUSE
AT
C. W. MATTHEWS CONTRACTING COMPANY
KR-10006

PREPARED FOR:

C. W. MATTHEWS CONTRACTING COMPANY
4957 HIGHWAY 41 SOUTH
BOLINGBROKE, GEORGIA 31004

PREPARED BY:

ADVANCED INDUSTRIAL RESOURCES, INC.
3407 NOVIS POINTE
ACWORTH, GEORGIA 30101

TEST DATE: JUNE 19, 2018

REPORT CERTIFICATION SHEET

Having conducted the Technical Review of this report, I hereby certify the data, information, results, and calculations in this report to be accurate and true according to the methods and procedures used.

July 11, 2018

Ross Winne
Technical Director
Advanced Industrial Resources

Date

Having written and prepared this report, I hereby certify that the data, information and results in this report to be correct and all inclusive of the necessary information required for a complete third-party review of the testing event.

July 11, 2018

Steven Haigh
Report Preparation Director
Advanced Industrial Resources

Date

Having supervised all aspects of the field testing, I hereby certify the equipment preparation, field sample collection procedures, and all equipment calibrations were conducted in accordance to the applicable methodologies.

June 22, 2018

Scott Gunnell
Project Supervisor Advanced Industrial Resources

Date

TABLE OF CONTENTS

LIST OF APPENDICES

1.0 INTRODUCTION

1.1 SUMMARY OF TEST PROGRAM

C.W. Matthews Construction Company operates a Hot Mix Asphalt manufacturing facility at 4957 Highway 41 South, Bolingbroke, Georgia 31004. A compliance test was conducted to determine particulate matter and visible emission concentrations and rates from the Hot Mix Asphalt Baghouse (Baghouse). The test was conducted on June 19, 2018.

Testing was conducted in order to determine compliance with applicable standards for pollution emissions, in accordance with the requirements of the Georgia Department of Natural Resources and the *Code of Federal Regulations*, Title 40, Part 60 Subpart I – Standards of Performance for Hot Mix Asphalt facilities. Advanced Industrial Resources (AIR) conducted all testing.

1.2 KEY PERSONNEL

The key personnel who coordinated the test program and their telephone numbers are:

Lee Smith, C. W. Matthews Contracting Co.
Scott Wilson, Advanced Industrial Resources
Derek Stephens, Advanced Industrial Resources

2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 PROCESS & CONTROL EQUIPMENT DESCRIPTION

The Baghouse controls emissions from the asphalt manufacturing process.

2.2 SAMPLING LOCATION

The exhaust stack is circular with an internal diameter of 50.0 inches. The sampling location on the baghouse exhaust is located at 4.1 equivalent diameters downstream from the nearest upstream flow disturbance and 0.7 equivalent diameters upstream from the stack exhaust. The stack has two sampling ports perpendicular to one another on a horizontal plane. Twenty-four sampling points (twelve traverse points in each of the two sampling ports) were used for USEPA Methods 2, 3, 4, and 5 sampling, in accordance with USEPA Method 1 requirements

3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 OBJECTIVES

The purpose of the test program was to determine particulate matter concentrations and rates and visible emissions from the Baghouse exhaust.

3.2 FIELD TEST CHANGES AND PROBLEMS

The testing was conducted in accordance with the Site-Specific Test Protocol submitted to Georgia EPD prior to testing. No significant problems were encountered during testing that required deviation from the planned test protocol.

3.3 PRESENTATION OF TEST RESULTS

TABLE 3-1: Results Summary

Source	**Pollutant**	Average Measured	Allowable	Units	**% of Allowable**
Asphalt Baghouse	**PM**	0.00091	0.040	gr/dscf	**2%**
	VE	0	20	%	**0%**

Emission rates and concentrations are summarized and compared to permit limits in Table 3-1. Concentrations and mass rates are presented in Reduced and tabulated data from the field-testing is included in Appendix B. The calculations and nomenclature used to reduce the data are presented in Appendix C. Actual raw field data sheets are presented in Appendix D. Laboratory reports and custody records are presented in Appendix E.

3.4 PROCESS MONITORING

All essential process monitoring equipment on the Baghouse was operating properly and recording data throughout the test period. Data is presented in Appendix G.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

Performance testing was conducted according to the methodology in the *Title 40 Code of Federal Regulation*, Part 60, Appendix A as applicable to particulate matter emitting sources. Specifically, Method 1 was used for the qualification of the location of sampling ports and for the determination of the stack gas velocity and volumetric flow rate. Method 2 was used for the determination of the stack velocity and volumetric flow rate. Method 3 was used for the determination of the composition and dry molecular weight for effluent stack gas. Method 5 was used for the determination of particulate matter emissions from stationary sources. Particulate matter is withdrawn isokinetically from the source and collected on a glass fiber filter maintained at a temperature of 120 ± 14 ^{o}C (248 ± 25 ^{o}F) or such other temperature as specified by an applicable subpart of the standards or approved by the Administrator for a particular application. The particulate matter mass, which includes any material that condenses at or above the filtration temperature, is determined gravimetrically after the removal of uncombined water. Method 9 was used for the determination of visible emissions from stationary sources.

Prior to each test run for particulate matter emissions, the sampling line was cleaned with acetone, and a labeled pre-tared glass-fiber filter was placed in the filter holder. The first two impingers were loaded with 100 mL each of water; the last impinger was loaded with 200 g of indicating silica gel; and the train was reassembled. After each test run, the filter was recovered and stored in a labeled petri dish, and the filter holder was rinsed with acetone into a labeled sample bottle. The nozzle and probe liner were brushed and rinsed with acetone, and the rinsing was added to the same sample bottle. Finally, the moisture collected in the impingers was measured, and the spent silica gel was stored in a labeled container. The final fluid level in the wash sample bottle was marked prior to shipment. All recovered filters and sample bottle were kept in a closed sample box until final laboratory analysis.

Reduced and tabulated data from the field-testing is included in Appendix B. The calculations and nomenclature used to reduce the data are presented in Appendix C. Actual raw field data sheets are presented in Appendix D. Laboratory reports and custody records are presented in Appendix E.

5.0 QUALITY ASSURANCE ACTIVITIES

5.1 INTERNAL QUALITY ASSURANCE

The quality assurance/quality control (QA/QC) measures associated with the sampling and analysis procedures given in the noted EPA reference methodologies, in Subparts A of 40 *CFR* 60 and 40 *CFR 63*, and in the *EPA QA/QC Handbook*, Volume III (EPA 600/R-94/038c) were employed, as applicable. Such measures include, but are not limited to, the procedures detailed below.

5.1.1 SAMPLING TRAIN LEAK CHECKS

Determinations of the leakage rate of the Method 5 sampling train were made before and after each sampling run using the procedure detailed in Section 8.4 of EPA Method 5. Before the sampling run, after the sampling train had been assembled and probe and filter box temperatures had time enough to settle at their appropriate operating values, the probe nozzle will be plugged and the system was evacuated to a pressure of 15 inches of Hg below ambient pressure. The volumetric leakage rate was be measured by the dry gas meter over the course of one (1) minute. The leakage rate was less than 0.020 cfm for each run, thereby meeting the maximum allowable leakage rate.

After the sampling run, before the train was disassembled the probe nozzle was plugged and the system depressurized to a vacuum equal to or greater than the maximum value reached during the sampling run. The dry gas meter measured the volumetric leakage rate over the course of one (1) minute. The leakage rate was determined to be less than 0.020 cfm, thereby meeting the maximum allowable leakage rate.

The Type “S” Pitot tube assembly was also checked for leaks before and after sampling runs using the procedure in Section 8.1 of EPA Method 2. The impact opening of the Pitot tube was blown through until a pressure of at least 3 inches of water registered on the manometer. The impact opening was quickly plugged and held for at least 15 seconds, during which time the manometer reading held. The same operation was performed on the static pressure side of the Pitot tube, except suction was used to obtain the pressure differential.

5.1.2 PROBE NOZZLE DIAMETER CHECKS

Probe nozzles were calibrated before field testing by measuring the internal diameter of the nozzle entrance orifice along three different diameters. Each diameter was measured to the nearest 0.001 inch, and all measurements were averaged. The diameters were within the limit of acceptable variation of 0.004".

5.1.3 PITOT TUBE FACE PLANE ALIGNMENT CHECK

Before field testing, each Type S Pitot tube was examined in order to verify that the face planes of the tube were properly aligned, per Method 2 of 40 *CFR* 60, Appendix A. The external tubing diameter and base-to-face plane distances were measured in order to verify the use of 0.84 as the baseline (isolated) pitot coefficient. At that time the entire probe assembly (i.e., the sampling probe, nozzle, thermocouple, and Pitot tube) was inspected in order to verify that its components met the interference-free alignment specifications given in EPA Method 2. Because the specifications were met, then the baseline pitot coefficient was used for the entire probe assembly.

After field testing, the face plane alignment of each Pitot tube was checked. No damage to the tube orifices was noted.

5.1.4 METERING SYSTEM CALIBRATION

Every three months each dry gas meter (DGM) console is calibrated at five orifice settings according to Method 5 of 40 *CFR* 60, Appendix A. From the calibration data, calculations of the values of Y_m and $\Delta H_@$ are made, and an average of each set of values is obtained. The limit of total variation of Y_m values is $\pm$0.02, and the limit for $\Delta H_@$ values is $\pm$0.20.

After field testing, the calibration of the DGM console was checked by performing three calibration runs at a single intermediate orifice setting that is representative of the range used during field-testing. Each DGM was within the limit of acceptable relative variation from Y_m of 5.0%.

5.1.5 TEMPERATURE GAUGE CALIBRATION

After field testing, the temperature measuring instruments on each sampling train was calibrated against standardized mercury-in-glass reference thermometers. Each indicated temperature was within the limit of acceptable variation between the absolute reference temperature and the absolute indicated temperature of 1.5%.

5.1.6 SAMPLE HANDLING AND CHAIN OF CUSTODY PROCEDURES

All samples were transported in a closed sample box, the security of which was the responsibility of the *AIR* Test Director, Mr. Scott Gunnell. These samples were received, checked, and numbered by the Test Director and custody records were written. The *AIR* Test Director, Mr. Scott Gunnell, then again checked the integrity of the samples and their identification.

The samples collected during the test program were placed in shipping coolers with sufficient insulation to prevent breakage during shipping. All samples in a shipping container were listed on the chain-of-custody form enclosed in the shipping container. Once the samples were securely packaged, the container was sealed with tape and several custody seals were placed over the top edge so that the container could not be opened without breaking the custody seals.

5.1.7 DATA REDUCTION CHECKS

AIR ran an independent check (using a validated computer program) of the calculations with predetermined data before the field test, and the *AIR* Team Leader conducted spot checks on-site to assure that data was being recorded accurately. After the test, *AIR* checked the data input to assure that the raw data had been transferred to the computer accurately. Flow rates, temperatures and moisture levels were relatively constant (variation $<5\%$) during the three test runs, which indicates that data recording and Method 2 and 4 sampling and calculation errors are not likely.

5.2 EXTERNAL QUALITY ASSURANCE

5.2.1 TEST PROTOCOL EVALUATION

A Site-Specific Test Protocol was submitted to Georgia EPD in advance of testing, which provided regulatory personnel the opportunity to review and comment upon the test and quality assurance procedures used in conducting this testing.

5.2.2 ON-SITE TEST EVALUATION

A test schedule was submitted with the Site-Specific Test Protocol and Georgia EPD personnel were notified of all changes in the schedule. No tests were performed earlier than stated in the original schedule. Therefore, regulatory personnel were afforded the opportunity for on-site evaluation of all test procedures.

6.0 DATA QUALITY OBJECTIVES

The data quality objectives (DQOs) process is generally a seven-step iterative planning approach to ensure development of sampling designs for data collection activities that support decision making. The seven steps are as follows: (1) defining the problem; (2) stating decisions and alternative actions; (3) identifying inputs into the decision; (4) defining the study boundaries; (5) defining statistical parameters, specifying action levels, and developing action logic; (6) specifying acceptable error limits; and (7) selecting resource-effective sampling and analysis plan to meet the performance criteria. The first five steps are primarily focused on identifying qualitative criteria such as the type of data needed and defining how the data will be used. The sixth step defines quantitative criteria and the seventh step is used to develop a data collection design. In regards to emissions sampling, these steps have already been identified for typical monitoring parameters.

Monitoring methods presented in 40 *CFR* 60 Appendix A indicate the following regarding DQOs: Adherence to the requirements of this method will enhance the quality of the data obtained from air pollutant sampling methods. At a minimum, each method provides the following types of information: summary of method; equipment and supplies; reagents and standards; sample collection, preservation, storage, and transportation; quality control; calibration and standardization; analytical procedures, data analysis and calculations; and alternative procedures. These test methods have been designed and tested according to DQOs for emissions testing and analysis. These test methods have been specified and were followed in accordance with the Site-Specific Test Protocol submitted to the Georgia Environmental Protection Division to ensure that DQOs were met for this project.

APPENDIX A

TEST RESULTS

Advanced Industrial Resources, Inc.
Visible Emissions Results Summary

Client: C.W. Matthews
Location: Bolingbroke, Georgia
Source: Asphalt Baghouse

Run #	Start		Instantaneous Opacity (%)		Average Opacity (%)	
	Date	Time	Min.	Max.	6-Minute	Run
1	6/19/2018	7:20 AM	0	0	0.0	0.0
2	6/19/2018	8:50 AM	0	0	0.0	0.0
3	6/19/2018	11:30 AM	0	0	0.0	0.0
			Overall Average Opacity (%)			0.0

Advanced Industrial Resources, Inc.

Data Reduction Sheet

Client:	C.W. Matthews	**Console ID:**	C-019
Location:	Bolingbroke, Georgia	**Y_m:**	1.008
Source:	Asphalt Baghouse	**$\Delta H_@$:**	1.836
Test Team:	GDG, RW	**C_p:**	0.84
EPA Methods:	1, 2, 3, 4 & 5	**Analyte(s):**	Particulate Matter

		Units	Run 1	Run 2	Run 3
Test Date			19-Jun-18	19-Jun-18	19-Jun-18
Start Time			7:20	8:50	11:30
End Time			8:22	9:51	12:31
V_m	**Volume of gas sample**	dcf	40.698	40.816	40.013
M_{lc}	**Mass of liquid collected**	g	428.6	437.1	417.2
Δp	**Velocity head of stack gas**	inches H_2O	0.326	0.329	0.322
$(\Delta p)^{1/2}$	**Square root of velocity head**	(inches $H_2O)^{1/2}$	0.570	0.573	0.567
ΔH	**Pressure differential**	inches H_2O	1.53	1.55	1.45
θ	**Total sampling time**	minutes	60.0	60.0	60.0
D_n	**Diameter of nozzle**	inches	0.322	0.322	0.322
D_s	**Diameter of stack**	inches	50.0	50.0	50.0
T_m	**Temperature of meter**	°R	547	556	559
T_s	**Temperature of stack gas**	°R	768	766	768
P_{bar}	**Barometric pressure**	inches Hg	29.28	29.28	29.28
p_g	**Gauge pressure of stack gas**	inches H_2O	0.24	0.24	0.24
% O_2	**Percent O2 by volume**	percent ($^v/_v$)	13.00	13.00	13.00
% CO_2	**Percent CO2 by volume**	percent ($^v/_v$)	6.00	6.00	6.00
% N_2	**Percent N2 by volume**	percent ($^v/_v$)	81.0	81.0	81.0
m_{PM}	**Mass of particulate matter**	mg	2.5	2.0	2.2

APPENDIX B

FIELD DATA REDUCTION

Advanced Industrial Resources, Inc.

Particulate Matter Test Results

C.W. Matthews
Bolingbroke, Georgia
Asphalt Baghouse

		Units	Run 1	Run 2	Run 3	Averages
Test Date			19-Jun-18	19-Jun-18	19-Jun-18	
P_m	**Pressure of meter gases**	inches Hg	29.39	29.39	29.39	29.39
P_s	**Pressure of stack gases**	inches Hg	29.30	29.30	29.30	29.30
$V_{m(std)}$	**Volume of gas sample**	dscf	38.93	38.42	37.45	38.27
$V_{w(std)}$	**Volume of water vapor**	scf	20.29	20.69	19.74	20.24
B_{ws}	**Moisture in stack gas**	dimensionless	0.343	0.350	0.345	0.346
M_d	**Mol. Wt. Of gas at DGM**	lb./lb.-mole	29.48	29.48	29.48	29.48
M_s	**Mol. Wt. Of gas at stack**	lb./lb.-mole	25.55	25.46	25.52	25.51
v_s	**Velocity of stack gas**	ft./sec	41.51	41.70	41.27	41.50
A_n	**Area of nozzle**	ft^2	0.000566	0.000566	0.000566	0.000566
A_s	**Area of stack**	ft^2	13.64	13.64	13.64	13.64
Gas Stream Flow Rates						
Q_a	**Vol. Flow rate of actual gas**	cfm	33,958	34,118	33,768	33948
Q_{sd}	**Vol. Flow rate of dry gas**	dscfm	15,022	14,972	14,891	14962
I	**Isokinetic sampling ratio**	percent	104.0	103.0	101.0	102.7
Gas Stream Particulate Concentrations						
c_{PM}	**Conc. Of PM in dry stack gas**	mg/dscm	2.30	1.87	2.09	2.09
c_{PM}	**Conc. Of PM in dry stack gas**	gr/dscf	0.00100	0.00082	0.00091	**0.00091**
E_{PM} All	**Allowable PM Emission Rate**	gr/dscf	0.04	0.04	0.04	**0.04**
% of All	**% of Allowable**	%	3%	2%	2%	**2%**
Particulate Matter Mass Rates						
E_{PM}	**Emission rate of PM**	lb./hour	0.129	0.105	0.116	0.117

APPENDIX C

EXAMPLE CALCULATIONS

AND

NOMENCLATURE

Advanced Industrial Resources, Inc.
Sample Calculation Sheet

C.W. Matthews, Bolingbroke, Georgia
Asphalt Baghouse, Run #1

Area of nozzle:

$A_n = 3.1415 \times D_n^2 / 4 / 144 \; in^2/ft^2$

$A_n = 3.1415 \times (0.322) \times (0.322) / 4 / 144$

$A_n = 0.000565 \; ft^2$

Area of stack:

$A_s = 3.1415 \times D_s^2 / 4 / 144 \; in^2/ft^2$

$A_s = 3.1415 \times (50) \times (50) / 4 / 144$

$A_s = 13.63 \; ft^2$

Absolute pressure of meter gases:

$P_m = P_{bar} + \Delta H / 13.6$

$P_m = 29.28 + 1.531 / 13.6$

$P_m = 29.39$ inches Hg

Absolute pressure of stack gases:

$P_s = P_{bar} + p_g / 13.6$

$P_s = 29.28 + 0.24 / 13.6$

$P_s = 29.30$ inches Hg

Volume of gas sample, standardized:

$V_{m(std)} = V_m \times Y_m (T_{std} / T_m) (P_m / P_{std})$

$V_{m(std)} = (40.698) \times (1.008) \times (528/547) \times (29.39/29.92)$

$V_{m(std)} = 38.90$ dscf

Volume of water vapor in the gas sample, standardized:

$V_{w(std)} = (V_{lc} \times p_w \times R \times T_{std}) / (M_w \times P_{std})$

$V_{w(std)} = (428.643) \times (0.002201) \times (21.85) \times (528) / (18 \times 29.92)$

$V_{w(std)} = 20.21$ scf

Volume proportion of water in the stack gas stream:

$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$

$B_{ws} = (20.21 / (38.9 + 20.21))$

$B_{ws} = 0.3419$

Nitrogen content of gas at the DGM:

$\%N_2 = 100\% - \%CO_2 - \%O_2 - \%CO$

$\%N_2 = 100\% - 6\% - 13\% - 0\%$

$\%N_2 = 81 \; \%$

*Note: Values may not agree exactly with results shown elsewhere in this report due strictly to rounding

Advanced Industrial Resources, Inc.
Sample Calculation Sheet

C.W. Matthews, Bolingbroke, Georgia
Asphalt Baghouse, Run #1

Molecular weight of gas at the DGM:

M_d = ((44 x %$CO_{2)}$ + (32 x %$O_{2)}$ + (28 x (%N_2 + %CO)))/100%

M_d = ((44 x 6) + (32 x 13) + (28 (81 + 0)))/100%

M_d = 29.48 lb/lb-mole

Molecular weight of gas at the stack:

M_s= M_d (1 - B_{ws}) + M_w x B_{ws}

M_s= (29.48 x (1 - 0.3419)) + (18 x 0.3419)

M_s= 25.55 lb/lb-mole

Velocity of stack gas:

v_s = K_p x C_p $[\Delta p]^{1/2}$ x $[T_s/(P_sM_s)]^{1/2}$

v_s = (85.49 x 0.84 x (0.326)^1/2 x [768 / (29.3 x 25.55)]^1/2

v_s = 41.53 ft/s

Volumetric flow rate of actual stack gas:

Qa = v_s x A_s x 60 sec/min

Q_a = (41.53) x (13.63) x (60 sec/min)

Q_a = 33963 cfm

Volumetric flow rate of dry stack gas, standardized:

Q_{sd} = (60 sec/min) x (1 - B_{ws}) v_s A_s (T_{std} / T_s) x (P_s/P_{std})

Q_{sd} = (60 sec/min) x (1 - 0.3419) x 41.53 x 13.63 x (528 / 768) x (29.3 / 29.92)

Q_{sd} = 15048 dscfm

Isokinetic sampling ratio expressed as percentage:

I= 100 T_s [(K_3 x V_{lc})+ (Y_m x V_m x P_m / T_m)] / (60 x Q x v_s x P_s x A_n)

I= 100 x (768) x ((0.002669 x 428.643) + (1.008 x 40.698 x 29.39 / 547)))/(60 x 60 x 41.53 x 29.3 x 0.000565)

I= 103.9 %

*Note: Values may not agree exactly with results shown elsewhere in this report due strictly to rounding

Advanced Industrial Resources, Inc.
Sample Calculation Sheet

C.W. Matthews, Bolingbroke, Georgia
Asphalt Baghouse, Run #1

Concentration of PM in dry stack gas, standardized:

c= $(m / V_{m(std)})$ $(35.32\ ft^3 / m^3)$

c= (2.53499999999462 / 38.9) x 35.32

c= **2.30** **mg/dscm**

Concentration of PM in dry stack gas, standardized:

c= (mg/dscm) / $(35.32\ ft^3 / m^3)$ / (64.8 mg/gr)

c= (2.3) / 35.32 / 64.8

c= **0.00100** **gr/dscf**

Emission rate of PM, time basis:

E= $c_{mg/dscm}$ x Q_{sd} x (60 min/hr) x $(2.2046 \times 10^{-6}$ lb/mg) / $(35.32\ ft^3 / m^3)$

E= 2.3 x 15048 x 60 x 2.2046 x 10-6 / 35.32

E= **0.130** **lb/hr**

*Note: Values may not agree exactly with results shown elsewhere in this report due strictly to rounding

EXAMPLE CALCULATIONS

$A_n = D_n^2 \pi / 4$

$A_s = D_s^2 \pi / 4$

$B_{ws} = V_{w(std)} / (V_{m(std)} + V_{w(std)})$

$c_{analyte} = (m_{analyte} / V_{m(std)})\ (35.31466\ ft^3/m^3)$

$`c_{analyte} = (m_{analyte} / V_{m(std)})\ (0.015432\ gr/mg)$

$c_{analyte} = `c_{analyte}\ MW_{analyte} / 24.04\ l/mol$

$CC = t_{0.975}\ (S_d / n^{1/2})$

$d = 1/n\ (Sd_i)$

$DE = (E_{Inlet} – E_{Outlet}) / E_{,Inlet} \times 100\%$

$E_{analyte} = (m_{analyte} / V_{m(std)})\ Q_{sd}\ (60\ min/hr)\ (2.2046x10^{-6}\ lb./mg)$

$E_{analyte} = c_{analyte}\ Q_{sd}\ (60\ min/hr)\ (2.2046x10^{-6}\ lb./mg)$

$I = 100\ T_s\ (K_3\ V_{lc} + Y_m\ V_m\ P_m / T_m) / (60\ \theta\ v_s\ P_s\ A_n)$

where $K_3 = 0.002669\ (in.\ Hg\ ft^3) / (mL\ °R)$

$K_I = [(2.0084x10^7\ \Delta H_@)\ A_n\ (1 – B_{ws})]^2\ (M_d / M_s)\ (T_m / T_s)\ (P_s / P_m)$

$M_d = 0.44\ (\%\ CO_2) + 0.32\ (\%\ O_2) + 0.28\ (\%\ N_2 + \%\ CO)$

$M_s = M_d\ (1 – B_{ws}) + M_w\ B_{ws}$

$P = Qsd / F\text{-}Factor \times 60 \times (20.9\text{-}O_2) / 20.9$

$P_m = P_{bar} + \Delta H / 13.6$

$P_s = P_{bar} + p_g / 13.6$

$Q_a = (60\ s/min)\ v_s\ A_s$

$Q_{sd} = (60\ s/min)\ (1 - B_{ws})\ v_s\ A_s\ (T_{std} / T_s)\ (P_s / P_{std})$

$RA = [Abs(d) + Abs(CC)]/RM$

$S_d = [(Sd_i^2 – (Sdi)^2/n)/(n-1)]^{1/2}$

$T_m = t_m + 460°$

$T_s = t_s + 460°$

$V_{m(std)} = V_m\ Y_m\ (T_{std} / T_m)\ (P_m / P_{std})$

$V_{w(std)} = (V_{lc}\ \rho_w\ R\ T_{std}) / (M_w\ P_{std})$

$v_s = K_p\ C_p\ [\Delta p]^{1/2}\ [T_s / (P_s\ M_s)]^{1/2}$

NOMENCLATURE

Symbol	Units	Description
Abs(x)	dimensionless	Absolute value of parameter x
A_n	ft^2	Area of the nozzle
A_s	ft^2	Area of the stack
B_{ws}	dimensionless	Volume proportion of water in the stack gas stream
C_p	dimensionless	Type S pitot tube coefficient
$c_{analyte}$	mg/dscm	Concentration of analyte in dry stack gas, standardized
$'c_{analyte}$	gr./dscf	Concentration of analyte in dry stack gas, standardized
$'c_{analyte}$	ppm	Concentration of analyte in dry stack gas, standardized
CC	dimensionless	One-tailed 2.5% error confidence coefficient
d	ppm	Arithmetic mean of differences
d_i	ppm	Difference between individual CEM and reference method concentration value
D_n	inches	Internal diameter of the nozzle at the entrance orifice
D_s	inches	Internal diameter of the stack at sampling location
DE	percent	Destruction efficiency
aH	inches H_2O	Average pressure differential across the meter orifice
$aH_@$	inches H_2O	Orifice pressure differential that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of Hg
ap	inches H_2O	Velocity head of stack gas
$E_{analyte}$	lb./hour	Emission rate of analyte, time basis
I	percent	Isokinetic sampling ratio expressed as percentage
K_I	dimensionless	K-factor, ratio of DH to DP, ideal
K_p	ft[(lb/lb-mol)(in. Hg)]$^{1/2}$	Type S pitot tube constant,
	s[(°R)(in. H_2O)]$^{1/2}$	= 85.49
L_p	cfm	Measured post-test leakage rate of the sampling train
M_d	lb./lb.-mole	Molecular weight of gas at the DGM
M_s	lb./lb.-mole	Molecular weight of gas at the stack

NOMENCLATURE

Symbol	Units	Description
$\mathbf{M_w}$	lb./lb.-mole	Molecular weight of water,
		= 18.0
$\mathbf{m_{analyte}}$	mg	Mass of analyte in the sample
n	dimensionless	Number of data points
P	MMBtu	Fuel firing rate
$\mathbf{P_{bar}}$	inches Hg	Barometric pressure at measurement site
$\mathbf{P_{input}}$	tons/hour	Process dry mass input rate
$\mathbf{p_g}$	inches H_2O	Gauge (static) pressure of stack gas
$\mathbf{P_m}$	inches Hg	Absolute pressure of meter gases
$\mathbf{P_s}$	inches Hg	Absolute pressure of stack gases
$\mathbf{P_{std}}$	inches Hg	Standard absolute pressure
		= 29.92
$\mathbf{Q_a}$	cfm	Volumetric flow rate of actual stack gas
$\mathbf{Q_{sd}}$	dscfm	Volumetric flow rate of dry stack gas, standardized
R	(in. Hg)(ft^3)	Ideal gas constant,
	(lb-mole)(°R)	= 21.85
RA	percent	Relative accuracy
RE	percent	Removal efficiency
RM	ppm	Average reference method concentration
$\mathbf{r_w}$	lb/mL	Density of water,
		= 0.002201
$\mathbf{r_a}$	g/mL	Density of acetone,
		= 0.7899
$\mathbf{S_d}$	dimensionless	Standard deviation
$\mathbf{T_m}$	°R	Absolute temperature of dry gas meter
$\mathbf{T_s}$	°R	Absolute temperature of stack gas
$\mathbf{T_{std}}$	°R	Standard absolute temperature,
		= 528
$\mathbf{t_{0.975}}$	dimensionless	2.5 percent error t-value
$\mathbf{t_m}$	°F	Temperature of DGM
$\mathbf{t_s}$	°F	Temperature of stack gas
¯:	minutes	Total sampling time

NOMENCLATURE

Symbol	Units	Description
V_{lc}	mL	Total volume of liquid collected
V_m	dcf	Volume of gas sample as measured by the DGM
$V_{m(std)}$	dscf	Volume of gas sample as measured by the DGM, standardized
$V_{w(std)}$	scf	Volume of water vapor in the gas sample, standardized
v_s	ft./sec	Velocity of stack gas
Y_m	dimensionless	DGM calibration coefficient
Y_c	dimensionless	DGM calibration check value
Y_w	dimensionless	Reference (wet) gas meter calibration coefficient
% CO_2	percent	Percent CO_2 by volume, dry basis
% O_2	percent	Percent O_2 by volume, dry basis
% N_2	percent	Percent N_2 by volume, dry basis

APPENDIX D

FIELD DATA

Advanced Industrial Resources, Inc.

Particulate Matter Field Data Sheet

Client:	C.W. Matthews	**Test Date:**	June 19, 2018
Location:	Bolingbroke, Georgia	**Console ID:**	C-019
Source:	Asphalt Baghouse	**Y_m / $\Delta H_@$:**	1.008 1.836
Test Team:	GSG, RW	**Sampling Box ID:**	B-19
EPA Methods:	1, 2, 3, 4 & 5	**Probe Assembly ID:**	P5-01
D_s (in.):	50.0	**D_n (in.):**	0.322
% O_2	13.00	**Assumed B_{ws}:**	28.0
% CO_2	6.00	**P_{bar} (in. Hg):**	29.28
Start Run:	7:20 AM	**p_g (in. H_2O):**	0.24
End Run:	8:22 AM	**Minutes/Point:**	2.5
Run Number:	1	**K-Factor:**	4.7

		Inches H_2O			Temperature Readings (°F)					
Point	**Meter (dcf)**	**Δp**	**ΔH**	**$(\Delta p)^{1/2}$**	**t_s**	**Filter**	**Last Impinger**	**t_m Average**	**Filer Exit**	**Vacuum (in. Hg)**
1	0.000	0.36	1.69	0.600	299	259	68	80	215	2
2	1.77	0.36	1.69	0.600	300	253	66	80	220	2
3	3.54	0.33	1.55	0.574	301	255	65	80	233	2
4	5.26	0.31	1.46	0.557	301	256	65	80	245	2
5	6.91	0.29	1.36	0.539	301	256	64	80	252	2
6	8.52	0.30	1.41	0.548	304	254	63	81	257	2
7	10.14	0.29	1.36	0.539	306	264	63	82	260	2
8	11.76	0.31	1.46	0.557	308	262	62	83	262	2
9	13.37	0.33	1.55	0.574	309	253	63	83	262	2
10	15.05	0.33	1.55	0.574	311	252	63	84	265	2
11	16.71	0.32	1.50	0.566	311	257	64	85	266	2
12	18.37	0.31	1.46	0.557	310	258	63	87	266	2
13	20.02	0.37	1.74	0.608	314	255	68	87	260	2
14	21.85	0.36	1.69	0.600	313	256	63	88	270	2
15	23.60	0.35	1.65	0.592	313	258	64	89	271	2
16	25.50	0.35	1.65	0.592	313	257	65	90	271	2
17	27.14	0.34	1.60	0.583	312	260	65	91	271	2
18	28.89	0.33	1.55	0.574	312	257	65	91	270	2
19	30.63	0.31	1.46	0.557	311	256	66	92	270	2
20	32.31	0.31	1.46	0.557	311	260	66	90	269	2
21	33.99	0.32	1.50	0.566	311	257	66	93	267	2
22	35.68	0.32	1.50	0.566	310	256	66	94	265	2
23	37.37	0.31	1.46	0.557	310	252	67	94	261	2
24	39.04	0.31	1.46	0.557	309	252	68	95	259	2
End	40.698									

Total Moisture Collected (mL):	429.5
Pre- System Leak Check (cfm):	0.007
Post- System Leak Check (cfm):	0.005

Advanced Industrial Resources, Inc.

Particulate Matter Field Data Sheet

Client:	C.W. Matthews	**Test Date:**	June 19, 2018
Location:	Bolingbroke, Georgia	**Console ID:**	C-019
Source:	Asphalt Baghouse	**Y_m / $\Delta H_@$:**	1.008 1.836
Test Team:	GSG, RW	**Sampling Box ID:**	B-19
EPA Methods:	1, 2, 3, 4 & 5	**Probe Assembly ID:**	P5-01
D_s (in.):	50.0	**D_n (in.):**	0.322
% O_2	13.00	**Assumed B_{ws}:**	26.0
% CO_2	6.00	**P_{bar} (in. Hg):**	29.28
Start Run:	8:50 AM	**p_g (in. H_2O):**	0.24
End Run:	9:51 AM	**Minutes/Point:**	2.5
Run Number:	**2**	**K-Factor:**	4.7

		Inches H_2O			Temperature Readings (°F)					
Point	**Meter (dcf)**	**Δp**	**ΔH**	**$(\Delta p)^{1/2}$**	**t_s**	**Filter**	**Last Impinger**	**t_m Average**	**Filer Exit**	**Vacuum (in. Hg)**
1	0.000	0.37	1.74	0.608	306	257	68	90	219	2
2	1.81	0.36	1.69	0.600	308	252	64	90	221	2
3	3.59	0.34	1.60	0.583	308	255	58	90	225	2
4	5.30	0.34	1.60	0.583	308	258	59	90	229	2
5	7.00	0.34	1.60	0.583	308	251	59	91	232	2
6	8.71	0.33	1.55	0.574	306	254	59	91	234	2
7	10.41	0.32	1.50	0.566	305	257	60	92	235	2
8	12.09	0.32	1.50	0.566	303	259	60	93	235	2
9	13.75	0.31	1.46	0.557	303	255	62	94	238	2
10	15.39	0.32	1.50	0.566	303	260	62	94	239	2
11	17.05	0.31	1.46	0.557	304	258	64	95	240	2
12	18.69	0.31	1.46	0.557	304	257	65	95	240	2
13	20.33	0.36	1.69	0.600	306	258	68	96	237	2
14	22.07	0.35	1.65	0.592	307	257	68	97	246	2
15	23.83	0.35	1.65	0.592	306	256	67	97	245	2
16	25.58	0.33	1.55	0.574	306	252	66	98	245	2
17	27.30	0.32	1.50	0.566	306	252	67	98	246	2
18	29.02	0.32	1.50	0.566	307	258	68	99	248	2
19	30.73	0.32	1.50	0.566	307	257	67	99	250	2
20	32.41	0.31	1.46	0.557	307	257	66	100	250	2
21	34.08	0.31	1.46	0.557	306	254	66	100	246	2
22	35.75	0.32	1.50	0.566	305	257	67	101	241	2
23	37.45	0.32	1.50	0.566	305	255	67	101	238	2
24	32.13	0.31	1.46	0.557	305	251	66	101	238	2
End	40.816									

Total Moisture Collected (mL):	438.0
Pre- System Leak Check (cfm):	0.008
Post- System Leak Check (cfm):	0.004

Advanced Industrial Resources, Inc.
Particulate Matter Field Data Sheet

Client:	C.W. Matthews	**Test Date:**	June 19, 2018
Location:	Bolingbroke, Georgia	**Console ID:**	C-019
Source:	Asphalt Baghouse	**Y_m / $\Delta H_@$:**	1.008 1.836
Test Team:	GDG, RW	**Sampling Box ID:**	B-19
EPA Methods:	1, 2, 3, 4 & 5	**Probe Assembly ID:**	P5-01
D_s (in.):	50.0	**D_n (in.):**	0.322
% O_2	13.00	**Assumed B_{ws}:**	28.0
% CO_2	6.00	**P_{bar} (in. Hg):**	29.28
Start Run:	11:30 AM	**p_g (in. H_2O):**	0.24
End Run:	12:31 PM	**Minutes/Point:**	2.50
Run Number:	**3**	**K-Factor:**	4.50

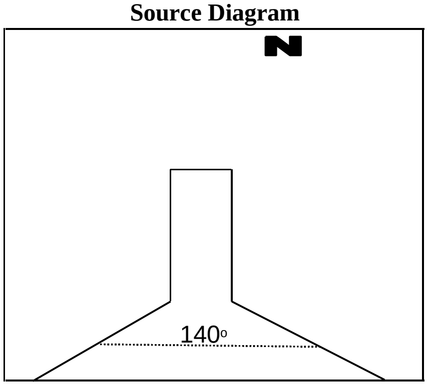
		Inches H_2O			Temperature Readings (°F)					
Point	**Meter (dcf)**	**Δp**	**ΔH**	**$(\Delta p)^{1/2}$**	**t_s**	**Filter**	**Last Impinger**	**t_m Average**	**Filer Exit**	**Vacuum (in. Hg)**
1	0.000	0.36	1.62	0.600	293	255	68	92	218	2
2	1.77	0.36	1.62	0.600	296	261	67	92	234	2
3	3.50	0.33	1.49	0.574	300	255	64	92	247	2
4	5.17	0.31	1.40	0.557	303	260	63	93	251	2
5	6.78	0.30	1.35	0.548	305	256	63	93	253	2
6	8.36	0.31	1.40	0.557	306	255	63	94	254	2
7	9.96	0.31	1.40	0.557	307	256	63	95	255	2
8	11.57	0.30	1.35	0.548	308	252	64	95	257	2
9	13.16	0.30	1.35	0.548	310	253	63	96	257	2
10	14.74	0.31	1.40	0.557	310	251	64	96	257	2
11	16.36	0.31	1.40	0.557	311	255	65	97	258	2
12	18.00	0.31	1.40	0.557	311	256	65	98	258	2
13	19.65	0.37	1.67	0.608	313	257	68	99	258	2
14	21.45	0.36	1.62	0.600	313	256	67	100	261	2
15	23.20	0.35	1.58	0.592	313	254	66	100	262	2
16	24.94	0.35	1.58	0.592	313	257	65	101	262	2
17	26.70	0.33	1.49	0.574	313	258	64	102	262	2
18	28.42	0.32	1.44	0.566	311	259	65	102	261	2
19	30.13	0.31	1.40	0.557	311	254	65	103	262	2
20	31.78	0.30	1.35	0.548	307	258	65	104	258	2
21	33.42	0.31	1.40	0.557	307	257	66	104	257	2
22	35.07	0.31	1.40	0.557	305	253	66	105	253	2
23	36.73	0.31	1.40	0.557	308	260	67	105	250	2
24	38.38	0.30	1.35	0.548	311	257	68	106	248	2
End	40.013									

Total Moisture Collected (mL):	418.0
Pre- System Leak Check (cfm):	0.006
Post- System Leak Check (cfm):	0.004

Advanced Industrial Resources, Inc.
Visible Emissions Field Data Sheet

Client:	C.W. Matthews		**Date:**	June 19, 2018
Location:	Bolingbroke, Georgia		**Run Number:**	1
Source:	Asphalt Baghouse		**Start Run:**	7:20 AM
Control Device:	Baghouse		**Distance to Source:**	50
Test Personnel:	Ross Winne		**Height of Discharge Point:**	25
Wind Direction:	East		**Ambient Temperature:**	73
Wind Speed:	2 Mph			
Sky Color:	Blue		**Condensed H_2O in Plume:**	No
Background:	Clear		**Plume:**	Detached

Source Diagram



** Indicate Magnetic North*

Minutes Read: 60

Average Percent Opacity: 0

Percent Opacity Readings									
	Seconds					**Seconds**			
Minutes	**0:00**	**0:15**	**0:30**	**0:45**	**Minutes**	**0:00**	**0:15**	**0:30**	**0:45**
0	0	0	0	0	**30**	0	0	0	0
1	0	0	0	0	**31**	0	0	0	0
2	0	0	0	0	**32**	0	0	0	0
3	0	0	0	0	**33**	0	0	0	0
4	0	0	0	0	**34**	0	0	0	0
5	0	0	0	0	**35**	0	0	0	0
6	0	0	0	0	**36**	0	0	0	0
7	0	0	0	0	**37**	0	0	0	0
8	0	0	0	0	**38**	0	0	0	0
9	0	0	0	0	**39**	0	0	0	0
10	0	0	0	0	**40**	0	0	0	0
11	0	0	0	0	**41**	0	0	0	0
12	0	0	0	0	**42**	0	0	0	0
13	0	0	0	0	**43**	0	0	0	0
14	0	0	0	0	**44**	0	0	0	0
15	0	0	0	0	**45**	0	0	0	0
16	0	0	0	0	**46**	0	0	0	0
17	0	0	0	0	**47**	0	0	0	0
18	0	0	0	0	**48**	0	0	0	0
19	0	0	0	0	**49**	0	0	0	0
20	0	0	0	0	**50**	0	0	0	0
21	0	0	0	0	**51**	0	0	0	0
22	0	0	0	0	**52**	0	0	0	0
23	0	0	0	0	**53**	0	0	0	0
24	0	0	0	0	**54**	0	0	0	0
25	0	0	0	0	**55**	0	0	0	0
26	0	0	0	0	**56**	0	0	0	0
27	0	0	0	0	**57**	0	0	0	0
28	0	0	0	0	**58**	0	0	0	0
29	0	0	0	0	**59**	0	0	0	0

Comments:

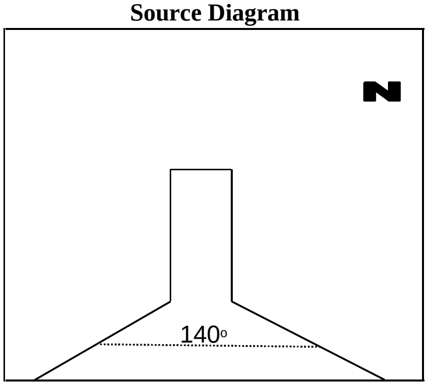
Test Personnel Ross Winne

Certification Date: April 13, 2018

Advanced Industrial Resources, Inc.
Visible Emissions Field Data Sheet

Client:	C.W. Matthews		**Date:**	June 19, 2018
Location:	Bolingbroke, Georgia		**Run Number:**	2
Source:	Asphalt Baghouse		**Start Run:**	8:50 AM
Control Device:	Baghouse		**Distance to Source:**	50
Test Personnel:	Ross Winne		**Height of Discharge Point:**	25
Wind Direction:	East		**Ambient Temperature:**	84
Wind Speed:	2 Mph			
Sky Color:	Blue		**Condensed H_2O in Plume:**	No
Background:	Clear		**Plume:**	Detached

Source Diagram



** Indicate Magnetic North*

Minutes Read: 60

Average Percent Opacity: 0

Percent Opacity Readings									
	Seconds					Seconds			
Minutes	**0:00**	**0:15**	**0:30**	**0:45**	**Minutes**	**0:00**	**0:15**	**0:30**	**0:45**
0	0	0	0	0	**30**	0	0	0	0
1	0	0	0	0	**31**	0	0	0	0
2	0	0	0	0	**32**	0	0	0	0
3	0	0	0	0	**33**	0	0	0	0
4	0	0	0	0	**34**	0	0	0	0
5	0	0	0	0	**35**	0	0	0	0
6	0	0	0	0	**36**	0	0	0	0
7	0	0	0	0	**37**	0	0	0	0
8	0	0	0	0	**38**	0	0	0	0
9	0	0	0	0	**39**	0	0	0	0
10	0	0	0	0	**40**	0	0	0	0
11	0	0	0	0	**41**	0	0	0	0
12	0	0	0	0	**42**	0	0	0	0
13	0	0	0	0	**43**	0	0	0	0
14	0	0	0	0	**44**	0	0	0	0
15	0	0	0	0	**45**	0	0	0	0
16	0	0	0	0	**46**	0	0	0	0
17	0	0	0	0	**47**	0	0	0	0
18	0	0	0	0	**48**	0	0	0	0
19	0	0	0	0	**49**	0	0	0	0
20	0	0	0	0	**50**	0	0	0	0
21	0	0	0	0	**51**	0	0	0	0
22	0	0	0	0	**52**	0	0	0	0
23	0	0	0	0	**53**	0	0	0	0
24	0	0	0	0	**54**	0	0	0	0
25	0	0	0	0	**55**	0	0	0	0
26	0	0	0	0	**56**	0	0	0	0
27	0	0	0	0	**57**	0	0	0	0
28	0	0	0	0	**58**	0	0	0	0
29	0	0	0	0	**59**	0	0	0	0

Comments:

Test Personnel Ross Winne

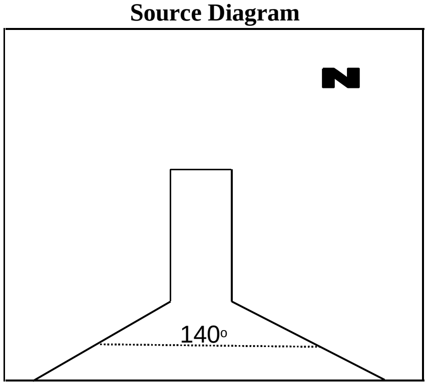
Certification Date: April 13, 2018

Advanced Industrial Resources, Inc.
Visible Emissions Field Data Sheet

Client: C.W. Matthews
Location: Bolingbroke, Georgia
Source: Asphalt Baghouse
Control Device: Baghouse
Test Personnel: Ross Winne
Wind Direction: East
Wind Speed: 2 Mph
Sky Color: Blue/White
Background: Clear - 30% Clouds

Date: June 19, 2018
Run Number: 3
Start Run: 11:30 AM
Distance to Source: 50
Height of Discharge Point: 25
Ambient Temperature: 92
Condensed H_2O in Plume: No
Plume: Detached

Source Diagram



** Indicate Magnetic North*

Minutes Read: 60

Average Percent Opacity: 0

Percent Opacity Readings									
	Seconds					Seconds			
Minutes	**0:00**	**0:15**	**0:30**	**0:45**	**Minutes**	**0:00**	**0:15**	**0:30**	**0:45**
0	0	0	0	0	**30**	0	0	0	0
1	0	0	0	0	**31**	0	0	0	0
2	0	0	0	0	**32**	0	0	0	0
3	0	0	0	0	**33**	0	0	0	0
4	0	0	0	0	**34**	0	0	0	0
5	0	0	0	0	**35**	0	0	0	0
6	0	0	0	0	**36**	0	0	0	0
7	0	0	0	0	**37**	0	0	0	0
8	0	0	0	0	**38**	0	0	0	0
9	0	0	0	0	**39**	0	0	0	0
10	0	0	0	0	**40**	0	0	0	0
11	0	0	0	0	**41**	0	0	0	0
12	0	0	0	0	**42**	0	0	0	0
13	0	0	0	0	**43**	0	0	0	0
14	0	0	0	0	**44**	0	0	0	0
15	0	0	0	0	**45**	0	0	0	0
16	0	0	0	0	**46**	0	0	0	0
17	0	0	0	0	**47**	0	0	0	0
18	0	0	0	0	**48**	0	0	0	0
19	0	0	0	0	**49**	0	0	0	0
20	0	0	0	0	**50**	0	0	0	0
21	0	0	0	0	**51**	0	0	0	0
22	0	0	0	0	**52**	0	0	0	0
23	0	0	0	0	**53**	0	0	0	0
24	0	0	0	0	**54**	0	0	0	0
25	0	0	0	0	**55**	0	0	0	0
26	0	0	0	0	**56**	0	0	0	0
27	0	0	0	0	**57**	0	0	0	0
28	0	0	0	0	**58**	0	0	0	0
29	0	0	0	0	**59**	0	0	0	0

Comments:

Test Personnel Ross Winne
Certification Date: April 13, 2018

Advanced Industrial Resources, Inc.
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client:	C.W. Matthews	**Date:**	June 19, 2018
Location:	Bolingbroke, Georgia	**D_s (in.):**	50.0
Source:	Asphalt Baghouse	**A_s (ft^2):**	13.64
Test Team:	GSG, RW	**D_n (in.):**	0.322
Probe ID:	P5-01	**A_n (ft^2):**	0.000566
C_p:	0.84		

t_m (°F):	78
Console ID:	C-019
Y_m:	1.008
$\Delta H_@$:	1.836
Assumed B_{ws}:	26%
P_{bar} (in. Hg):	29.28

Point	Δp (in. H_2O)	α (degrees)
1	0.0	0.0
2	0.0	0.0
3	0.0	1.0
4	0.0	1.0
5	0.0	2.0
6	0.0	1.0
7	0.0	0.0
8	0.0	1.0
9	0.0	1.0
10	0.0	0.0
11	0.0	0.0
12	0.0	0.0
Change Ports		
1	0.0	0.0
2	0.0	1.0
3	0.0	1.0
4	0.0	1.0
5	0.0	2.0
6	0.0	2.0
7	0.0	1.0
8	0.0	0.0
9	0.0	0.0
10	0.0	1.0
11	0.0	0.0
12	0.0	0.0

Advanced Industrial Resources, Inc.
Source Description Sheets

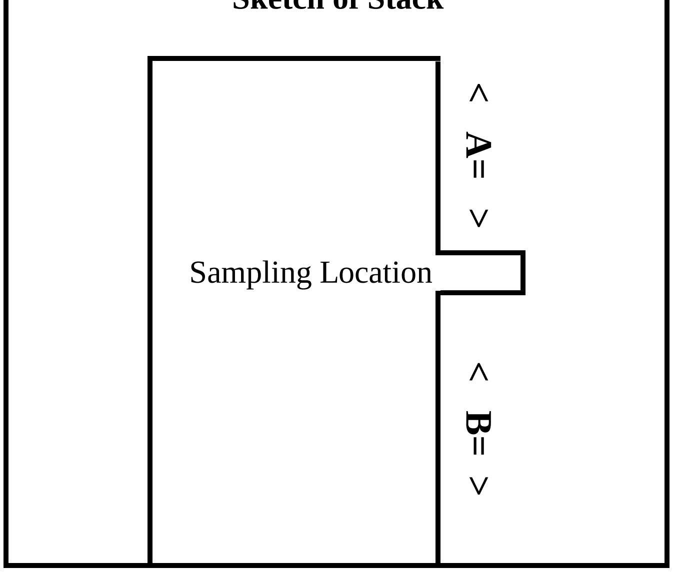
Client:	C.W. Matthews
Location:	Bolingbroke, Georgia
Source:	Asphalt Baghouse
Date:	June 19, 2018
Test Team:	GSG, RW

D_n (in.):	0.322
A_n (ft^2):	0.000566
D_s (in.):	50.0
A_s (ft^2):	13.64
Length A:	36
Length B:	168
t_{amb} (°F):	87
Assumed B_{ws}:	26%
P_{bar} (in. Hg):	29.28
P_g (in. H_2O):	0.24
% O_2:	13.0%
% CO_2:	6.0%
Console ID:	C-019
Y:	1.008
$\Delta H_@$:	1.836
C_p:	0.84
K-Factor:	4.7

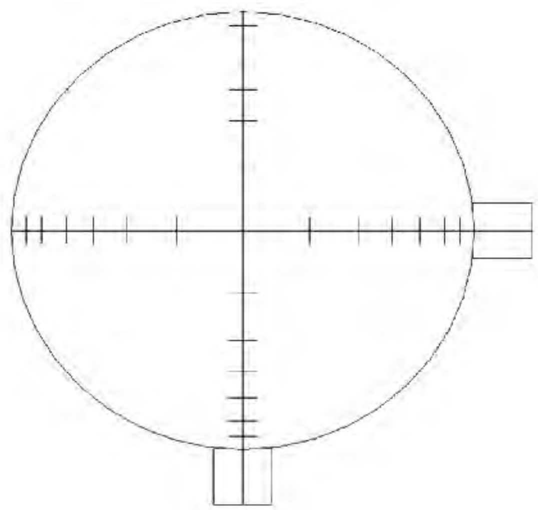
Point	Δp (in. H_2O)	t_s (°F)
1	0.36	270
2	0.36	270
3	0.33	270
4	0.30	272
5	0.27	272
6	0.26	273
7	0.27	274
8	0.29	274
9	0.31	275
10	0.31	274
11	0.31	274
12	0.30	273
Change Ports		
1	0.36	274
2	0.36	275
3	0.36	275
4	0.35	277
5	0.35	277
6	0.31	278
7	0.30	278
8	0.30	278
9	0.31	278
10	0.32	275
11	0.31	278
12	0.32	276

Digital Photograph of Source Not Available

Sketch of Stack



Traverse Point Locations
for
C.W. Matthews
Asphalt Baghouse



50.0 Inch Diameter Stack
Two Ports at 90°

Sampling Point	Distance from Stack Wall (inches)
1	1.1
2	3.4
3	5.9
4	8.9
5	12.5
6	17.8
7	32.2
8	37.5
9	41.2
10	44.1
11	46.7
12	49.0

Advanced Industrial Resources, Inc.
Field Data Sheet

Client:	CW MATTHEWS	Test Date:	6/19/18
Location:	BOLINGBROKE, GA	Console ID:	C-019
Source:	BH EXHAUST	Y_m / $\Delta H_@$:	1.008 / 1.836
Test Team:	GSG RW	Sampling Box ID:	B-19
EPA Methods:	1,2,3,5	Probe Assembly ID:	PS-01
D_s (in.):	50	D_n (in.):	~~0.434~~ 0.3?2 0.50
% O_2	13	Assumed B_{ws}:	28
% CO_2	6	P_{bar} (in. Hg):	29.28
Start Run:	07:20	p_g (in. H_2O):	0.24
End Run:	08:22	Minutes/Point:	5.0
Run Number:	1	K-Factor:	~~7.8~~ 4.7 0.80

Point	Meter (dcf)	Inches H_2O Δp	Inches H_2O ΔH	Temperature Readings (°F) t_s	Probe	Filter Box	Last Impinger	t_m Inlet	t_m Outlet	Filter Exit (M5 or CPM)	Vacuum (in. Hg)
1	0.0000	0.36	1.69	299	253	259	66	80	80	215	2
2	1.77	0.36	1.69	300	252	253	66	80	80	220	2
3	3.59	0.33	1.55	301	253	255	65	80	80	233	2
4	5.26	0.31	1.46	301	254	256	65	80	80	245	2
5	6.91	0.29	1.36	301	253	256	64	80	80	252	2
6	8.52	0.30	1.41	304	252	254	63	81	81	257	2
7	10.14	0.29	1.36	306	252	264	63	82	82	260	2
8	11.74	0.31	1.46	308	253	262	62	83	83	262	2
9	13.37	0.33	1.55	309	252	253	63	83	83	262	2
10	15.05	0.33	1.55	311	253	252	63	84	84	265	2
11	16.71	0.32	1.50	311	252	257	64	85	85	266	2
12	18.37	0.31	1.46	310	252	258	63	87	87	266	2
Change Ports											
1	20.023	0.37	1.74	314	252	255	68	87	87	260	2
2	21.85	0.34	1.49	313	253	256	63	88	88	270	2
3	23.60	0.35	1.45	313	252	258	64	89	89	271	2
4	25.50	0.35	1.65	313	254	257	65	90	90	271	2
5	27.14	0.34	1.60	312	253	260	65	91	91	271	2
6	28.89	0.33	1.55	312	252	257	65	91	91	270	2
7	30.63	0.31	1.46	311	252	256	66	92	92	270	2
8	32.31	0.31	1.46	311	252	260	66	93	93	269	2
9	33.99	0.32	1.50	311	251	257	66	93	93	267	2
10	35.68	0.32	1.50	310	252	256	66	94	94	265	2
11	37.37	0.31	1.46	310	252	256	67	94	94	261	2
12	39.04	0.31	1.46	309	251	252	68	95	95	259	2
End	40.698										

Moisture Collected (g)

	Initial	Final	Net
Body:	200	615	~~315~~ 415 GSG
Silica Gel:	200.0	214.5	14.5
Gel Number:		Total:	~~329.5~~ 429.5

Pre-Run Leak Checks (dcfm @ "Hg)
Sampling Line: 0.0007 @ 10"
Pitot A: ✓
Pitot B: ✓

Post-Run Leak Checks (dcfm @ "Hg)
Sampling Line: 0.0005 @ 5"
Pitot A: ✓
Pitot B: ✓

Silica Gel Desc. (initial): BLUE
Silica Gel Desc. (final): LT. BLUE
Test Team Leader Review: [signature]
Data Entry Review: [signature]

Reagent 1: ACETONE Lot No: 175270
Reagent 2: Lot No:

Advanced Industrial Resources, Inc.

Field Data Sheet

Client:	CW MATTHEWS	Test Date:	6/19/18
Location:	BOLINGBROKE GA	Console ID:	C-019
Source:	BH EXHAUST	Y_m / $\Delta H_@$:	1.008 / 1.836
Test Team:	GSG RW	Sampling Box ID:	B-19
EPA Methods:	1,2,3,5	Probe Assembly ID:	P5-01
D_s (in.):	50	D_n (in.):	0.322
% O_2	13	Assumed B_{ws}:	28
% CO_2	6	P_{bar} (in. Hg):	29.28
Start Run:	08:50	p_g (in. H_2O):	0.24
End Run:	09:54	Minutes/Point:	2.5
Run Number:	2	K-Factor:	4.7

Point	Meter (dcf)	Inches H_2O Δp	Inches H_2O ΔH	Temperature Readings (°F) t_s	Probe	Filter Box	Last Impinger	t_m Inlet	t_m Outlet	Filter Exit (M5 or CPM)	Vacuum (in. Hg)
1	0.0000	0.37	1.74	306	252	257	68	90	90	219	2
2	1.81	0.36	1.69	308	252	252	64	90	90	221	2
3	3.59	0.34	1.60	308	254	255	58	90	90	225	2
4	5.30	0.34	1.60	308	252	258	59	90	90	229	2
5	7.00	0.34	1.60	308	253	251	59	91	91	232	2
6	8.71	0.33	1.55	306	253	254	59	91	91	234	2
7	10.41	0.32	1.50	305	252	257	60	92	92	235	2
8	12.09	0.32	1.50	303	253	259	60	93	93	235	2
9	13.75	0.31	1.46	303	253	255	62	94	94	238	2
10	15.39	0.32	1.50	303	252	260	62	94	94	239	2
11	17.05	0.31	1.46	304	252	258	64	95	95	240	2
12	18.69	0.31	1.46	304	252	257	65	95	95	240	2
Change Ports											
1	20.325	0.36	1.69	306	252	258	68	96	96	237	2
2	22.07	0.35	1.65	307	253	257	68	97	97	246	2
3	23.83	0.35	1.65	306	252	256	67	97	97	245	2
4	25.58	0.33	1.55	306	253	252	66	98	98	245	2
5	27.30	0.32	1.50	306	253	252	67	98	98	246	2
6	29.02	0.32	1.50	307	252	256	68	99	99	248	2
7	30.73	0.32	1.50	307	252	257	67	99	99	250	2
8	32.41	0.31	1.46	307	252	257	66	100	100	250	2
9	34.08	0.31	1.46	306	252	254	66	100	100	246	2
10	35.75	0.32	1.50	305	252	257	67	101	101	241	2
11	37.48	0.32	1.50	305	252	258	67	101	101	238	2
12	39.13	0.31	1.46	305	247	251	66	101	101	238	2
End	40.0164										

Moisture Collected (g)

	Initial	Final	Net
Body:	200	624	~~324~~ 424
Silica Gel:	200.0	214.0	14.0
Gel Number:		Total:	~~338.0~~ 438

Pre-Run Leak Checks (dcfm @ "Hg)
Sampling Line: 0.008 @ 6"
Pitot A: —
Pitot B: —

Post-Run Leak Checks (dcfm @ "Hg)
Sampling Line: 0.004 @ 5"
Pitot A: ok
Pitot B: ok

Silica Gel Desc. (initial): BWR
Silica Gel Desc. (final): LT BWR
Test Team Leader Review: [signature]
Data Entry Review: [signature]

Reagent 1: Acetone Lot No: 175270
Reagent 2: Lot No:

Advanced Industrial Resources, Inc.

Field Data Sheet

Client:	CW MATTHEWS	Test Date:	6/19/18
Location:	BOLINGBROKE, GA	Console ID:	C-019
Source:	BH EXHAUST	Y_m / $\Delta H_@$:	1.008/1.836
Test Team:	GSG RW	Sampling Box ID:	B-19
EPA Methods:	1,2,3,5	Probe Assembly ID:	P5-01
D_s (in.):	50	D_n (in.):	0.372
% O_2	13	Assumed B_{ws}:	28
% CO_2	6	P_{bar} (in. Hg):	29.20
Start Run:	11:30	p_g (in. H_2O):	0.24
End Run:	12:31	Minutes/Point:	2.5
Run Number:	3	K-Factor:	4.5

Point	Meter (dcf)	Inches H_2O Δp	Inches H_2O ΔH	Temperature Readings (°F) t_s	Probe	Filter Box	Last Impinger	t_m Inlet	t_m Outlet	Filter Exit (M5 or CPM)	Vacuum (in. Hg)
1	0.0000	0.36	1.62	293	253	255	68	92	92	218	2
2	1.77	0.36	1.62	296	252	261	67	92	92	234	2
3	3.50	0.33	1.49	300	254	255	64	92	92	247	2
4	5.17	0.31	1.40	303	253	260	63	93	93	251	2
5	6.70	0.30	1.35	305	258	256	63	93	93	253	2
6	8.36	0.31	1.40	306	252	255	63	94	94	254	2
7	9.94	0.31	1.40	307	253	256	63	95	95	255	2
8	11.57	0.30	1.35	308	252	252	64	95	95	257	2
9	13.16	0.30	1.35	310	252	253	63	96	96	257	2
10	14.74	0.31	1.40	310	254	261	64	96	96	257	2
11	16.36	0.31	1.40	311	253	255	65	97	97	258	2
12	18.00	0.31	1.40	311	252	256	65	98	98	258	2
Change Ports											
1	19.652	0.37	1.67	313	254	257	68	99	99	258	2
2	21.45	0.36	1.62	313	252	256	67	100	100	241	2
3	23.20	0.35	1.58	313	253	254	66	100	100	262	2
4	24.94	0.35	1.58	313	252	257	65	101	101	262	2
5	26.70	0.33	1.49	313	254	258	64	102	102	262	2
6	28.42	0.32	1.44	311	252	259	65	102	102	261	2
7	30.13	0.31	1.40	311	252	254	65	103	103	262	2
8	31.78	0.30	1.35	307	251	258	65	104	104	258	2
9	33.42	0.31	1.40	307	252	257	66	104	104	257	2
10	35.07	0.31	1.40	305	251	253	66	105	105	253	2
11	36.73	0.31	1.40	306	252	260	67	105	105	250	2
12	38.38	0.30	1.35	311	245	257	68	106	106	248	2
End	40.0131										

Moisture Collected (g)

	Initial	Final	Net
Body:	200	603	403
Silica Gel:	200.0	215	15
Gel Number:		Total:	418

Pre-Run Leak Checks (dcfm @ "Hg)

Sampling Line: 0.0006 @ 8"
Pitot A: ✓
Pitot B: ✓

Post-Run Leak Checks (dcfm @ "Hg)

Sampling Line: 0.0004 @ 5"
Pitot A: ok
Pitot B: ok

Silica Gel Desc. (initial): Blue
Silica Gel Desc. (final): 1/7 Blue
Test Team Leader Review: [signature]
Data Entry Review: [signature]

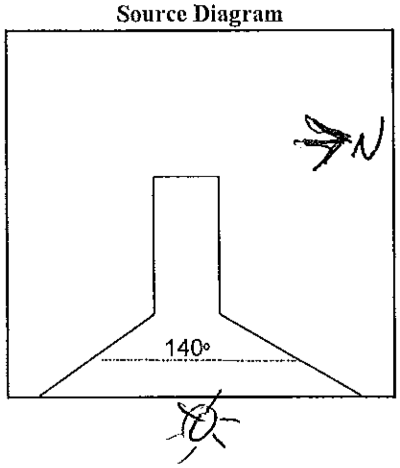
Reagent 1: Acetone Lot No: 175270
Reagent 2: Lot No:

Advanced Industrial Resources, Inc.

Visible Emissions Field Data Sheet

Client:	CW Matthews	Date:	6/19/18
Location:	Rolling Brooke	Run Number:	1
Source:	Asphalt Plant	Start Run:	720
Control Device:	Baghouse	Distance to Source:	50 ft
Test Personnel:	RW	Height of Discharge Point:	25 ft
Wind Direction:	~~Calm~~ East	Ambient Temperature:	73
Wind Speed:	~2 mph		
Sky Color:	Blue	Condensed H_2O in Plume:	Yes / No (No circled)
Background:	Clear	Plume:	Attached / Detached NA

Source Diagram



* *Indicate Magnetic North*

Minutes	0:00	0:15	0:30	0:45	Minutes	0:00	0:15	0:30	0:45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Minutes Read: 60

Percent Opacity: ______

Comments: ______

Signature: [signature]

Certification Date: 4/13/18

Test Team Leader Review: [initials]

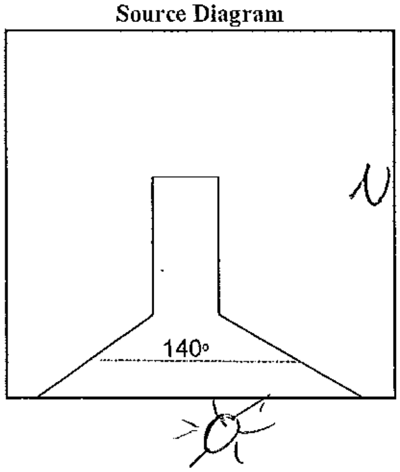
Data Entry Review: [initials]

Advanced Industrial Resources, Inc.

Visible Emissions Field Data Sheet

Client:	CW Matthews	**Date:**	6/19/18
Location:	Boiling Brooke	**Run Number:**	(2)
Source:	Asphalt Plant	**Start Run:**	8:50
Control Device:	Baghouse	**Distance to Source:**	50 ft
Test Personnel:	RW	**Height of Discharge Point:**	25 ft.
Wind Direction:	E	**Ambient Temperature:**	84
Wind Speed:	2 mph		
Sky Color:	Blue	**Condensed H_2O in Plume:**	Yes / ~~No~~ (No circled)
Background:	Clear	**Plume:**	Attached / Detached NA

Source Diagram



* *Indicate Magnetic North*

Minutes Read: 60

Percent Opacity: ______

	Seconds					Seconds			
Minutes	**0:00**	**0:15**	**0:30**	**0:45**	**Minutes**	**0:00**	**0:15**	**0:30**	**0:45**
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Comments: ______

Signature: [signature]

Certification Date: 4/13/18

Test Team Leader Review: [signature]

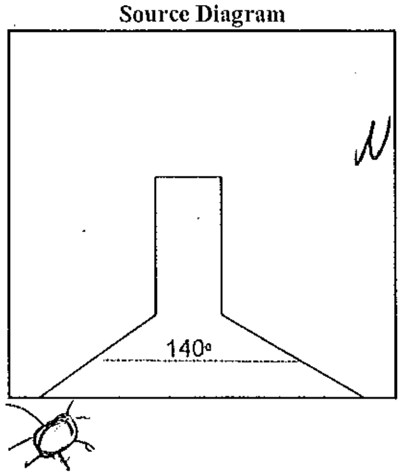
Data Entry Review: ______

Advanced Industrial Resources, Inc.

Visible Emissions Field Data Sheet

Client:	CW MATTHEWS	**Date:**	6/19/18
Location:	BOILING BROOK	**Run Number:**	(3)
Source:	ASPHALT PLANT	**Start Run:**	11:30
Control Device:	BAGHOUSE	**Distance to Source:**	50 ft
Test Personnel:	RW	**Height of Discharge Point:**	25 FT
Wind Direction:	E	**Ambient Temperature:**	92
Wind Speed:	2 mph		
Sky Color:	BLUE - WHITE	**Condensed H_2O in Plume:**	Yes / (No)
Background:	CLEAR - 30% CLOUDS	**Plume:**	Attached / Detached NA

Source Diagram



** Indicate Magnetic North*

Minutes	0:00	0:15	0:30	0:45	Minutes	0:00	0:15	0:30	0:45
0	0	0	0	0	30	0	0	0	0
1	0	0	0	0	31	0	0	0	0
2	0	0	0	0	32	0	0	0	0
3	0	0	0	0	33	0	0	0	0
4	0	0	0	0	34	0	0	0	0
5	0	0	0	0	35	0	0	0	0
6	0	0	0	0	36	0	0	0	0
7	0	0	0	0	37	0	0	0	0
8	0	0	0	0	38	0	0	0	0
9	0	0	0	0	39	0	0	0	0
10	0	0	0	0	40	0	0	0	0
11	0	0	0	0	41	0	0	0	0
12	0	0	0	0	42	0	0	0	0
13	0	0	0	0	43	0	0	0	0
14	0	0	0	0	44	0	0	0	0
15	0	0	0	0	45	0	0	0	0
16	0	0	0	0	46	0	0	0	0
17	0	0	0	0	47	0	0	0	0
18	0	0	0	0	48	0	0	0	0
19	0	0	0	0	49	0	0	0	0
20	0	0	0	0	50	0	0	0	0
21	0	0	0	0	51	0	0	0	0
22	0	0	0	0	52	0	0	0	0
23	0	0	0	0	53	0	0	0	0
24	0	0	0	0	54	0	0	0	0
25	0	0	0	0	55	0	0	0	0
26	0	0	0	0	56	0	0	0	0
27	0	0	0	0	57	0	0	0	0
28	0	0	0	0	58	0	0	0	0
29	0	0	0	0	59	0	0	0	0

Minutes Read: 60

Percent Opacity: ______

Comments: ______

Signature: [signature]

Certification Date: 4/13/18

Test Team Leader Review: [signature]

Data Entry Review: [signature]

Advanced Industrial Resources, Inc.
Cyclonic Flow Absence Verification Field Data
EPA Method 1

Client: CW MATTHEWS
Location: BOLINGBROKE, GA
Source: B14 EXHAUST
Test Team: GSG, RW
Probe ID: PS-01
C_p: 0.84

Date: 6/19/18
D_s (in.): 50
A_s (ft^2): 13.64
D_n (in.): 0.322
A_n (ft^2): 0.00056555

t_m (°F): 78
Console ID: 6019
Y_m: 1.008
$\Delta H_@$: 1.836
Assumed B_{ws}: 26
P_{bar} (in. Hg): 29.28

Point	Δp (in. H_2O)	α (degrees)
1	0.0	0
2	0.0	0
3	0.0	1
4	0.0	1
5	0.0	2
6	0.0	1
7	0.0	0
8	0.0	1
9	0.0	1
10	0.0	0
11	0.0	0
12	0.0	0
Change Ports		
1	0.0	0
2	0.0	1
3	0.0	1
4	0.0	1
5	0.0	2
6	0.0	2
7	0.0	1
8	0.0	0
9	0.0	0
10	0.0	1
11	0.0	0
12	0.0	0

Test Team Leader Review: [signature]
Data Entry Review: [signature]

Advanced Industrial Resources, Inc.

Source Description Sheets

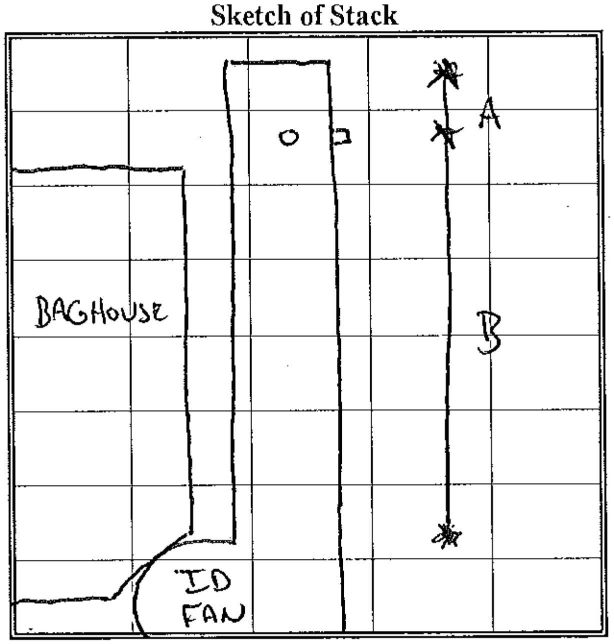
Client: CW MATTHEWS
Date: 6/19/18
Location: BOLINGBROKE, GA
Test Team: GSG RW
Source: BH EXHAUST

D_n (in.): ~~0.434~~ 0.322 (O.S.O.)
A_n (ft^2): 0.0005655
D_s (in.): 50
A_s (ft^2): 13.64
Length A (in.): 36
Length B (in.): 168

t_{amb} (°F): 87
Assumed B_{ws}: 26
P_{bar} (in. Hg): 29.28
P_g (in. H_2O): 0.24
% O_2: 13
% CO_2: 6
Console ID: C-019
Y: 1.008
$\Delta H_@$: 1.836
C_p: 0.84
K-Factor: ~~7.0~~ 4.7 O.S.O.

Point	Δp (in. H_2O)	t_s (°F)
1	0.36	270
2	0.36	270
3	0.33	270
4	0.30	272
5	0.27	272
6	0.26	273
7	0.27	274
8	0.29	274
9	0.31	275
10	0.31	274
11	0.31	274
12	0.30	273
Change Ports		
1	0.36	274
2	0.36	275
3	0.36	275
4	0.35	277
5	0.35	277
6	0.31	278
7	0.30	278
8	0.30	278
9	0.31	278
10	0.32	275
11	0.31	278
12	0.32	276

Sketch of Stack



Test Team Leader Review: [signature]
Data Entry Review: [signature]

APPENDIX E

LABORATORY REPORTS

Advanced Industrial Resources, Inc.
Laboratory Test Report

Client:	CW Matthews	**Test Date:**	June 19, 2018
Location:	Bolingbroke, GA	**Analytical Method:**	5
Source:	Baghouse Exhaust	**Target Analytes:**	particulate matter

Particulate Matter Analysis Data and Results

Wash Blank Volume:	200	mL	Acetone Density:	0.7899	g/mL
Actual Blank Residue:	0.9	mg	Residue Concentration:	0.0057	mg/g
Max Allowed Blank Residue:	1.6	mg			

Filter Samples

Test	Filter ID	Tare Weights (g)		Gross Weights (g)		Average Net Weight (g)
1	Q11095	0.4142	0.4139	0.4138	0.4139	0.0000
2	Q11096	0.4118	0.4121	0.4117	0.4120	0.0000
3	Q813	0.3935	0.3937	0.3945	0.3941	0.0007
Blank	Q814	0.3834	0.3837	0.3836	0.3833	0.0000

Solvent Wash Samples

Test	Beaker ID	Tare Weights (g)		Gross Weights (g)		Average Net Weight (g)
1	A76	109.4969	109.4970	109.5005	109.5000	0.0033
2	A92	113.0512	113.0509	113.0541	113.0540	0.0030
3	O14	112.8362	112.8361	112.8388	112.8386	0.0025
Blank	A80	111.9536	111.9531	111.9544	111.9541	0.0009

Initial Solvent Residue

Test	Beaker ID	Solvent Volume (mL)	Actual Solvent Residue (g)	Max. Allowed Solvent Residue (g)	Solvent Residue Value Used (g)
1	A76	170	0.0008	0.0013	0.0008
2	A92	215	0.0010	0.0017	0.0010
3	O14	230	0.0010	0.0018	0.0010

Net Particulate Matter in Sample

Test	m_{PM} (g)
1	**0.0025**
2	**0.0020**
3	**0.0022**

Analytical Balance ID: AS 220/c/2 (1)

Comments:

Prepared By: T.G. Drummond

Date: June 29, 2018

STATE OF LOUISIANA
DEPARTMENT OF ENVIRONMENTAL QUALITY

Is hereby granting a Louisiana Environmental Laboratory Accreditation to

Advanced Industrial Resources
3407 Novis Pointe
Acworth, Georgia 30101

Agency Interest No. 114715
Activity No. ACC20170002

According to the Louisiana Administrative Code, Title 33, Part I, Subpart 3, LABORATORY ACCREDITATION, the State of Louisiana formally recognizes that this laboratory is technically competent to perform the environmental analyses listed on the scope of accreditation detailed in the attachment.

The laboratory agrees to perform all analyses listed on this scope of accreditation according to the Part I, Subpart 3 requirements and acknowledges that continued accreditation is dependent on successful ongoing compliance with the applicable requirements of Part I. Please contact the Department of Environmental Quality, Louisiana Environmental Laboratory Accreditation Program (LELAP) to verify the laboratory's scope of accreditation and accreditation status.

Accreditation by the State of Louisiana is not an endorsement or a guarantee of validity of the data generated by the laboratory. To be accredited initially and maintain accreditation, the laboratory agrees to participate in two single-blind, single-concentration PT studies, where available, per year for each field of testing for which it seeks accreditation or maintains accreditation as required in LAC 33:I.4711.

Cheryl Sonnier Nolan
Administrator
Public Participation and Permit Support Services Division

Issued Date: 26 June 2017

Effective Date: July 1, 2017
Expiration Date: June 30, 2018
Certificate Number: 04085

APPENDIX F

CALIBRATION DATA

ABGAS VISIBLE EMISSIONS CONSULTANTS, LLC

2165 WHISPERING PINES LANE

MCDONOUGH, GA 30253

JEFF.BABB@ABGASVEC.COM **Phone: 404-966-7786**

ART.HOLLIS@ABGASVEC.COM **Phone: 404-964-8740**

4/23/2018

Ross Winnie
Advanced Industrial Resources
3407 Novis Point
Acworth, GA 30101

Dear Ross Winne:

Please be advised that you have successfully completed the field certification training of the ABGAS Visible Emissions Consultants, LLC Certification Training Course conducted at 3407 Novis Point, Acworth, GA 30101 on April 13, 2018.

Your plume evaluations were within the specifications of Federal Reference Method "9", which qualified you as a Visible Emissions Evaluator. Your average error on black and white smoke did not exceed 7.5 percent opacity and you incurred no single error exceeding 15 percent opacity during your qualifying run.

This letter serves as your official notice of certification, which is valid for six months from the date you qualified, April 13, 2018, subject to the following visual restrictions:

Prescription Corrective Lenses Required: None

It is our hope that the end result of your participation in this course will help in promoting cleaner and healthier air.

Yours for Clean Air,

Arthur Hollis
Co-Owner
ABGAS Visible Emissions Consultants, LLC

Advanced Industrial Resources, Inc.

Dry Gas Meter Calibration Data

Dry Gas Meter	
Console ID:	C-019
Serial Number:	1604007

Reference Meter	
Meter ID:	M5RFM1
Calibration Factor, Y_w:	1.0006

Date: 09/05/17 **Performed By:** LS

Barometric Pressure, P_b (in. Hg): 28.98 **Reviewed By:**

Data

Vacuum (in. Hg)	ΔH (in. H_2O)	Reference Meter Volume V_w (ft^3)	Dry Gas Meter Volume V_m (ft^3)	Temperatures (°F) Reference Meter t_w	Dry Gas Meter init. t_i	final t_f	avg. t_m	Time Elapsed θ (min.)
5.0	0.50	5.126	5.035	82	81.0	83.0	82.0	13.00
5.0	1.00	5.106	5.036	83	84.0	86.0	85.0	9.10
5.0	2.00	5.119	5.080	85	86.0	89.0	87.5	6.30
5.0	3.00	5.062	5.045	86	89.0	91.0	90.0	5.10
5.0	4.00	5.172	5.179	88	91.0	94.0	92.5	4.50

Calculations

ΔH (inches H_2O)	Y_m (dimensionless)	Variation (dimensionless)		$\Delta H_@$ (inches H_2O)	Variation (dimensionless)	
0.50	1.017	0.009	**PASS**	1.904	0.069	**PASS**
1.00	1.016	0.007	**PASS**	1.877	0.042	**PASS**
2.00	1.008	-0.001	**PASS**	1.796	-0.040	**PASS**
3.00	1.004	-0.005	**PASS**	1.803	-0.032	**PASS**
4.00	0.997	-0.011	**PASS**	1.798	-0.038	**PASS**
Averages:	**1.008**	**PASS**		**1.836**	**PASS**	

Where:

Y_m is the ratio of the reading of the reference meter to that of the dry gas meter (DGM); variance limit: ±0.02.

$$Y_m = \frac{Y_w \, V_w \, P_b \, (t_m + 460)}{V_m \, (P_b + \Delta H/13.6) \, (t_w + 460)}$$

$\Delta H_@$ is the orifice pressure differential (inches H_2O) that corresponds to 0.75 cfm of air at 68 °F and 29.92 inches of mercury; variance limit: ±0.20.

$$\Delta H_@ = \frac{0.0317 \, \Delta H \, ((t_w + 460) \, \theta)^2}{P_b \, (t_m + 460) \, (Y_w \, V_w)^2}$$

EMC Approved Alternative Method (EMC ALT-009)
Alternative Method 5 Post-test Calibration

Console ID: C-019
DGM Y_m: 1.008
Source: Asphalt Baghouse
Method: 5

Test Date	6/19/18	6/19/18	6/19/18	
Run #	1	2	3	
Y_{qa}	1.029	1.039	1.029	dry gas meter calibration check value, dimensionless.
Test time	60	60	60	total run time, min.
Vm	40.698	40.8164	40.0131	total sample volume measured by dry gas meter, dcf.
Tm	547	556	559	absolute average dry gas meter temp., BR.
Pb	29.28	29.28	29.28	barometric pressure, in. Hg.
K	0.0319	0.0319	0.0319	(29.92/528)(0.75)2 (in. Hg/B/R) cfm2.
ΔH_{avg}	1.53	1.55	1.45	average orifice meter differential, in. H20.
$\Delta H_{@}$	1.836	1.836	1.836	orifice meter calibration coefficient, in. H2O.
$M_{d\text{-}stack\ gas}$	29.48	29.48	29.48	dry molecular weight of stack gas, lb/lb-mole.
$M_{d\text{-}air}$	29	29	29	dry molecular weight of air, lb/lb-mole.
Hg_{SG}	13.6	13.6	13.6	specific gravity of mercury.
% diff. from Y_m	-2.0%	-3.0%	-2.1%	

Average % diff. from Y_m: -2.4%
Calibration check value status: PASS

*Post-test DGM calibration check value (Y_{qa}) must be within ±5% of the specific DGM's established Y_m

APEX INSTRUMENTS REFERENCE METER 2 Point Audit

USING WET-TEST METER #11AE6

Advanced Ind. Resources

Calibration Meter Information	
WTM Model #	AL20
WTM Serial #	11AE6
WTM Gamma	0.9999
Original 15Pt Gamma	**1.0006**

Calibration Conditions			
Date	Time	19-Sep-17	9:30
Barometric Pressure		29.57	in Hg
Calibration Tech		EW	
DGM Serial Number		T-110-356333	

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	°R/in Hg

Calibration Data													Results	
Run Time	Metering Console						Calibration Meter						Dry Gas Meter	
	DGM Input	Volume	Volume	Volume	Outlet Temp		Volume	Volume	Volume	Outlet Temp		Meter	Calibration Factor	
Elapsed	Pressure	Initial	Final	Sample	Initial	Final	Initial	Final	Sample	Initial	Final	Pressure	Previous	Current
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(V_m)	(t_{mi})	(t_{mf})	(Vw_i)	(Vw_f)	(V_m)	(t_{wi})	(t_{wf})	$P_{(wm)}$	(Y)	(Y)
min	in H_2O	cubic feet	cubic feet	cubic feet	°F	°F	cubic feet	cubic feet	cubic feet	°F	°F	in H_2O		
6.00	-4.0	617.904	623.945	6.041	80.0	81.0	956.900	962.910	6.010	74	74	2.2	1.0011	1.0115
											Variation		1.04%	must be less t
10.00	-2.4	623.945	629.518	5.573	81.0	82.0	962.910	968.460	5.550	74	74	1.8	1.0009	1.0114
											Variation		1.05%	must be less t

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, App A, Method 5, Paragraph 7.1.2.2, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature [signature] Date 9/19/17

Airla REF DGM

APEX INSTRUMENTS DRY GAS METER CALIBRATION

USING WET-TEST METER #11AE6 5-POINT ENGLISH UNITS

Advanced Ind. Resources

Meter Console Information	
WTM Model	AL-20
WTM Serial #	11AE6
Calibration Meter Gamma	0.9999

Calibration Conditions			
Date	Time	10-Oct-17	3:30
Barometric Pressure		29.60	in Hg
Calibration Technician		EW	
DGM Serial Number		T-200	27979

Factors/Conversions		
Std Temp	528	°R
Std Press	29.92	in Hg
K_1	17.647	°R/in Hg

Calibration Data

Run Time	Dry Gas Meter						Calibration Meter					
Elapsed	DGM Orifice ΔH	Volume Initial	Volume Final	Sample Volume	Outlet Temp Initial	Outlet Temp Final	Volume Initial	Volume Final	Sample Volume	Outlet Temp Initial	Outlet Temp Final	Meter Pressure
(Θ)	(P_m)	(V_{mi})	(V_{mf})	(V_m)	(t_{mi})	(t_{mf})	(Vw_i)	(Vw_f)	(V_m)	(t_{wi})	(t_{wf})	(P_{wm})
min	in H_2O	cubic feet	cubic feet	cubic feet	°F	°F	cubic feet	cubic feet	cubic feet	°F	°F	in H_2O
5	-5.0	492.750	499.019	6.269	78.0	78.0	662.740	668.920	6.180	77.0	77.0	2.5
6	-3.8	505.167	511.203	6.036	79.0	79.0	675.080	681.060	5.980	77.0	77.0	2.2
7	-3.0	511.203	516.770	5.567	79.0	79.0	681.060	686.600	5.540	77.0	77.0	2.0
10	-2.3	516.770	522.381	5.611	79.0	79.0	686.600	692.205	5.605	77.0	77.0	1.8
15	-1.9	499.019	505.167	6.148	78.0	79.0	668.920	675.080	6.160	77.0	77.0	1.6

Results

Standardized Data				Dry Gas Meter		
Dry Gas Meter		Calibration Meter		Calibration Factor		Flowrate
				Value	Variation	Std & Corr
$(V_{m(std)})$	$(Q_{m(std)})$	$(Vw_{(std)})$	$(Qw_{(std)})$	(Y)	(ΔY)	$(Q_{m(std)(corr)})$
cubic feet	cfm	cubic feet	cfm			cfm
6.011	1.202	5.974	1.195	0.9938	-0.007	1.19
5.794	0.966	5.785	0.964	0.9983	-0.002	0.96
5.355	0.765	5.362	0.766	1.0013	0.001	0.77
5.407	0.541	5.427	0.543	1.0038	0.003	0.54
5.936	0.396	5.968	0.398	1.0054	0.005	0.40
				1.0005	Y Average	

APEX SOURCE TESTING EQUIPMENT INSTRUMENTS

Note: For Calibration Factor Y, the ratio of the reading of the calibration meter to the dry gas meter, acceptable tolerance of individual values from the average is +-0.02.

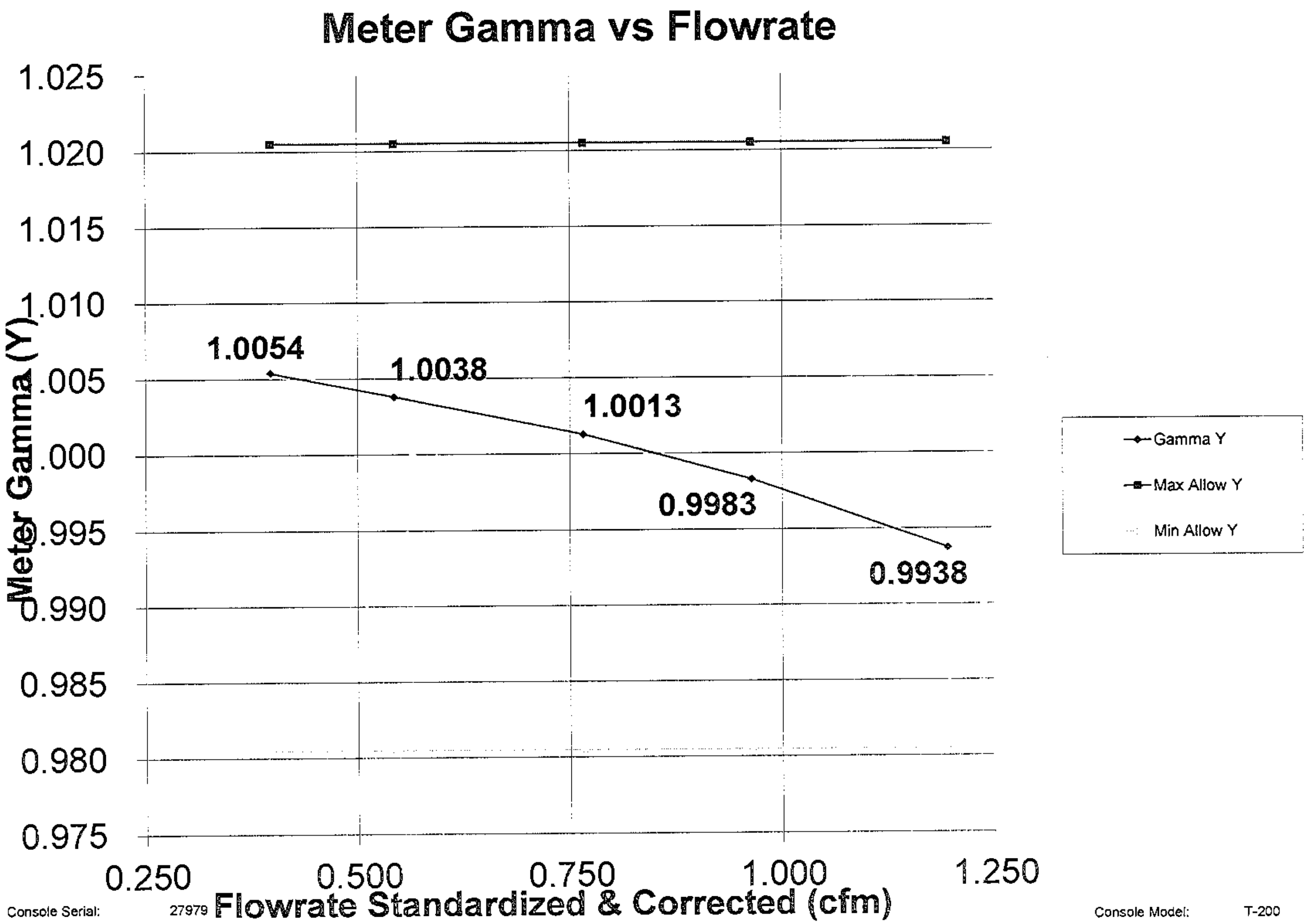
Note: For $\Delta H_@$, orifice pressure differential that equates to 0.75cfm (0.0212m³/min) at standard temperature and pressure, acceptable tolerance of individual values from the average is +-0.2inches (5.1mm) H_2O.

I certify that the above Dry Gas Meter was calibrated in accordance with USEPA Methods, CFR 40 Part 60, using the Precision Wet Test Meter # 11AE6, which in turn was calibrated using the American Bell Prover # 3785, certificate # F107, which is traceable to the National Bureau of Standards (N.I.S.T.).

Signature [signature] Date 10/10/17

Calibration Date: 10-10-2017

Calibration Technician: EW

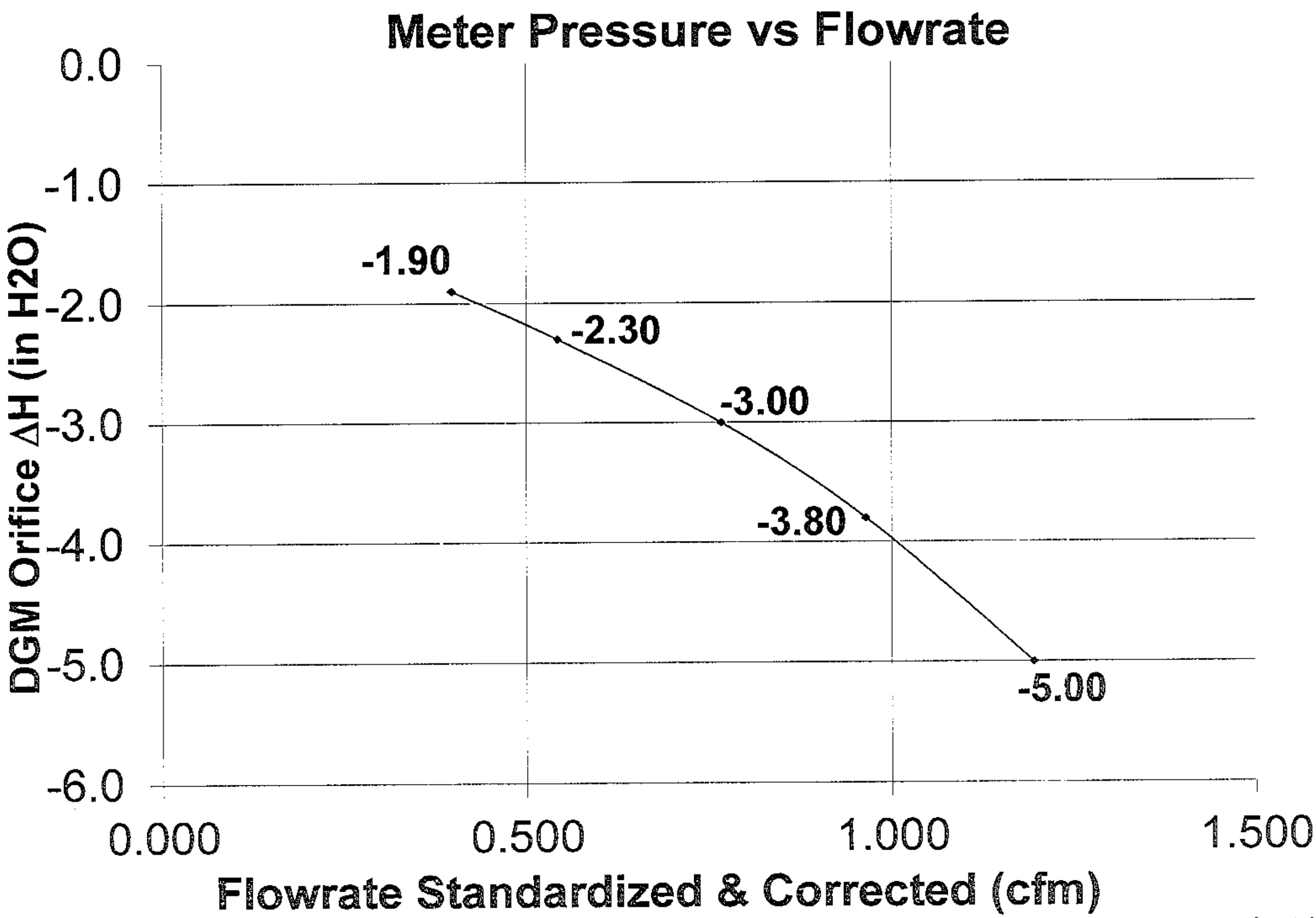


Console Serial: 27979

Console Model: T-200

Calibration Date: 10-10-2017

Calibration Technician: EW



Console Serial: 27979

Console Model: T-200

Advanced Industrial Resources, Inc.

Thermocouple Calibration Data

Thermometer ID: RT-01 ; RT-03 **Date:** 06/22/18

Bias: 0 **Performed By:** TM

Apparatus ID	Apparatus Description	Reference Temperature Reading		Indicated Temperature		Relative Variation
		°F	°R	°F	°R	%
P5-01	Stack Temp.	32	492	32	492	0.0
P5-01	Stack Temp.	210	670	210	670	0.0
B-19	Filter Temp.	32	492	32	492	0.0
B-19	Filter Temp.	210	670	210	670	0.0
B-19	Exit Imp. Temp.	32	492	32	492	0.0
B-19	Exit Imp. Temp.	210	670	210	670	0.0
C-019	Meter In Temp.	32	492	33	493	0.2
C-019	Meter In Temp.	210	670	211	671	0.1
C-019	Meter Out Temp.	32	492	32	492	0.0
C-019	Meter Out Temp.	210	670	211	671	0.1
B-19	Filter Exit Temp.	32	492	33	493	0.2
B-19	Filter Exit Temp.	210	670	211	671	0.1
P5-01	Probe Temp.	32	492	32	492	0.0
P5-01	Probe Temp.	210	670	210	670	0.0

VERIFICATION OF CONSTRUCTION SPECIFICATIONS FOR THE TYPE-S PITOT TUBE

Thomas R. Clark, Wade Mason, Paul Reinermann III
PEDCo Environmental, Inc.,
Cincinnati, Ohio

Revisions to EPA Reference Method 2 - Determination of Stack Gas Velocity and Volumetric Flow Rate (Type-S Pitot Tube) - promulgated August 18, 1977, exempted certain pitot tubes from calibration and included appropriate construction criteria and application guidelines.

Figure 1 summarizes procedures for determining the calibration coefficients of Type-S pitot tubes. A pitot tube may be calibrated using procedures outlined in Method 2 or assigned a baseline coefficient (C_p) of 0.84 if it meets the following criteria:

- Pitot tube meets the construction criteria of Figures 2 and 3
- The external tubing diameter (D_t) is between 0.48 and 0.95 cm (3/16 and 3/8 in.)
- The base-to-opening plane distances (P_A and P_B) are equal and range between 1.05 and 1.50 D_t
- The pitot tube is used separately, or in a pitot-probe assembly, mounted in accordance with the specifications in Figures 4 and 5

Pitot tubes that meet the construction criteria of Figures 2 and 3, but do not meet the specified limits for D_t, P_A, and P_B may be used, but must be calibrated.

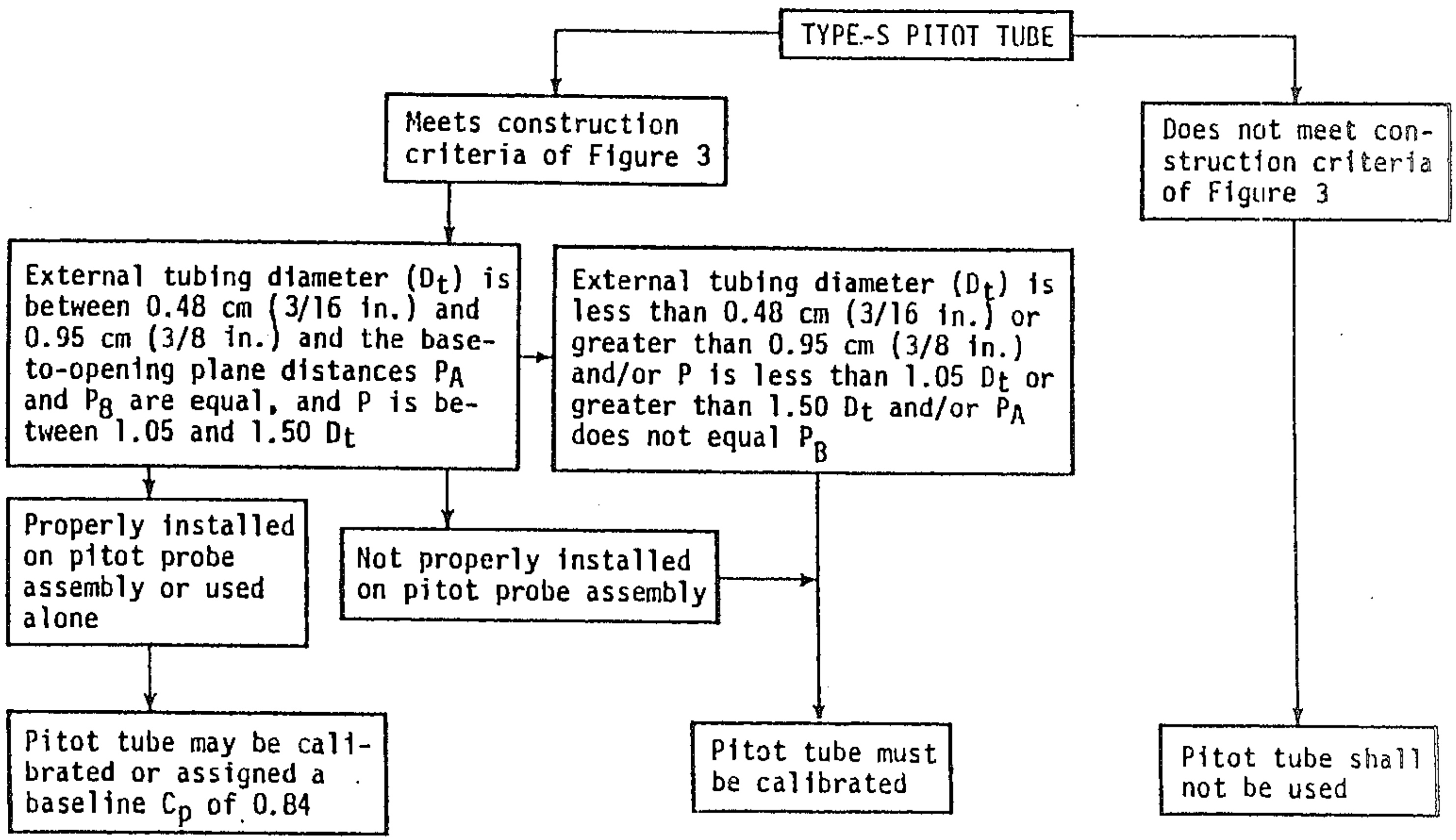


Figure 1. Procedures for determining the calibration coefficients of Type-S pitot tubes.

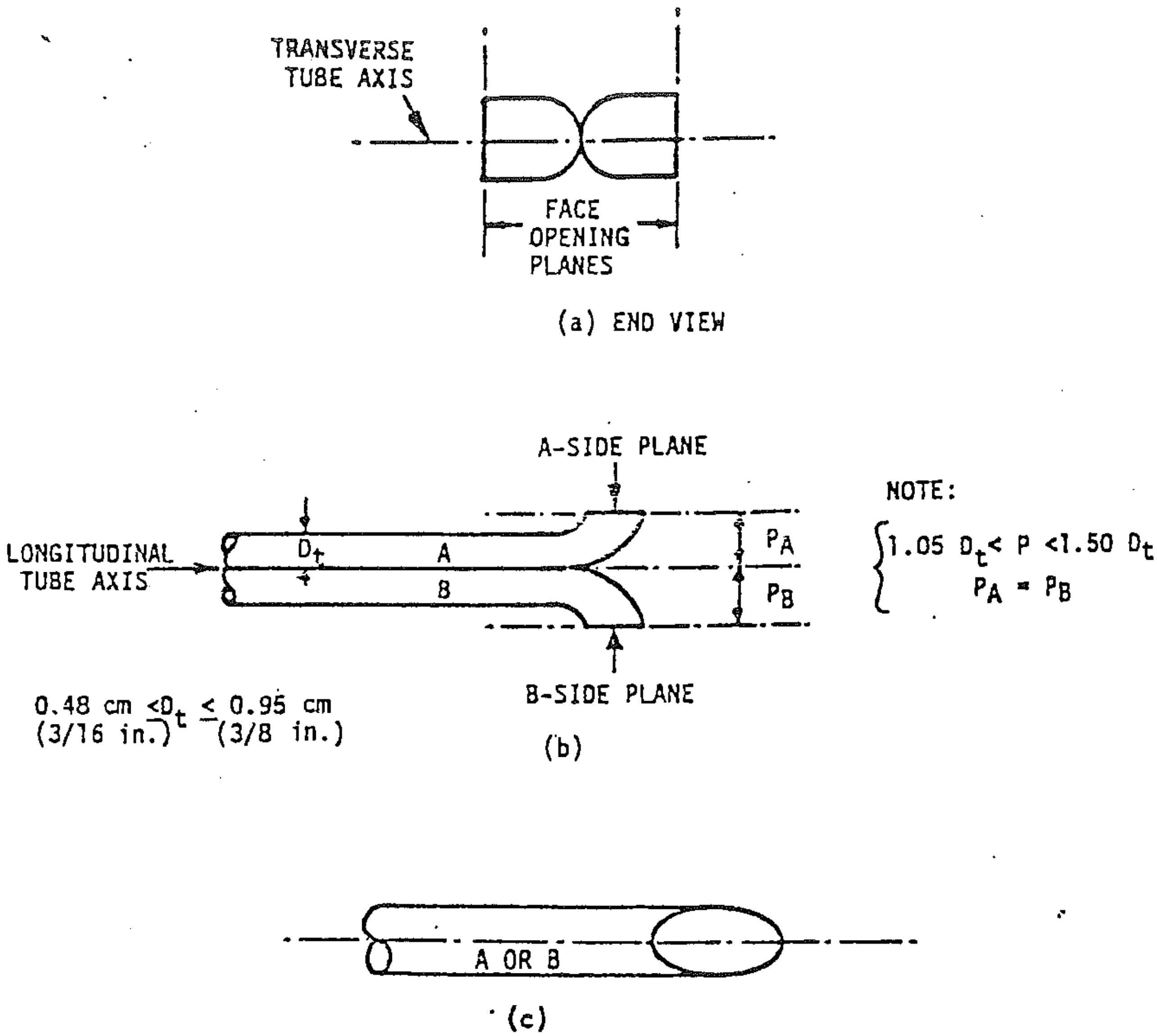


Figure 2. Properly constructed Type-S pitot tube, shown in: (a) end view; face opening planes perpendicular to transverse axis; (b) top view; face opening plans parallel to longitudinal axis; (c) side view; both legs of equal length and centerlines coincident, when viewed from both sides. Baseline coefficient values of 0.84 may be assigned to pitot tubes constructed this way.

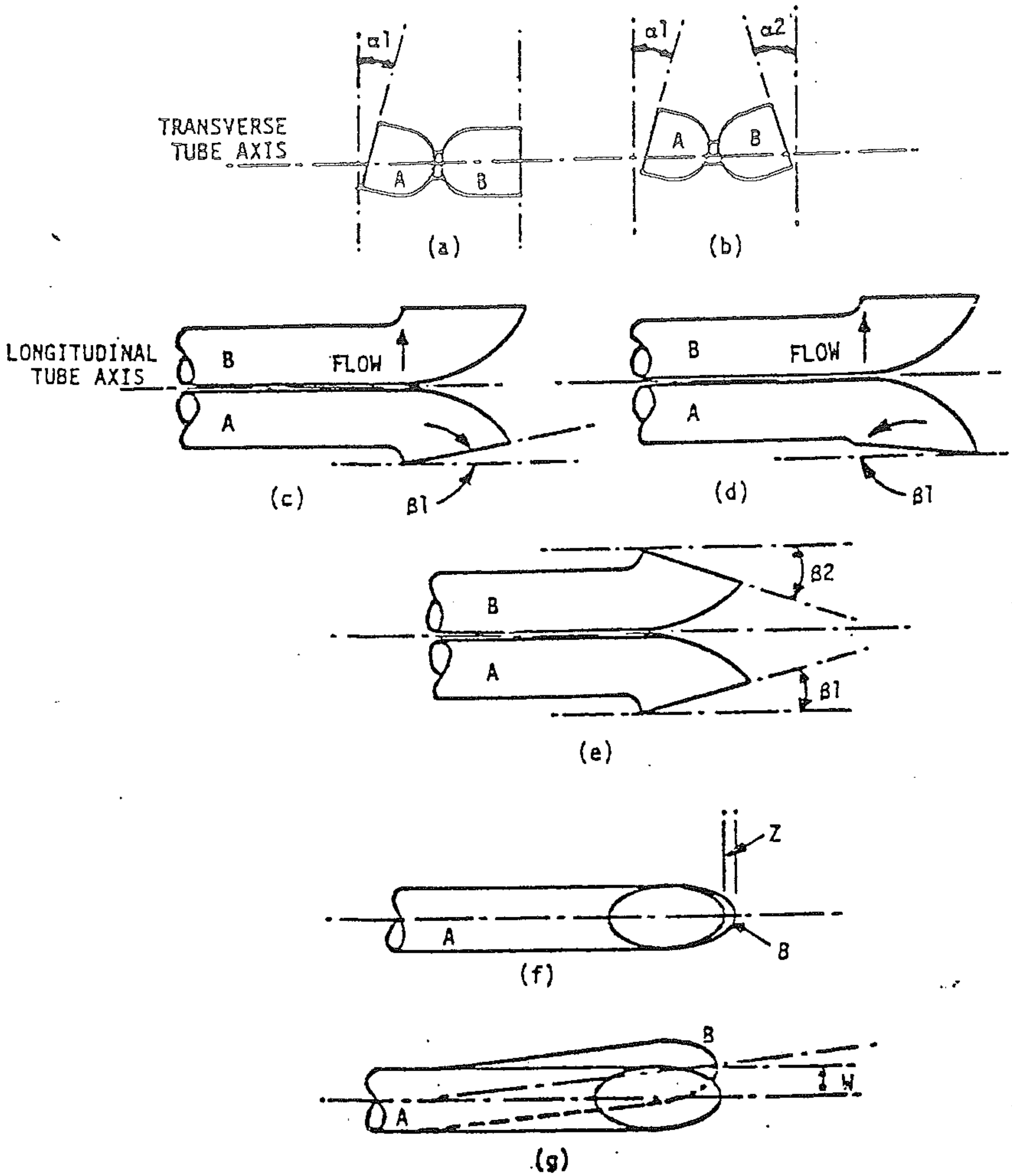
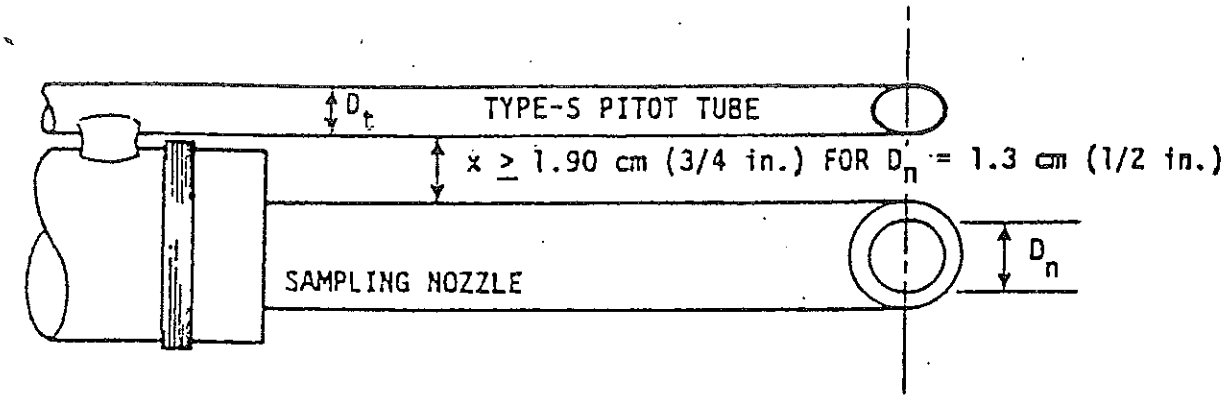
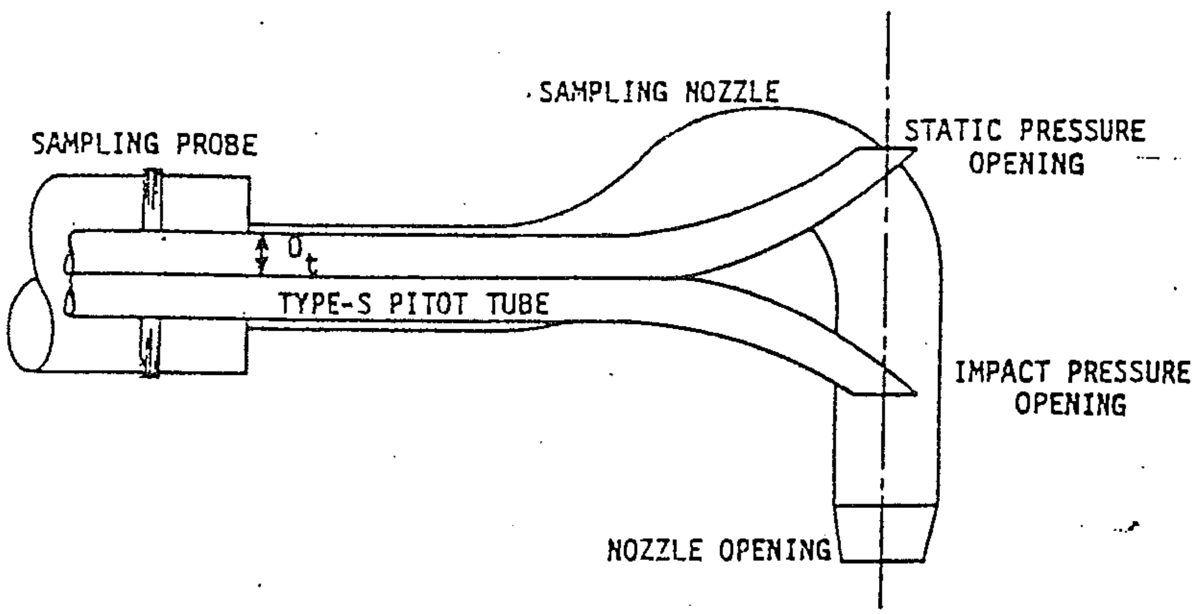


Figure 3. Types of face-opening misalignment that can result from field use or improper construction of Type S pitot tubes. These will not affect Cp as long as a_1 and a_2 <10°, β_2 <5°, z <0.32 cm (1/8 in.) and w <0.08 cm (1/32 in.).



A. BOTTOM VIEW: SHOWING MINIMUM PITOT-NOZZLE SEPARATION.



B. SIDE VIEW: TO PREVENT PITOT TUBE FROM INTERFERING WITH GAS FLOW STREAMLINES APPROACHING THE NOZZLE. THE IMPACT PRESSURE OPENING PLANE OF THE PITOT TUBE SHALL BE EVEN WITH OR ABOVE THE NOZZLE ENTRY PLANE.

Figure 4. Required pitot tube - sampling nozzle configuration to prevent aerodynamic interference; buttonhook - type nozzle; centers of nozzle and pitot opening aligned; D_t between 0.48 and 0.95 cm (3/16 and 3/8 in.).

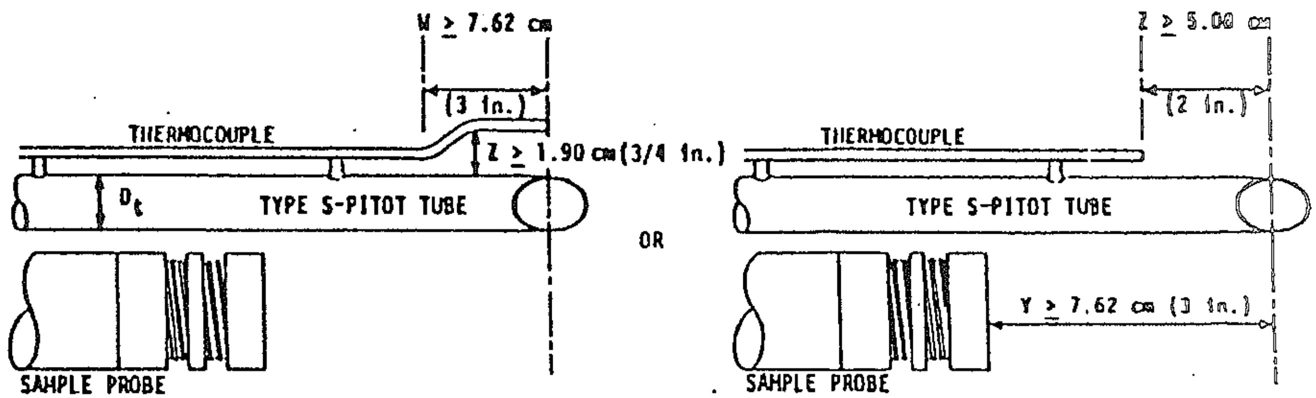


Figure 5. Required thermocouple and probe placement to prevent interference; D_t between 0.48 and 0.95 cm (3/16 and 3/8 in.).

The EPA has not specified a measurement technique to verify proper construction. The following procedures provide a quick and accurate method of checking construction specifications for Type-S pitot tubes. The apparatus is inexpensive and available in most hardware stores. The method can be used in the laboratory by testers and easily adapted to field use by agency personnel while witnessing tests or performing quality assurance checks.

1. Obtain a section of angle aluminum approximately 20 cm (8 in.) by 1.3 x 2.5 cm (0.5 x 1.0 in.). Mount a bull's-eye level (with $\pm$1 degree accuracy) to the angle aluminum, as shown in Figure 6. After mounting the bull's-eye level to the angle aluminum, level the angle aluminum and place the degree-indicating level in the parallel and perpendicular positions. The indicating level should not read more than 1 degree in either position.

2. Place the pitot tube in the angle aluminum as shown in Figure 6, and level the pitot tube as indicated by the bull's-eye level. A vise may be used to hold the angle aluminum and pitot tube in the laboratory and a C-clamp in the field. <u>Note</u>: A permanently mounted pitot tube and probe assembly may require a shorter section of angle aluminum to allow proper mounting on the assembly.

3. Place a degree-indicating level in the various positions, as illustrated in Figures 7 and 8.

4. Measure distances P_A and P_B with a micrometer.

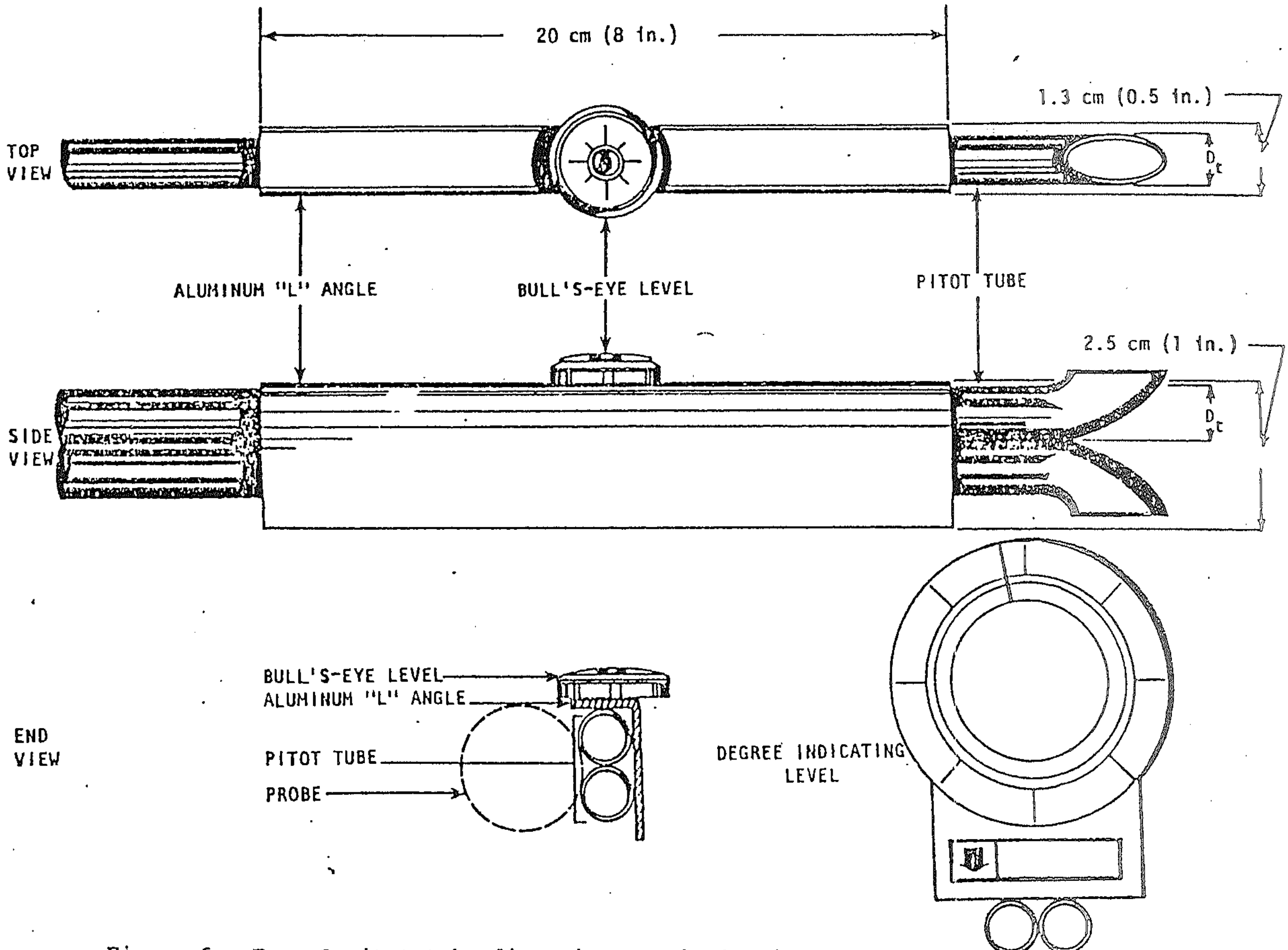


Figure 6. Type S pitot tube dimension specialization measurements.

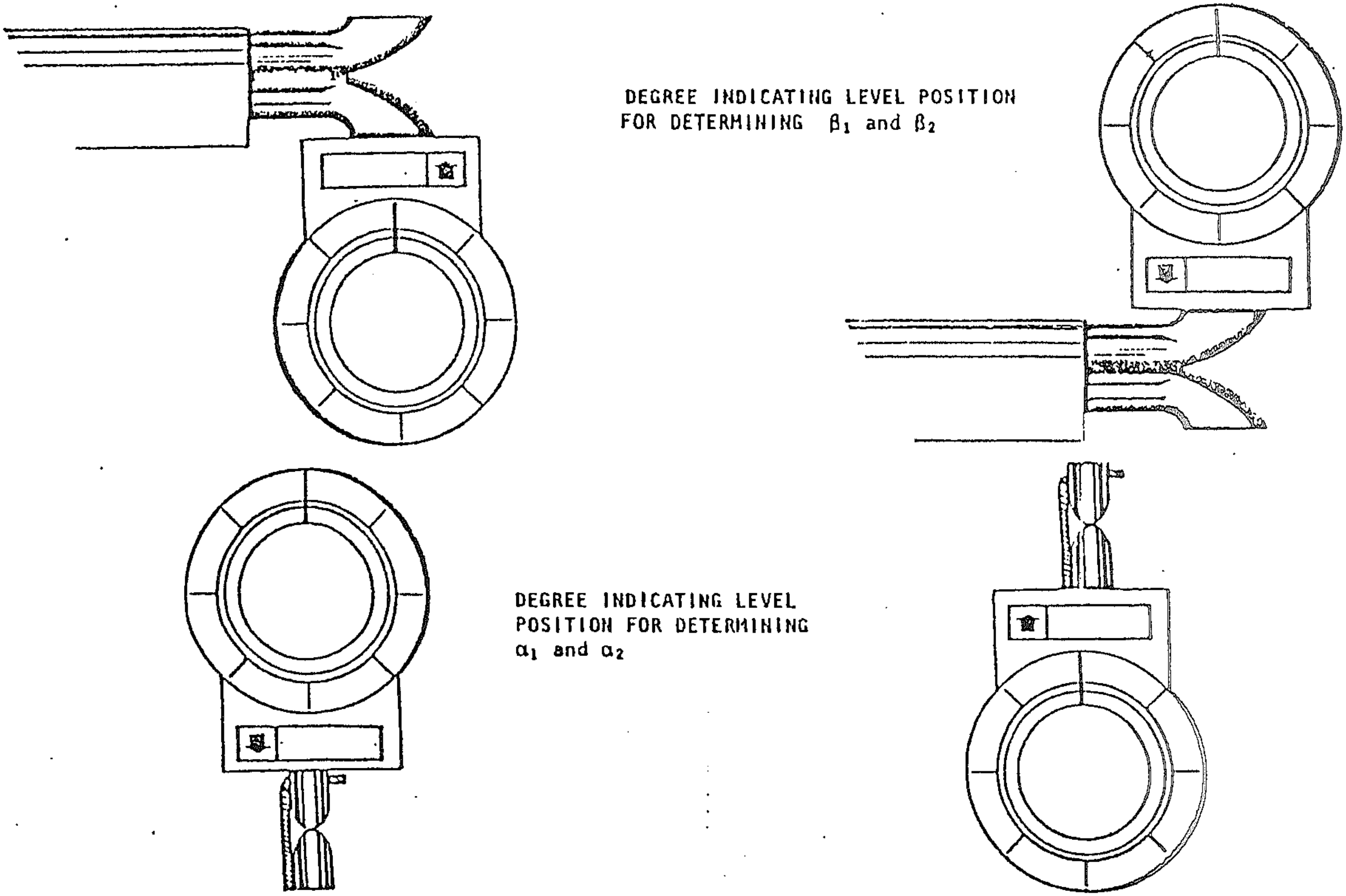
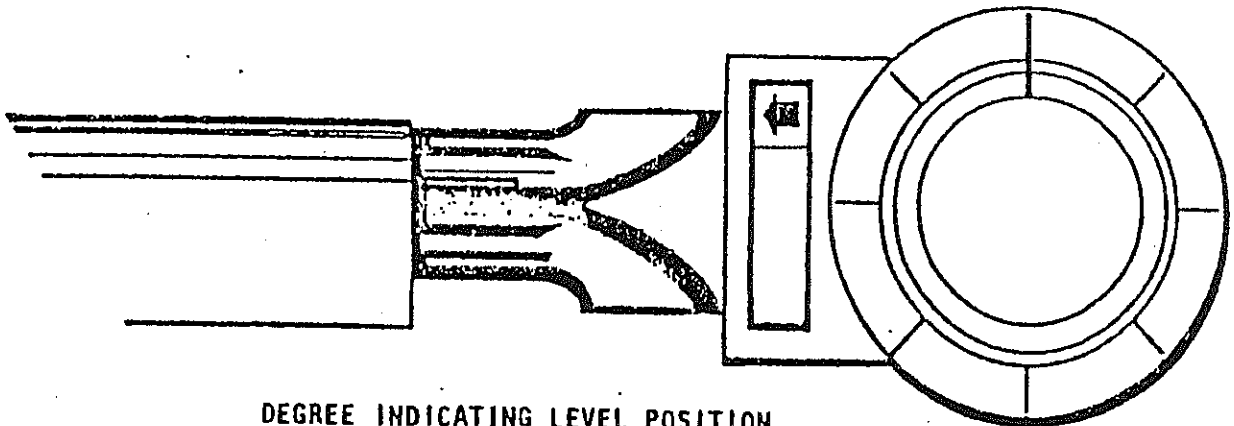
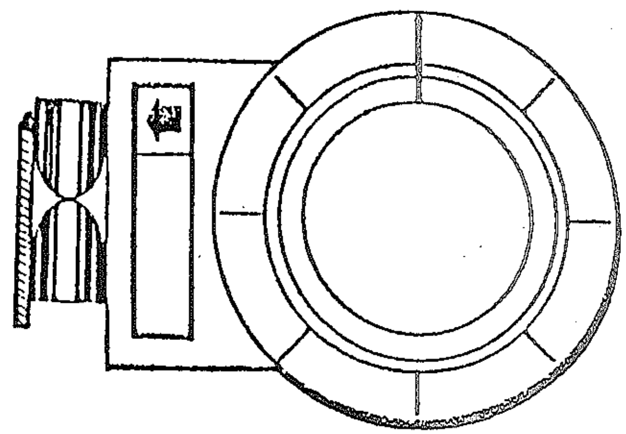


Figure 7. Position of dimension measurement.



DEGREE INDICATING LEVEL POSITION
FOR DETERMINING γ, THEN CALCULATING Z.



DEGREE INDICATING LEVEL
POSITION FOR DETERMINING
θ, THEN CALCULATE W.

Figure 8. Position of dimension measurement.

5. Measure the external tube diameter (D_t). Record all data on a data sheet such as Figure 9.

6. Calculate dimensions w and z using the following equations:

$$w = A \sin \theta \qquad \text{Equation 1}$$

$$z = A \sin \gamma \qquad \text{Equation 2}$$

where,

w = alignment dimension, cm (in.)

z = alignment dimension, cm (in.)

A = distance between tips, ($P_A + P_B$), cm (in.)

θ = angle in degrees

γ = angle in degrees.

Note: Pitot tubes with bent or damaged tubing may be difficult to check using this procedure.

If the Type-S pitot tube meets the face alignment criteria, an identification number should be assigned and permanently marked or engraved on the body of the tube.

References

1. Federal Register, Vol. 42. No. 160, August 18, 1977.

Advanced Industrial Resources, Inc.
Type-S Pitot Tube Assembly Inspection Data Sheet

Date: 6/22/2018

Pitot Tube Assembly: P5-01 Caliper ID: C-01

Performed by: TB

Pitot tube assembly level? x yes ____ no

Pitot tube openings damaged? ____ yes (explain below) x no

α_1= 2 ^{o}(<10^o) β_1= 2 ^{o}(<5^o)

α_2= 3 ^{o}(<10^o) β_2= 1 ^{o}(<5^o)

γ = 3 ^{o} θ = 1 ^{o} A= 0.973 in.

z = A sin γ = 0.0509 in. <1/8 in. (0.125 in.)

w = A sin θ = 0.0170 in. <1/32 in. (0.03125 in.)

P_A= 0.487 in. **P_B=** 0.487 in.

D_t = 0.449 cm (in.) **P / D_t =** 1.08352 (1.05 </= and </= 1.50)

$P_a = P_b = P$

X = 1.134 (>0.75 in.) (Dist. between pitot and nozzle)
Y = 3.412 (>3.0 in.) (Dist. from nozzle union to pitot tube openings)
Z = 1.141 (>0.75 in.) (Dist. between pitot and stack thermocouple)

Does the pitot tube assembly meet the Method 2 requiremnets? x yes
____ no (explain below)

If the Method 2 requirements are met then a coefficient of **0.84** is assigned to the pitot tube assembly being inspected.

Advanced Industrial Resources, Inc.

Nozzle Calibration Data

Client: C W MATTHEWS

Date: 6/18/18

Location: BOLINGBROKE, GA

Performed By: GSG

Caliper ID: DC-04

Source	Nozzle ID	Nozzle Description	Measurements (inches) 1	2	3	Average (inches)
BH EXHAUST	SN2.10	STAINLESS	0.321	0.322	0.322	0.322

Test Team Leader Review: [signature]

Data Entry Review: [signature]

APPENDIX G

PROCESS OPERATION DATA

Advanced Industrial Resources, Inc.

Plant Production /Operating Parameters Log Sheet

Company Name:	C.W. Matthews	Test Date:	6/19/2018
Location:	Bolingbroke, Georgia	Minutes/ Reading:	5
Source:	Asphalt Baghouse	Recorded By:	Facility Personal
		Title:	Operator

Test # 1 Start Time 7:20

Minute	Inlet Temp	Production (tons/ hour)	Magnahelics (in. H_2O)
0	347	292	0.7
5	342	298	1.0
10	339	299	1.0
15	352	301	1.1
20	353	301	1.0
25	358	299	1.0
30	356	300	1.1
35	352	301	1.0
40	350	299	1.1
45	348	300	1.1
50	349	299	1.0
55	346	299	1.1
60	340	301	1.1

Test # 2 Start Time 8:50

Minute	Inlet Temp	Production (tons/ hour)	Magnahelics (in. H_2O)
0	348	300	1.0
5	345	299	1.0
10	342	301	1.1
15	336	300	1.0
20	341	299	1.1
25	345	300	1.0
30	344	299	1.1
35	342	298	1.0
40	345	299	1.0
45	343	300	1.1
50	339	299	1.0
55	339	299	1.0
60	346	300	1.1

Test # 3 Start Time 11:30

Minute	Inlet Temp	Production (tons/ hour)	Magnahelics (in. H_2O)
0	344	299	1.0
5	347	302	1.0
10	347	301	1.0
15	347	300	1.0
20	347	300	1.0
25	347	299	1.0
30	349	302	1.0
35	348	300	1.0
40	343	299	1.0
45	337	300	1.0
50	335	301	1.0
55	344	300	1.0
60	353	299	1.0

Advanced Industrial Resources, Inc.

Plant Production /Operating Parameters Log Sheet

Company Name: CW MATTHEWS
Location: BOLINGBROKE GA
Source: BH EXHAUST

Test Date: 6/19/18
Minutes/ Reading: 5.0
Recorded By:
Title: OPERATOR

Test # 1 Start Time 7:20

Minute	Inlet Temp.	Production (tons/ hour)	Magnahelics (in. H_2O)
0	347	292	.7
5	342	298	1.0
10	339	299	1.0
15	352	301	1.1
20	353	301	1.0
25	358	299	1.0
30	356	300	1.1
35	352	301	1.0
40	350	299	1.1
45	348	300	1.1
50	349	299	1.0
55	346	299	1.1
60	340	301	1.1

Test # 2 Start Time 8:50

Minute	Inlet Temp.	Production (tons/ hour)	Magnahelics (in. H_2O)
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5	345	299	1.0
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15	336	300	1.0
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30	344	299	1.1
35	342	298	1.0
40	345	299	1.0
45	343	300	1.1
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55	339	299	1.0
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Test # 3 Start Time 11:30

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5	347	302	1.0
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25	347	299	1.0
30	349	302	1.0
35	348	300	1.0
40	343	299	1.0
45	337	300	1.0
50	335	301	1.0
55	344	300	1.0
60	353	299	1.0

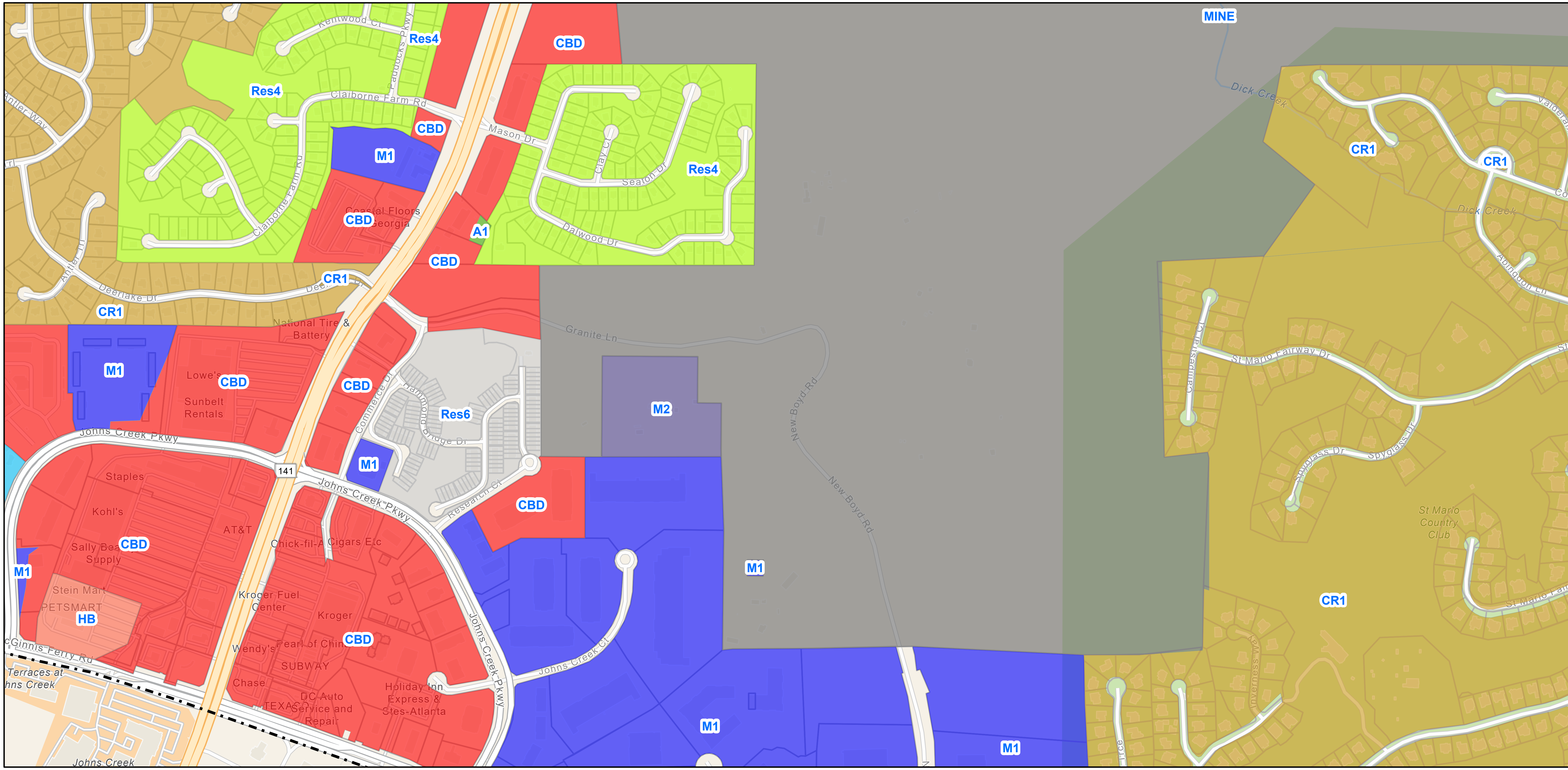
Test # Start Time

Minute	Inlet Temp.	Production (tons/ hour)	Magnahelics (in. H_2O)
0			
5			
10			
15			
20			
25			
30			
35			
40			
45			
50			
55			
60			

EXHIBIT H

ZONING MAP

Zoning Map



11/8/2019, 12:26:01 PM

Zoning Districts

- A1 - Agricultural
- CBD - Commercial Business District
- CR1 - Single-Family Community Residential
- HB - Highway Business
- M1 - Restricted Industrial
- M2 - Heavy Industrial
- MINE - Mining Operations
- O&I - Office and Institutional
- RES4 - Single-Family Residential
- RES6 - Single-Family Residential
- Forsyth County Boundary
- Tax Parcels

1:9,028

0 | 0.07 | 0.15 | 0.3 mi

0 | 0.13 | 0.25 | 0.5 km

EXHIBIT I

PUBLIC PARTICIPATION POWERPOINT PRESENTATION

Conditional Use Permit CP190040

Big Creek Asphalt Plant Relocation Public Participation Meeting

Site Overview

Site Overview

9/20/2019, 11:09:09 AM

Forsyth County Boundary

Tax Parcels

1:18,056

0 0.17 0.35 0.7 mi

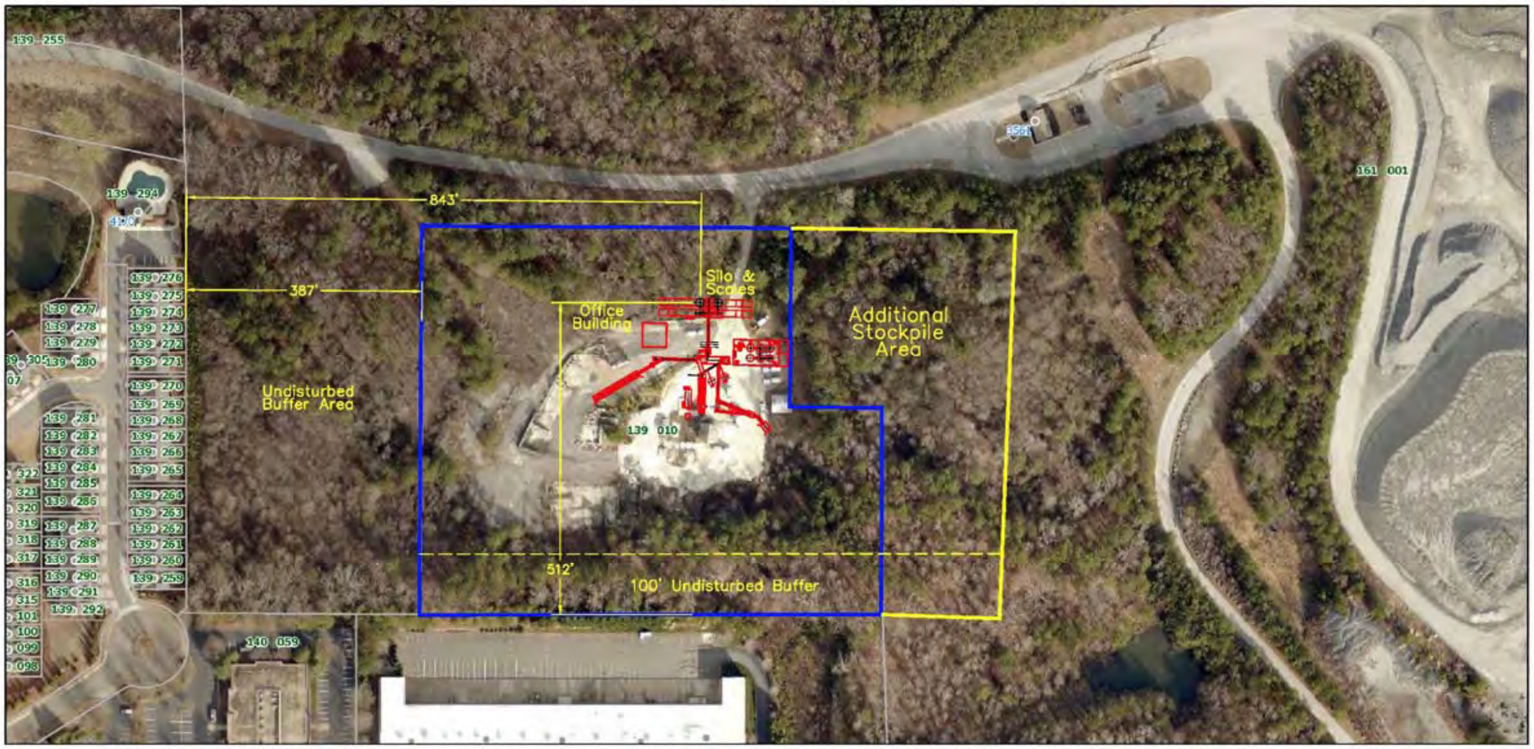
0 0.28 0.55 1.1 km

Web AppBuilder for ArcGIS

City of Johns Creek, GA, Forsyth County GIS, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA |

Proposed Site

Proposed Site



9/20/2019, 11:13:26 AM

Forsyth County Boundary

Tax Parcels

Site Address

1:2,257

0 0.02 0.04 0.09 mi

0 0.04 0.07 0.14 km

Web AppBuilder for ArcGIS

City of Johns Creek, GA, Forsyth County GIS, BuildingFootprintUSA, Esri, HERE, Garmin, INCREMENT P, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA |

Aerial Photograph of Plant

Ground View of Plant

Key Points of New Facility

- Proposed plant will be a new 2020 Asphalt Plant compared to the existing Plant circa 1990's.
- The new Asphalt Plant will have the latest technologies offered by the manufacturer with a 10% to 30% reduction in electrical usage. With the newer technologies and energy reduction this reduces the decibel levels of the components by 12-18 decibels.
- The proposed location provides greater separation from the plant site to residential dwellings of 390' compared to the existing site of 100'. In addition, we intend to leave the trees and vegetative buffers to the west and south of the proposed site.
- The production capabilities of the new Asphalt Plant will not differ from the existing site thus no increased truck volume.
- We will secure all required State and Federal Permits related to the operation of an Asphalt Plant.

Questions