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MEMORANDUM

То:	Scott Galati DayZen LLC
From:	Andrew Scanlon
	Kimley-Horn and Associates, Inc.
Date:	October 20, 2022 Updated December 8, 2022
Subject:	Lafayette Data Center Plume Airspace Analysis

On behalf of DayZen LLC (Client) Kimley-Horn conducted an airspace study to analyze potential aeronautical impacts of the thermal plume for a proposed 576,120 square foot datacenter with an associate backup generator facility and chiller system located near Norman Y. Mineta San Jose International Airport (SJC). As discussed in this document, an overall approximated building/ generator/chiller footprint was analyzed. The building has previously been analyzed by the FAA and a Determination of No Hazard was issued. These determinations are attached to this study. Height of the thermal plumes to be analyzed were provided by the Client and adjusted by the Client to represent the maximum height from the ground. Therefore, Kimley-Horn did not adjust the thermal plume heights to account for any stacks or exhaust cowls.

Proposed Site

The site is located at 2825 Lafayette Street, shown in Figure 1. The site is within 0.19 nautical miles (nm) of the physical end of Runway 12R. Table 1 provides points analyzed which approximates the overall potential footprint of the plume location. The client provided Electrical Site Plan has been annotated with point numbers which correlates to the tabular data represented in Table 1 and is included as an attachment.



Figure 1 – Project Site

Point	Latitude	Longitude
Point 1	37° 22' 25.15" N	121° 56' 55.02" W
Point 2	37° 22' 23.91" N	121° 56' 48.27" W
Point 3	37° 22' 23.66" N	121° 56' 48.32" W
Point 4	37° 22' 23.34" N	121° 56' 46.57" W
Point 5	37° 22' 22.90" N	121° 56' 46.69" W
Point 6	37° 22' 22.78" N	121° 56' 45.96" W
Point 7	37° 22' 21.50" N	121° 56' 46.13" W
Point 8	37° 22' 19.98" N	121° 56' 46.62" W
Point 9	37° 22' 20.46" N	121° 56' 49.27" W
Point 10	37° 22' 21.33" N	121° 56' 49.03" W
Point 11	37° 22' 22.41" N	121° 56' 54.80" W
Point 12	37° 22' 22.14" N	121° 56' 54.91" W
Point 13	37° 22' 22.83" N	121° 56' 59.15" W
Point 14	37° 22' 23.27" N	121° 56' 59.18" W
Point 15	37° 22' 24.39" N	121° 56' 58.75" W
Point 16	37° 22' 25.40" N	121° 56' 57.51" W

Table 1 – Points Analyzed

For the site, two plume heights were evaluated: the diesel generator plume which was calculated to be 112.9 feet Above Ground Level (AGL, rounded to 113 feet for this analysis) and the chiller plume which was calculated to be 132.4 feet AGL (rounded to 133 feet for this analysis). For the purposes of

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this evaluation, a site elevation of 40 feet was assumed and added to the plume heights to get a top Mean Sea Level (MSL) elevation of 153 and 173 feet for the diesel and chiller plumes, respectively.

The plume heights were provided by others and were calculated assuming a max height associated with a velocity of 5.3 m/s which represents the minimum velocity to cause light turbulence. The Vertical Plume Velocity Assessment Report is attached to this analysis for reference.

Methodology

Kimley-Horn modeled the airport imaginary surfaces at SJC, as defined in 14 Code of Federal Regulations (CFR) Part 77 (Part 77) and evaluated applicable airport design standards set forth in Federal Aviation Administration (FAA) Advisory Circular (AC) 150/300-13B, Airport Design.

Kimley-Horn also modeled the obstacle clearance surfaces as defined in FAA Order 8260-3E, United States Standard for Terminal Instrument Procedures (TERPS), including Change 1. Specifically, Kimley-Horn modeled:

- TERPS 40:1 Departure Surface for Runways 30L and 30R
- ILS¹ or LOC² Runway (RWY) 12R
- RNAV³ RNP⁴ Approach to RWY 12R
- RNAV GPS⁵ Approach to RWY 12R
- RNAV RNP Approach to RWY 12L
- RNAV GPS Approach to RWY 12L

Assumptions and Limitations

Ultimately, the FAA is responsible for making the final determination regarding the cumulative impacts resulting from this development. The results of Kimley-Horn's modeling should be used for informational purposes only.

This analysis is limited to an airspace study and does not include the investigation of potential impacts of the proposed development to navigational facilities (i.e., interference).

It is also important to note that the FAA evaluates the elevations of proposed construction with respect to MSL. Often, civil engineers and surveyors report elevation values using other vertical datums, which, when compared with MSL, can cause discrepancies between the proposed and evaluated elevations. It is recommended that the Client consult with their surveyor prior to setting final building elevations, as to ensure consistency with the elevation values. The FAA requires the

- ¹ ILS Instrument Landing System
- ² LOC Localizer
- ³ RNAV Area Navigation
- ⁴ RNP Required Navigation Approach
- ⁵ GPS Global Positioning System

coordinates in North American Datum of 1983 (NAD83) and elevations in North American Vertical Datum of 1988 (NAVD88).

Findings

The following includes findings for the project site.

PART 77

The site is very near the Runway 12R end and falls mostly within the Transitional Surface and partially within the Horizontal Surface for SJC. The Transitional Surface is a sloping surface, that gains one foot vertically for every seven feet horizontally, as it extends perpendicular to the runway centerline. The Horizontal Surface is a flat plane, 150 feet above the airport elevation. At SJC, the Horizontal Surface is 212.16 feet MSL. A graphical depiction of the site and overlying Part 77 surfaces is found in Figure 2. The Transitional Surface is represented in green, and the Horizontal Surface is represented in blue. Table 2 presents the results at each of the 16 points evaluated. Negative numbers represent penetrations to the Part 77 Surfaces.



Figure 2 – Part 77 Transitional Surface

	Ta	able 2 – Part 77 Allow	able MSL		
Point	Latitude	Longitude	Surface Elevation (in MSL)	Diesel Plume Results	Chiller Plume Results
Point 1	37° 22' 25.15" N	121° 56' 55.02" W	174	21	1
Point 2	37° 22' 23.91" N	121° 56' 48.27" W	128	-25	-45
Point 3	37° 22' 23.66" N	121° 56' 48.32" W	131	-22	-42
Point 4	37° 22' 23.34" N	121° 56' 46.57" W	119	-34	-54
Point 5	37° 22' 22.90" N	121° 56' 46.69" W	124	-29	-49
Point 6	37° 22' 22.78" N	121° 56' 45.96" W	119	-34	-54
Point 7	37° 22' 21.50" N	121° 56' 46.13" W	133	-20	-40
Point 8	37° 22' 19.98" N	121° 56' 46.62" W	152	-1	-21
Point 9	37° 22' 20.46" N	121° 56' 49.27" W	170	17	-3
Point 10	37° 22' 21.33" N	121° 56' 49.03" W	160	7	-13
Point 11	37° 22' 22.41" N	121° 56' 54.80" W	199	46	26
Point 12	37° 22' 22.14" N	121° 56' 54.91" W	202	49	29
Point 13	37° 22' 22.83" N	121° 56' 59.15" W	212	59	39
Point 14	37° 22' 23.27" N	121° 56' 59.18" W	212	59	39
Point 15	37° 22' 24.39" N	121° 56' 58.75" W	212	59	39
Point 16	37° 22' 25.40" N	121° 56' 57.51" W	194	41	21
Negative numb	ers represent penetratio	ns to the Part 77 Surfac	es.		•

Penetrations to the Part 77 Transitional Surface are common occurrences at airports. Based upon the currently FAA approved Airport Layout Plan (ALP), SJC features over 100 obstacles which currently penetrate the Part 77 Transitional Surfaces. Aircraft will not be regularly flying over this area at these low elevations. It is assumed that the plumes will not represent a hazard to air navigation because it does not impact any of the published approach, missed approach, or departure procedures for SJC (see subsequent sections in this report).

AIRPORT DESIGN SURFACES

The project site is outside of Airport Design Surfaces and therefore does not adversely impact the airport design surfaces at SJC. However, the San Jose VOR/DME⁶ is near the project site and is within the 1,000-foot VOR critical area (see Figure 3). Solid or fixed structures will represent a more critical concern for the VOR critical area than the plumes associated with the chillers or backup diesel generators. As previously noted, a 7460 for the proposed building was submitted to the FAA for review. The FAA analyzed potential impacts to air navigation, inclusive of this navigational aid, and made a "Determination of No Hazard" for the building. The determinations are attached to this report.

⁶ VOR/DME – Very High Frequency Omni-Directional Range/Distance Measuring Equipment

The FAA Technical Operations Line of Business is provided an opportunity to comment during the 7460 review process. No comments were received, and a Determination of No Hazard was issued.



Figure 3 – VOR Critical Area Over Project Site

DEPARTURE SURFACE FOR RUNWAYS 30L AND 30R (TERPS)

The northeastern portion of the project site lies within the TERPS 40:1 Departure Surfaces for Runways 30L and 30R. Specifically, Points 2 through 6 are within the lateral limits of the TERPS 40:1 Departure Surfaces. Neither the diesel plume, nor the chiller plume, impacts the TERPS 40:1 Departure Surfaces. The lowest elevation of the Runway 30L TERPS 40:1 Departure Surface is at Point 4, where it is about 351 feet MSL and 368 feet MSL for the Runway 30R TERPS 40:1 Departure Surface.

ILS OR LOC RWY 12R

The ILS or LOC RWY 12 instrument approach procedure consists of Vertically Guided (ILS) and Non-Vertically Guided (Localizer) components. The northeastern portion of the site, specifically Points 2 through 7, is within the obstacle identification surface for both the ILS and Localizer components. At the studied MSLs, the diesel and chiller plumes do not impact the ILS or Localizer components. The maximum top elevation before adversely impacting the Localizer approach to Runway 12R is 196 feet MSL.

RNAV (GPS) RWY 12R

The RNAV (GPS) RWY 12R instrument approach procedure consists of Precision Vertically Guided (LPV), Non-Precision Vertically Guided (LNAV/VNAV) and Non-Precision (LNAV) lines of minima. Each are discussed below.

LPV: The LPV uses the same obstacle identification surfaces as the above-mentioned ILS procedure. Thus, Points 2 through 7 are within the obstacle identification surface and do not penetrate the LPV procedure.

LNAV/VNAV: Points 2 through 7 are within the obstacle identification surface of the LNAV/VNAV procedure. The plumes – diesel and chiller – do not adversely impact the existing LNAV/VNAV procedure. The required Decision Altitude (DA) to clear the plumes is 371 feet MSL, which matches the currently published DA. Any increase in site elevation will impact this procedure.

LNAV: The Points 2 through 7 are also within the LNAV obstacle identification surface. The existing LNAV procedure is not adversely impacted by the diesel and chiller plumes.

<u>Missed Approach</u>: For the RNAV (GPS) RWY 12R approach procedure, there is a missed approach segment. This protects for aircraft executing an aborted landing maneuver when the runway is not in sight at the specified DA or Minimum Descent Altitude (MDA). The entire site is within Missed Approach surface and the chiller plume is clear by at least 37 feet.

RNAV (RNP) RWY 12R

The RNAV (RNP) RWY 12R instrument approach procedure consists of Vertically Guided (RNP) segments that have different obstacle evaluation areas to accommodate aircraft with advanced avionics. The project site is partially within the obstacle evaluation areas and does not represent an obstacle at the evaluated heights.

RNAV (GPS) RWY 12L

The RNAV (GPS) RWY 12L instrument approach procedure also consists of LPV, LNAV/VNAV, and LNAV lines of minima.

LPV: There are no penetrations to the LPV procedure.

LNAV/VNAV: The plumes – diesel and chiller – do not adversely impact the existing LNAV/VNAV procedure.

LNAV: The LNAV procedure is also not adversely impacted by the diesel and chiller plumes.

<u>Missed Approach</u>: The site is also within the Missed Approach surfaces associated with this instrument approach procedure and does not cause an adverse impact at either plume height. The chiller plume height is clear of the Missed Approach surface by 7 feet.

RNAV (RNP) RWY 12L

The project site is partially within the RNAV (RNP) RWY 12L obstacle evaluation areas and does not represent an obstacle at the evaluated points and heights. None of the points analyzed are within the missed approach surface.

Analysis of Overflights

At the request of SJC staff, additional analysis was performed to determine the frequency at which overflights occurred over the project site, and at what altitudes those overflights occurred. Kimley-Horn obtained Automatic Dependent Surveillance – Broadcast (ADS-B) data for the area identified in Figure 4. Powered aircraft are required to have ADS-B transponders when operating at SJC.

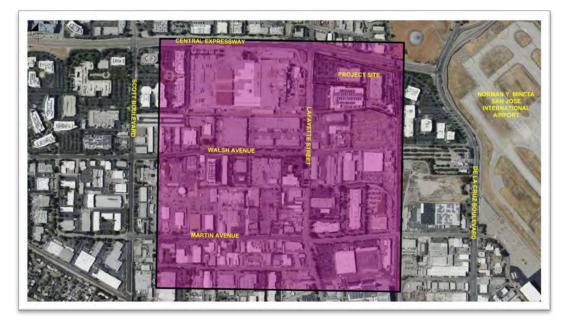


Figure 4 – ADS-B Collection Area

The area examined was larger than the project site because data samples were taken every five seconds by the vendor. The northeast corner of the box was used as the controlling point and the box was stretched west and south to capture as many aircraft pings as possible. The northeast corner of the box was identified as the critical corner and sited to capture the northern limit of the project site and remain clear of the extended Runway 12R/30L centerline. Encroachment on the extended runway centerline could artificially skew the results. Due to limitations, the data vendor could only define data collection boxes that are square and aligned with true north. In other words, a box parallel with the runway centerline could not be used.

Data was collected from March 6, 2020, through November 27, 2022. This was the extent that data was available. Based on feedback from SJC staff, it was determined that small airplanes (aircraft weighing less than 12,500 pounds) and helicopter operations were of concern. Aircraft altitudes from the ground up to 2,600 feet were collected. This was intended to capture aircraft arriving, departing, and conducting pattern work at SJC, while avoiding general SJC overflight traffic. Figure 5 shows the number of operations through the identified box per month, with March 2020 and November 2022 being partial months of data. Figure 6 shows the range of altitudes aircraft were at when transiting this are.

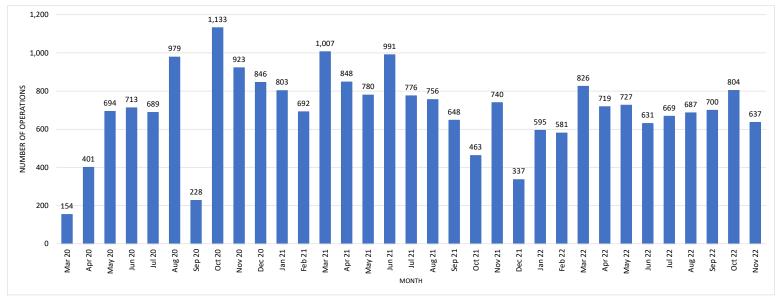


Figure 5 – Number of Aircraft Flying Over the Project Site

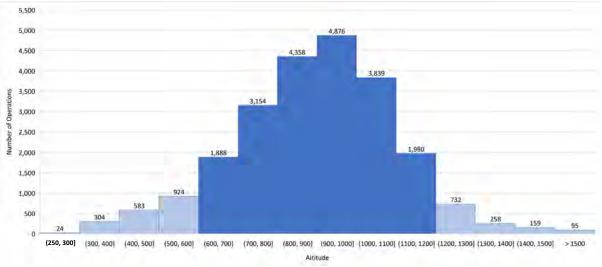


Figure 6 – Altitudes of Aircraft Flying Over the Project Site

On average, about 720 small airplanes overfly the project site monthly. These aircraft are generally at an altitude of 600 feet MSL to 1,200 feet MSL. The lowest altitude observed was 250 feet MSL. All small aircraft overflying this area over the last two and half years were above the maximum plume height of 173 feet MSL.

Conclusions

Table 3 summarizes the results presented in the analysis above. While the plumes will penetrate the Part 77 Transitional Surfaces, they will likely not represent a hazard to air navigation due to no impacts to any published approaches. Also, based on the acquired ADS-B data, no small airplanes or helicopters overfly this site at an altitude that will be affected by the plumes. A portion of the site is within the San Jose VOR/DME critical area. However, the building received a Determination of No Hazard from the FAA which represents a more critical obstruction to the VOR/DME than the thermal plumes as the plumes will not interfere with the VOR/DME radio signals.

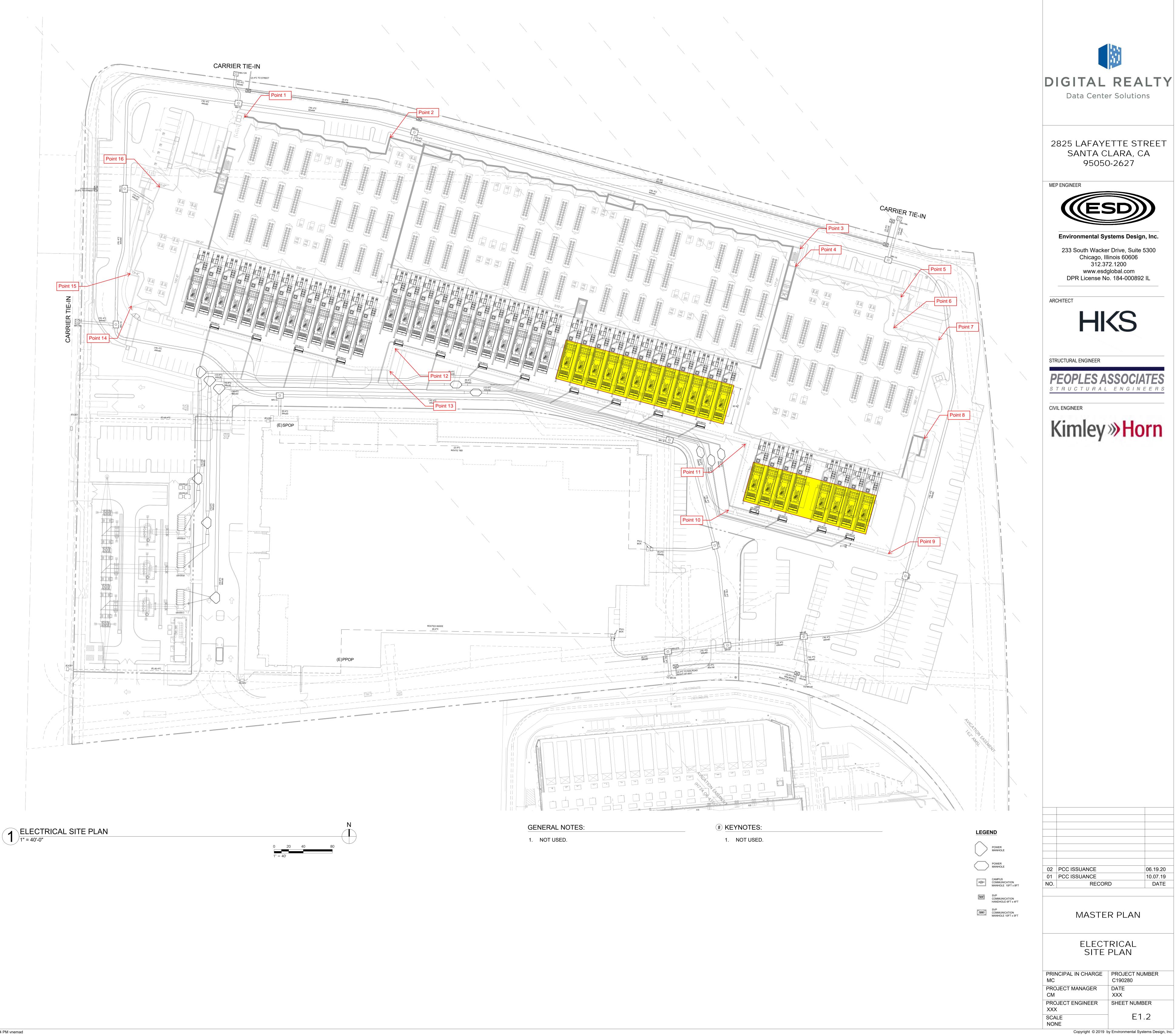
	Table 3 –	- Summary	of Results		
Component Analyzed	Thermal Plume Impacts				Additional Information
	Yes	No			
Part 77		~	Penetrations are common within the Part 77 Transitional Surface		
Airport Design Surfaces		~	Fixed building was determined to not be a hazard to air navigation		
Departure Surface for Runways 30L and 30R		~	Clear by at least 178 feet.		
ILS/LOC RWY 12R		✓	Must remain below 196 feet MSL.		
RNAV (GPS) RWY 12R		✓	MSL cannot be increased.		
RNAV (RNP) RWY 12R		✓			
RNAV (GPS) RWY 12L		✓	Must remain below 180 feet MSL.		
RNAV (RNP) RWY 12L		 ✓ 			

Attachments:

- A: Project Site Plan
- B: Thermal Plume Calculation & Analysis
- C: 7460 Notice of Determination

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Please do not hesitate to contact me at 909.991.4398 (mobile), or <u>Andrew.scanlon@kimley-horn.com</u> to discuss further or if you have any questions or comments.



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DOCKETED	
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Vertical Plume Velocity Assessment

Lafayette Backup Generating Facility

Santa Clara, California

Submitted to California Energy Commission

Submitted by



Prepared by

Atmospheric Dynamics, Inc.



May 2022

Introduction

This report presents the evaluation of the Lafayette Backup Generating Facility (LBGF) source generated plumes from the 46 Cummins diesel engines and 88 rooftop chillers on the effects on airport/aircraft operations. The Normal Y. Mineta San Jose International Airport is located approximately 0.38 miles east southeast of the LBGF. This report is based upon an analysis prepared by Atmospheric Dynamics, Inc. in accordance with the California Energy Commission (CEC) application requirements for a Small Power Plant Exemption (SPPE) pursuant to the power plant siting regulations. This analysis is but one part of a larger analysis, which seeks an SPPE Decision from the CEC.

Based on the stack parameter data, an analysis of the potential plume characteristics from the routine operation the diesel engines and rooftop chillers on vertical winds was prepared and compared to the California Energy Commission (CEC) significance criteria of 5.3 meters per second (m/s) for the average vertical plume velocities as described below.

Atmospheric Dynamics, Inc. (ADI) prepared a screening level plume vertical velocity assessment which are based on the calm wind Spillane methodology outlined in the "Aviation Safety and Buoyant Plumes" paper (Peter Best, et. al., presented at the Clean Air Conference, Newcastle, New South Wales, Australia, 2003). This methodology is also recognized as a screening tool for aviation safety set out by the Australian Civil Aviation Safety Authority (CASA) and presented in "AC 139-5(1) Plume Rise Assessments (CASA, 2012)".

The aim of this screening assessment is to conservatively determine the potential for turbulence generated by the diesel engines and rooftop chillers waste heat exhaust plumes. Part 139.370 of the Australian Civil Aviation Safety Regulations (1998, 2004) provides that CASA may determine that plume velocities in excess of 4.3 m/s is or will be a potential hazard to aircraft operations. The *Manual of Aviation Meteorology* (Australian Bureau of Meteorology 2003) defines severe turbulence as a vertical wind gust velocity in excess of 10.6 m/s. The assumed critical vertical velocity used as a CEC significance threshold is 5.3 meters per second* (m/s) but it should be noted that the basis of the original CASA derived threshold of 4.3 m/s has been lost in antiquity and that CASA no longer relies on the 1998 and 2004 regulations that established this critical threshold other than to note that a more rigorous analysis, which includes site specific meteorology, should be used if the 4.3 m/s and 10.6 m/s screening thresholds are exceeded. The screening method uses absolute worst-case assumptions of calm winds and neutral atmospheric conditions for the entire vertical extent of the plume to determine these worst-case impacts. It should be noted that these results are extremely conservative in that these worst-case conditions typically only occur during a few hours each year.

The Spillane methodology is generally applied to a limited number of plume source geometry's (turbines, power plant boilers, etc.) with the stacks arranged linearly (in a single straight-line) and separated by distances that typically exceed the individual stack diameters. For the diesel engines, this assumption was maintained. Only one engine stack was modeled consistent with the normal operational testing schedule of the emergency generator engines. For the chiller assessment, a conservative assumption was made in order to use the Spillane methodology on an atypical chiller plume configuration, which is made up of 88 chillers arranged on a two-dimensional surface. Here, the methodology, as described below, assumed that all sixteen chiller cells for each chiller were merged into a single stack with an effective diameter based on the combined area of all sixteen chiller cells. In other words, a single stack was assumed to initially

*For the Puente Power Project (Docket#15-AFC-01, TN#213674, 9/15/2016), "CEC staff ... concluded that an average velocity of 5.3 m/s is the appropriate velocity ... (for a plume velocity threshold)." The CEC staff "Plume Background Threshold" attached to the docketed document concludes with "...(CEC) staff will use 10.6 m/s peak vertical plume velocity as the new threshold. The altitude at which a plume would have a peak vertical velocity of 10.6 m/s would be the same altitude at which a plume would have an average vertical velocity of half that, 5.3 m/s."



describe the release parameters of the combined chiller cells in each of the 88 individual chillers. The effective plume diameter is appropriate for each individual chiller based on the close proximity and arrangement of the sixteen chiller cells.

Screening Methodology and Vertical Plume Velocity Calculations

The Spillane methodology is based on worst-case calm wind neutral stability conditions to assess the average plume vertical velocity as a function of height. The methodology is based on wellverified laboratory and theoretical treatments of the rise and spread of a buoyant jet, both into a still ambient environment and into a light crosswind. This treatment covers in detail the initial dynamics of the plume as it exits the stack and the entrainment of ambient air into the plume as it rises directly above the stack. In addition to providing clarifications and algebraic solutions to the Spillane methodology, the 2003 Peter Best paper provides additional methodologies that also consider the enhancement of vertical velocities that may occur if the plumes from multiple identical stacks merge and form a higher buoyancy combined plume (referred to here as the enhanced Spillane methodology).

The vertical plume assessment will involve several stages of development. For individual plumes, the stages are:

- (a) In the first stage very close to the stack exit, the high plume momentum will result in a short section in which the conditions at the center of the plume are relatively unaffected by ambient and plume buoyancy conditions. This jet phase extends from the stack exit to approximately a distance of 6.25 D above the stack (where D is the stack diameter) in calm conditions. At the end of this stage, the plume-averaged vertical velocity has decreased to half of the stack exit velocity, with a corresponding increase, or doubling, in effective plume diameter.
- (b) In the second stage, the plume responds to differences between ambient and plume buoyancy conditions, with much cooler and less turbulent ambient air being entrained into the plume from the outside regions of the plume towards the plume centerline. The momentum and buoyancy of the plume significantly influences plume rise and subsequently the dilution of the stack exhaust to decrease plume vertical velocities. This dilution is very sensitive to ambient wind speed, so the calm wind conditions considered here are extremely conservative.
- (c) In the third stage of plume development, plume rise is due entirely to the buoyancy of the plume and continues from some distance until there is an equalization of turbulence conditions within and outside the plume. This final rise is often only achieved at considerable heights/distances from the stack where the effective average vertical velocity is then close to zero. Since there is very little turbulence and near-zero vertical velocities, this stage of plume development is usually not considered for this type of analysis.

In the second stage of development, the analytical solution of the governing equations under these conditions is given by:



Where the subscript 'o' refers to values of the parameters at the stack outlet and the variables are:

- a plume radius (m)
- V average vertical velocity (m/s)
- z height above stack top (m)
- z_{ν} virtual source height (m)
- D stack diameter (m)
- F_o buoyancy flux evaluated at the stack outlet (m⁴s⁻³)

These are the two primary equations governing the growth of a single plume in the second stage of development under neutral calm wind conditions. Additional equations governing the first stage of single plume development as well as the interaction of multiple plumes in the second stage of development are discussed in detail in the Best paper.

For multiple stacks in the enhanced Spillane methodology, the equations governing the second stage are calculated from the point when the plumes begin to merge until they are fully merged. The plume merging begins at the height where the plume diameters equal the stack separations and the plumes are fully merged at the height where the plume diameters are equal to 2d(N-1)/2 for three or more stacks or 2d for two stacks. At the fully merged height, the merged plume diameter and velocity is enhanced by the fourth root of the number of stacks. Above the fully merged plume height, the enhanced plume diameter and plume velocities follow the regular equations given for the second stage. Below the fully merged plume height for the merging phase, plume velocities are linearly interpolated by height from the single plume velocity at the height where the plumes begin to merge to the enhanced plume velocity at the fully merged plume height.

Vertical Plume Velocity Calculations for the Diesel Engines

The LBGF is comprised of 44 individual large and one (1) small diesel emergency generator stacks. The small diesel emergency generator was not assessed as it would have smaller plume vertical velocities. Generator stack parameter data (plume exit velocity, plume exit temperature and stack exit diameter) were provided by Cummins. Only one (1) engine will be tested during any one hour. While the engines will be tested at minimum loads, the 100 percent load case was utilized for the worst-case plume analysis. For the engine analysis, two ambient conditions were considered: 41.0°F, the minimum monthly mean of daily minimum temperatures, and 84.3°F, the maximum monthly mean of daily maximum temperatures for the San Jose Airport (*"Climatology of the United States No. 81 – Monthly Station Normals of Temperature, Precipitation, and Heating and Cooling Degree Days 1971-2000 – California"*, February 2002, and *"Climatology of the United States No 20 – Monthly Station Climate Summaries, 1971-2000 – California"*, February 2004. These data is summarized in Table 1.



Cummins Diesel Stack Characteris	Table 1 stics for Vertical	Plume Velocity A	nalysis
	Case #	1	2
Ambient Temperature (°F)*		41.0	41.0
Stack Diameter (m)		0.7112	0.7112
Exhaust Velocity (m/s)*		31.20	31.20
Exhaust Temperature (K)*		912.0	912.0
Stack Release Height (m)		22.86	22.86
Stack Buoyancy Flux (m ⁴ /s ³)		24.58	23.35
*Stack data provided by Cummins at 100% load			

Screening level vertical plume velocity assessments were made for two ambient temperatures with calm winds and neutral atmospheric conditions for the cases presented in Table 1 which are based on 100 percent load. The results based on the two ambient conditions are presented in Table 2 and the output from the calculation spreadsheet provided in Attachment A.

The initial jet phase extends to a height of about 90 feet above grade level (ft-agl) for both cases. After the jet phase, plume temperature buoyancy characteristics modeled in the Spillane methodology cause a uniform decrease in plume-averaged vertical velocities, with the critical plume-averaged vertical velocity of 5.3 m/s occurring at about 113 ft-agl for both cases

Table 2 Diesel Engine Vertical Plume Velocity Analysis Re	sults for Referen	ce Height
Case #	1	2
Ambient Temperature (°F)	41.0	84.3
Single Plume Results:		
Plume-Averaged Vertical Velocity at 200 feet-agl (m/s)	2.77	2.73
Height of 5.3 m/s Plume-Averaged Vertical Velocity (feet-agl)	112.8	112.9

These screening results indicate that mechanical and thermal turbulence levels due to the flow from the diesel engine always remain in the light turbulence category and below the significance level of 5.3 m/s at all heights above about 113 ft-agl. Even light wind speeds can dramatically decrease the predicted plume-averaged vertical velocities, so the above results are very conservative indications of adverse conditions. The important factor for a given location is the appropriateness of available information for estimating true wind and temperature profiles throughout a typical year. Theoretical calculations, as shown in the tables above, are likely to overestimate the expected vertical velocities, for the following reasons:

- The wind profile is assumed constant with height with no occurrence of wind-shear when realistically, there is a considerable variation with height, especially in light winds;
- Worst-case scenarios are based on very light-wind, near-neutral atmospheric conditions with maximum loading.

Vertical Plume Velocity Calculations for the Rooftop Chillers

The 88 rooftop chillers are each comprised of 20 individual cells, with a cell fan diameter of 34 inches. The 88 chillers are generally arranged 24 along the longer building length (averaging 15 feet between adjacent chillers) by three along the shorter building width (averaging 15 feet between adjacent chillers). It should be noted that the chillers are arranged differently on the two-story part of the data center (8x2). Based on the groupings of chillers, the single and merged



plumes were based on the 24 (3x8) chiller arrangement my merging plumes along the length (3 merged stacks) and width (8 merged stacks). Chiller stack parameter data (exit velocity and temperature) were provided by the applicant. An effective stack diameter for all 20 cells was utilized for each chiller. The chillers will utilize variable speed fans and the number of fans that are operational are dependent upon ambient temperature and plant load. However, to be conservative, all chillers/cells were assumed to be operating at full load. These data are summarized in Table 3 for the same ambient temperatures used for the engine analysis.

	ics for Vertical Plun	4	
	Case #	1	2
Ambient Temperature (°F)*		41.0	84.3
Effective Stack Diameter (m)**		3.86	3.86
Exhaust Velocity (m/s)*		8.06	8.06
Exhaust Temperature (K)*		289.26	313.32
Stack Release Height (m)		23.81	23.81
Stack Buoyancy Flux (m ⁴ /s ³)		11.33	10.45

** Calculated value based on the cell diameter of 34 inches multiplied by the square of the number of operating cells, or $D_{eff} = 34^{n*}\sqrt{20}$

The Spillane methodology was originally developed to treat multiple individual stacks that are arranged along a linear x or y direction, but not both directions at once, with stack separations much greater than the stack diameters, typical of boilers/turbines at large power plants. As noted above, the 88 chillers are generally arranged in a 3 x 8 pattern. Therefore, the enhanced Spillane methodology was based on calculating the total merging height for the largest linear direction of chiller placements (which is eight chillers spaced 24.6 feet apart along the longer length of the building). The largest grouping of 48 (3x16) chillers were considered in the calculation of vertical velocity plume enhancement (both at and above the totally merged height, and for the interpolation down to the plume touching height. Again, the effective single stack diameter of each chiller was based on the combined 20 cells.

Screening level vertical plume velocity assessments were made for the same ambient temperatures with calm winds and neutral atmospheric conditions as was done for the emergency generator engines. The results are presented in Table 4 and the output from the calculation spreadsheets are provided in Attachment A.

The initial jet phase extends to a height of about 157.3 ft-agl for both cases. The critical plumeaveraged vertical velocity of 5.3 m/s occurs in the jet phase at about 132.4 ft-agl for both cases. The plumes touch (begin to merge) at about 246 ft-agl and are fully merged at about 1,233 ft-agl for both cases. Under the enhanced Spillane methodology, the merged plume-averaged vertical velocities never approach 5.3 m/s (either above the totally merged height or when interpolated down to the touching height).



Table 4 Chiller Vertical Plume Velocity Analysis Resul	Its for Reference H	eight
Case #	1	2
Ambient Temperature (°F)	41.0	84.3
Single Plume Results:		
Height of 5.3 m/s Plume-Averaged Vertical Velocity (Within the Jet Phase, feet-agl)	132.4	132.4
Merged Plume Results:		
Plume-Averaged Vertical Velocity at 1,000 feet-agl (m/s)	3.50	3.42

From these results and for each ambient condition, the vertical plume velocities are less than the threshold value of 5.3 m/s for all heights above about 132 ft-agl and above for the chillers. The heights at which plume-averaged vertical velocities exceed 5.3 m/s only occur during the jet phase for both cases. These cases also represent worst-case conditions of calm winds at all levels of a neutral atmosphere.

These screening results indicate that mechanical and thermal turbulence levels due to the flow from the chillers always remain in the light turbulence category and below the significance level of 5.3 m/s at all heights above about 132 ft-agl. Even light wind speeds can dramatically decrease the predicted plume-averaged vertical velocities so the above results are very conservative indications of adverse conditions. The important factor for a given location is the appropriateness of available information for estimating true wind and temperature profiles throughout a typical year. Theoretical calculations, as shown in the tables above, are likely to overestimate the expected vertical velocities, for the following reasons:

- The wind profile is assumed constant with height with no occurrence of wind-shear when realistically, there is a considerable variation with height, especially in light winds;
- Worst-case scenarios are based on very light-wind, near-neutral atmospheric conditions with maximum loading.



Attachment A Spillane Method Plume Velocity Calculations



	"Aviation Sa	fety and Buo	yant Plumes	," Peter Be	st, et. al.			
	"The Evaluat	ion of Maxin	num Updraft	Speeds for	Calm Con	ditions at V	arious Heights in the Plum	e
		from a Gas-	Turbine Pow	er Station a	at Oakey, Q	ueensland,	Australia," Dr. K.T. Spilla	ne
mbient Conditions:					Constants:	Assume ne	eutral conditions (dθ/dz=0 or	θ _a =θ _e)
Ambient Potential Temp θ _ε	278.15	Kelvins	41.0	°F			meters/feet	
lume Exit Conditions:					Gravity g	9.81	m/s ²	
Maximum Stack Height h	22.86	meters	75	feet-inches	λ	1.11		
Stack Diameter D	0.7112	meters	28	inches	λο	~1.0		
Stack Velocity Vexi	31.20	m/s	102.37	ft/sec				
Volumetric Flow	12.39	cu.m/sec	26,264	ACFM	$\pi V_{exit} D^2/4$			Sect.2/¶1
Stack Potential Temp θ _e	762.04	Kelvins	912	°F				
Initial Stack Buoyancy Flux F	24.5763	m ⁴ /s ³			gV _{exit} D ² (1-6	$\theta_a/\theta_s)/4 = V$	ol.Flow(g/π)(1-θ _a /θ _s)	Sect.2/¶1
Plume Buoyancy Flux F	N/A	m ⁴ /s ³			λ^2 gVa ² (1- θ	_a /θ _n) for a,V	,θ _p at plume height (see belo	w)
No.of Stacks N				1.000			cation Factor (N ^{0.25})	
onditions at End (Top) of Jet Phase:								
Height above Stack z _{ie}	4 445	meters*	14.6	feet*	7 = 6.250) metere*=	meters above stack top	Sect.3/¶1
Height above Ground z _{jet} +h _e		meters	89.6		zjet - 0.20L	, metera –		"
Vertical Velocity V _{je}				ft/sec	V = 0.5V	_{exit} = V _{exit} /2		
Plume Top-Hat Diameter 2a _{ie}		meters		feet		exit = vexit/2	Conservation of momentum	
Plume Top-Hat Diameter Zaje	1.422	meters	4.7	leel	2a _{jet} = 2D		Conservation of momentum	
pillane Methodology - Analytical Solutions			-					
Single Plume-averaged Vertical Velocity				er where P				
Plume Top-Hat Radius a		olutions in T					crease with height	Sect.2/Eq.6
Virtual Source Height z _v		meters*		feet*	6.25D[1-(θ _e	₂ /θ _s) ^{1/2}], met	ers*=meters above stack top	Sect.2/Eq.6
Height above Ground zv+h		meters	80.8	feet			where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} =$	
Vertical Velocity V	S	olutions in T	able Below				/) ² - (6.25D-z _v) ²]} ^(1/3) / a	Sect.2.1(6)
Product (Va)	6.703	m²/s			$V_{exit}D/2(\theta_e/$	'θ _s) ^{1/2}		
Solve for plume-averaged vertical velo	city at height	200.0	feet	60.96	meters abo	ve ground (z'+hs)	
Gives the following Height above Stack z	38.100	meters*	125.0					
Plume Top-Hat Diameter 2a		meters	38.2		2a'=2*0.16	(z'-z _v)		Sect.2/Eq.6
Vertical Velocity V	2.769		9.09	ft/sec			() ² -(6.25D-z _v) ²]} ^(1/3) /(2a'/2)	Sect.2/Eq.6
Voltical Volcony V	200		0.00	10000	• ((•u/o ·	0.121 8[(2 2)	(0.200 20) IJ ((20,2)	
Solve for Height of CASC critical vertica	Velocity V	5 20	m/s plume-a	woragod y	ortical vold	oitu	Critical VV	' > Top of Jet (Spilla)
			-	_		-		
Find Height above Stack z _{cri}		meters	37.8 112.8				Itaneously in both eqs. (i.e.,	
Height above Ground z _{crit} +h	34.379	meters	112.8	teet	tor V=4.3 n		e cubic equation ax3+bx2+cx	
							and b=-(0.12Fo)/(4.330.163)=	
Interpolated Height of critical vertical v					and o	d=[0.12F _o (6	.25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³)=	
Find Height above Stack z _{cri}								
		meters		feet				
Height above Ground z _{crit} +h		meters	#N/A #N/A			give	s the real solution x = z-zv =	
						give	s the real solution x = z-zv = or z(m/above stack) =	9.75 11.5
Height above Ground z _{ent} +h _t	#N/A	meters	#N/A	feet			s the real solution x = z-zv =	11.5
Height above Ground z _{ent} +h _t able of Plume Top-Hat Diameters (2a) and	#N/A Plume-Averag	meters ed Vertical	#N/A Velocities sta	feet arting at en	d of jet ph		s the real solution x = z-zv = or z(m/above stack) =	9.75 11.5
Height above Ground z _{ent} +h _t	#N/A Plume-Averag	meters ed Vertical	#N/A Velocities sta	feet arting at en	d of jet ph		s the real solution x = z-zv = or z(m/above stack) =	9.75 11.5
Height above Ground z _{ent} +h _t able of Plume Top-Hat Diameters (2a) and	#N/A Plume-Averag (meters)	meters ed Vertical Plume	#N/A Velocities sta	feet arting at en Plume	d of jet ph		s the real solution x = z-zv = or z(m/above stack) =	9.75 11.5
Height above Ground z _{ent} +h able of Plume Top-Hat Diameters (2a) and Height (feet	#N/A Plume-Averag (meters)	meters ed Vertical Plume Radius(m)	#N/A Velocities sta SingleStk	feet arting at en Plume Temp(K)	d of jet ph		s the real solution x = z-zv = or z(m/above stack) =	9.7 11.
Height above Ground z _{ent} +h _t able of Plume Top-Hat Diameters (2a) and Height (feet above ground	#N/A Plume-Averag (meters) above stack 0.00	meters Jed Vertical Plume Radius(m) 0.356	#N/A Velocities sta SingleStk VertVel(m/s) 31.20	feet arting at en Plume Temp(K)	d of jet ph		s the real solution x = z-zv = or z(m/above stack) =	9.7 11.
Height above Ground z _{ent} +h able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack.Rel.Ht = 75.0	#N/A Plume-Averag (meters) above stack 0.00 1.52	meters ed Vertical Plume Radius(m) 0.356 0.477	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86	feet arting at en Plume Temp(K)	d of jet ph		is the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) =	9.7 11. 11
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground <i>Stack.Rel.Ht = 75.0</i> 80.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05	meters ed Vertical Plume Radius(m) 0.356 0.477 0.599	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86	feet arting at er Plume Temp(K)	d of jet ph		s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs:	9.7 11. 11
Height above Ground z _{ent} +h _i able of Plume Top-Hat Diameters (2a) and Height (feet above ground <i>Stack.Rel.Ht</i> = 75.0 80.0 85.0	#N/A Plume-Averag (meters) above stack 0.00 1.52 3.05 4.45	meters ped Vertical Plume Radius(m) 0.356 0.477 0.599 0.711	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60	feet arting at er Plume Temp(K)			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R	9.75 11.4 11 11 11 11 11 11 11 11 11 11 11 11 11
Height above Ground z _{ent} +h able of Plume Top-Hat Diameters (2a) and Height (feet above ground <i>Stack. Rel. Ht</i> = 75.0 80.0 85.0 Top of jet = 89.6	#N/A Plume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57	meters ed Vertical Plume Radius(m) 0.356 0.477 0.599 0.711 0.450	#N/A Velocities str SingleStk VertVel(m/s) 25.86 20.52 15.60 14.93	feet arting at en Plume Temp(K) 465.22			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations:	9,7 11. 11 11 11 11 11 11 11 11 11 11 11 11
Height above Ground z _{ent} +h able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack.Rel.Ht = 75.0 80.0 Top of jet = 88.6 90.0	#N/A	meters ed Vertical ¹ Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73	feet arting at en Plume Temp(K) 465.22 361.34			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plume} =((Va) _o ³ +0.12F _o](z-z,) ² -(6.2	9.7 11. 11. 11 5 foot interv let Ht to Top of Jet (50-2,) ²]) ¹² / a 10 foot interv
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground <i>Stack.Rel.Ht = 75.0</i> 80.0 80.0 80.0 80.0 70p of jet = 89.6 90.0 100.0 110.0	#N/A	meters ed Vertical ' Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62	feet arting at en Plume Temp(K) 465.22 361.34 327.69			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11. 11 5 foot interv let Ht to Top of Jet (50-2,) ²]) ¹² / a 10 foot interv
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground <i>Stack. Rel. Ht = 75.0</i> 80.0 85.0 <i>Top of jet = 89.6</i> 90.0 100.0 110.0 <i>Spillane 5.3 m/s Height = 112.8</i>	#N/A	meters ed Vertical ¹ Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562	#N/A Velocities st. SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28	feet Plume Temp(K) 465.22 361.34 327.69 322.07			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11 5 foot interv letHt to Top of Jet 55D-2,) ²]) ¹⁰ / a 10 foot interv
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground <i>Stack. Rel. Ht = 75.0</i> 80.0 85.0 <i>Top of jet = 89.0</i> 90.0 100.0 110.0 <i>Spillane 5.3 m/s Height = 112.8</i> 120.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72	meters ed Vertical ' Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64	feet arting at er Plume Temp(K) 465.22 361.34 327.69 322.07 311.42			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11 5 foot interv letHt to Top of Jet 55D-2,) ²]) ¹⁰ / a 10 foot interv
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground <i>Stack. Rel. Ht =</i> 75.0 85.0 <i>Top of jet =</i> 88.6 90.0 100.0 1100.0 <i>Spillane 5.3 m/s Height =</i> 112.8 120.0 130.0	#N/A Plume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 2.13.72 18.72	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.64	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11. 5 foot interv tel.Ht to Top of Jet 550-z,) ²]) ¹⁰ / a 10 foot interv ma ⁺ a ²⁺ Å ²)))
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground <i>Stack.Rel.Ht = 75.0</i> 80.0 85.0 Top of jet = 88.6 90.0 100.0 110.0 Spillane 5.3 m/s Height = 112.8 120.0 130.0 140.0	#N/A Plume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 13.72 16.76 13.72 13.72	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72	feet arting at er Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11. 5 foot interv tel.Ht to Top of Jet 550-z,) ²]) ¹⁰ / a 10 foot interv ma ⁺ a ²⁺ Å ²)))
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (fect above ground Stack.Rel.Ht = 75.0 80.0 70p of jet = 89.6 90.0 100.0 100.0 100.0 100.0 100.0 110.0 130.0 130.0 140.0 150.0	#N/A	meters ed Vertical ' Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376	#N/A Velocities st. SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46	feet arting at er Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 292.49			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Intern eli-H to Top of Jet 5D-2,) ²) ^{1/a} / a 10 foot Intern m [*] (a ² ⁽² ⁽²⁾)))
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 50.0 70p of jet = 89.6 90.0 100.0 5pillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 160.0	#N/A Plume-Averag (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 16.76 19.81 22.86 25.91	meters Plume Radius(m) 0.366 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864	#N/A Single Stk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.466 3.26	feet arting at er Plume Temp(K) 465.22 361.34 322.07 311.42 302.17 292.49 289.77			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11. 5 foot interv tel.Ht to Top of Jet 550-z,) ²]) ¹⁰ / a 10 foot interv ma ⁺ a ²⁺ Å ²)))
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 85.0 Top of jet = 88.6 90.0 1100.0 Spillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 160.0 170.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 13.72 16.76 19.81 22.86 25.91 28.96	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.64 4.09 3.72 3.46 3.26 3.26	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 292.49 289.77 287.78			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11. 5 foot interv tel.Ht to Top of Jet 50-z,) ²]) ¹⁰ / a 10 foot interv ma ⁺ a ²⁺ Å ²))) Max<5.30 (
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack.Rel.Ht = 75.0 80.0 85.0 Top of jet = 88.6 90.0 100.0 110.0 Spillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 160.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 10.67 11.52 10.67 13.72 16.76 19.81 22.86 22.591 22.86 25.91 22.86 44.20	reters red Vertical Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26	feet arting at er Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 292.49 287.78 282.84			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11. 5 foot interv tel.Ht to Top of Jet 50-z,) ²]) ¹⁰ / a 10 foot interv ma ⁺ a ²⁺ Å ²))) Max<5.30 (
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 70p of jet = 88.6 90.0 1100.0 Spillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 160.0 170.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 10.67 11.52 10.67 13.72 16.76 19.81 22.86 22.591 22.86 25.91 22.86 44.20	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.552 1.552 1.552 1.562 3.364 4.351 6.790 9.228	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.77 3.466 3.26 3.10 2.61 2.34	feet arting at er Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 292.49 287.78 282.84			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Intern bit.Ht to Top of Jet 5D-2,7 ³) ^{1/a} / a 10 foot Intern m ^a ^{(a²7²))) Max<5.30}
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack.Rel.Ht = 75.0 80.0 85.0 Top of jet = 88.6 90.0 100.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 16.76 19.81 22.86 25.91 22.86 25.91 22.96 25.94	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.552 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.77 3.466 3.26 3.10 2.61 2.34	feet arting at er Plume Temp(K) 465.22 361.34 322.07 311.42 302.17 292.49 289.77 287.78 282.84 280.99			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Intern bit.Ht to Top of Jet 5D-2,7 ³) ^{1/a} / a 10 foot Intern m ^a ^{(a²7²))) Max<5.30}
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 85.0 70p of jet = 89.0 90.0 100.0 100.0 100.0 100.0 100.0 110.0 100.0 110.0 100.	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 16.76 19.81 22.66 25.91 22.66 25.91 28.96 44.20 59.44 74.68	reters red Vertical Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667	#N/A Single Stk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.47 289.77 287.78 282.84 289.97 287.78 282.84 280.99 280.08			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Intern bit.Ht to Top of Jet 5D-2,7 ³) ^{1/a} / a 10 foot Intern m ^a ^{(a²7²))) Max<5.30}
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 50.0 70p of jet = 89.0 90.0 100.0 110.0 5pillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 170.0 220.0 320.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92	reters red Vertical Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.662 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.20 3.10 2.61 2.34	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 292.49 289.77 287.78 282.84 280.99 280.09 280.09 280.09 280.09			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Intern bit.Ht to Top of Jet 5D-2,7 ³) ^{1/a} / a 10 foot Intern m ^a ^{(a²7²))) Max<5.30}
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Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 50.0 70p of jet = 89.6 90.0 100.0 5pillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 130.0 140.0 130.0 140.0 130.0 140.0 12	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 16.76 19.81 22.86 25.91 22.86 25.91 22.86 44.20 59.44 74.68 89.92 2105.16 120.40	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.466 3.26 3.10 2.61 2.34 2.16 2.05 1.20 1	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 292.49 289.77 287.78 282.84 289.77 287.78 282.84 289.79 280.08 279.56 279.56 279.56 279.56 279.57 279.50			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Intern bit.Ht to Top of Jet 5D-2,7 ³) ^{1/a} / a 10 foot Intern m ^a ^{(a²7²))) Max<5.30}
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Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 70p of jet = 88.6 90.0 100.0 110.0 Spillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 150.0 1	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 16.76 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.40 135.64	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.662 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 11.862 2.1.420 2.21.420 2.6.297	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 4.2.16 2.02 1.83 3.1.76 1.64	feet arting at er Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 292.49 289.77 287.78 282.84 280.99 280.90 279.56 279.23 279.01 278.55 278.65			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Internet. EI-H to Top of Jet 5(D-z,)?) ^{1/0} / a 10 foot Internet. as ² (a ² \ ²))) Max<5.30
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 85.0 70p of jet = 89.0 90.0 100.	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 18.76 19.81 22.86 25.91 22.86 25.91 22.86 25.94 4.420 59.44 7.468 89.92 105.16 120.40 135.64 120.40 120.60 120.64 120.60 120.64 1	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 16.543 18.982 21.420 26.297 31.174	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16 2.02 1.92 1.83 1.76 1.64 1.55	feet arting at er Plume Temp(K) 465.22 361.34 322.07 311.42 302.17 292.49 289.77 287.78 282.84 280.99 280.08 279.56 279.56 278.85 278.85 278.53			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 ⁻ 5 foot Interv bLHt to Top of Jet 5(D-z,) ²) ^{1,a} / a 10 foot Interv m [*] ^(a²γ²))) Max<5.30
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 50.0 70p of jet = 89.6 90.0 100.0 5pillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 130.0 140.0 150.0 150.0 160.0 170.0 22	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.44 142.20 59.44 74.68 89.92 105.16 120.40 59.44 74.68 89.92 105.16 120.40 59.44 74.68 89.92 105.16 120.40 135.44 166.12 196.60 227.08	meters red Vertical Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051	#N/A Velocities st. SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16 2.02 1.92 1.83 1.76 1.65 1.47	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 292.49 289.77 287.78 282.84 289.92 280.08 279.56 279.53 278.65 278.55			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 ⁻ 5 foot Interv bLHt to Top of Jet 5(D-z,) ²) ^{1,a} / a 10 foot Interv m [*] ^(a²γ²))) Max<5.30
Height above Ground z _{ent} +h _i able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 70p of jet = 89.6 90.0 100.0 110.0 Spillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 160.0 170.0 220.0 370.0 320.0 320.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 (10.67 11.52 (13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 120.46 120.46 120.46 126.46	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.662 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051 40.927	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.10 2.61 2.34 4.216 2.02 1.92 2.183 1.76 1.64 1.55 5.1.47 1.41	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 297.49 287.78 282.84 282.84 289.99 280.99 289.79.23 279.60 279.53 279.65 278.85 278.85 278.85 278.85 278.43 278.43 278.45 278.43 278.45 278.45 278.45 278.43 278.45 279.23 279.23 279.23 279.23 279.24 279.25 279.25 279.25 279.25 279.25 279.25 279.25 279.25 279.25 279.25 279.25 279.25 279.45 279.45 279.45 279.45 279.45 279.45 279.45 279.45 279.45 279.45 279.45 279.45 279.45 278.55 278.5			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 ⁻ 5 foot Interv bLHt to Top of Jet 5(D-z,) ²) ^{1,a} / a 10 foot Interv m [*] ^(a²γ²))) Max<5.30
Height above Ground z _{ent} +h _i able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack.Rel.Ht = 75.0 80.0 85.0 70p of jet = 89.0 90.0 100.	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 10.67 11.52 28.96 28.96 44.20 59.44 7.468 88.92 105.16 120.40 135.64 166.12 196.60 227.08 257.56 288.04	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.34 2.16 2.02 1.92 1.83 1.76 1.64 1.65 1.47 1.41	feet arting at er Plume Temp(K) 465.22 361.34 322.07 311.42 302.17 296.37 292.49 289.77 287.78 282.84 280.99 280.08 279.23 279.01 278.85 278.85 278.45 278.55 27			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 ⁻ 5 foot Interv bLHt to Top of Jet 5(D-z,) ²) ^{1,a} / a 10 foot Interv m [*] ^(a²γ²))) Max<5.30
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 70p of jet = 89.0 90.0 100.0 5pillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 140.0 150.0 160.0 170.0 220.0 270.0 320.0 370.0 3	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 18.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.40 135.64 166.12 19.660 227.08 227.08 225.756 288.04 318.52	meters ped Vertical Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 50.681	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.466 3.26 3.10 2.61 2.34 2.16 2.05 1.47 1.62 1.92 1	feet arting at er Plume Temp(K) 465.22 361.34 322.07 311.42 302.17 292.49 289.77 287.78 282.84 289.97 287.78 282.84 289.08 279.56 279.56 279.56 278.65 278.65 278.45 278.39 278.45 278.39 278.35 278.45 278.39 278.35 278.32 27			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Internet. EI-H to Top of Jet 5(D-z,)?) ^{1/0} / a 10 foot Internet. as ² (a ² \ ²))) Max<5.30
Height above Ground z _{ent} +h _i able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack.Rel.Ht = 75.0 80.0 80.0 70p of jet = 89.0 90.0 100.	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 18.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.40 135.64 166.12 19.660 227.08 227.08 225.756 288.04 318.52	meters ped Vertical Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 50.681	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.466 3.26 3.10 2.61 2.34 2.16 2.05 1.47 1.62 1.92 1	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 292.49 280.77 287.78 282.84 280.99 280.08 279.56 279.23 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.53 278.45 278.35 278.45 278.35 278.45 278.35 278.45 278.35 278.45 278.55			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11 1 5 foot Inter BLHE to Top of Jet (5D-2,) ²) ^{1/2} / a 10 foot Inter m [*] (² ^α ³ ^λ ³))) Max<5.30
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 70p of jet = 89.0 90.0 100.0 5pillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 140.0 150.0 160.0 170.0 220.0 270.0 320.0 370.0 3	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 16.76 19.81 22.66 25.91 22.66 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 196.62 105.756 227.08 257.56 288.04 318.52 349.00	meters Plume Radius(m) 0.366 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 45.558	#N/A Velocities st. Single Stk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16 2.02 1.92 1.83 1.76 1.65 1.47 1.41 1.32 1.28	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.47 287.78 282.84 289.97 287.78 282.84 289.28 279.56 279.23 279.65 278.55 278.55			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11 1 5 foot Inter BLHE to Top of Jet (5D-2,) ²) ^{1/2} / a 10 foot Inter m [*] (² ^α ³ ^λ ³))) Max<5.30
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 50.0 70p of jet = 89.6 50.0 50.0 50.0 50.0 50.0 50.0 50.0 50	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 (10.67 11.52 (13.72 16.76 22.86 22.51 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.46 1	meters ped Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.662 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 50.681 155.588 60.435	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.10 2.61 2.34 4.64 3.26 3.10 2.61 2.34 4.216 2.02 1.93 1.76 1.64 1.55 5.1.47 1.41 1.36 1.32 1.28	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 297.49 287.78 282.84 289.99 289.09 279.53 279.03 279.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.65 278.53 278.45 278.32			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11 1 5 foot Inter BLHE to Top of Jet (5D-2,) ²) ^{1/2} / a 10 foot Inter m [*] (² ^α ³ ^λ ³))) Max<5.30
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 70p of jet = 88.6 90.0 100.0 1100.0 Spillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 150.0 170.0 220.0 370.0 370.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 13.72 13.72 13.72 13.72 13.72 14.55 44.20 19.81 22.86 24.91 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 120.40 135.64 136.62 288.04 318.52 349.00 379.48 409.96	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 50.558 86.0435 60.435 60.435 65.311	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16 2.02 1.92 1.83 1.76 1.64 1.55 1.47 1.41 1.36 1.32 1.28	feet arting at er Plume Temp(K) 465.22 361.34 322.07 311.42 302.17 292.49 280.97 282.84 280.99 280.08 279.63 279.01 278.85 278.85 278.85 278.85 278.85 278.85 278.85 278.85 278.85 278.85 278.85 278.85 278.85 278.85 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 278.26 278.29 27			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Internet. EI-H to Top of Jet 5(D-z,)?) ^{1/0} / a 10 foot Internet. as ² (a ² \ ²))) Max<5.30
Height above Ground z _{ent} +h _i able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 80.0 70p of jet = 89.0 90.0 10	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.40 135.64 120.40 135.64 120.40 349.00 379.48 40.956 440.44 40.956 440.44	meters red Vertical ' Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 45.558 60.435 55.558 66.311 70.188	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16 2.05 1.47 1.41 1.36 1.32 1.28	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 292.49 289.77 287.78 282.84 289.28 279.50 279.50 279.50 279.50 279.50 279.50 278.55 278.45 278.39 278.35 278.45 278.39 278.27			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 5 foot Internet. EI-H to Top of Jet 5(D-z,)?) ^{1/0} / a 10 foot Internet. as ² (a ² \ ²))) Max<5.30
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 50.0 70p of jet = 89.6 90.0 100.0 50.0 50.0 50.0 50.0 50.0 50.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.7.62 10.57 11.52 13.72 16.76 19.81 22.86 25.91 28.96 44.20 105.16 120.40 105.16 120.40 135.64 16.12 196.60 227.08 257.56 288.04 318.52 349.00 379.48 409.96 440.44 470.92	meters ed Vertical Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 3.864 4.351 6.790 9.228 11.667 3.864 4.351 6.790 9.228 11.667 3.864 4.351 6.790 9.228 11.653 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 55.558 60.435 65.311 70.188 75.065	#N/A Velocities st. Single Stk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16 2.02 1.92 1.83 1.76 1.64 1.55 1.47 1.41 1.36 1.28 1	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 296.37 296.37 296.37 296.37 297.28 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 287.78 278.53 278.53 278.53 278.53 278.53 278.53 278.53 278.53 278.53 278.53 278.53 278.53 278.53 278.55 278.26 278.27 278.26 278.26 278.27 278.26 278.26 278.27 278.26 278.26 278.27 278.26 278.27 278.26 278.27 278.26			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 ⁻ 5 foot Interv bLHt to Top of Jet 5(D-z,) ²) ^{1,a} / a 10 foot Interv m [*] ^(a²γ²))) Max<5.30
Height above Ground z _{ent} +h _i able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. <i>Rel. Ht</i> = 75.0 80.0 85.0 70p of jet = 89.0 90.0 100.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.52 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 13.72 10.67 11.52 2.89 2.89 4.420 3.99 4.420 4.99 4.420 4.99 4.420 4.99 4.420 4.99 5.0140 4.420 4.420 4.420 5.0140 4.420 5.0140 4.420 5.0140 4.420 5.0140 4.420 5.0140 4.420 5.0140 4.420 5.0140	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 50.588 60.435 65.311 70.188 75.065 79.942	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.69 3.72 3.46 3.26 3.10 2.61 2.34 6.2.02 1.92 1.83 1.76 1.64 1.55 1.47 1.41 1.36 1.32 1.28 1.24 1.21 1.18 1.13	feet Ting at er Plume Temp(K) 465.22 361.34 322.07 311.42 302.17 296.37 292.49 289.77 287.78 282.84 280.99 280.08 279.23 279.01 278.85 278.85 278.45 278.25 278.55 278.55 278.55 278.55 278.55 278.55 278.55 278.55 278.55 278.			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 11. 5 foot interv tel.Ht to Top of Jet 550-z,) ²]) ¹⁰ / a 10 foot interv ma ⁺ a ²⁺ Å ²)))
Height above Ground z _{ent} +h, able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. Rel. Ht = 75.0 80.0 85.0 70p of jet = 89.0 90.0 100.0 100.0 5pillane 5.3 m/s Height = 112.8 120.0 130.0 140.0 130.0 140.0 150.0 160.0 170.0 220.0 270.0 320.0 270.0 320.0 270.0 320.0 270.0 320.0 270.0 320.0 270.0 320.0 270.0 320.0 270.0 320.0 270.0 320.0 170.0 32	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.52 13.72 13.72 13.72 14.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.40 135.64 166.12 19.60 227.08 227.08 227.08 227.08 227.08 227.08 227.08 23.64 318.52 349.00 379.48 409.96 440.44 470.92 501.40 531.88	meters Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 14.105 16.543 18.982 21.4207 31.174 36.051 40.927 45.804 50.5681 55.558 66.311 70.188 75.065 79.942 84.819	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 5.28 4.64 4.09 3.77 3.562 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16 2.02 1.92 1.83 1.76 1.64 1.55 1.47 1.41 1.36 1.32 1.28 1.24 1.21 1.41 1.41	feet Plume Temp(K) 465.22 361.34 322.07 311.42 302.17 292.49 289.77 287.78 282.84 289.77 287.78 282.84 289.77 287.78 282.49 289.77 287.78 282.49 289.00 279.56 279.56 278.65 278.65 278.65 278.65 278.65 278.65 278.29			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 ⁻ 5 foot Interv bLHt to Top of Jet 5(D-z,) ²) ^{1,a} / a 10 foot Interv m [*] ^(a²γ²))) Max<5.30
Height above Ground z _{ent} +h _i able of Plume Top-Hat Diameters (2a) and Height (feet above ground Stack. <i>Rel. Ht</i> = 75.0 80.0 85.0 70p of jet = 89.0 90.0 100.0	#N/A Plume-Average (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.57 11.52 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 59.44 74.68 89.92 105.16 22.708 25.56 24.57 28.04 120.40 318.52 349.00 379.48 409.96 440.94 318.52 349.00 379.48 409.96 440.44 470.92 501.40 551.88 562.36	meters ped Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.450 0.938 1.425 1.562 1.913 2.401 2.888 3.376 3.864 4.351 6.790 9.228 11.667 3.864 4.351 16.543 18.982 21.420 26.297 31.174 36.051 40.927 45.804 45.5588 60.435 65.311 70.188 75.065 79.942 84.819 89.695	#N/A Velocities st. Single Stk VertVel(m/s) 31.20 25.86 20.52 15.60 14.93 7.73 5.62 5.28 4.64 4.09 3.72 3.46 3.26 3.10 2.61 2.34 2.16 2.02 1.92 1.83 1.76 1.65 1.47 1.41 1.36 1.32 1.28 1.24 1.24 1.21 1.18 1.15 1.13 1.11 1.09	feet Plume Temp(K) 465.22 361.34 327.69 322.07 311.42 302.17 292.49 289.77 287.78 282.84 289.28 279.56 279.56 279.53 278.65 278.55 278.27			s the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly Interpolated from Stack R Spillane Equations: V _{pluma} =((Vs), ³⁺ 0.12F _a ((z-z,) ² -(6.2 a = 0.16(z-z,))	9.7 11. 1 ⁻ 5 foot Interv bLHt to Top of Jet 5(D-z,) ²) ^{1,a} / a 10 foot Interv m [*] ^(a²γ²))) Max<5.30

NOAA Sources: Climatography of the United States No.81 "Monthly Station Normals of Temperatures, Precipitation, and Heating and Cooling Degree Days, 1971-2000 California" and Climatography of the United States No. 20 "Monthly Station Climate Summaries, 1971-2000 California"



	"Aviation Sa	fety and Buo	yant Plumes	," Peter Be	st, et. al.			
	"The Evaluat	ion of Maxin	num Updraft	Speeds for	Calm Con	ditions at V	arious Heights in the Plum	e
							, Australia," Dr. K.T. Spilla	
nbient Conditions:					Constants:	Assume ne	eutral conditions (d0/dz=0 or	$\theta_a = \theta_e$)
Ambient Potential Temp θ _a	302.21	Kelvins	84.3				meters/feet	
ume Exit Conditions:					Gravity g	9.81	m/s ²	
Maximum Stack Height hs	22.86	meters	75	feet-inches	λ	1.11		
Stack Diameter D	·	meters		inches	λο	~1.0		
Stack Velocity Vexit	31.20		102.37		No.	1.0		
-					N. 5214			0.10/51
Volumetric Flow		cu.m/sec		ACFM	πV _{exit} D ² /4			Sect.2/¶1
Stack Potential Temp θ _s		Kelvins	912	°F				
Initial Stack Buoyancy Flux Fo	23.3543	m ⁴ /s ³			gV _{exit} D ² (1-6	$\theta_a/\theta_s)/4 = V$	ol.Flow(g/π)(1-θ _a /θ _s)	Sect.2/¶1
Plume Buoyancy Flux F	N/A	m ⁴ /s ³			λ ² gVa ² (1-θ	_a /θ _p) for a,V	,θ _p at plume height (see belo	w)
No.of Stacks N	1			1.000	Multiple St	ack Multipli	cation Factor (N ^{0.25})	
onditions at End (Top) of Jet Phase:								
Height above Stack z _{iet}	4 445	meters*	14.6	feet*	7 - 6 250) motore*-	meters above stack top	Sect.3/¶1
Height above Ground z _{jet} +h _s		meters		feet	Zjet - 0.202	, meters –		"
					V - 0.5V	- 1/ /0		
Vertical Velocity V _{jet}	15.600			ft/sec		$_{exit} = V_{exit}/2$		
Plume Top-Hat Diameter 2a _{jet}	1.422	meters	4.7	feet	2a _{jet} = 2D		Conservation of momentum	•
illane Methodology - Analytical Solutions f	or Calm Con	ditions for Pl	ume Heights	s above Je	t Phase			
Single Plume-averaged Vertical Velocity	v given by Ar	alytical Sol	ution in Pap	er where P	roduct Va	given by e	quations below:	
Plume Top-Hat Radius a		olutions in T					crease with height	Sect.2/Eq.6
Virtual Source Height z _v		meters*		feet*			ers*=meters above stack top	Sect.2/Eq.6
-					3.20D[1-(0	, o _s , j, met	where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} =$	
Height above Ground zv+hs		meters	80.4	ieet				
Vertical Velocity V		olutions in T	able Below				_v) ² - (6.25D-z _v) ²]} ^(1/3) / a	Sect.2.1(6)
Product (Va) _o	6.987	m²/s			$V_{exit}D/2(\theta_e/$	$(\theta_{s})^{1/2}$		
Solve for plume-averaged vertical velo	city at height	200.0	feet	60.96	meters abo	ve ground (z'+h _s)	
Gives the following Height above Stack z'		meters*	125.0			J		
				feet	0-1-0*0.40	(-1 -)		0+0/5-0
Plume Top-Hat Diameter 2a'		meters			2a'=2*0.16		.2	Sect.2/Eq.6
Vertical Velocity V	2.731	m/s	8.96	ft/sec	V={(Va) _o 3+	0.12F₀[(z-z	v) ² -(6.25D-zv) ²]} ^(1/3) /(2a'/2)	Sect.2/Eq.6
Solve for Height of CASC critical vertical	velocity V _{crit}	5.30	m/s plume-a	averaged v	ertical velo	ocity	Critical VV	' > Top of Jet (Spill
Find Height above Stack z _{crit}	11.563	meters	37.9	feet	Solve for x	=(z-z _v) simu	ultaneously in both eqs. (i.e.,	Va and a)
Height above Ground zcrit+hs	34 423	meters	112.9	feet			e cubic equation ax3+bx2+cx	
	01.120	motoro		1001	101 V - 4.011		and b=-(0.12F _o)/(4.3 ³ 0.16 ³)=	
9 · · · · · ·								-4.
-	1 14 - 1 - 1 - 4	Dh						=
Interpolated Height of critical vertical ve					and o		.25D-z _v) ² -(Va) ₀ ³]/(4.3 ³ 0.16 ³)=	
-		Phase: meters	#N/A	feet	and o		.25D-z _v) ² -(Va) ₀ ³]/(4.3 ³ 0.16 ³)=	-52 /www.1728.org/cubic
Interpolated Height of critical vertical ve	#N/A		#N/A #N/A		and o	d=[0.12F _o (6	.25D-z _v) ² -(Va) ₀ ³]/(4.3 ³ 0.16 ³)=	/www.1728.org/cubic 9. 1*
Interpolated Height of critical vertical vertica	#N/A #N/A	meters meters	#N/A Velocities sta	feet arting at er	nd of jet ph	d=[0.12F _o (6. give	.25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³)= <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) =	/www.1728.org/cubic 9. 1*
Interpolated Height of critical vertical v Find Height above Stack z _{crit} Height above Ground z _{crit} +h _s ble of Plume Top-Hat Diameters (2a) and P	#N/A #N/A lume-Averag	meters meters ed Vertical ^v Plume	#N/A Velocities sta	feet arting at er Plume	nd of jet ph	d=[0.12F _o (6. give	.25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³)= <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) =	/www.1728.org/cubic 9. 1*
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters)	meters meters ed Vertical ¹ Plume Radius(m)	#N/A Velocities sta SingleStk	feet arting at er Plume Temp(K)	nd of jet ph	d=[0.12F _o (6. give	.25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³)= <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) =	/www.1728.org/cubic 9. 1*
Interpolated Height of critical vertical v Find Height above Stack z _{crit} Height above Ground z _{crit} +h _s ble of Plume Top-Hat Diameters (2a) and P Height (feet) above ground Stack. Rel. Ht = 75.0	#N/A #N/A lume-Averag (meters) above stack 0.00	meters meters ed Vertical V Plume Radius(m) 0.356	#N/A Velocities sta SingleStk VertVel(m/s) 31.20	feet arting at er Plume Temp(K)	nd of jet ph	d=[0.12F _o (6. give	.25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³)= <u>http:/</u> es the real solution x = z-zv= or z(m/above stack) = z(ft/above ground) =	/www.1728.org/cubic 9. 11
Interpolated Height of critical vertical vertica	#N/A #N/A flume-Averag (meters) above stack 0.00 1.52	meters meters ed Vertical V Plume Radius(m) 0.356 0.477	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86	feet arting at er Plume Temp(K)	nd of jet ph	d=[0.12F _o (6. give	.25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³)= <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs:	/www.1728.org/cubic 9. 11 11 5 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05	meters meters ed Vertical V Plume Radius(m) 0.356 0.477 0.599	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52	feet arting at er Plume Temp(K)	nd of jet ph	d=[0.12F _o (6. give	.25D-z _v /2-(Va) _o ³)/(4.3 ^o 0.16 ³)= <u>http:/</u> ss the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R	/www.1728.org/cubic 9. 11 11 5 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60	feet arting at er Plume Temp(K)	nd of jet ph	d=[0.12F _o (6. give	.25D-z _v /2-(Va) _o ³]/(4.3 ^o 0.16 ³)= <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) z(ft/above ground) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations:	/www.1728.org/cubic 9. 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95	feet arting at er Plume Temp(K) 480.36	nd of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³)= <u>http:/</u> besthe real solution x = z-zv= or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plume} =((Va) _o ³ +0.12F _e ((z-z,y) ² -(6.2))	/www.1728.org/cubic 9. 1 1 5 foot inte bel-Ht to Top of Jet 25D-z,) ²]) ^{1/2} / a
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60	feet arting at er Plume Temp(K) 480.36	nd of jet ph	d=[0.12F _o (6. give	.25D-z _v /2-(Va) _o ³]/(4.3 ^o 0.16 ³)= <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) z(ft/above ground) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations:	/www.1728.org/cubic 9. 1 1 5 foot inte bel-Ht to Top of Jet 25D-z,) ²]) ^{1/2} / a
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95	feet arting at er Plume Temp(K) 480.36 383.84	nd of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³)= <u>http:/</u> besthe real solution x = z-zv= or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plume} =((Va) _o ³ +0.12F _e ((z-z,y) ² -(6.2))	/www.1728.org/cubic 9. 1 1 5 foot inte 850-z.,?)) ¹⁰ / a 10 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95 7.83	feet Plume Temp(K) 480.36 383.84 351.66	nd of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubic 9. 1 1 5 foot inte 850-z.,?)) ¹⁰ / a 10 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587	#N/A SingleStk VertVel(m/s) 25.86 20.52 15.60 14.95 7.83 5.67 5.30	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97	id of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubic 9. 1 1 5 foot inte 850-z.,?)) ¹⁰ / a 10 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A Jume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.45 4.57 7.62 10.67 11.56 13.72	meters meters ed Vertical N Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.567 1.931	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95 7.83 5.67 5.30 4.66	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubic 9. 1 1 5 foot inte 850-z.,?)) ¹⁰ / a 10 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A dume-Averag (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.56 13.72 16.76	meters meters ed Vertical V Plume Radius(m) 0.3656 0.477 0.599 0.771 0.488 0.956 1.444 1.587 1.931 2.419	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08	feet Plume Temp(K) 480.36 383.84 351.66 345.97 335.63 326.68	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/oubid 9 1 1 5 foot inte tel-Ht to Top of Jet 55D-z,) ²)) ¹⁰ / a 10 foot inte ma [*] a ²⁺ ^ ²)))
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.419 2.907	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.66 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70	feet Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89	id of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/oubid 9 1 1 5 foot inte tel-Ht to Top of Jet 55D-z,) ²)) ¹⁰ / a 10 foot inte ma [*] a ²⁺ ^ ²)))
Interpolated Height of critical vertical vertica	#N/A #N/A dume-Averag (meters) above stack 0.00 1.52 3.05 4.45 7.62 10.67 11.56 13.72 16.76	meters meters ed Vertical V Plume Radius(m) 0.3656 0.477 0.599 0.771 0.488 0.956 1.444 1.587 1.931 2.419	#N/A SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08	feet Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89	id of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/oubid 9 1 1 5 foot inte tel-Ht to Top of Jet 55D-z,) ²)) ¹⁰ / a 10 foot inte ma [*] a ²⁺ ^ ²)))
Interpolated Height of critical vertical vertica	#N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.419 2.907	#N/A Velocities sta Single Stk VertVel(m/s) 31.20 25.86 20.525 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.707 3.43	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89 316.98 316.98	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/oubid 9 1 1 5 foot inte tel-Ht to Top of Jet 55D-z,) ²)) ¹⁰ / a 10 foot inte ma [*] a ²⁺ ^ ²)))
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.70 3.43 3.23	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89 326.88 320.89 314.21	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/oubid 9 1 1 5 foot inte tel-Ht to Top of Jet 55D-z,) ²)) ¹⁰ / a 10 foot inte ma [*] a ²⁺ ^ ²)))
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A dume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96	meters meters ed Vertical V Plume Radius(m) 0.3656 0.477 0.599 0.771 0.488 0.956 1.444 1.587 1.931 2.419 2.907 3.394 3.882 4.370	#N/A Velocities sta SingleStk VertVel(m/s) 25.565 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.23	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89 316.22 312.18	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubis 9 1 1 5 foot inte العلية 5 foot inte 5 foot of of 5 foot inte 5 foot of of 10 foot inte 10 foot inte ma [*] (a [*] \^)))
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394 3.882 4.370 6.808	#N/A Velocities stat SingleStk VertVel(m/s) 25.66 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.06 3.70 3.370 3.43 3.070 2.58	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 320.68 320.89 316.98 312.18 307.10	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubis 9 1 1 5 foot inte العلية 5 foot inte 5 foot of of 5 foot inte 5 foot of of 10 foot inte 10 foot inte ma [*] (a [*] \^)))
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44	meters meters ed Vertical N Plume Radius(m) 0.356 0.711 0.468 0.956 0.711 1.444 1.567 1.931 2.419 2.907 3.334 3.882 4.370 6.808 9.246	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95 7.83 5.67 5.33 4.66 4.08 3.70 3.43 3.23 3.07 2.585 2.30	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 320.89 316.98 314.21 312.18 307.10 305.17	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubis 9 1 1 5 foot inte العلية 5 foot inte 5 foot of of 5 foot inte 5 foot of of 10 foot inte 10 foot inte ma [*] (a [*] \^)))
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.45 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68	meters meters ed Vertical N Plume Radius(m) 0.356 0.477 0.599 0.771 0.468 0.956 1.444 1.587 1.931 2.419 2.907 3.382 4.370 6.808 9.246 11.685	#N/A Velocities sta SingleStk VertVel(m/s) 25.56 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.443 3.23 3.07 2.58 2.30 2.12	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 326.68 320.89 316.28 314.21 312.18 307.10 305.17 304.22	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubis 9 1 1 5 foot inte العلية 5 foot inte 5 foot of of 5 foot inte 5 foot of of 10 foot inte 10 foot inte ma [*] (a [*] \^)))
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A ume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.477 0.468 0.956 1.444 1.687 1.931 2.419 2.907 3.394 3.882 4.370 6.808 9.246 11.685 14.123	#N/A Velocities sta SingleStk VertVel(m/s) 25.86 20.52 15.60 14.95 7.83 5.67 7.83 5.67 6.30 4.66 4.66 4.66 3.70 3.43 3.23 3.07 2.58 2.30 2.12 1.99	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 320.88 314.21 312.18 307.10 305.17 304.22 303.68	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubis 9 1 1 5 foot inte العلية 5 foot inte 5 foot of of 5 foot inte 5 foot of of 10 foot inte 10 foot inte ma [*] (a [*] \^)))
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.45 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394 3.882 4.370 6.808 9.246 1.41685 1.4123 1.6552	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 7.83 5.67 5.67 5.67 5.67 5.67 3.34 4.66 4.08 3.70 3.34 3.23 3.07 2.585 2.30 2.12 1.99 1.88	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 320.88 314.21 312.18 307.10 305.17 304.22 303.68	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ^o 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubis 9 1 1 5 foot inte العليم 5 foot inte 5(D-z,) ²)) ^{1/2} / a 10 foot inte ma [*] (a ²⁺ λ ²))) Max<5.3(
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A ume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.477 0.468 0.956 1.444 1.687 1.931 2.419 2.907 3.394 3.882 4.370 6.808 9.246 11.685 14.123	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 7.83 5.67 5.67 5.67 5.67 5.67 3.34 4.66 4.08 3.70 3.34 3.23 3.07 2.585 2.30 2.12 1.99 1.88	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89 316.98 314.21 312.18 307.10 305.17 304.22 303.66 303.34	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubis 9 1 1 5 foot inte العليم 5 foot inte 5(D-z,) ²)) ^{1/2} / a 10 foot inte ma [*] (a ²⁺ λ ²))) Max<5.3(
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394 3.882 4.370 6.808 9.246 1.41685 1.4123 1.6552	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.44 3.23 3.70 2.58 2.30 2.12 1.99 1.88 1.80	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.63 326.68 320.89 316.98 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.11	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubic 9. 1 5 foot inte 10 foot inte 55D-2,) ²) ^{1/1} / a 10 foot inte ma [*] ² ² ³ ¹))
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64	meters meters ed Vertical V Plume Radius(m) 0.356 0.477 0.599 0.771 0.488 0.956 1.444 1.587 1.931 2.419 2.907 3.382 4.370 6.808 9.246 11.685 14.123 16.562 19.000 21.438	#N/A Velocities sta SingleStk VertVel(m/s) 25.66 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.58 2.30 2.19 1.88 1.80 1.88 1.80 1.73	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 303.68 303.44 303.11 302.95	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubic 9 1 1 5 foot inte الله الذ التاريخ 50 تركيم 10 foot inte الله المحافظة 10 foot inte الله المحافظة 50 foot inte 50 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.055 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64 160.12	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394 3.882 4.370 6.808 9.246 11.655 14.123 16.552 19.000 2.435 14.235 14.235 14.552 14.235 14.552 14.552 14.552 14.552 14.552 14.552 14.552 14.555	#N/A Velocities sta SingleStk VertVel(m/s) 25.86 20.52 15.60 14.95 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 7.83 5.67 5.30 4.66 4.06 4.06 3.370 3.43 3.377 2.58 2.30 2.12 1.99 1.88 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.80 1.811.80 1.811.80 1.811.801.811.801.81	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 320.68 320.89 316.98 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.34 303.11 302.95 302.73	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubic 9 1 1 5 foot inte الله الذ التاريخ 50 تركيم 10 foot inte الله المحافظة 10 foot inte الله المحافظة 50 foot inte 50 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.40 135.64 166.12	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.667 1.931 2.419 2.907 3.394 3.882 4.370 6.808 9.246 11.685 14.123 16.552 19.000 21.438 26.315 31.192	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.585 2.30 2.12 1.99 1.88 1.80 1.73 3.161 1.52	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 320.89 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.11 302.95 302.73 302.60	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubic 9 1 1 5 foot inte الله الذ التاريخ 50 تركيم 10 foot inte الله المحافظة 10 foot inte الله المحافظة 50 foot inte 50 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.45 13.72 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 196.60 227.08	meters meters ed Vertical N Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.567 1.931 2.419 2.907 3.394 3.882 4.370 6.808 9.246 11.685 14.123 16.552 19.000 21.438 26.315 31.192 36.069	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.56 20.52 7.83 5.67 5.30 4.66 4.08 3.70 3.443 3.23 3.07 2.58 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.61	feet 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.11 302.95 302.73 302.60 302.52	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubit 9 1 1 5 foot Inte tel H to Top of Jet 5(D-z,) ²)1 ¹⁰ / a 10 foot Inte • *a ² ^λ ²))) Max<5.3
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.055 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 105.64 166.12 105.64 166.12	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.687 1.931 2.907 3.394 3.882 9.246 11.665 14.123 16.562 19.000 2.4375 0.214 3.659 1.442 1.597 1.597 1.911 2.907 3.394 3.882 3.394 3.882 3.394 3.394 3.394 3.437 3.442 3.447 3.442 3.442 3.442 3.442 3.442 3.442 3.442 3.442 3.442 3.442 3.444 3.442 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.44444 3.44444 3.444444 3.44444 3.4444	#N/A Velocities stat SingleStk VertVel(m/s) 25.565 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.58 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.45 4.65 1.52 1.45 1.52	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 355.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.41 302.95 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 303.44 303.44 303.44 305.17 305.27 305.27 305.27 302.60 305.17 305.17 305.27 305.27 305.26 305.27 305.26 305.27 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.26 305.26 305.27 305.26 305.26 305.26 305.27 305.26 30	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubit 9 1 1 5 foot Inte tel H to Top of Jet 5(D-z,) ²)1 ¹⁰ / a 10 foot Inte • *a ² ^λ ²))) Max<5.3
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.45 13.72 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 196.60 227.08	meters meters ed Vertical N Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.567 1.931 2.419 2.907 3.394 3.882 4.370 6.808 9.246 11.685 14.123 16.552 19.000 21.438 26.315 31.192 36.069	#N/A Velocities stat SingleStk VertVel(m/s) 25.565 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.58 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.45 4.65 1.52 1.45 1.52	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 355.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.41 302.95 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 302.55 302.73 302.60 303.44 303.44 303.44 305.17 305.27 305.27 305.27 302.60 305.17 305.17 305.27 305.27 305.26 305.27 305.26 305.27 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.27 305.26 305.26 305.26 305.27 305.26 305.26 305.26 305.27 305.26 30	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubit 9 1 1 5 foot Inte tel H to Top of Jet 5(D-z,) ²)1 ¹⁰ / a 10 foot Inte • *a ² ^λ ²))) Max<5.3
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.055 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 105.64 166.12 105.64 166.12	meters meters ed Vertical 1 Plume Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.687 1.931 2.907 3.394 3.882 9.246 11.665 14.123 16.562 19.000 2.4375 0.214 3.659 1.442 1.597 1.597 1.911 2.907 3.394 3.882 3.394 3.882 3.394 3.394 3.394 3.437 3.442 3.447 3.442 3.442 3.442 3.442 3.442 3.442 3.442 3.442 3.442 3.442 3.444 3.442 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.4444 3.44444 3.44444 3.444444 3.44444 3.4444	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 7.83 5.67 5.33 4.66 4.08 3.70 3.343 3.23 3.07 2.585 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.52 1.53 1.64 1.55 1.55 1.55 1.55 1.55 1.55 1.55 1.5	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 320.89 314.21 312.18 307.10 305.17 304.22 303.64 303.34 303.11 302.95 302.73 302.60 302.52 302.42 302.42	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubit 9 1 1 5 foot Inte tel H to Top of Jet 5(D-z,) ²)1 ¹⁰ / a 10 foot Inte • *a ² ^λ ²))) Max<5.3
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 196.60 227.08 227.56 228.04 318.52	meters meters meters Radius(m) 0.365 0.477 0.599 0.711 0.468 0.956 1.444 1.867 1.931 2.419 2.907 3.394 3.882 4.370 6.808 9.246 11.685 14.123 16.562 19.000 21.438 26.315 31.192 36.069 40.946 45.822 50.699	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 15.60 14.455 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.58 2.30 2.212 1.99 1.88 1.80 1.73 1.61 1.52 1.45 1.45 1.45 1.45 1.45 1.45 1.39 1.34 1.29	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.84 303.311 302.95 302.73 302.66 302.42 302.46 302.42 302.46 302.43 302.45 3	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubit 9 1 1 5 foot Inte tel H to Top of Jet 5(D-z,) ²)1 ¹⁰ / a 10 foot Inte • *a ² ^λ ²))) Max<5.3
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A lume-Averag (meters) above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 196.60 227.08 257.56 228.04 318.52 349.00	meters meters meters Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.419 2.907 3.384 2.419 2.907 3.384 3.862 4.370 6.808 9.246 11.655 14.123 16.555 14.123 16.555 31.192 36.069 40.946	#N/A Velocities sta SingleStk VertVel(m/s) 25.66 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.58 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.55 1.55 1.55 1.55 1.55 1.55 1.5	feet 480.36 383.84 351.66 345.97 335.83 326.68 320.89 316.98 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.34 303.34 302.55 302.46 302.42	d of jet ph 	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubit 9 1 1 5 foot Inte tel H to Top of Jet 5(5(-z,) ²)) ^{1/3} / a 10 foot Inte m [*] (a ²⁺ λ ²))) Max<5.3
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 196.60 227.08 227.76 228.04 318.52 2349.00 379.48	meters meters meters Redus(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394 3.882 4.370 6.808 9.246 11.656 14.123 16.556 19.000 2.438 2.6.315 3.1192 3.6.669 4.5.822 5.5.576 6.0.453	#N/A Velocities stat SingleStk VertVel(m/s) 25.565 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.58 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.454 1.39 1.25 2.122	feet arting at er Plume Temp(K) 480.36 383.84 351.66 345.97 335.83 326.68 320.89 316.21 312.18 307.10 304.22 303.68 303.34 303.11 302.45 302.73 302.60 302.46 302.42 302.46 302.42 302.46 302.42 302.39 302.34 30	d of jet ph 	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubi 9 1 1 5 foot Inte tel H to Top of Jet 5(D-z,) ²)) ^{1/2} / a 10 foot Inte m [*] (a ²⁺ λ ²))) Max<5.3 50 foot Inte
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 196.60 227.08 225.756 288.04 318.52 349.00 379.48 409.96	meters meters meters Radus(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394 3.882 4.370 6.808 9.246 11.655 14.123 16.562 19.000 21.438 26.315 31.192 36.069 40.5576 60.6453 25.576 60.6453 25.576 60.4533 1.53300 1.533000 1.533000 1.533000 1.533000 1.533000 1	#N/A Velocities sta SingleStk VertVel(m/s) 3120 25.86 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.585 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.45 1.45 1.45 1.45 1.22 1.25 1.25	feet 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.68 307.10 305.17 304.22 303.68 307.10 305.17 304.22 303.68 307.10 305.17 304.22 303.68 307.10 305.17 304.22 303.68 302.42 302.46 302.42 302.46 302.44 302.48 302.38 302.38 302.38 302.38 302.38 302.38 302.38 302.38 302.38 302.38 302.38 302.38 302.38 302.48 302.38 302.38 302.38 302.48 302.38 302.38 302.38 302.48 302.38 302.38 302.48 302.38 302.48 302.38 302.48 302.38 302.48 302.38 302.48 302.38 302.48 302.38 302.48 302.38 302.48 302.48 302.38 302.48 302.48 302.48 302.48 302.38 302.48	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubit 9 1 1 5 foot Inte tel H to Top of Jet 5(5(-z,) ²)) ^{1/3} / a 10 foot Inte m [*] (a ²⁺ λ ²))) Max<5.3
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 19.660 227.08 227.08 227.56 288.04 318.52 349.00 379.48	meters meters meters Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.867 1.931 2.419 2.907 3.304 3.882 4.370 6.808 9.246 11.685 14.123 16.552 19.000 21.438 26.315 31.192 36.069 40.946 45.822 55.576 60.453 36.537 0.453 55.576 60.453 36.537 0.456 1.2555 1.2555 1.2555 1.2555 1.2555 1.2555 1.	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.66 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.44 3.23 3.70 2.58 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.61 1.52 1.22 1.22 1.22 1.22 1.22 1.22 1.2	feet 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.11 302.95 302.73 302.60 302.52 302.46 302.42 302.42 302.43 302.45	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubi 9 1 1 5 foot Inte tel H to Top of Jet 5(D-z,) ²)) ^{1/2} / a 10 foot Inte m [*] (a ²⁺ λ ²))) Max<5.3 50 foot Inte
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 196.60 227.08 225.756 288.04 318.52 349.00 379.48 409.96	meters meters meters Radus(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394 3.882 4.370 6.808 9.246 11.655 14.123 16.562 19.000 21.438 26.315 31.192 36.069 40.5576 60.6453 25.576 60.6453 25.576 60.4533 1.53300 1.533000 1.533000 1.533000 1.533000 1.533000 1	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.66 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.44 3.23 3.70 2.58 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.61 1.52 1.22 1.22 1.22 1.22 1.22 1.22 1.2	feet 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.311 302.95 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.45 302.46 302.45 302.46 302.45 302.46 302.45 302.46 302.45 302.46 302.45 302.46 302.46 302.46 302.46 302.46 302.46 302.46 302.46 302.46 302.46 302.46 302.46 302.46 302.46 302.47 302.46 302.36 302.46 302.36 302.46 302.36 302.46 302.46 302.36 302.46 302.36 302.46 302.36 302.46 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.46 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.36 302.46 302.46 302.36 302.36 302.56	d of jet ph	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubit 9 1 1 5 foot Inte tel H to Top of Jet 5(5(-z,) ²)) ^{1/3} / a 10 foot Inte m [*] (a ²⁺ λ ²))) Max<5.3
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 19.660 227.08 227.08 227.56 288.04 318.52 349.00 379.48	meters meters meters Radius(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.867 1.931 2.419 2.907 3.304 3.882 4.370 6.808 9.246 11.685 14.123 16.552 19.000 21.438 26.315 31.192 36.069 40.946 45.822 55.576 60.453 36.537 0.453 55.576 60.453 36.537 0.456 1.2555 1.2555 1.2555 1.2555 1.2555 1.2555 1.	#N/A Velocities stat SingleStk VertVel(m/s) 31.20 25.56 20.52 14.65 7.83 5.67 5.30 4.66 4.08 3.70 3.43 3.23 3.07 2.55 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.52 1.45 1.33 1.61 1.52 1.45 1.33 1.61 1.52 1.45 1.33 1.61 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.55 1.53 1.55 1.55 1.55 1.55 1.55 1.55	feet 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.68 303.34 302.42 303.34 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.46 302.42 302.43 302.43 302.31 302.30 302.30 302.31 302.30	d of jet ph 	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubic 9. 11: 5 foot Inte tel Ht to Top of Jet 5(D-z,) ²) ¹⁰ / a 10 foot Inte m [*] (a ²⁺ λ ²))) Max<5.3(50 foot Inte
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.055 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 120.40 135.64 166.12 105.66 120.40 227.08 257.56 228.04 318.52 349.00 379.48 409.96 440.44 470.92	meters meters meters Redus(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.687 1.931 2.907 3.394 3.822 4.370 6.808 9.246 11.665 14.123 16.562 19.000 2.438 2.6315 31.192 3.6059 40.946 40.946 45.822 50.609 55.576 60.453 60.453 60.453 60.453 60.955 5.756 60.453 60.955 5.756 60.453 60.955 60.75,083 60.956 60.453 60.955 60.9	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 7.83 5.67 5.30 4.66 4.08 3.70 3.343 3.23 3.07 2.565 2.30 2.21 2.30 2.21 1.99 1.88 1.80 1.73 1.61 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.45 1.52 1.52 1.53 1.67 1.53 1.52 1.53 1.53 1.53 1.53 1.53 1.53 1.53 1.53	feet 480.36 383.44 351.66 345.97 335.83 320.89 314.21 312.18 307.10 305.17 304.22 303.64 303.34 307.10 305.17 304.22 303.64 303.34 303.11 302.95 302.42 302.42 302.42 302.42 302.42 302.42 302.44 302.33 302.42 302.36 302.34 302.31	d of jet ph 	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubic 9 1 1 5 foot inte الله الذ التاريخ 50 تركيم 10 foot inte الله المحافظة 10 foot inte الله المحافظة 50 foot inte 50 foot inte
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 22.86 44.20 59.44 74.68 89.92 105.16 120.40 135.64 120.40 135.64 166.12 196.60 227.08 225.756 228.04 318.52 349.00 379.48 409.96 440.44 440.44 440.92 501.40 531.88	meters meters meters Radus(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.667 1.931 2.419 2.907 3.394 3.882 4.370 6.808 9.246 11.685 14.123 16.562 19.000 21.438 26.315 31.192 36.069 40.946 45.822 50.699 55.576 60.453 55.576 80.453 70.206 75.083 79.960 84.837 79.960 70.833 79.960 70.957 70.95	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.86 20.52 7.83 5.67 5.30 4.66 4.08 3.70 3.44 5.67 5.30 4.66 4.08 3.70 3.44 3.23 3.07 2.58 2.30 2.212 1.99 1.88 1.80 1.73 1.61 1.52 1.22 1.22 1.22 1.22 1.22 1.22 1.2	feet 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.68 303.34 303.11 302.95 302.46 302.42 302.46 302.42 302.30 302.46 302.42 302.46 302.42 302.30 302.46 302.42 302.45 302.46 302.42 302.46 302.42 302.45 302.46 302.42 302.45	d of jet ph 	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	(www.1728.org/cubic 9. 11' 5 foot Inter دtH to Top of Jet 5(D-z,) ²) ^{10'} / a 10 foot Inter • ************************************
Interpolated Height of critical vertical vertica	#N/A #N/A #N/A above stack 0.00 1.52 3.05 4.45 4.57 7.62 10.67 11.56 13.72 16.76 19.81 22.86 25.91 28.96 44.20 59.44 74.68 89.92 105.16 122.40 135.64 166.12 106.60 227.08 287.56 288.04 318.52 349.00 379.48 409.94 40.94 440.44 440.94	meters meters meters Redus(m) 0.356 0.477 0.599 0.711 0.468 0.956 1.444 1.587 1.931 2.907 3.394 3.822 4.370 6.808 9.246 11.685 14.123 16.562 19.000 21.438 26.315 31.192 36.069 36.069 36.5576 65.330 70.206 75.063 75.063 79.960	#N/A Velocities sta SingleStk VertVel(m/s) 31.20 25.56 20.52 15.60 14.95 7.83 5.67 5.30 4.66 4.08 3.70 3.44 3.32 3.70 2.58 2.30 2.12 1.99 1.88 1.80 1.73 1.61 1.55 1.22 1.25 1.25	feet 480.36 383.84 351.66 345.97 335.83 326.68 320.89 314.21 312.18 307.10 305.17 304.22 303.88 303.34 303.34 303.34 303.34 302.42 302.46 302.42 302.46 302.42 302.43 302.46 302.42 302.43 302.43 302.44 302.42 302.42 302.42 302.44 302.42 302.44 302.42 302.44 302.44 302.42 302.44	d of jet ph 	d=[0.12F _o (6. give	25D-z _v) ² -(Va) _o ³]/(4.3 ³ 0.16 ³) = <u>http:/</u> es the real solution x = z-zv = or z(m/above stack) = z(ft/above ground) = Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: V _{plum} ={(Va) _o ⁺ 0.12F _o ((z-z _v) ² (6.2 a = 0.16(z-z _v)	/www.1728.org/cubic 9. 11 5 foot inte 8. Ht to Top of Jet 55D-z.,) ²) ¹⁰ / a 10 foot Inte



ased on 48 chillers w/ 20 cells/chiller. C ff.diam for each chiller with each cell at 3		al Velocities "Aviation Sai							
			-	-			litions at V	arious Heights in the Plume	,
220,110 ACFM total for each chiller).			from a Gas-	Turbine Pow	er Station a	at Oakey, Q	ueensland,	Australia," Dr. K.T. Spillar	ne
mbient Conditions:						Constants:	Assume ne	eutral conditions (dθ/dz=0 or θ	θ _a =θ _e)
Ambient Potential T	emp θ _a	278.15	Kelvins	41.0	°F			meters/feet	
lume Exit Conditions:						Gravity g		m/s ²	
Stack He	-	-	meters		feet-inches	λ	1.11		
Individual Chiller Stack Dian		3.8621			inches	λο	~1.0		
Stack Veloci		8.06			ft/sec	4Vol/(60πD	²)		
Individual Chiller Volumetr			cu.m/sec	200,110		πV _{exit} D ² /4			Sect.2/¶1
Stack Potential To			Kelvins	61.0					
Initial Stack Buoyancy		11.3279		20.0	ΔT(°F)			ol.Flow(g/π)(1-θ _a /θ _s)	Sect.2/¶1
Plume Buoyancy			m ⁴ /s ³					,θ _p at plume height (see below	w)
Number of Ch	illers n	48			2.632	Multiple Sta	ack Multipli	cation Factor (n ^{0.25})	
onditions at End (Top) of Jet Phase:									
Height above Sta			meters*	79.2		$z_{jet} = 6.250$), meters*=	meters above stack top	Sect.3/¶1
Height above Ground		47.952		157.3					
Vertical Veloc		4.031			ft/sec	$V_{jet} = 0.5V_{e}$	$e_{xit} = V_{exit}/2$		
Plume Top-Hat Diamet	er 2a _{jet}	7.724	meters	25.3	feet	2a _{jet} = 2D		Conservation of momentum	
pillane Methodology - Analytical Sol									
Single Plume-averaged Vertical Ve					er where P				
Plume Top-Hat Ra			olutions in T					rease with height	Sect.2/Eq.6
Virtual Source He	-		meters*		feet*	6.25D[1-(θ _e	/θ _s) ^{1/2}], met	ers*=meters above stack top	Sect.2/Eq.6
Height above Ground			meters	79.7	feet			(= =) (= =)	0.9806
Vertical Vel			olutions in T	able Below) ² - (6.25D-z _v) ²]} ^(1/3) / a	Sect.2.1(6)
Produc	t (Va)₀	15.265	m²/s			$V_{exit}D/2(\theta_e/$	θ _s) ^{1/2}		
ingle Chiller Results:									
Solve for plume-averaged vertic			940.0			meters abo	ve ground (z'+h _s)	
Gives the following Height above S		262.698	meters*	861.9					
Plume Top-Hat Diame	eter 2a'	83.914	meters	275.3		2a'=2*0.16(Sect.2/Eq.6
Vertical Vel	ocity V	1.092	m/s	3.58	ft/sec	V={(Va) _o ³ +	0.12F _o [(z-z	/) ² -(6.25D-z _v) ²]} ^(1/3) /(2a'/2)	Sect.2/Eq.6
Solve for Height of CASC critical v	ertical	velocity V_{crit}	5.30	m/s plume-a	veraged v	ertical velo	city	Critical	VV < Top of J
Find Height above Sta	ck z _{crit}	#N/A	meters	#N/A	feet	Solve for x=	=(z-z _v) simu	Itaneously in both eqs. (i.e.,	Va and a)
Height above Ground	z _{crit} +h _s	#N/A	meters	#N/A	feet	for V=V _{crit} u	using the cu	ibic equation ax ³ +bx ² +cx+d=	0, where
							a=1, c=0,	and b=-(0.12F _o)/(V _{crit} ³ 0.16 ³)=	-2.229
Interpolated Height of critical ver	tical ve	elocity in Jet I	Phase:			and d	=[0.12F _o (6.2	25D-z _v) ² -(Va) _o ³]/(V _{crit} ³ 0.16 ³)=	-4584.
Find Height above Sta	ck z _{crit}	16.537	meters	54.3	feet			http://www.17	28.org/cubic.ht
Height above Ground	z _{crit} +h _s	40.352	meters	132.4	feet		give	s the real solution x = z-zv =	17.38
								or z(m/above stack) =	17.8
								z(ft/above ground) =	136
able of Plume Top-Hat Diameters (2a) and F	lume-Averag	ed Vertical	Velocities sta	rting at en	d of jet pha	ase:		
Heigh		(meters)	Plume		Plume				
above g				vertVel(m/s)					
Stack.Rel.Ht	= 78.1	0.00	1.931	8.06					
	80.0	0.57	1.977	7.97				Jet Phase Eqs:	20 ft Intervals
	100.0	6.67	2.464	6.95				Linearly interpolated from Stack Re	el.Ht to Top of Jet
	120.0	12.76	2.952	5.93				Spillane Equations:	
Single Jet 5.3 m/s Height =	132.4	16.54	3.254	5.30					
	140.0	18.86	3.440	4.91				$V_{plume} = \{(Va)_{o}^{3} + 0.12F_{o}[(z-z_{v})^{2} - (6.2)]$	5D-z _v)²]} ^{1/3} / a
Top of Single jet =	157.3	24.14	3.862	4.03				$a = 0.16(z-z_v)$	
	160.0	24.95	3.918					$\theta_{\rm p} = \theta_{\rm s} (1 + (1 - (\theta_{\rm e}/\theta_{\rm s}))^* (V_{\rm exit} D^2/(4$	4V _{plume} *a ² *λ ²))
	180.0	31.05	4.893					CEC Staff Equation:	plane //
	200.0	37.15	5.868		281.49			V _{mp} =n ^{0.25} V _{sp}	
	2200.0	43.24	6.844		280.82			Delevela Faurations	
	220.0	43.24 49.34	7.819					V _{Brigg's} = (2/3) x 1.6 ^(3/2) x F _{mp} ^(1/2) x u	I ^(-1/2) x 7 ^(-1/2)
	240.0 260.0	49.34 55.43	8.795					where F _{mp} = nF _{sp}	
	280.0				279.98 279.71			where i mp = ill'sp	
		61.53	9.770						
	300.0	67.63	10.745						50 ft late and
	350.0	82.87	13.184						50 ft Interval
		98.11	15.622					Max<5.3 m/s	
	400.0		10.000		278.82				
	450.0	113.35	18.060						
	450.0 500.0	113.35 128.59	20.499	1.43	278.68				
	450.0 500.0 550.0	113.35 128.59 143.83	20.499 22.937	1.43 1.37	278.68 278.58				
	450.0 500.0 550.0 600.0	113.35 128.59 143.83 159.07	20.499 22.937 25.376	1.43 1.37 1.31	278.68 278.58 278.51				
	450.0 500.0 550.0 600.0 650.0	113.35 128.59 143.83 159.07 174.31	20.499 22.937 25.376 27.814	1.43 1.37 1.31 1.27	278.68 278.58 278.51 278.46				
	450.0 500.0 550.0 600.0 650.0 700.0	113.35 128.59 143.83 159.07 174.31 189.55	20.499 22.937 25.376 27.814 30.252	1.43 1.37 1.31 1.27 1.23	278.68 278.58 278.51 278.46 278.42				
	450.0 500.0 550.0 600.0 650.0 700.0 800.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03	20.499 22.937 25.376 27.814 30.252 35.129	1.43 1.37 1.31 1.27 1.23 1.16	278.68 278.58 278.51 278.46 278.42 278.38				100 ft Interva
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51	20.499 22.937 25.376 27.814 30.252 35.129 40.006	1.43 1.37 1.31 1.27 1.23 1.16 1.11	278.68 278.58 278.51 278.46 278.42 278.38 278.33				100 ft Interva
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07	278.68 278.58 278.51 278.46 278.42 278.38 278.33 278.33				100 ft Interva
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03	278.68 278.58 278.51 278.46 278.42 278.38 278.33 278.30 278.30 278.27				100 ft Interva
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0 1200.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00	278.68 278.58 278.51 278.46 278.42 278.38 278.33 278.30 278.30 278.27				100 ft Interva
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00	278.68 278.58 278.51 278.46 278.42 278.38 278.33 278.30 278.30 278.27				100 ft Interva
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 220.51 280.99 311.47 341.95	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00 0.97	278.68 278.58 278.51 278.46 278.42 278.38 278.33 278.30 278.27 278.25				100 ft Interva
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0 1200.0 1300.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00 0.97 0.94	278.68 278.58 278.51 278.46 278.42 278.38 278.30 278.30 278.27 278.25 278.24 278.23				100 ft Interva
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0 1200.0 1300.0 1400.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43 402.91	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513 64.390	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00 0.97 0.94	278.68 278.58 278.51 278.46 278.38 278.33 278.30 278.27 278.25 278.24 278.23 278.23 278.23				
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0 1200.0 1300.0 1400.0 1500.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43 402.91 433.39	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513 64.390 69.267 93.651	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00 0.97 0.94 0.92 0.83	278.68 278.58 278.51 278.46 278.38 278.33 278.30 278.27 278.25 278.24 278.23 278.23 278.23				
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0 1200.0 1300.0 1400.0 1500.0 2200.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 260.51 280.99 311.47 341.95 372.43 402.91 433.39 585.79 738.19	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513 64.390 69.267 93.651 118.035	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.03 1.00 0.97 0.94 0.92 0.83 0.77	278.68 278.58 278.51 278.46 278.42 278.38 278.30 278.27 278.25 278.24 278.23 278.22 278.24 278.23 278.23 278.24 278.23				
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0 1200.0 1300.0 1500.0 2500.0 3000.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43 402.91 433.39 585.79 788.19 890.59	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513 64.390 69.267 93.651 118.035 142.419	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00 0.97 0.94 0.92 0.83 0.77 0.72	278.68 278.58 278.51 278.46 278.33 278.30 278.30 278.27 278.25 278.24 278.22 278.22 278.21 278.21 278.17				
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 1000.0 1100.0 1200.0 1300.0 1400.0 1500.0 2500.0 3500.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43 402.91 433.39 585.79 738.19 880.59 1042.99	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513 64.390 69.267 93.651 118.035 142.419 166.803	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00 0.97 0.94 0.92 0.83 0.77 0.72 0.68	278.68 278.58 278.51 278.46 278.42 278.33 278.30 278.27 278.25 278.24 278.23 278.22 278.21 278.17 278.17				
	450.0 500.0 550.0 600.0 650.0 700.0 800.0 900.0 1000.0 1100.0 1200.0 1300.0 2500.0 2500.0 3500.0 4000.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43 402.91 433.39 585.79 738.19 890.59 1042.99 1042.99	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513 64.390 69.267 93.651 118.035 142.419 166.803 191.187	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.07 1.03 1.00 0.97 0.94 0.92 0.83 0.77 0.72 0.688 0.65	278.68 278.58 278.51 278.46 278.42 278.33 278.33 278.33 278.33 278.25 278.24 278.25 278.24 278.23 278.21 278.19 278.17 278.17 278.16				100 ft Interva 500 ft Interva
	450.0 500.0 550.0 600.0 700.0 800.0 900.0 1000.0 1100.0 1200.0 1200.0 2000.0 2500.0 3500.0 4000.0	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43 402.91 433.39 585.79 738.19 890.59 1042.99 1195.39 1195.39	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513 64.390 69.267 93.651 118.035 142.419 166.803 191.187 215.571	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.03 1.00 0.97 0.94 0.92 0.83 0.77 0.72 0.68 0.65 0.63	278.68 278.58 278.51 278.46 278.42 278.38 278.33 278.30 278.27 278.25 278.24 278.23 278.21 278.21 278.11 278.17 278.16				
	450.0 500.0 550.0 600.0 650.0 700.0 900.0 1100.0 1100.0 1100.0 1100.0 1200.0 1300.0 2000.0 2500.0 3500.0 4000.0 4500.0 0 12500.0 1250.	113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43 402.91 433.39 585.79 738.19 890.59 1042.99 1195.39 1195.39	20.499 22.937 25.376 27.814 30.252 35.129 40.006 44.883 49.760 54.636 59.513 64.390 69.267 93.651 118.035 142.419 166.803 191.187 215.571	1.43 1.37 1.31 1.27 1.23 1.16 1.11 1.03 1.00 0.97 0.94 0.92 0.83 0.77 0.72 0.68 0.65 0.63	278.68 278.58 278.51 278.46 278.42 278.38 278.33 278.30 278.27 278.25 278.24 278.23 278.21 278.21 278.11 278.17 278.16				

MERGED (along length) Plume Average Ver			otte Chillers u Noyant Plumes			yy - w		
						ditions at \	arious Heights in the Merg	ed
	, ne Evalua			•			/arious Heights in the Merg , Queensland, Australia ," D	
mbient Conditions:							eutral conditions (d0/dz=0 or	
Ambient Potential Temp 0	278.15	Kelvins	41.0	°F			meters/feet	Ja Gey
Plume Exit Conditions:				-	Gravity g		m/s ²	
Stack Height h	23.81	meters	78 2/12	feet-inches	λ		1100	
Individual Stack Diameter				inches	λο			
Stack Velocity V _{exi}				ft/sec	4Vol/(60πE			
Individual Volumetric Flow		cu.m/sec	200,110		πV _{exit} D ² /4	. ,		Sect.2/¶1
Stack Potential Temp 0		Kelvins	61.0		in vexito / 1			0000.2/11
Initial Stack Buoyancy Flux F		m ⁴ /s ³		ΔT(°F)	$dV = D^2(1-t)$	= (A) (A = V)	ol.Flow(g/π)(1-θ _a /θ _s)	Sect.2/¶1
Plume Buoyancy Flux F		m ⁴ /s ³	20.0	Δ1(1)			,θ _p at plume height (see belo	
		m /s			x gva (1-0	a/op)iora,v	,op at plume neight (see belo	vv)
Total Number of Stacks r Average Adjacent Stack Separation of		meters	53.5	faat	Cales hass	d on multipl	e plume treatment in Peter Be	ot Bonori
Number of Stacks along Orientation N		meters	53.5	leet				
Number of Stacks along Orientation N	3						used by N ^{0.25} at the height when	
					fully merge	d (interp. be	low ht, single merged stack a	bove nt)
Conditions at End (Top) of Jet Phase:								
Height above Stack z _{je}		meters*		feet*	z _{jet} = 6.25E	0, meters*=	meters above stack top	Sect.3/¶1
Height above Ground z _{jet} +h		meters	157.3					
Vertical Velocity V _{je}				ft/sec		$e_{xit} = V_{exit}/2$		
Plume Top-Hat Diameter 2a _{je}	7.724	meters	25.3	feet	2a _{jet} = 2D		Conservation of momentum	
pillane Methodology - Analytical Solutions	for Calm Con	ditions for	Plume Height	s above Je	t and Merg	ing Phase	S	
Single Plume-averaged Vertical Velocit	y V given by	Analytical	Solution in Pa	per where				
Single Plume Values: Plume Top-Hat Radius a	Use	d in Plume	Merging Onl	у	a = 0.16(z-	z _v), or linea	r increase with height	Sect.2/Eq.6
Virtual Source Height z	0.468	meters*	1.5	feet*			, meters*=meters above stack top	Sect.2/Eq.6
Height above Ground z _v +h		meters	79.7	feet			where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} =$	
Single Plume Values: Vertical Velocity V			Merging Onl		$\{(Va)_{n}^{3} + 0\}$	12F。[(z-z.	$(1)^{2} - (6.25D-z_{y})^{2}$	Sect.2.1(6)
Product (Va)					V _{exit} (D/2)(θ			
						-,		
Plume Merging - Based on Single Plume Ca	culations wh	ere:						Sect.3/¶3
Begin Merging Plume Top-Hat Diameter 2atouch		meters	53.5	feet	2atour = d	or atouch=d/	2)	
Height above Stack z _{touct}		meters meters*	168.8				2) meters*=meters above stack	top
		meters -	246.9		-touch - Zv	ur (2 U. 10),		. op
Height above Ground z _{touch} +h			~			(.) 3 . 0 40	F _o [(z-z _v) ² - (6.25D-z _v) ²]} ^(1/3)	
Vertical Velocity Vtouch				ft/sec				
Total Merging Plume Top-Hat Diameter 2a _{ful}		meters	107.0				ul=d(N-1)/2) FOR 2 STACKS,	
Height above Stack z _{ful}		meters*	336.0		$z_{full} = z_v + 2$	d/(2*0.16),	meters*=meters above stack	top
Height above Ground z _{full} +h			414.1					
Vertical Velocity V _{ful}			5.2	ft/sec	V _{full} = {(Va) _o ³ + 0.12F _c	$[(z_{full}-z_v)^2 - (6.25D-z_v)^2]$	/ a _{full}
Product (V ³ a) _{ful}		m ⁴ /s ³						
Conditions at End (Top) of Merging Phase - [ed Plume c				
Merged Plume Values: Plume Diameter 2a	S	olutions in	Table Below		2a = 2 x (a	m + 0.16(z-	z _{full})), or linear increase with h	neight
Revised Merged Plume Radius an	42.930	meters	140.8	feet			here Total Merging Occurs	
Revised Merged Plume Velocity V _n	4.143	m/s	13.59	ft/sec	and V _m =	= n ^{0.25} V _{full} w	here Total Merging Occurs	
Revised Virtual Source Height zful	102.406	meters*	336.0	feet*			ere Total Merging Occurs (sh	iown above)
B-2-144-4-144-4-144	-					1/2	eights above total merging ele	
Revised Vertical Velocity V	S S	olutions in	Tables Below		$V = \{n(V^{\circ}a)_{f_1}\}$	"/a}"° for he		svation
Revised Vertical Velocity V	S S	olutions in	Tables Below					ation
	S	olutions in	Tables Below				z-z _{touch})/(z _{full} -z _{touch})	
Multiple Plume Calculations				286 512	V=V _{touch} +(V _m -V _{touch})*(z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin	
Multiple Plume Calculations Solve for plume-averaged vertical velo	city at height	940.0	feet		V=V _{touch} +('	V _m -V _{touch})*(: ove ground (:	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin	
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z	city at height 262.698	940.0 meters*	feet 861.9	feet*	V=V _{touch} +(meters abo REGULAR	V _m -V _{touch})*(: ove ground (: EQNS	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s)	
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a	city at height 262.698 68.577	940.0 meters* meters	feet 861.9 225.0	feet* feet	$V=V_{touch}+(n)$ meters abo REGULAR $a=a_m+0.16$	V _m -V _{touch})*(; ove ground (; EQNS (z-z _{full}) if z >	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z _{full}	
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z	city at height 262.698 68.577	940.0 meters* meters	feet 861.9 225.0	feet*	$V=V_{touch}+(1)$ meters above REGULAR $a=a_{m}+0.16$ $V=\{n(V^{3}a)_{fu}\}$	V _m -V _{touch})*(: ove ground (: EQNS (z-z _{full}) if z> _{ull} /a) ^{1/3} if z>	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z _{full} z _{full}	ng elevation
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a	city at height 262.698 68.577	940.0 meters* meters	feet 861.9 225.0	feet* feet	$V=V_{touch}+(t)$ meters abo REGULAR $a=a_{m}+0.16$ $V=\{n(V^{3}a)_{ft}$ $V'=V_{touch}+(t)$	V _m -V _{touch})*(; expe ground (; EQNS (z-z _{full}) if z> V _m -V _{touch})*(z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z _{full} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} <	ng elevation
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V	city at height 262.698 68.577 3.544	940.0 meters* meters m/s	feet 861.9 225.0 11.63	feet* feet	$V=V_{touch}+(t)$ meters abo REGULAR $a=a_m+0.16$ $V=\{n(V^3a)_{ft}$ $V'=V_{touch}+(t)$ V'=single p	V_m - V_{touch})*(2 pove ground (2 EQNS $((z-z_{full})$ if $z >$ u_{ll}/a) ^{1/3} if $z >$ V_m - V_{touch})*(olume values)	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z _{full} Z _{full} Z _{full} i if z <z<sub>touch)/(z_{full}-z_{touch}) if z_{touch}<</z<sub>	ng elevation
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical	city at height 262.698 68.577 3.544 velocity V _{crit}	940.0 meters* meters m/s 5.30	feet 861.9 225.0 11.63 m/s	feet* feet ft/sec	$V=V_{touch}+(n)$ meters abo REGULAR $a=a_m+0.16$ $V=\{n(V^3a)_{ft}$ $V'=V_{touch}+(n)$ $V'=single p$ BEFORE T	Vm-V _{touch})*(; EQNS (z-z _{full}) if z > Jl/a} ^{1/3} if z > Vm-V _{touch})*(olume values	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z _{full} z _{full} z _{vull} z _{touch})/(z _{full} -z _{touch}) if z _{touch} s if z <z<sub>touch Critical</z<sub>	ng elevation
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert}	city at height 262.698 68.577 3.544 velocity V _{crit}	940.0 meters* meters m/s 5.30 meters	feet 861.9 225.0 11.63 m/s JET	feet* feet ft/sec feet	$V=V_{touch}+('$ meters abc REGULAR $a=a_m+0.16$ $V=\{n(V^3a)_t$ $V'=V_{touch}+('$ $V'=single p$ BEFORE T $z_{crit}=z_{full}$	V _m -V _{touch})*(; ve ground (; EQNS (z-z _{full}) if z > ull/a} ^{1/3} if z > V _m -V _{touch})*(ull ve values TOUCHING + {[n(V ³ a) _{full}	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) *z _{full} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} is if z <z<sub>touch)/(z_{full}-z_{touch}) if z_{touch} (V_{critl})³]-a_m)/0.16 if V_{crit}<v<sub>m</v<sub></z<sub>	ng elevation z <z<sub>full VV < Top of 、</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical	city at height 262.698 68.577 3.544 velocity V _{crit}	940.0 meters* meters m/s 5.30	feet 861.9 225.0 11.63 m/s JET	feet* feet ft/sec	$V=V_{touch}+('$ meters abc REGULAR $a=a_m+0.16$ $V=\{n(V^3a)_t$ $V'=V_{touch}+('$ $V'=single p$ BEFORE T $z_{crit}=z_{full}$	V _m -V _{touch})*(; ve ground (; EQNS (z-z _{full}) if z > ull/a} ^{1/3} if z > V _m -V _{touch})*(ull ve values TOUCHING + {[n(V ³ a) _{full}	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z _{full} z _{full} z _{vull} z _{touch})/(z _{full} -z _{touch}) if z _{touch} s if z <z<sub>touch Critical</z<sub>	ng elevation z <z<sub>full VV < Top of 、</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{en} Height above Ground z _{ent} +h _t	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET	940.0 meters* meters m/s 5.30 meters meters	feet 861.9 225.0 11.63 m/s JET	feet* feet ft/sec feet feet	$V=V_{touch}+(V)$ meters abo REGULAR a=am+0.16 V={n(V ³ a) _t V'=V _{touch} +(V) "=single p BEFORE T z _{crit} =z _{touch} +	V_m-V_{touch} *(; EQNS ((z-z _{full}) if z= _{ull} /a) ^{1/3} if z= V_m-V_{touch} *(ulume values OUCHING + {[n(V ³ a) _{full} - (zfull-ztouch)	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _a) >z _{full} z _{lull} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} if z-z _{touch})/(z _{full} -z _{touch}) if z _{touch} Critical /(V _{critl}) ³)-a _m)/0.16 if V _{crit} <v<sub>m *(V_{critl}-V_{touch})/(V_m-V_{touch}) if V_{cri}</v<sub>	ng elevation zz <z<sub>full VV < Top of 、</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ent} +h _c Table of MERGED Plume-Averaged Vertical	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET Velocities sta	940.0 meters* meters m/s 5.30 meters meters	feet 861.9 225.0 11.63 m/s JET	feet* feet ft/sec feet feet	$ \begin{array}{l} V=V_{touch}+(v)\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=\{n(V^3a)_{t_1},\\ V'=V_{touch}+(v)\\ V'=single p\\ BEFORE T\\ z_{crit}=z_{touch}+(v)\\ Single Plun\\ Single Plun\\ \end{array} $	$V_m-V_{touch})^*(z \\ ve ground (z \\ EQNS \\ (z-z_{rull}) if z > \\ V_m-V_{touch})^*(1 \\ ve $	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z_{full} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} if z <z<sub>touch)/(z_{full}-z_{touch}) if z_{touch} (V_{crtl})³]-⊕_m)/0.16 if V_{crtl}<v<sub>m *(V_{crtl}-V_{touch})/(V_m-V_{touch}) if V_{crt} es Single Plume spreadsheet</v<sub></z<sub>	ng elevation zz <z<sub>full VV < Top of 、</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{en} Height above Ground z _{ent} +h _t	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET Velocities sta	940.0 meters* meters m/s 5.30 meters meters rting at Tou	feet 861.9 225.0 11.63 m/s JET	feet* feet ft/sec feet feet	$ \begin{array}{l} V=V_{touch}+(v)\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=\{n(V^3a)_{t_1},\\ V'=V_{touch}+(v)\\ V'=single p\\ BEFORE T\\ z_{crit}=z_{touch}+(v)\\ Single Plun\\ Single Plun\\ \end{array} $	$V_m-V_{touch})^*(z \\ ve ground (z \\ EQNS \\ (z-z_{rull}) if z > \\ V_m-V_{touch})^*(1 \\ ve $	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _a) >z _{full} z _{lull} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} if z-z _{touch})/(z _{full} -z _{touch}) if z _{touch} Critical /(V _{critl}) ³)-a _m)/0.16 if V _{crit} <v<sub>m *(V_{critl}-V_{touch})/(V_m-V_{touch}) if V_{cri}</v<sub>	ng elevation sz <z<sub>full VV < Top of s</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ent} +h _c Table of MERGED Plume-Averaged Vertical	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET Velocities sta (meters)	940.0 meters* m/s 5.30 meters meters rting at Tou Plume	feet 861.9 225.0 11.63 m/s JET JET JET vching Height Vert.	feet* feet ft/sec feet feet	$ \begin{array}{l} V=V_{touch}+(v)\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=\{n(V^3a)_{t_1},\\ V'=V_{touch}+(v)\\ V'=single p\\ BEFORE T\\ z_{crit}=z_{touch}+(v)\\ Single Plun\\ Single Plun\\ \end{array} $	$V_m - V_{touch})^*(z)$ we ground (z EQNS (z-z _{full}) if z= $V_m - V_{touch})^*(d)$ $V_m - V_{touch})^*(d)$ we values OUCHING $+ {[n(V^3a)_{full})^*(d)$ $+ {[n(z_{full} - z_{touch})]^*(d)$ me Eqns (so	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z_{full} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} if z <z<sub>touch)/(z_{full}-z_{touch}) if z_{touch} (V_{crtl})³]-⊕_m)/0.16 if V_{crtl}<v<sub>m *(V_{crtl}-V_{touch})/(V_m-V_{touch}) if V_{crt} es Single Plume spreadsheet</v<sub></z<sub>	ng elevation sz <z<sub>full VV < Top of s</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{en} Height above Ground z _{ent} +h _c Fable of MERGED Plume-Averaged Vertical Height (fect	city at height 262.698 68.577 3.544 velocity V _{crit} JET Velocities sta (meters) above stack	940.0 meters* m/s 5.30 meters meters rting at Tou Plume	feet 861.9 225.0 11.63 m/s JET JET rching Height Vert.	feet* feet ft/sec feet feet	$V=V_{touch}+(t)$ meters abo REGULAR $a=a_m+0.16$ $V=\{n(V^3a)_{rL}$ $V'=V_{touch}+(t)$ V'=single p BEFORE T $z_{crit}=z_{tull}$ $z_{crit}=z_{tull}$ $z_{crit}=z_{tull}$ a=0.16(z-a)	$V_m - V_{touch})^*(z)$ we ground (z) EQNS $(z-z_{tull})$ if $z > z_{ull}/a)^{1/3}$ if $z > V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $N_m = Eqns$ (see $a^3 + 0.12F_e[(z-z) - z_v)$	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _s) >z_{full} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} if z <z<sub>touch)/(z_{full}-z_{touch}) if z_{touch} (V_{crtl})³]-⊕_m)/0.16 if V_{crtl}<v<sub>m *(V_{crtl}-V_{touch})/(V_m-V_{touch}) if V_{crt} es Single Plume spreadsheet</v<sub></z<sub>	ng elevation sz <z<sub>full VV < Top of s</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{cri} Height above Ground z _{crit} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground	city at height 262.698 68.577 3.544 velocity V _{ent} JET Velocities sta (meters) above stack 51.44	940.0 meters* m/s 5.30 meters meters rting at Tou Plume Radius(m)	feet 861.9 225.0 111.63 JET JET Iching Height Vert. Vel(m/s)	feet* feet ft/sec feet feet	$\begin{split} & \forall = \forall_{touch} + (' \\ & meters abc \\ & REGULAR \\ & a = a_m + 0.16 \\ & \forall = (r_1(\sqrt{3}a)_{r_1}) \\ & \forall' = \forall_{touch} + (' \\ & \forall' = single \ p \\ & BEFORE \ T \\ & z_{crit} = z_{full} \\ & z_{crit} = z_{full} \\ & z_{crit} = z_{full} \\ & Single \ Plum \\ & Single \ Plum \\ & A = 0.16(z_{-}) \\ & \theta_p = \theta_a(1 + (1 + 1)) \\ & \theta_p = \theta_p = \theta_p = \theta_p = \theta_p \\ & \theta_p = \theta_p = \theta_p = \theta_p \\ & \theta_p = \theta_p = \theta_p = \theta_p \\ & \theta_p = \theta_p = \theta_p \\ & \theta_p = \theta_p = \theta_p \\ & \theta_p \\ & \theta_p = \theta_p \\ & \theta_p \\ & \theta_p = \theta_p \\ & \theta$	$V_m - V_{touch})^*(z)$ we ground (z) EQNS $(z-z_{tull})$ if $z > z_{ull}/a)^{1/3}$ if $z > V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $V_m - V_{touch})^*(z)$ $r(z) rull - Z_{touch})^*(z)$ me Eqns (see $a^3 + 0.12F_e[(z-z) - z_v))$	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _b) *z _{full} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} is if z <z<sub>touch)/(z_{full}-z_{touch}) if z_{touch} (V_{critl})²]-a_m)/0.16 if V_{crit}<v<sub>m *(V_{critl}-V_{touch})/(V_m-V_{touch}) if V_{er} see Single Plume spreadsheet y²-(6.25D-z,)²h¹³/a (td²/(V_{plume}*a²⁺λ²)))</v<sub></z<sub>	ng elevation cz <z<sub>full VV < Top of . /I:>Vm</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ert} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (fouch) = 246.3	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET Velocities sta (meters) above stack 51.44	940.0 meters* m/s 5.30 meters meters rting at Tou Plume Radius(m) 8.155	feet 861.9 225.0 11.63 JET JET Iching Height Vert. Vel(m/s) 2.27	feet* feet ft/sec feet feet	$\begin{array}{l} V{=}V_{touch}{+}(')\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_n,\\ V=V_{touch}{+}(V^3single p\\ BEFORE T\\ Z_{crit}{=}Z_{touch}{+}\\ Single Plut\\ v_{ptom}{=}(Va)_{a}\\ a=0.16(z-\theta_{p}{=}\theta_{s}(t{+}(1$	$V_m^-V_{touch}^*(:$ we ground (: EQNS (z-z _{tuli}) if z= $V_m^-V_{touch}^*(:$ if z= $V_m^-V_{touch}^*(:$ Hume values OUCHING $* ([f_1(V^3a)_{ruli})^*(z_{rul}^-z_{ruch})^*)^*(z_{rul}^-z_{ruch})^*(z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}$	z-z _{touch})/(z _{full} -z _{touch}) for heights below total mergin z+h _b) *z _{full} z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} is if z <z<sub>touch)/(z_{full}-z_{touch}) if z_{touch} (V_{critl})²]-a_m)/0.16 if V_{crit}<v<sub>m *(V_{critl}-V_{touch})/(V_m-V_{touch}) if V_{er} see Single Plume spreadsheet y²-(6.25D-z,)²h¹³/a (td²/(V_{plume}*a²⁺λ²)))</v<sub></z<sub>	ng elevation cz <z<sub>full VV < Top of . /I:>Vm</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{en} Height above Ground z _{ent} +h _e fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 260.0	city at height 262.698 68.577 3.544 velocity V _{crit} JET Velocities sta (meters) above stack 51.44 55.43 61.53	940.0 meters* m/s 5.30 meters meters rting at Tou Plume Radius(m) 8.155 #N/A	feet 861.9 225.0 111.63 m/s JET JET sching Height Vert. Vel(m/s) 2.27 2.42	feet* feet ft/sec feet feet	$\begin{array}{l} V{=}V_{touch}{+}(')\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_n,\\ V=V_{touch}{+}(V^3single p\\ BEFORE T\\ Z_{crit}{=}Z_{touch}{+}\\ Single Plut\\ v_{ptom}{=}(Va)_{a}\\ a=0.16(z-\theta_{p}{=}\theta_{s}(t{+}(1$	$V_m^-V_{touch}^*(:$ we ground (: EQNS (z-z _{tuli}) if z= $V_m^-V_{touch}^*(:$ if z= $V_m^-V_{touch}^*(:$ Hume values OUCHING $* ([f_1(V^3a)_{ruli})^*(z_{rul}^-z_{ruch})^*)^*(z_{rul}^-z_{ruch})^*(z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}$	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	ng elevation cz <z<sub>full VV < Top of . /I:>Vm</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ert} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 300.0	city at height 262.698 68.577 3.544 velocity V _{ent} JET Velocities sta (meters) above stack 51.44 55.43 61.53 61.53	940.0 meters* m/s 5.30 meters meters rting at Too Plume Radius(m) & 155 #NIA #NIA	feet 861.9 225.0 11.63 m/s JET JET Vert. Vel(m/s) 2.27 2.42 2.64 2.86	feet* feet ft/sec feet feet	$\begin{array}{l} V{=}V_{touch}{+}(')\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_n,\\ V=V_{touch}{+}(V^3single p\\ BEFORE T\\ Z_{crit}{=}Z_{touch}{+}\\ Single Plut\\ v_{ptom}{=}(Va)_{a}\\ a=0.16(z-\theta_{p}{=}\theta_{s}(t{+}(1$	$V_m^-V_{touch}^*(:$ we ground (: EQNS (z-z _{tuli}) if z= $V_m^-V_{touch}^*(:$ if z= $V_m^-V_{touch}^*(:$ Hume values OUCHING $* ([f_1(V^3a)_{ruli})^*(z_{rul}^-z_{ruch})^*)^*(z_{rul}^-z_{ruch})^*(z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}$	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	ng elevation cz <z<sub>full VV < Top of s</z<sub>
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Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{en} Height above Ground z _{ent} +h _t Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 300.0 340.0	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET Velocities sta (meters) above stack 5.43 61.53 61.53 61.53 67.63 73.72 79.82	940.0 meters* m/s 5.30 meters meters Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET JET Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31	feet* feet ft/sec feet feet	$\begin{array}{l} V{=}V_{touch}{+}(')\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_n,\\ V=V_{touch}{+}(V^3single p\\ BEFORE T\\ Z_{crit}{=}Z_{touch}{+}\\ Single Plut\\ v_{ptom}{=}(Va)_{a}\\ a=0.16(z-\theta_{p}{=}\theta_{s}(t{+}(1$	$V_m^-V_{touch}^*(:$ we ground (: EQNS (z-z _{tuli}) if z= $V_m^-V_{touch}^*(:$ if z= $V_m^-V_{touch}^*(:$ Hume values OUCHING $* ([f_1(V^3a)_{ruli})^*(z_{rul}^-z_{ruch})^*)^*(z_{rul}^-z_{ruch})^*(z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}$	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	ng elevation cz <z<sub>full VV < Top of . /I:>Vm</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ert} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 300.0 340.0 360.0	city at height 262.698 68.577 3.544 velocity V _{ent} JET Velocities sta (meters) above stack 51.44 55.43 61.53 67.63 73.72 9 79.82 85.91	940.0 meters* moters m/s 5.30 meters meters rting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET Vert. Vel(m/s) 2.27 2.42 2.64 2.66 3.09 3.31 3.54	feet* feet ft/sec feet feet	$\begin{array}{l} V{=}V_{touch}{+}({}^{t}\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V{=}(n(V^3a)_n,\\ V{=}Vouch+V\\ V^{=}single p\\ BEFORE T\\ Z_{crit}{=}Z_{touch}{+}\\ Single Plut\\ v_{ptom}{=}(Va)_{0}\\ a=0.16(z-\theta_{p}{=}\theta_{s}(1{+}(1{+})))\\ Interpolates the second $	$V_m^-V_{touch}^*(:$ we ground (: EQNS (z-z _{tuli}) if z= $V_m^-V_{touch}^*(:$ if z= $V_m^-V_{touch}^*(:$ Hume values OUCHING $* ([f_1(V^3a)_{ruli})^*(z_{rul}^-z_{ruch})^*)^*(z_{rul}^-z_{ruch})^*(z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}$	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	ng elevation cz <z<sub>full VV < Top of . /I:>Vm</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ert} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.3 280.0 300.0 300.0 320.0 340.0 380.0 380.0	city at height 262.698 68.577 3.544 velocity V _{erit} JET JET Velocities sta (meters) above stack 51.44 55.43 61.53 67.63 73.72 79.82 85.91 92.01	940.0 meters* m/s 5.30 meters meters ting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET Vert. Vert. Vel(m/s) 2.27 2.42 2.64 4.2.86 3.09 3.31 3.54 3.76	feet* feet ft/sec feet feet	$\begin{array}{l} V{=}V_{touch}{+}({}^{t}\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V{=}(n(V^3a)_n,\\ V{=}Vouch+V\\ V^{=}single p\\ BEFORE T\\ Z_{crit}{=}Z_{touch}{+}\\ Single Plut\\ v_{ptom}{=}(Va)_{0}\\ a=0.16(z-\theta_{p}{=}\theta_{s}(1{+}(1{+})))\\ Interpolates the second $	$V_m^-V_{touch}^*(:$ we ground (: EQNS (z-z _{tuli}) if z= $V_m^-V_{touch}^*(:$ if z= $V_m^-V_{touch}^*(:$ Hume values OUCHING $* ([f_1(V^3a)_{ruli})^*(z_{rul}^-z_{ruch})^*)^*(z_{rul}^-z_{ruch})^*(z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}^-z_{rul}^-z_{rul}^-z_{rul})^*(v_{ul}^-z_{rul}$	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	ng elevation cz <z<sub>full VV < Top of s</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{en} Height above Ground z _{ent} +h _c Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 300.0 340.0 340.0 360.0 380.0	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET Velocities sta (meters) above stack 5.43 61.53 67.63 77.72 79.82 85.91 9.92.01 9.82.11	940.0 meters* m/s 5.30 meters meters reting at Tou Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET JET Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 3.76 3.98	feet* feet ft/sec feet feet	$\begin{array}{l} V \!=\! V_{touch} \!+\! (' \\ meters abc \\ REGULAR \\ a \!=\! a_m \!+\! 0.16 \\ V \!=\! \{n(V^3a)_t, \\ V \!=\! V_{touch} \!+\! (V \!=\! single p \\ BEFORE T \\ Z_{crit} \!=\! Z_{tout} \!+\! (Z_{crit} \!=\! Z_{tout} \!+\! (Z_{crit} \!=\! Z_{tout} \!+\! (Y \!=\! Single Plut \\ Single Plut \\ Single Plut \\ A \!=\! 0.16(Z \!=\! Q_{p} \!=\! \Theta_{c}(1 \!+\! (1 \!-\! Interpolate \\ V \!=\! V_{touch} \!+\! (Y \!=\! Y_{touch} \!+\! (Y$	$\begin{array}{l} \forall m^{-V} {\rm touch})^{*}(:\\ {\rm vergeround}(:\\ {\rm EQNS} \\ (z-z_{\rm rul}) \mbox{if } z > \\ (w^{-V} {\rm touch}) \mbox{if } z > \\ (z - z_{\rm rul}) i$	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	ng elevation cz <z<sub>full VV < Top of . /I:>Vm</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack Z _{ert} Height above Ground Z _{ert} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 300.0 320.0 340.	city at height 262.698 68.577 3.544 velocity V _{ent} JET Velocities sta (meters) above stack 51.44 55.43 61.53 67.63 73.72 79.82 85.91 92.01 98.11 102.40	940.0 meters* moders m/s 5.30 meters meters rting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET Vert. Vel(m/s) 2.27 2.42 2.64 2.66 3.09 3.31 3.54 3.54 3.76 3.98 4.14	feet* feet ft/sec feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m + 0.16\\ V=(n(V^3a)_{tit}),\\ V' = V_{touch} + ('V^{=}single p\\ BEFORE T\\ z_{crit} = z_{tiu} = '\\ z_{crit} = z_{tiu} = '\\ z_{crit} = z_{tiu} = '\\ single Plut\\ Single Plut\\ Single Plut\\ V_{plume} = (Va)_{touch} + ('V^{=}Va)_{touch} + ('V^{=}Va)_{touch}$	Vm ^{-V} touch)*(: EQNS (2-2rui) if 22 u/a) ^{1/3} if 22 Vm ^{-V} touch)*(lutme values 70UCHING + (In(V ³ a)rui (2rui+2rouch) me Eqns (st d-Layer Eqn Vm ^{-V} touch)*(u/a) ^{1/3} (2rui+2rouch) (d-Layer Eqn Vm ^{-V} touch)*($z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	rg elevation cz <z<sub>full VV < Top of . ///> 20 ft Interval</z<sub>
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Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack Z _{ert} Height above Ground Z _{ert} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 280.0 300.0 340.0 340.0 340.0 500.0 End Merging (full/mp) = 414.1 450.0 500.0	city at height 262.698 68.577 3.544 velocity V _{ent} JET Velocities sta (meters) above stack 51.44 55.43 61.53 61.53 67.63 73.72 79.82 92.01 92.01 92.01 98.11 102.40 91.13.85 128.59 143.83	940.0 meters* meters m/s 5.30 meters meters rting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A 40.2930 44.681 47.119 49.558	feet 861.9 225.0 11.63 m/s JET JET Vert. Vel(m/s) 2.27 2.42 2.64 2.66 3.09 3.31 3.54 3.54 3.76 3.98 4.14 4.09 4.02 3.95	feet* feet ft/sec feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	rg elevation
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Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{erf} Height above Ground z _{enf} +h _e fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 260.0 280.0 300.0	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET Velocities sta (meters) above stack 51.44 55.43 61.53 61.53 61.53 67.63 77.82 9.79.82 9.92.01 9.85.91 9.92.01 9.85.91 9.92.01 9.81.11 102.40 0.113.35 128.59 1.43.83 159.07 174.31	940.0 meters* meters 5.30 meters meters tting at Tou Plume Radius(m) 8.15/3 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 4.14 4.09 4.02 3.98 4.14 4.09 4.02 3.88 3.89 3.83	feet* feet ft/sec feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ see Single Plume spreadsheet $v_{j}^{2} - (6.25D-z_{v})^{2})^{1/a} / a$ $z_{touch}^{2}(U_{Vplume}^{*}a^{2*}\lambda^{2})))$	rg elevation cz <z<sub>full VV < Top of v rit>Vm) 20 ft Interval 50 ft Interval</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ert} +h fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 300.0 300.0 300.0 300.0 300.0 260.0 30.	city at height 262.698 68.577 3.544 velocity V _{crit} JET JET Velocities sta (meters) above stack 51.44 55.43 61.53 61.53 61.53 67.63 77.82 9.79.82 9.92.01 9.85.91 9.92.01 9.85.91 9.92.01 9.81.11 102.40 0.113.35 128.59 1.43.83 159.07 174.31	940.0 meters* meters m/s 5.30 meters meters tring at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET vert. Vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 3.54 3.76 3.98 4.14 4.09 4.02 3.89 4.02 3.89	feet* feet ft/sec feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ see Single Plume spreadsheet $v_{j}^{2} - (6.25D-z_{v})^{2})^{1/a} / a$ $z_{touch}^{2}(U_{Vplume}^{*}a^{2*}\lambda^{2})))$	rg elevation cz <z<sub>full VV < Top of v rit>Vm) 20 ft Interval 50 ft Interval</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{erf} Height above Ground z _{enf} +h _e fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 260.0 280.0 300.0	city at height 262.698 68.577 3.544 velocity V _{ent} JET Velocities sta (meters) above stack 51.44 55.43 61.53 61.53 67.63 73.72 78.22 79.82 92.01 98.11 102.40 91.13.35 128.59 143.83 91.59.174.31	940.0 meters* meters 5.30 meters meters ting at Tou Plume Radius(m) 8.15/3 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 4.14 4.09 4.02 3.98 4.14 4.09 4.02 3.88 3.89 3.83	feet* feet ft/sec feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ see Single Plume spreadsheet $v_{j}^{2} - (6.25D-z_{v})^{2})^{1/a} / a$ $z_{touch}^{2}(U_{Vplume}^{*}a^{2*}\lambda^{2})))$	rg elevation cz <z<sub>full VV < Top of v rit>Vm) 20 ft Interval 50 ft Interval</z<sub>
Aultiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack Z _{ert} Height above Ground Z _{ert} +hr Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 280.0 300.0 340.0 340.0 500.0 End Merging (full/mp) = 414.1 450.0 500.0	city at height 262.698 68.577 3.544 velocity V _{crit} JET Velocities sta (meters) above stack 51.44 55.43 67.63 67.63 67.63 73.72 79.82 85.91 92.01 98.11 102.40 113.35 128.59 91.443.83 159.07 174.31 189.55 220.03	940.0 meters* meters m/s 5.30 meters meters rting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A 40.558 51.946 55.4.966 55.4.966	feet 861.9 225.0 11.63 m/s JET JET Vert. Vel(m/s) 2.27 2.42 2.64 2.66 3.09 3.31 3.54 3.54 3.54 3.56 3.98 4.14 4.09 4.02 3.95 3.89 3.83 3.83 3.77	feet* feet ft/sec feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ see Single Plume spreadsheet $v_{j}^{2} - (6.25D-z_{v})^{2})^{1/a} / a$ $z_{touch}^{2}(U_{Vplume}^{*}a^{2*}\lambda^{2})))$	rg elevation cz <z<sub>full VV < Top of rit>Vm) 20 ft Interval 50 ft Interval</z<sub>
Aultiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ent} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 260.0 280.0 300.0 280.0 300.0 End Merging (tull/mp) = 411.4 450.0 5550.0 600.0 600.0 600.0 600.0 600.0 600.0 600.0 600.0 600.0 600.0 800.0	city at height 262.698 68.577 3.544 velocity V _{erit} JET JET Velocities sta (meters) above stack 51.44 55.43 61.53 67.63 67.63 77.72 9.79.82 85.91 9.92.01 9.85.91 9.92.01 9.81.11 102.40 0.113.35 128.59 1.43.83 1.59.07 1.74.31 189.55 2.20.03 2.55.51	940.0 meters* meters m/s 5.30 meters meters tring at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 3.76 3.98 4.14 4.09 4.02 3.95 3.89 3.377 3.87	feet* feet ft/sec feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ see Single Plume spreadsheet $v_{j}^{2} - (6.25D-z_{v})^{2})^{1/a} / a$ $z_{touch}^{2}(U_{Vplume}^{*}a^{2*}\lambda^{2})))$	rg elevation cz <z<sub>full VV < Top of rit>Vm) 20 ft Interval 50 ft Interval</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Ground z _{ent} +h _t Height above Ground z _{ent} +h _t fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.5 280.0 300.0 300.0 300.0 280.0 300.0 300.0 300.0 300.0 300.0 300.0 300.0 500.0 End Merging (full/mp) = 414.1 450.0 500.0 550.0 600.0 600.0 800.0	city at height 262.698 68.577 3.544 velocity V _{ent} JET Velocities sta (meters) above stack 51.44 55.43 61.53 67.63 73.72 79.82 79.82 92.01 98.11 102.40 113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99	940.0 meters* meters m/s 5.30 meters meters tring at Tou Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET JET vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 4.14 4.09 4.02 3.98 4.14 4.09 4.02 3.98 3.83 3.77 3.87 3.87 3.83	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ see Single Plume spreadsheet $v_{j}^{2} - (6.25D-z_{v})^{2})^{1/a} / a$ $z_{touch}^{2}(U_{Vplume}^{*}a^{2*}\lambda^{2})))$	rg elevation cz <z<sub>full VV < Top of rit>Vm) 20 ft Interval 50 ft Interval</z<sub>
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ent} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.5 260.0 280.0 300.0 280.0 300.0 End Merging (full/mp) = 411.4 450.0 550.0 600.0	city at height 262.698 68.577 3.544 velocity V _{crit} JET Velocities sta (meters) above stack 51.44 55.43 67.63 67.63 67.63 67.63 92.01 98.11 102.40 91.13.55 128.59 143.83 159.07 174.31 189.55 220.03 260.51 280.99 311.47	940.0 meters* motors m/s 5.30 meters meters tring at Tou Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET sching Height Vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 3.54 3.54 3.56 3.98 4.14 4.09 4.02 3.95 3.89 3.89 3.83 3.77 3.67 3.58 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.89 3.54 4.14 4.09 4.09 4.00 3.95 3.89 3.89 3.89 3.89 3.89 3.85 3.99 3.35 4.14 4.09 4.00 3.95 3.89 3.89 3.89 3.85 3.95 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.95 3.89 3.85 3.89 3.85 3.95 3.89 3.87 3.89 3.87	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ see Single Plume spreadsheet $v_{j}^{2} - (6.25D-z_{v})^{2})^{1/a} / a$ $z_{touch}^{2}(U_{Vplume}^{*}a^{2*}\lambda^{2})))$	rg elevation cz <z<sub>full VV < Top of rit>Vm) 20 ft Interval 50 ft Interval</z<sub>
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Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack Z _{eri} Height above Ground Z _{eri} +hr Fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 280.0 300.0 300.0 340.0 340.0 550.0 End Merging (full/mp) = 414.1 455.0 500.0	city at height 262.698 68.577 3.544 velocity V _{erit} JET Velocities sta (meters) 45.43 61.53 67.63 73.72 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 79.82 70.92 71.73 128.59 143.83 148.55 128.99 143.83 149.55 128.99 143.83 149.55 128.99 131.47 341.55 372.43	940.0 meters* motors motors meters me	feet 861.9 225.0 11.63 m/s JET JET Vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 3.76 3.98 4.14 4.09 4.02 3.95 3.89 3.83 3.77 3.85 3.89 3.83 3.377 3.85 3.89 3.83 3.377 3.85 3.89 3.83 3.377 3.85 3.89 3.83 3.377 3.85 3.89 3.83 3.377 3.85 3.89 3.83 3.377 3.85 3	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ see Single Plume spreadsheet $v_{j}^{2} - (6.25D-z_{v})^{2})^{1/a} / a$ $z_{touch}^{2}(U_{Vplume}^{*}a^{2*}\lambda^{2})))$	rg elevation cz <z<sub>full VV < Top of rit>Vm) 20 ft Interval 50 ft Interval</z<sub>
Aultiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ent} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.5 280.0 300.0 280.0 300.0 600.0 End Merging (tull/mp) = 414.1 450.0 550.0 600.0 6	city at height 262.698 68.577 3.544 velocity Verit JET Velocities sta (meters) above stack 51.44 55.43 67.63 67.63 67.63 73.72 85.91 92.01 93.11 102.40 93.1147 31.985 220.03 250.51 188.55 220.03 250.51 188.55 220.03 250.51 188.55 220.03 250.51 188.55 220.03 250.51 280.99 311.47 3372.43 402.91	940.0 meters* modelss modelss meters meters rting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET sching Height Vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 3.54 3.54 3.56 3.98 3.17 3.88 3.89 3.83 3.77 3.67 3.88 3.89 3.89 3.83 3.77 3.67 3.88 3.89 3.89 3.83 3.77 3.67 3.88 3.89 3.89 3.85 3.89 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.85	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	22 full 20 ft Interval 50 ft Interval
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Ground z _{ent} +h Height above Ground z _{ent} +h fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.3 280.0 300.0 280.0 300.0 280.0 300.0 280.0 300.0 280.0 300.0 280.0 300.0 280.0 300.0 280.0 300.0 280.0 300.0 300.0 280.0 300.0	city at height 262.698 68.577 3.544 velocity V _{erit} JET JET Velocities sta (meters) above stack 51.44 55.43 67.63 73.72 79.82 85.91 9.201 9.811 102.40 113.35 128.59 143.83 159.07 143.83 159.07 143.83 159.07 174.31 189.55 220.03 250.51 260.51 200.	940.0 meters* meters m/s 5.30 meters meters tring at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 111.63 m/s JET JET JET vert. Vert. Vert. Vert. Vert. 2.27 2.42 2.64 2.86 3.09 3.31 3.54 4.14 2.86 3.09 3.31 3.54 4.09 4.02 3.95 3.89 3.83 3.77 3.88 3.83 3.77 3.58 3	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	22 tull VV < Top of . 20 ft Interval
Wultiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ert} +h Fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 2860.0 300.0 340.0 340.0 Soloc End Merging (full/mp) = 414.1 450.0 650.0 650.0 100.0 200.0 <td>city at height 262.698 68.577 3.544 velocity V_{erit} JET Velocities sta (meters) above stack 51.44 55.43 61.53 67.63 73.72 79.85 79.75 79.75 79.75 79.75 79.75 79.75</td> <td>940.0 meters* meters m/s 5.30 meters meters rting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A</td> <td>feet 861.9 225.0 11.63 m/s JET JET ching Height Vert. Vel(m/s) 2.27 2.42 2.64 2.26 3.09 3.31 3.54 3.76 3.95 3.88 4.14 4.09 4.02 3.95 3.89 3.83 3.77 3.67 3.88 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89</td> <td>feet* feet feet feet feet</td> <td>$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$</td> <td>$V_m^{-V}$touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a)^{1/3} if z> OUCHING + (In(V²a)₂µ/a)^{1/3} if z> OUCHING + (In(V²a)₂µ/a)^{1/3} me Eqns (st a³-0.12F₄(z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)</td> <td>$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$</td> <td>20 ft Interval</td>	city at height 262.698 68.577 3.544 velocity V _{erit} JET Velocities sta (meters) above stack 51.44 55.43 61.53 67.63 73.72 79.85 79.75 79.75 79.75 79.75 79.75 79.75	940.0 meters* meters m/s 5.30 meters meters rting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET ching Height Vert. Vel(m/s) 2.27 2.42 2.64 2.26 3.09 3.31 3.54 3.76 3.95 3.88 4.14 4.09 4.02 3.95 3.89 3.83 3.77 3.67 3.88 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V=(n(V^3a)_{11}, V=V_{touch} + (V) = single p\\ BEFORE T\\ Zcrit=Zrium=Z(va)_{2}\\ a=0.16(2-6)_{0}-8_{1}(+1)_{1}(1-1)$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	20 ft Interval
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Multiple Plume Calculations Solve for plume-averaged vertical velo Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack Z _{eri} Height above Ground Z _{erit} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 30.	city at height 262.698 68.577 3.544 velocity Verit JET Velocities sta (meters) above stack 51.44 55.43 67.63 67.63 73.72 85.91 92.01 102.40 98.11 102.40 91.13.55 128.59 143.83 159.07 174.31 189.55 220.03 260.51 280.99 311.47 341.95 372.43 402.91 343.85 73.81 9	940.0 meters* meters m/s 5.30 meters meters rting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET ching Height Vert. Vel(m/s) 2.27 2.42 2.64 2.26 3.09 3.31 3.54 3.76 3.95 3.88 4.14 4.09 4.02 3.95 3.89 3.83 3.77 3.67 3.88 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89 3.83 3.377 3.65 3.89	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V = (n_{V})^{a})_{1}, \\ V = V_{touch} + ('\\ V = single p\\ BEFORE T\\ Z_{crifi} = Z_{ruin} \\ Z_{crifi} = Z_{ruin} \\ Single Plut\\ Single Plut\\ Single Plut\\ A = 0.16(2-6)_{0} \\ \phi_{P} = 0_{4}(1+1). \\ Interpolated\\ V = V_{touch} + ('\\ V = V_{touch} + (') \\ V = V_{touch} + (') \\ Nerged Plut\\ V = (n_{V})^{a})_{n}, \end{array}$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	22 tull VV < Top of . 20 ft Interval
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ent} +h Table of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.5 280.0 3300.0 340.0 360.0 600.0 <i>End Merging (full/mp)</i> = 411.1 5550.0 600.0	city at height 262.698 68.577 3.544 velocity V _{erit} JET Velocities sta (meters) above stack 51.44 55.43 67.63 77.72 79.82 85.91 92.01 98.11 102.40 113.35 128.59 143.83 159.07 143.83 159.07 143.83 159.07 177.31 189.55 220.03 250.51 220.03 250.51 285.97 9311.47 341.95 372.43 3402.91 433.39 585.79 9,738.19 8,80.59	940.0 meters* motors motors motors meters me	feet 861.9 225.0 11.63 m/s JET JET sching Height Vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 3.76 3.98 4.14 4.09 4.02 3.95 3.89 3.85 3.89 3.85 3.89 3.85 3.89 3.35 3.97 3.55 3.89 3.35 3.97 3.55 3.98 3.17 3.55 3.98 3.37 3.55 3.99 3.31 3.54 4.14 4.09 4.02 3.95 3.89 3.35 3.95 3.89 3.85 3.89 3.35 3.95 3.89 3.35 3.95 3.95 3.89 3.35 3.95 3.55 3.95	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V = (n_{V})^{a})_{1}, \\ V = V_{touch} + ('\\ V = single p\\ BEFORE T\\ Z_{crifi} = Z_{ruin} \\ Z_{crifi} = Z_{ruin} \\ Single Plut\\ Single Plut\\ Single Plut\\ A = 0.16(2-6)_{0} \\ \phi_{P} = 0_{4}(1+1). \\ Interpolated\\ V = V_{touch} + ('\\ V = V_{touch} + (') \\ V = V_{touch} + (') \\ Nerged Plut\\ V = (n_{V})^{a})_{n}, \end{array}$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	22 tull VV < Top of . 20 ft Interval
Multiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Ground z _{ent} +h Height above Ground z _{ent} +h fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.3 280.0 300.0 280.0 300.0 <i>End Merging (tull/mp)</i> = 414.1 450.0 550.0 650.0 700.0 550.0 600.0 1000.0 1000.0 1000.0 110	city at height 262.698 68.577 3.544 velocity V _{erit} JET Velocities sta (meters) above stack 51.44 55.43 61.53 67.63 77.82 79.82 79.82 10.98.11 102.40 113.35 128.59 143.83 159.07 174.31 189.55 220.03 250.51 280.99 311.47 341.95 372.43 9.65.79 341.95 372.43 9.65.79 341.95 372.43 9.65.79 341.95 372.43 9.65.79 341.95 372.43 9.65.79 341.95 372.43 9.65.79 341.95 372.43 9.65.79 9.738.19 9.890.59 10.42.99 10	940.0 meters* meters m/s 5.30 meters meters tring at Tou Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 111.63 m/s JET JET Vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 2.86 3.09 3.31 3.54 4.14 4.09 4.02 3.95 3.89 3.83 3.77 3.58 3.89 3.83 3.77 3.58 3.50 3.42 3.55 3.58 3.50 3.42 3.55 3.58 3.58 3.50 3.42 3.55 3.58	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V = (n_{V})^{a})_{1}, \\ V = V_{touch} + ('\\ V = single p\\ BEFORE T\\ Z_{crifi} = Z_{ruin} \\ Z_{crifi} = Z_{ruin} \\ Single Plut\\ Single Plut\\ Single Plut\\ A = 0.16(2-6)_{0} \\ \phi_{P} = 0_{4}(1+1). \\ Interpolated\\ V = V_{touch} + ('\\ V = V_{touch} + (') \\ V = V_{touch} + (') \\ Nerged Plut\\ V = (n_{V})^{a})_{n}, \end{array}$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	22 tull VV < Top of . 20 ft Interval
Wultiple Plume Calculations Solve for plume-averaged vertical veloc Gives the following Height above Stack z Plume Top-Hat Radius a Vertical Velocity V Solve for Height of CASC critical vertical Find Height above Stack z _{ert} Height above Ground z _{ert} +h Fable of MERGED Plume-Averaged Vertical Height (feet above ground Begin Merging (touch) = 246.9 280.0 300.0 320.0 340.0 5000 End Merging (full/mp) = 414.1 450.0 5000.0 650	city at height 262.698 68.577 3.544 velocity V _{crit} JET Velocities sta (meters) above stack 51.44 55.43 67.63 67.63 73.72 85.91 92.01 102.40 98.11 102.40 91.13.55 128.59 143.83 159.07 174.31 189.55 220.03 260.51 280.99 311.47 341.95 372.43 402.91 433.19 585.79 9.585.79 9.585.79 9.585.79 1.42.99 1.43.99 1.42.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.42.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.42.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.43.99 1.44.99 1.45.99 1.44.99 1	940.0 meters* moters m/s 5.30 meters meters riting at Too Plume Radius(m) 8.155 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A	feet 861.9 225.0 11.63 m/s JET JET Ching Height Vert. Vel(m/s) 2.27 2.42 2.64 2.86 3.09 3.31 3.54 3.76 3.95 3.88 4.14 4.02 3.95 3.89 3.83 3.77 3.67 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.65 3.88 3.83 3.377 3.67 3.88 3.32 3.54 4.02 3.55 3.89 3.83 3.377 3.67 3.88 3.89 3.83 3.377 3.67 3.68 3.52 3.52 3.52 3.52 3.52 3.52 3.52 3.52 3.52 3.52 3.52 3.52 3.52 3.55 3.52 3.55 3.52 3.55 3.52 3.55 3.52 3.55 3.52 3.55 3.52 3.55	feet* feet feet feet feet	$\begin{array}{l} V = V_{touch} + ('\\ meters abc\\ REGULAR\\ a=a_m+0.16\\ V = (n_{V})^{a})_{1}, \\ V = V_{touch} + ('\\ V = single p\\ BEFORE T\\ Z_{crifi} = Z_{ruin} \\ Z_{crifi} = Z_{ruin} \\ Single Plut\\ Single Plut\\ Single Plut\\ A = 0.16(2-6)_{0} \\ \phi_{P} = 0_{4}(1+1). \\ Interpolated\\ V = V_{touch} + ('\\ V = V_{touch} + (') \\ V = V_{touch} + (') \\ Nerged Plut\\ V = (n_{V})^{a})_{n}, \end{array}$	V_m^{-V} touch)*(: two ground (: EQNS (2<-ztu) if z2 µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} if z> OUCHING + (In(V ² a) ₂ µ/a) ^{1/3} me Eqns (st a ³ -0.12F ₄ (z-z v) (a)(a)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)(2)	$z-z_{touch})(z_{fullt}-z_{touch})$ for heights below total mergin $z+h_{s})$ z_{full} $z'-z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch}) if z_{touch} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(z_{fullt}-z_{touch})(Z_{fullt}-z_{touch}) if V_{crit} < z_{touch})(Z_{fullt}-z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit} < z_{touch})(V_{m-V_{touch}}) if V_{crit}$ $z_{full} = z_{full} (Z_{fullt}-Z_{fullt}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{full}-Z_{full}) if (Z_{fullt}-Z_{full}-Z_{ful$	ng elevation zz <z<sub>full VV < Top of J</z<sub>



| | "The Evalue |

 | ıoyant Plumes
imum Updraft |
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| Ambient Conditions: | |

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 | | | eutral conditions (d0/dz=0 or 0 | • | | | | | | | | |
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| Ambient Potential Temp θ_a | 278.15 | Kelvins

 | 41.0 | °F
 | | 0.3048 | meters/feet | | | | | | | | | |
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| lume Exit Conditions: | |

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 | Gravity g | | m/s ² | | | | | | | | | |
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| Stack Height hs | | meters

 | | feet-inches
 | λ | 1.11 | | | | | | | | | | |
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| Individual Stack Diameter D | 3.86213661 |

 | | inches
 | λο | ~1.0 | | | | | | | | | | |
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| Stack Velocity V _{exit} | 8.06 |

 | | ft/sec
 | 4Vol/(60πD | r²) | | | | | | | | | | |
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| Individual Volumetric Flow | | cu.m/sec

 | 200,110
61.0 |
 | πV _{exit} D ² /4 | | | Sect.2/¶1 | | | | | | | | |
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| Stack Potential Temp θ _s
Initial Stack Buoyancy Flux F _o | | Kelvins
m ⁴ /s ³

 | |
 | a)/ D ² (1.6 | (0)(4 - 1) | ol.Flow(g/π)(1-θ _a /θ _s) | Sect.2/¶1 | | | | | | | | |
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| Plume Buoyancy Flux F | | m ⁴ /s ³

 | 20.0 | ΔT(°F)
 | | | ,θ _p at plume height (see belo | | | | | | | | | |
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| Total Number of Stacks n | 48 |

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 | X gva (1-0 | , op) ioi a, v | , op at plane height (see belo | | | | | | | | | |
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| Average Adjacent Stack Separation d | | meters

 | 24.6 | feet
 | Calcs base | d on multipl | e plume treatment in Peter Be | st Paper: | | | | | | | | |
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| Number of Stacks along Orientation N | 16 |

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 | | | sed by N ^{0.25} at the height when | | | | | | | | | |
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 | | | low ht, single merged stack a | | | | | | | | | |
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| conditions at End (Top) of Jet Phase: | |

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 | | | | | | | |
| Height above Stack z _{jet} | 24.138 | meters*

 | 79.2 | feet*
 | z _{jet} = 6.250 |), meters*= | meters above stack top | Sect.3/¶1 | | | | | | | | |
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| Height above Ground zjet+hs | 47.952 | meters

 | 157.3 | feet
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 | | | | | | | |
| Vertical Velocity V _{jet} | 4.031 | m/s

 | 13.22 | ft/sec
 | $V_{jet} = 0.5V_{e}$ | $_{exit} = V_{exit}/2$ | | | | | | | | | | |
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| Plume Top-Hat Diameter 2a _{jet} | 7.724 | meters

 | 25.3 | feet
 | 2a _{jet} = 2D | | Conservation of momentum | | | | | | | | | |
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| pillane Methodology - Analytical Solutions f | |

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| Single Plume-averaged Vertical Velocity | |

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| Single Plume Values: Plume Top-Hat Radius a | |

 | Merging Onl |
 | | | r increase with height | Sect.2/Eq.6 | | | | | | | | |
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 | | | | | | | |
| Virtual Source Height z _v | | meters*

 | | feet*
 | z _v = 6.25D | $[1-(\Theta_{e}/\Theta_{s})^{1/2}]$ | , meters*=meters above stack top | | | | | | | | | |
 | | | | | | | | | | | |
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 | | | | | | | | | | | |
 | | | | | | | |
| Height above Ground zv+hs | | meters

 | 79.7 |
 | (0.(-) 3 · - | | where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} =$ | | | | | | | | | |
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| Single Plume Values: Vertical Velocity V | |

 | Merging Onl | У
 | | |) ² - (6.25D-z _v) ²]} ^(1/3) / a | Sect.2.1(6) | | | | | | | | |
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 | | | | | | | |
| Product (Va)。 | 15.265 | rn-/s

 | |
 | V _{exit} (D/2)(0 | e/⊎s)``¯ | | | | | | | | | | |
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| Plume Merging - Based on Single Plume Cal | ulations wh | ere:

 | |
 | | | | Sect.3/¶3 | | | | | | | | |
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 | | | | | | | |
| Begin Merging Plume Top-Hat Diameter 2atouch | | meters

 | 24.6 | feet
 | 2a _{touch} =d, (| or a = d/ | 2) | 00000/110 | | | | | | | | |
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 | | | | | | | | | | | |
 | | | | | | | |
| Height above Stack z _{touch} | | meters
meters*

 | | feet*
 | | | 2)
meters*=meters above stack | top | | | | | | | | |
 | | | | | | | | | | | |
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 | | | | | | | | | | | |
 | | | | | | | |
| Height above Ground z _{touch} +h _s | | meters

 | 156.6 |
 | -touch - 2v | , | | | | | | | | | | |
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 | | | | | | | |
| Vertical Velocity V _{touch} | 4.065 |

 | | ft/sec
 | V _{touch} = {(V | a) _o ³ + 0.12 | = _o [(z-z _v) ² - (6.25D-z _v) ²]} ^(1/3) | /a | | | | | | | | |
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 | | | | | | | |
| otal Merging Plume Top-Hat Diameter 2afull | 112.500 |

 | 369.1 |
 | | | =d(N-1)/2) FOR 2 STACKS, | | | | | | | | | |
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 | | | | | | | |
| Height above Stack z _{full} | 352.031 |

 | 1155.0 |
 | | | meters*=meters above stack | | | | | | | | | |
 | | | | | | | | | | | |
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 | | | | | | | |
| Height above Ground z _{full} +h _s | 375.845 |

 | 1233.1 | feet
 | | . ,. | | · · | | | | | | | | |
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 | | | | | | | |
| Vertical Velocity V _{full} | 0.986 | m/s

 | 3.2 | ft/sec
 | V _{full} = {(Va) | ³ + 0.12F _c | $[(z_{full}-z_v)^2 - (6.25D-z_v)^2]^{(1/3)}$ | /a _{full} | | | | | | | | |
 | | | | | | | | | | | |
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| Product (V ³ a) _{full} | 54 | m ⁴ /s ³

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| conditions at End (Top) of Merging Phase - De | efine new valu | es for V _{full} a

 | ind a _{full} in Merg | jed Plume c
 | alculations (| based on T | OTAL number of stacks): | | | | | | | | | |
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| Merged Plume Values: Plume Diameter 2a | S | olutions in

 | Table Below |
 | | | z _{full})), or linear increase with h | neight | | | | | | | | |
 | | | | | | | | | | | |
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 | | | | | | | |
| Revised Merged Plume Radius am | 148.058 | meters

 | 485.8 | feet
 | | | nere Total Merging Occurs | | | | | | | | | |
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 | | | | | | | |
| Revised Merged Plume Velocity V _m | 2.596 | m/s

 | 8.52 | ft/sec
 | | | here Total Merging Occurs | | | | | | | | | |
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 | | | | | | | |
| Revised Virtual Source Height z _{full} | 352.031 |

 | 1155.0 | feet*
 | | | ere Total Merging Occurs (sh | | | | | | | | | |
 | | | | | | | | | | | |
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 | | | | | | | |
| Revised Vertical Velocity V | Se | olutions in

 | Tables Below |
 | V={n(V ³ a) _f | ⊮/a} ^{1/3} for h | eights above total merging ele | vation | | | | | | | | |
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 | V=V _{touch} +(V | / _m -V _{touch})*(| z-z _{touch})/(z _{full} -z _{touch}) | | | | | | | | | |
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| Aultiple Plume Calculations | |

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 | | | for heights below total mergin | ng elevation | | | | | | | | |
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| Solve for plume-averaged vertical veloc | |

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 | meters abo | | | | | | | | | | | |
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| Gives the following Height above Stack z | 262.698 |

 | 861.9 | feet*
 | LESS THA | | MERGING PHASE-INTERPO | LATE | | | | | | | | |
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| | #N1/A |

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| Plume Top-Hat Radius a | | meters

 | | feet
 | $a=a_m+0.16$ | | | | | | | | | | | |
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 | | | | | | | |
| | #N/A
2.996 |

 | | feet
ft/sec
 | V={n(V ³ a) _f | ⊪/a} ^{1/3} if z> | Z _{full} | 7<7 | | | | | | | | |
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| Plume Top-Hat Radius a | |

 | |
 | V={n(V ³ a) _f
V'=V _{touch} +(| lll/a} ^{1/3} if z>
V _m -V _{touch})*(| zfull
z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} < | z <z<sub>full</z<sub> | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V | 2.996 | m/s

 | 9.83 |
 | V={n(V ³ a) _f L
V'=V _{touch} +(
V'=single p | lll/a} ^{1/3} if z>
V _m -V _{touch})*(
lume values | zfull
z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} <
i if z <z<sub>touch</z<sub> | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical | 2.996
velocity V _{crit} | m/s
5.30

 | 9.83
m/s | ft/sec
 | V={n(V ³ a) _f L
V'=V _{touch} +(
V'=single p
BEFORE T | _{ll/} a} ^{1/3} if z>
V _m -V _{touch})*(
lume values
OUCHING | zfull
z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} <
i if z <z<sub>touch
Critical</z<sub> | z <z<sub>full
VV < Top of 、</z<sub> | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit} | 2.996
velocity V _{crit}
JET | m/s

 | 9.83
m/s | ft/sec
feet
 | V={n(V ³ a) _f L
V'=V _{touch} +(
V'=single p
BEFORE T
z _{crit} = z _{full} 4 | ll/a} ^{1/3} if z>
V _m -V _{touch})*(
lume values
OUCHING
⊷ {[n(V ³ a) _{full} | ztuli
z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch}
if z <z<sub>touch
Critical
/(V_{crit})³]-a_m)/0.16 if V_{crit}<v<sub>m</v<sub></z<sub> | VV < Top of 、 | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical | 2.996
velocity V _{crit}
JET | m/s
5.30
meters

 | 9.83
m/s | ft/sec
 | V={n(V ³ a) _f L
V'=V _{touch} +(
V'=single p
BEFORE T
z _{crit} = z _{full} 4 | ll/a} ^{1/3} if z>
V _m -V _{touch})*(
lume values
OUCHING
⊷ {[n(V ³ a) _{full} | zfull
z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch} <
i if z <z<sub>touch
Critical</z<sub> | VV < Top of 、 | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s | 2.996
velocity V _{crit}
JET
JET | m/s
5.30
meters
meters

 | 9.83
m/s
JET | ft/sec
feet
feet
 | V={n(V ³ a) _{ft}
V'=V _{touch} +(
V'=single p
BEFORE T
z _{crit} =z _{ful} 4
z _{crit} =z _{touch} + | ll/a} ^{1/3} if z>
V _m -V _{touch})*(
lume values
OUCHING
← {[n(V ³ a) _{full}
(z _{full} -z _{touch}) | ztuli
z'-z _{touch})/(z _{full} -z _{touch}) if z _{touch}
if z <z<sub>touch
Critical
/(V_{crit})³]-a_m)/0.16 if V_{crit}<v<sub>m</v<sub></z<sub> | VV < Top of ,
_{it} >V _m | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet) | 2.996
velocity V _{crit}
JET
JET
elocities sta
(meters) | m/s
5.30
meters
meters
rting at Tou
Plume

 | 9.83
m/s
JET | ft/sec
feet
feet
 | $V=\{n(V^{3}a)_{fu}$ $V'=V_{touch}+('$ $V'=single p$ $BEFORE T$ $Z_{crit}=Z_{full}+Z_{crit}$ $Single Plum$ | ll/a} ^{1/3} if z>
V _m -V _{touch})*(
lume values
OUCHING
← {[n(V ³ a) _{full}
(Z _{full} -Z _{touch})
me Eqns (se | Zfull
z'-ztouch)/(zfull=Ztouch) if ztouch
if z <ztouch
Critical
(V_{crit})²]-am)/0.16 if V_{crit}<v<sub>m
(V_{crit}-V_{touch})/(V_m-V_{touch}) if V_{cr}</v<sub></ztouch
 | VV < Top of ,
_{it} >V _m | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
able of MERGED Plume-Averaged Vertical V | 2.996
velocity V _{crit}
JET
JET
elocities sta
(meters) | m/s
5.30
meters
meters
rting at Tou
Plume

 | 9.83
m/s
JET
JET | ft/sec
feet
feet
 | $V=\{n(V^{3}a)_{fu}$ $V'=V_{touch}+('$ $V'=single p$ $BEFORE T$ $Z_{crit}=Z_{full}+Z_{crit}$ $Single Plum$ | $ /a ^{1/3}$ if z>
V_m - $V_{touch}^*($
 ume values
OUCHING
$+ \{[n(V^3a)_{full}$
$+ (Z_{full}-Z_{touch})$
$me Eqns$ (see 3^3 +0.12F ₀ [(z-z.)] | ztuil
z'-z _{touch} //(z _{full} -z _{touch}) if z _{touch}
if z <z<sub>touch
 Critical
 ((V_{crit})²)-a_m)/0.16 if V_{crit}<v<sub>m
 (V_{crit}-V_{touch})/(V_m-V_{touch}) if V_{cri}
 se Single Plume spreadsheet</v<sub></z<sub> | VV < Top of ,
_{it} >V _m | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
Table of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6 | 2.996
velocity V _{crit}
JET
JET
elocities sta
(meters)
above stack
23.92 | m/s
5.30
meters
meters
rting at Tou
Plume
Radius(m)
3.750

 | 9.83
m/s
JET
JET
vehing Height
Vert.
Vel(m/s)
4.06 | ft/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{iL} \\ & \forall = \forall_{touch} + (\forall \forall = single \ p \\ & BEFORE \ T \\ & z_{crit} = z_{touch} + \\ & z_{crit} = z_{touch} + \\ & Single \ Plur, \\ & \forall piums = \{(\forall a)_o \\ a = 0.16(z-, \theta_p=\theta_s(1+(1-z))) \} \end{split}$ | μ /a] ^{1/3} if z> Vm-Vtouch)*(lume values OUCHING • {[n(V ³ a)rull · ([n(V ³ a)rull · ([n(V ³ a)rull me Eqns (se me Zeqns (se ····· ···· ····· ···· ···· ···· ···· ···· ···· ···· ···· ···· ···· ···· ···· ···· ···· | $\begin{split} & \mbox{Zrull} \\ & \mbox{Zrull} \\ & \mbox{Zrule} \lambda / (2 \mbox{full}^{-2} \mbox{touch}) / (2 \mbox{full}^{-2} \mbox{touch}) / (2 \mbox{full}^{-2} \mbox{touch}) / (2 \mbox{full}^{-2} \mbox{drull}^{-2} d$ | VV < Top of ,
_{it} >V _m | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +hs
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0 | 2.996
velocity V _{crit}
JET
JET
elocities sta
(meters)
above stack
23.92
24.95 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#N/A

 | 9.83
JET
JET
Jching Height
Vert.
Vel(m/s)
4.06
4.06 | ft/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (se a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of ,
_{it} >V _m | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
180.0 | 2.996
velocity V _{crit}
JET
JET
elocities stat
(meters)
above stack
23.92
24.95
31.05 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#N/A
#N/A

 | 9.83
m/s
JET
JET
Vert.
Vel(m/s)
4.06
4.03 | ft/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (se a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{Zruil} \\ & z_{\text{Clouch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} \\ & \text{if } z_{\text{Clouch}} / (V_{\text{cril}} - z_{\text{touch}}) \text{ if } v_{\text{crit}} \\ & (V_{\text{cril}})^3 - 4m_3 / 0.16 \text{ if } V_{\text{crit}} - V_{\text{touch}}) \text{ if } V_{\text{crit}} \\ & v_{\text{touch}} / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{crit}} \\ & \text{se Single Plume spreadsheet} \\ & y^3 - (6.25D - z_y)^3 y^{1/3} / a \\ & \text{stl} D^2 / (4V_{\text{plume}} * a^2 + \lambda^2))) \end{split}$ | VV < Top of ,
_{it} >V _m | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
<i>Begin Merging (touch) = 156.6</i>
160.0
180.0
200.0 | 2.996
velocity V _{crit}
JET
JET
elocities stat
(meters)
above stack
23.92
24.95
31.05
37.15 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#N/A
#N/A
#N/A

 | 9.83
m/s
JET
JET
vert.
Vel(m/s)
4.06
4.06
4.03
4.01 | ft/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (se a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of ,
_{it} >V _m | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
188.0
220.0 | 2.996
welocity V _{crit}
JET
JET
elocities stat
(meters)
above stack
23.92
24.95
31.05
37.15
37.15
43.24 | m/s
5.30
meters
meters
rting at Tou
Plume
Radius(m)
3.750
#N/A
#N/A
#N/A

 | 9.83
m/s
JET
JET
Vert.
Vel(m/s)
4.06
4.06
4.03
4.01
3.98 | ft/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (se a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of ,
_{it} >V _m | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
<i>Begin Merging (touch) = 156.6</i>
160.0
180.0
220.0
220.0
220.0 | 2.996
Velocity V _{crit}
JET
JET
elocities sta
(metors)
above stack
23.92
24.95
31.05
37.15
43.24
49.34 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#N/A
#N/A
#N/A
#N/A
#N/A

 | 9.83
JET
JET
Iching Height
Vert.
Vel(m/s)
4.06
4.03
4.01
3.98
3.95 | ft/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of ,
_{it} >V _m | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
200.0
220.0
220.0
240.0
260.0 | 2.996
velocity V _{crit}
JET
JET
elocities stark
(meters)
above stack
23.92
24.95
31.05
31.05
37.15
43.24
49.34
49.34
45.543 | m/s
5.30
meters
meters
tring at Too
Plume
Radius(m)
3.750
#N/A
#N/A
#N/A
#N/A
#N/A

 | 9.83
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Iching Height
Vert.
Vel(m/s)
4.06
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3.98
3.95
3.92 | ft/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.u>Vm
)
20 ft Interval | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
180.0
220.0
220.0
220.0
220.0
300.0 | 2.996
velocity V _{crit}
JET
JET
elocities star
(meters)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
455.43
67.63 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A

 | 9.83
m/s
JET
JET
vert.
Vel(m/s)
4.06
4.06
4.03
4.01
3.98
3.95
3.92
3.87 | fl/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of (
it>Vm
)
20 ft Interval | | | | | | | | | | | |
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 | | | | | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
Table of MERGED Plume-Averaged Vertical V
Height (foet)
Begin Merging (touch) = 156.6
160.0
180.0
200.0
220.0
240.0
240.0
350.0 | 2.996
velocity V _{erit}
JET
JET
elocities stal
(metors)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
49.34
55.43
67.63
82.87 | m/s
5.30
meters
reters
rting at Tot
Plume
Radius(m)
3.750
#NVA
#NVA
#NVA
#NVA
#NVA
#NVA
#NVA

 | 9.83
JET
JET
Iching Height
Vert.
Vel(m/s)
4.06
4.03
4.01
3.95
3.92
3.82
3.87
3.80 | fl/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of (
it>Vm
)
20 ft Interval | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
Table of MERGED Plume-Averaged Vertical V
Height (foet)
above ground
Begin Merging (touch) = 156.6
160.0
180.0
220.0
220.0
220.0
220.0
300.0
300.0
300.0
350.0
400.0 | 2.996
velocity V _{crit}
JET
JET
elocities staak
(meters)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
49.34
49.34
55.43
67.63
82.87
98.11 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#N/A
#N/A
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#N/A

 | 9.83
JET
JET
rching Height
Vert.
Vel(m/s)
4.06
4.06
4.03
4.01
3.95
3.92
3.87
3.80
3.87
3.80
3.73 | fl/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of (
it>Vm
)
20 ft Interval | | | | | | | | | | | |
 | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground zent+hs
Table of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
180.0
220.0
220.0
220.0
220.0
220.0
300.0
355.0
400.0
450.0 | 2.996
velocity V _{crit}
JET
JET
elocities star
(meters)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
49.34
49.34
49.543
67.63
82.87
98.11
113.35 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A

 | 9.83
m/s
JET
JET
verting Height
Vert.
Vel(m/s)
4.06
4.06
4.03
4.01
3.98
3.95
3.92
3.87
3.80
3.73
3.66 | fl/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of (
it>Vm
)
20 ft Interval | | | | | | | | | | | |
 | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
sable of MERGED Plume-Averaged Vertical V
Height (foet)
Begin Merging (touch) = 156.6
160.0
180.0
200.0
220.0
240.0
240.0
300.0
350.0
400.0
350.0
400.0
500.0 | 2.996
velocity V _{erit}
JET
JET
elocities stal
(metors)
above stack
23.92
24.95
31.05
31.05
33.15
43.24
49.34
49.34
55.43
82.87
98.11
113.35
128.59 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#NVA
#NVA
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#NVA

 | 9.83
JET
JET
Iching Height
Vert.
Vel(m/s)
4.06
4.03
4.01
3.95
3.95
3.92
3.87
3.80
3.87
3.80
3.73
3.66
3.60 | fl/sec
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of
nt>Vm
)
20 ft Interval | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
Table of MERGED Plume-Averaged Vertical V
Height (feet)
Begin Merging (touch) = 156.6
160.0
180.0
220.0
220.0
220.0
220.0
220.0
300.0
300.0
355.0 | 2.996
velocity V _{crit}
JET
JET
elocities stack
23.92
24.95
31.05
37.15
43.24
49.34
49.34
45.43
67.63
82.87
98.11
113.35
128.59
143.83 | s.30 meters meters rting at Too Plume Radius(m) 3.750 #N/A

 | 9.83
m/s
JET
JET
vehing Height
Vert.
Vel(m/s)
4.06
4.03
4.03
4.03
3.92
3.87
3.80
3.73
3.60
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3.60
3.53 | fl/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + (\forall \forall \forall = v_{touch} + \forall \forall \forall d = v_{touch} + (\forall d = $ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of (
it>Vm
)
20 ft Interval | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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250.0 | 2.996
velocity V _{crit}
JET
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elocities stau
(meters)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
49.34
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49.34
49.34
49.34
49.34
49.34
49.34
49.34
15.43
67.63
82.87
98.11
113.35
128.59
143.83
159.07 | m/s
5.30
meters
meters
rting at Tou
Plume
Radius(m)
3.750
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A

 | 9.83
m/s
JET
JET
verting Height
Vert.
Vel(m/s)
4.06
4.03
4.01
3.98
3.95
3.92
3.87
3.80
3.73
3.66
3.66
3.63
3.46 | fl/sec
feet
feet
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = \forall_{touch} + (\forall \forall \forall = \forall p BEFORE T) \\ & \exists crit = z_{touch} + \\ & z_{crit} = z_{touch} + \\ & Single Plum \\ & \forall_{plume} = \{(\forall a)_{o} \\ & a = 0.16(z - \theta_{p} - \theta_{a}(1 + (1 - h_{p} - \theta_{a}(1 + (1 - h_{p}$ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of
nt>Vm
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20 ft Interval | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
Begin Merging (touch) = 156.6
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above stack
23.92
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37.15
43.24
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55.43
82.87
98.11
113.35
128.59
143.83
159.07
174.31 | m/s 5.30 meters meters rding at Tot Plume Radius(m) 3.750 #NVA

 | 9.83
JET
JET
Jeting Height
Vert.
Vel(m/s)
4.06
4.06
4.03
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3.98
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3.86
3.83
3.84
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 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = \forall_{touch} + (\forall \forall \forall = \forall p BEFORE T) \\ & \exists crit = z_{touch} + \\ & z_{crit} = z_{touch} + \\ & Single Plum \\ & \forall_{plume} = \{(\forall a)_{o} \\ & a = 0.16(z - \theta_{p} - \theta_{a}(1 + (1 - h_{p} - \theta_{a}(1 + (1 - h_{p}$ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of
nt>Vm
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20 ft Interval | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground zent+hs
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
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159.07
174.31
189.55 | m/s 5.30 meters meters rting at Too Plume Radius(m) 3.750 #N/A

 | 9.83
m/s
JET
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vehing Height
Vert.
Vel(m/s)
4.06
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 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = \forall_{touch} + (\forall \forall \forall = \forall p BEFORE T) \\ & \exists crit = z_{touch} + \\ & z_{crit} = z_{touch} + \\ & Single Plum \\ & \forall_{plume} = \{(\forall a)_{o} \\ & a = 0.16(z - \theta_{p} - \theta_{a}(1 + (1 - h_{p} - \theta_{a}(1 + (1 - h_{p}$ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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velocity V _{erit}
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(meters)
above stack
23.92
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98.11
113.35
128.59
143.83
159.07
174.31
189.55
220.03 | m/s
5.30
meters
meters
Plume
Radius(m)
3.750
#N/A
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 | 9.83
m/s
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vehing Height
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Vel(m/s)
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 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = \forall_{touch} + (\forall \forall \forall = \forall p BEFORE T) \\ & \exists crit = z_{touch} + \\ & z_{crit} = z_{touch} + \\ & Single Plum \\ & \forall_{plume} = \{(\forall a)_{o} \\ & a = 0.16(z - \theta_{p} - \theta_{a}(1 + (1 - h_{p} - \theta_{a}(1 + (1 - h_{p}$ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{crit}
Height above Ground z _{crit} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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900.0 | 2.996
velocity V _{erit}
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elocities stal
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above stack
23.92
24.95
31.05
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55.43
82.87
98.11
113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51 | m/s 5.30 meters meters rding at Tot Plume Radius(m) 3.750 #NVA

 | 9.83
m/s
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vert.
Ver(m/s)
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 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = \forall_{touch} + (\forall \forall \forall = \forall p BEFORE T) \\ & \exists crit = z_{touch} + \\ & z_{crit} = z_{touch} + \\ & Single Plum \\ & \forall_{plume} = \{(\forall a)_{o} \\ & a = 0.16(z - \theta_{p} - \theta_{a}(1 + (1 - h_{p} - \theta_{a}(1 + (1 - h_{p}$ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground zent+hs
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
180.0
220.0
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159.07
174.31
189.55
220.03
260.51
280.99 | m/s 5.30 meters meters rting at Too Plume Radius(m) 3.750 #N/A

 | 9.83
m/s
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 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = \forall_{touch} + (\forall \forall \forall = \forall p BEFORE T) \\ & \exists crit = z_{touch} + \\ & z_{crit} = z_{touch} + \\ & Single Plum \\ & \forall_{plume} = \{(\forall a)_{o} \\ & a = 0.16(z - \theta_{p} - \theta_{a}(1 + (1 - h_{p} - \theta_{a}(1 + (1 - h_{p}$ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51
280.99
311.47 | m/s 5.30 meters meters rting at Too Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA

 | 9.83
m/s
JET
JET
rching Height
Vert.
Vel(m/s)
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4.06
4.03
4.01
3.98
3.95
3.92
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3.80
3.73
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3.66
3.63
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3.32
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3.32
3.19
3.05
2.91
2.78 | fl/sec
 | $\begin{split} & \forall = \{n(\forall^3 a)_{tL} \\ & \forall = \forall_{touch} + (\forall \forall \forall = \forall_{touch} + (\forall \forall \forall = \forall p BEFORE T) \\ & \exists crit = z_{touch} + \\ & z_{crit} = z_{touch} + \\ & Single Plum \\ & \forall_{plume} = \{(\forall a)_{o} \\ & a = 0.16(z - \theta_{p} - \theta_{a}(1 + (1 - h_{p} - \theta_{a}(1 + (1 - h_{p}$ | _{all} /a) ^{1/3} if z> Vm-V _{touch})*(lume values OUCHING (In(V ³ a)rull (z _{full} -z _{touch}) ne Eqns (sc a ³ +0.12F _e [(z-z, z, y) e(e _e /θ _s))*(Ve d Layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +hs
able of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
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1000.0 | 2.996
velocity V _{erit}
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elocities staa
(metors)
above stack
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24.95
31.05
37.15
43.24
49.34
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82.87
98.11
113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51
280.99
311.47
341.95 | m/s 5.30 meters meters rding at Tot Plume Radius(m) 3.750 #NVA

 | 9.83
m/s
JET
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vert.
Ver(m/s)
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V _m -Viouch) [*] (| $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground zent+hs
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Morging (touch) = 156.6
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m_m-V_{iouch})⁷(
lume values)²(
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l(n(V³a)vut
(Z₁ut⁻²touch)
me Eqns (sc³a)vut
(de/de))[*](V_e
d¹ Layer Eqn²
V_m-V_{touch})[*](
layer Eqns</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}})
\text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$</td><td>VV < Top of
_{it}>V_m
)
20 ft Interva
50 ft Interva</td></tr> <tr><td>Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z_{ent}
Height above Ground z_{ent}+h_s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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341.95
352.03
372.43</td><td>m/s 5.30 meters meters rting at Too Plume Radius(m) 3.750 #N/A #N/A #N/A #N/A #N/A #N/A #N/A #N/A</td><td>9.83
m/s
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rching Height
Vert.
Vel(m/s)
4.06
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2.66</td><td>fl/sec</td><td>V=[n(V³a)₁,
V=V_{icuch}+(
V=Single p
BEFORE T
Z_{crit} = z_{lut} +
Z_{crit}=z_{lut} +
Z_{crit}=z_{lut} +
Single Plut
V_{plum}={(Va)
a = 0.16(z-
θ_p=θ_a(1+(1)
Interpolate
V=V_{touch}+(</td><td>µ(a)^{1/3} if z>
m⁻V_{touch})⁷(itrume values
OUCHING
-{ {[π(V³a]vali
(z_{ful}=z_{touch})
ne Eqns (st
⁺t0.12F_a[(z-z
z,)
(θ_a/θ_a))[*](V_e
1 Layer Eqn
V_m-V_{touch})[*](
⁺</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$</td><td>VV < Top of
_{it}>V_m
)
20 ft Interva
50 ft Interva</td></tr> <tr><td>Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z_{ent}
Height above Ground z_{ent} H_s
able of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
168.0
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113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51
280.99
311.47
341.95
352.03
372.43
402.91</td><td>m/s 5.30 meters meters rding at Tot Plume Radius(m) 3.750 #NVA
#NVA</td><td>9.83
m/s
JET
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vertny
Vert,
Ver(m/s)
4.06
4.06
4.03
3.95
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3.92
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3.32
3.87
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3.2</td><td>fl/sec</td><td>$V = \{n(V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $Single Plur,$ $V_{plume} = \{(Va)_{t.}$ $a = 0.16\{c_{t.}$ $h_{p} = \theta_{t.}(1 + (1 - 1)_{t.})_{t.}$ $V = V_{touch} + (1 - 1)_{t.}$ $Merged Plut,$ $Merged Plut,$</td><td>µ(a)^{1/3} if z>
m⁻V_{touch})⁷(itrume values
OUCHING
-{ {[π(V³a]vali
(z_{ful}=z_{touch})
ne Eqns (st
⁺t0.12F_a[(z-z
z,)
(θ_a/θ_a))[*](V_e
1 Layer Eqn
V_m-V_{touch})[*](
⁺</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$</td><td>VV < Top of .
.it=Vm
20 ft Interval</td></tr> <tr><td>Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground z_{ent}+h_g
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
180.0
220.0
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3</td><td>2.996
velocity V_{erit}
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elocities staak
(meters)
above stack
23.92
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49.34
455.43
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128.59
143.83
159.07
174.31
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250.51
280.99
311.47
341.95
352.03
372.43
402.91
433.39</td><td>m/s s.30 meters meters rting at Too Plume Radius(m) 3.750 #N/A #N/A</td><td>9.83
m/s
JET
JET
vering
Height
Vert.
Vel(m/s)
4.06
4.06
4.03
3.95
3.82
3.87
3.80
3.73
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2</td><td>fl/sec</td><td>V=[n(V³a)₁,
V=V_{icuch}+(
V=Single p
BEFORE T
Z_{crit} = Z₁u₁ 4
Z_{crit}=Z₁u₁+7
Single Plut
V_{pinn}={(Va)
a = 0.16(z-
θ_p=θ_a(1+(1)
Interpolate
V=V_{touch}+(</td><td>µ(a)^{1/3} if z>
m⁻V_{touch})⁷(itrume values
OUCHING
-{ {[π(V³a]vali
(z_{ful}=z_{touch})
ne Eqns (st
⁺t0.12F_a[(z-z
z,)
(θ_a/θ_a))[*](V_e
1 Layer Eqn
V_m-V_{touch})[*](
⁺</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$</td><td>VV < Top of .
.it=Vm
20 ft Interval</td></tr> <tr><td>Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z_{ent}
Height above Ground z_{ent}+h_s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
0
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0</td><td>2.996
velocity V_{erit}
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JET
elocities staa
(meters)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
67.63
82.87
98.11
113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51
280.99
311.47
341.95
352.03
372.43
402.91
433.39
585.79</td><td>m/s 5.30 meters meters fing at Tot Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA</td><td>9.83
JET
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Vert.
Vel(m/s)
4.06
4.03
4.03
4.03
3.88
3.95
3.92
3.87
3.80
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3.32</td><td>fl/sec</td><td>V=[n(V³a)₁,
V=V_{icuch}+(
V=Single p
BEFORE T
Z_{crit} = Z₁u₁ 4
Z_{crit}=Z₁u₁+7
Single Plut
V_{pinn}={(Va)
a = 0.16(z-
θ_p=θ_a(1+(1)
Interpolate
V=V_{touch}+(</td><td>µ(a)^{1/3} if z>
m⁻V_{touch})⁷(itrume values
OUCHING
-{ {[π(V³a]vali
(z_{ful}=z_{touch})
ne Eqns (st
⁺t0.12F_a[(z-z
z,)
(θ_a/θ_a))[*](V_e
1 Layer Eqn
V_m-V_{touch})[*](
⁺</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$</td><td>VV < Top of</td></tr> <tr><td>Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z_{ent}
Height above Ground z_{ent} H_s
able of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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650.0
700.0
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velocity V_{erit}
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elocities stal
(metors)
above stack
23.92
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31.05
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311.47
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352.03
372.43
402.91
433.39
738.19</td><td>m/s meters meters meters rting at Tot Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA</td><td>9.83
m/s
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vering
Height
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Vel(m/s)
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3.</td><td>fl/sec</td><td>V=[n(V³a)₁,
V=V_{icuch}+(
V=Single p
BEFORE T
Z_{crit} = Z₁u₁ 4
Z_{crit}=Z₁u₁+7
Single Plut
V_{pinn}={(Va)
a = 0.16(z-
θ_p=θ_a(1+(1)
Interpolate
V=V_{touch}+(</td><td>µ(a)^{1/3} if z>
m⁻V_{touch})⁷(itrume values
OUCHING
-{ {[π(V³a]vali
(z_{ful}=z_{touch})
ne Eqns (st
⁺t0.12F_a[(z-z
z,)
(θ_a/θ_a))[*](V_e
1 Layer Eqn
V_m-V_{touch})[*](
⁺</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$</td><td>VV < Top of .
III > Vm
20 ft Interval
50 ft Interval</td></tr> <tr><td>Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical V
Find Height above Stack zent
Height above Ground zent+hs
Table of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
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velocity V_{erit}
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elocities stack
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m/s
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verting Height
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V=V_{icuch}+(
V=Single p
BEFORE T
Z_{crit} = Z₁u₁ 4
Z_{crit}=Z₁u₁+7
Single Plut
V_{pinn}={(Va)
a = 0.16(z-
θ_p=θ_a(1+(1)
Interpolate
V=V_{touch}+(</td><td>µ(a)^{1/3} if z>
m⁻V_{touch})⁷(itrume values
OUCHING
-{ {[π(V³a]vali
(z_{ful}=z_{touch})
ne Eqns (st
⁺t0.12F_a[(z-z
z,)
(θ_a/θ_a))[*](V_e
1 Layer Eqn
V_m-V_{touch})[*](
⁺</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$</td><td>VV < Top of .
III > Vm
20 ft Interval
50 ft Interval</td></tr> <tr><td>Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z_{ent}
Height above Ground z_{ent}+h_s
Table of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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velocity V_{erit}
JET
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elocities stau
(meters)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
67.63
82.87
98.11
113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51
243.95
372.43
372.43
372.43
402.91
433.39
585.79
738.19
890.59
1042.99</td><td>m/s 5.30 meters meters fing at Tot Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA</td><td>9.83
JET
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Vert.
Vel(m/s)
4.06
4.03
4.03
4.01
3.88
3.85
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3.92
3.87
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2.55</td><td>fl/sec</td><td>V=[n(V³a)₁,
V=V_{icuch}+(
V=Single p
BEFORE T
Z_{crit} = Z₁u₁ 4
Z_{crit}=Z₁u₁+7
Single Plut
V_{pinn}={(Va)
a = 0.16(z-
θ_p=θ_a(1+(1)
Interpolate
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m⁻V_{touch})⁷(itrume values
OUCHING
-{ {[π(V³a]vali
(z_{ful}=z_{touch})
ne Eqns (st
⁺t0.12F_a[(z-z
z,)
(θ_a/θ_a))[*](V_e
1 Layer Eqn
V_m-V_{touch})[*](
⁺</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$</td><td>VV < Top of ,
_{it}>V_m</td></tr> <tr><td>Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground zent+hs
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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velocity V_{erit}
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m/s
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verting Height
Vert.
Vert(m/s)
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V=V_{icuch}+(
V=Single p
BEFORE T
Z_{crit} = Z₁u₁ 4
Z_{crit}=Z₁u₁+7
Single Plut
V_{pinn}={(Va)
a = 0.16(z-
θ_p=θ_a(1+(1)
Interpolate
V=V_{touch}+(</td><td>µ(a)^{1/3} if z>
m⁻V_{touch})⁷(itrume values
OUCHING
-{ {[π(V³a]vali
(z_{ful}=z_{touch})
ne Eqns (st
⁺t0.12F_a[(z-z
z,)
(θ_a/θ_a))[*](V_e
1 Layer Eqn
V_m-V_{touch})[*](
⁺</td><td>$\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{mouch}} / (V_{\text{crit}} - V_{\text{mouch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (V_{\text{crit}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (V_{\text{crit}} - V_{\text{touch}}) / (V_{\text{mouch}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2$</td><td>VV < Top of .
III > Vm
20 ft Interval
50 ft Interval</td></tr> | 9.83
m/s
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vering Height
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lume values) ² (
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me Eqns (sc ³ a)vut
(de/de)) [*] (V _e
d ¹ Layer Eqn ²
V _m -V _{touch}) [*] (
layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of
_{it} >V _m
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20 ft Interva
50 ft Interva | Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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rching Height
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Z _{crit} =z _{lut} +
Z _{crit} =z _{lut} +
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OUCHING
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⁺ t0.12F _a [(z-z
z,)
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V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of
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20 ft Interva
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Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} H _s
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m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
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(z _{ful} =z _{touch})
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⁺ t0.12F _a [(z-z
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V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground z _{ent} +h _g
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) =
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189.55
220.03
250.51
280.99
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341.95
352.03
372.43
402.91
433.39 | m/s s.30 meters meters rting at Too Plume Radius(m) 3.750 #N/A #N/A | 9.83
m/s
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Vert.
Vel(m/s)
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2 | fl/sec | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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Vert.
Vel(m/s)
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3.346
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3.32 | fl/sec | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of | Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} H _s
able of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) =
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738.19 | m/s meters meters meters rting at Tot Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA | 9.83
m/s
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vering Height
Vert.
Vel(m/s)
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4.06
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3. | fl/sec | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
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V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
III > Vm
20 ft Interval
50 ft Interval | Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical V
Find Height above Stack zent
Height above Ground zent+hs
Table of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
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9.83
m/s
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verting Height
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Vert(m/s)
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3.55 | fl/sec | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
III > Vm
20 ft Interval
50 ft Interval | Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
Table of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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velocity V _{erit}
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elocities stau
(meters)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
67.63
82.87
98.11
113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51
243.95
372.43
372.43
372.43
402.91
433.39
585.79
738.19
890.59
1042.99 | m/s 5.30 meters meters fing at Tot Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA | 9.83
JET
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Vert.
Vel(m/s)
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4.03
4.01
3.88
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3.80
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3.366
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2.55
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2.55 | fl/sec | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of ,
_{it} >V _m | Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground zent+hs
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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velocity V _{erit}
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Single Plut
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Interpolate
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OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{mouch}} / (V_{\text{crit}} - V_{\text{mouch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (V_{\text{crit}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (V_{\text{crit}} - V_{\text{touch}}) / (V_{\text{mouch}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 $ | VV < Top of .
III > Vm
20 ft Interval
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| 9.83
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vering Height
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3 | fl/sec | $V = \{n(V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $Single Plur,$ $V_{plume} = \{(Va)_{t.}$ $a = 0.16\{c_{t.}$ $h_{p} = \theta_{t.}(1 + (1 - 1)_{t.})_{t.}$ $V = V_{touch} + (1 - 1)_{t.}$ $Merged Plut,$ $Merged Plut,$

 | u/a) ^{1/3} if z>
m _m -V _{iouch}) ⁷ (
lume values) ² (
UUMP values) ² (
l(n(V ³ a)vut
(Z ₁ ut ⁻² touch)
me Eqns (sc ³ a)vut
(de/de)) [*] (V _e
d ¹ Layer Eqn ²
V _m -V _{touch}) [*] (
layer Eqns | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of
_{it} >V _m
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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113.35
128.59
143.83
159.07
174.31
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220.03
250.51
280.99
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 | 9.83
m/s
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rching Height
Vert.
Vel(m/s)
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2.66 | fl/sec
 | V=[n(V ³ a) ₁ ,
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V=Single p
BEFORE T
Z _{crit} = z _{lut} +
Z _{crit} =z _{lut} +
Z _{crit} =z _{lut} +
Single Plut
V _{plum} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of
_{it} >V _m
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20 ft Interva
50 ft Interva | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} H _s
able of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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128.59
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159.07
174.31
189.55
220.03
250.51
280.99
311.47
341.95
352.03
372.43
402.91 | m/s 5.30 meters meters rding at Tot Plume Radius(m) 3.750 #NVA

 | 9.83
m/s
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vertny
Vert,
Ver(m/s)
4.06
4.06
4.03
3.95
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 | $V = \{n(V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $V = V_{touch} + \{V^3a)_{t.}$ $Single Plur,$ $V_{plume} = \{(Va)_{t.}$ $a = 0.16\{c_{t.}$ $h_{p} = \theta_{t.}(1 + (1 - 1)_{t.})_{t.}$ $V = V_{touch} + (1 - 1)_{t.}$ $Merged Plut,$ $Merged Plut,$ | µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground z _{ent} +h _g
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
180.0
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402.91
433.39 | m/s s.30 meters meters rting at Too Plume Radius(m) 3.750 #N/A

 | 9.83
m/s
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vering Height
Vert.
Vel(m/s)
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4.06
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2 | fl/sec
 | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
.it=Vm
20 ft Interval | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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velocity V _{erit}
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(meters)
above stack
23.92
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341.95
352.03
372.43
402.91
433.39
585.79 | m/s 5.30 meters meters fing at Tot Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA

 | 9.83
JET
JET
JET
Vert.
Vel(m/s)
4.06
4.03
4.03
4.03
3.88
3.95
3.92
3.87
3.80
3.66
3.60
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3.53
3.346
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3.32 | fl/sec
 | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} H _s
able of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
200.0
220.0
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650.0
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700.0
800.0
1000.0
1100.0
1200.0
220.0
220.0
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220.0
220.0 | 2.996
velocity V _{erit}
JET
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elocities stal
(metors)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
49.34
49.34
67.63
82.87
98.11
113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51
280.99
311.47
341.95
352.03
372.43
402.91
433.39
738.19 | m/s meters meters meters rting at Tot Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA

 | 9.83
m/s
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vering Height
Vert.
Vel(m/s)
4.06
4.06
4.03
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3.95
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3. | fl/sec
 | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
III > Vm
20 ft Interval
50 ft Interval | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical V
Find Height above Stack zent
Height above Ground zent+hs
Table of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
160.0
180.0
220.0
240.0
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velocity V _{erit}
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elocities stack
23.92
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 | 9.83
m/s
JET
JET
JET
verting Height
Vert.
Vert(m/s)
4.06
4.06
4.03
3.95
3.92
3.87
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 | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of .
III > Vm
20 ft Interval
50 ft Interval | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack z _{ent}
Height above Ground z _{ent} +h _s
Table of MERGED Plume-Averaged Vortical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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0 | 2.996
velocity V _{erit}
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JET
elocities stau
(meters)
above stack
23.92
24.95
31.05
37.15
43.24
49.34
67.63
82.87
98.11
113.35
128.59
143.83
159.07
174.31
189.55
220.03
250.51
243.95
372.43
372.43
372.43
402.91
433.39
585.79
738.19
890.59
1042.99 | m/s 5.30 meters meters fing at Tot Plume Radius(m) 3.750 #NVA #NVA #NVA #NVA #NVA #NVA #NVA #NVA

 | 9.83
JET
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Vert.
Vel(m/s)
4.06
4.03
4.03
4.01
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 | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{m}} / (V_{\text{crit}} - V_{\text{iouch}}) / (V_{\text{m}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - z_{\text{m}} + z_{m$ | VV < Top of ,
_{it} >V _m | | | | | | | | | | | |
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| Plume Top-Hat Radius a
Vertical Velocity V
Solve for Height of CASC critical vertical
Find Height above Stack zent
Height above Ground zent+hs
able of MERGED Plume-Averaged Vertical V
Height (feet)
above ground
Begin Merging (touch) = 156.6
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velocity V _{erit}
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 | 9.83
m/s
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verting Height
Vert.
Vert(m/s)
4.06
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 | V=[n(V ³ a) ₁ ,
V=V _{icuch} +(
V=Single p
BEFORE T
Z _{crit} = Z ₁ u ₁ 4
Z _{crit} =Z ₁ u ₁ +7
Single Plut
V _{pinn} ={(Va)
a = 0.16(z-
θ _p =θ _a (1+(1)
Interpolate
V=V _{touch} +(| µ(a) ^{1/3} if z>
m ⁻ V _{touch}) ⁷ (itrume values
OUCHING
-{ {[π(V ³ a]vali
(z _{ful} =z _{touch})
ne Eqns (st
⁺ t0.12F _a [(z-z
z,)
(θ _a /θ _a)) [*] (V _e
1 Layer Eqn
V _m -V _{touch}) [*] (
⁺ | $\begin{split} & \text{ztuil} \\ z' - z_{\text{louch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (z_{\text{full}} - z_{\text{touch}}) \text{ if } z_{\text{touch}} / (V_{\text{crit}})^3 - a_m) / 0.16 \text{ if } V_{\text{erit}} - V_{\text{mouch}} / (V_{\text{crit}} - V_{\text{mouch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (V_{\text{crit}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (V_{\text{crit}} - V_{\text{touch}}) / (V_{\text{mouch}} - V_{\text{touch}}) \text{ if } V_{\text{erit}} - v_{\text{mouch}} / (2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 $ | VV < Top of .
III > Vm
20 ft Interval
50 ft Interval | | | | | | | | |
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SINGLE/Approximated Plume Average Ver Based on 88 chillers w/ 20 cells/chiller. Calc'	"Aviation Sa							
eff.diam for each chiller wiith each cell at 34" I						ditions at V	arious Heights in the Plume	,
220,110 ACFM total for each chiller).			-	-			Australia," Dr. K.T. Spilla	
Ambient Conditions:							eutral conditions (dθ/dz=0 or	
Ambient Potential Temp	θ _a 302.21	Kelvins	84.3	°F		0.3048	meters/feet	
Plume Exit Conditions:					Gravity g	9.81	m/s ²	
Stack Height	h _s 23.81	meters	78 2/12	feet-inches	λ	1.11		
Individual Chiller Stack Diameter	D 3.8621	meters	152.1	inches	λο	~1.0		
Stack Velocity V	xit 8.06	m/s	26.45	ft/sec	4Vol/(60πE	²)		
Individual Chiller Volumetric Flo	w 94.44	cu.m/sec	200,110	ACFM	$\pi V_{exit} D^2/4$			Sect.2/¶1
Stack Potential Temp	θ _s 313.32	Kelvins	104.3	°F				
Initial Stack Buoyancy Flux	Fo 10.4540	m ⁴ /s ³	20.0	ΔT(°F)	gV _{exit} D ² (1-6	$\theta_a/\theta_s)/4 = V$	ol.Flow(g/π)(1-θ _a /θ _s)	Sect.2/¶1
Plume Buoyancy Flux	F N/A	m ⁴ /s ³			λ ² gVa ² (1-θ	_a /θ _p) for a,V	,θ _p at plume height (see below	w)
Number of Chillers	n 48			2.632	Multiple St	ack Multipli	cation Factor (n ^{0.25})	
conditions at End (Top) of Jet Phase:								
Height above Stack z	Let 24.138	meters*	79.2	feet*	$z_{iet} = 6.250$). meters*=	meters above stack top	Sect.3/¶1
Height above Ground z _{jet} +		meters	157.3		-jet -:	,	······	
Vertical Velocity V				ft/sec	$V_{iet} = 0.5V_{iet}$	_{exit} = V _{exit} /2		
Plume Top-Hat Diameter 2a		meters		feet	2a _{jet} = 2D	BAIL - BAIL-	Conservation of momentum	
	jet	motoro	20.0	1001	zajet zo			
nillano Mothodology Analytical Solution	e for Calm Con	ditions for P	umo Hoight	abovo lot	Phaeo			
pillane Methodology - Analytical Solutior Single Plume-averaged Vertical Veloci						aiven by a	quations below:	
		olutions in T		si where P			crease with height	Sect.2/Eq.6
Plume Top-Hat Radius				faatt			•	
Virtual Source Height		meters*		feet*	υ.∠ວມ[1-(θ ₆	,, ds) ⊺], met	ers*=meters above stack top	Sect.2/Eq.6
Height above Ground z _v +		meters	79.5	ieet	(01)3	105 5 1	where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} =$	
Vertical Velocity		olutions in T	able Below				/) ² - (6.25D-z _v) ²]} ^(1/3) / a	Sect.2.1(6)
Product (Va	i) _o 15.289	m²/s			$V_{exit}D/2(\theta_e/$	θ _s)″∠		
ingle Chiller Results:								
Solve for plume-averaged vertical ve					meters abo	ve ground (z'+h _s)	
Gives the following Height above Stack		meters*	921.9	feet*				
Plume Top-Hat Diameter 2	a' 89.777	meters	294.5	feet	2a'=2*0.16			Sect.2/Eq.6
Vertical Velocity	V 1.040	m/s	3.41	ft/sec	V={(Va) _o ³ +	0.12F _o [(z-z	/) ² -(6.25D-z _v) ²]} ^(1/3) /(2a'/2)	Sect.2/Eq.6
Solve for Height of CASC critical vertic	al velocity V _{crit}	5.30	m/s plume-a	averaged v	ertical velo	ocity	Critical	VV < Top of
Find Height above Stack z	arit #N/A	meters	#N/A	feet	Solve for x	=(z-z _v) simu	Itaneously in both eqs. (i.e.,	Va and a)
Height above Ground z _{crit} +		meters	#N/A				ubic equation ax ³ +bx ² +cx+d=	
g						-	and b=-(0.12F _o)/(V _{crit} ³ 0.16 ³)=	-2.05
Interpolated Height of critical vertical	velocity in .let	Phase			b bre		$(V_{crit}^{3})^{2} - (V_{a})_{o}^{3} / (V_{crit}^{3})^{3} = $	-4704
Find Height above Stack z	-	meters	54.3	foot	anu u	-[0.121 0(0.	<u>http://www.17</u>	
						-1		
Height above Ground z _{crit} +	40.352	meters	132.4	ieel		give	es the real solution x = z-zv =	17.47
							or z(m/above stack) =	17.9
							z(ft/above ground) =	13
Fable of Plume Top-Hat Diameters (2a) and	-			-	d of jet ph	ase:	z(π/above ground) =	13
Height (fee	et) (meters)	Plume	SingleStk	Plume	d of jet ph	ase:	z(π/above ground) =	13
Height (fee above groun	et) (meters) nd above stack	Plume Radius(m)	SingleStk VertVel(m/s)	Plume Temp(K)	id of jet ph	ase:	z(π/above ground) =	13
Height (fee above groun <u>Stack.Rel.Ht = 78</u>	et) (meters) ad above stack .1 0.00	Plume Radius(m) 1.931	SingleStk VertVel(m/s) 8.06	Plume Temp(K)	d of jet ph	ase:		
Height (fee above groun <u>Stack.Rel.Ht = 78</u> 80	et) (meters) ad above stack 1 0.00 .0 0.57	Plume Radius(m) 1.931 1.977	SingleStk VertVel(m/s) 8.06 7.97	Plume Temp(K)	d of jet ph	ase:	Jet Phase Eqs:	20 ft Interva
Height (fed above groun Stack.Rel.Ht = 78 80 100	(meters) above stack 1 0.00 .0 0.57 .0 6.67	Plume Radius(m) 1.931 1.977 2.464	SingleStk VertVel(m/s) 8.06 7.97 6.95	Plume Temp(K)	d of jet ph	ase:	Jet Phase Eqs: Linearly interpolated from Stack Re	20 ft Interva
Height (fee above groun <u>Stack.Rel.Ht = 78</u> 80	(meters) above stack 1 0.00 .0 0.57 .0 6.67	Plume Radius(m) 1.931 1.977 2.464	SingleStk VertVel(m/s) 8.06 7.97 6.95	Plume Temp(K)	d of jet ph	ase:	Jet Phase Eqs:	20 ft Interva
Height (fed above groun Stack.Rel.Ht = 78 80 100	(meters) above stack 1 0.00 .0 0.57 .0 6.67 .0 12.76	Plume Radius(m) 1.931 1.977 2.464 2.952	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93	Plume Temp(K)	d of jet ph	ase:	Jet Phase Eqs: Linearly interpolated from Stack Re	20 ft Interva
Height (fe above grou Stack.Rel.Ht = 78 80 100 120	(meters) above stack 1 0.00 .0 0.57 .0 6.67 .0 12.76 .4 16.54	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30	Plume Temp(K)	d of jet ph	a se :	Jet Phase Eqs: Linearly interpolated from Stack Re	<mark>20 ft Interva</mark> el.Ht to Top of Je
Height (fec above groun Stack.Rel.Ht = 78 80 100 120 Single Jet 5.3 m/s Height = 132 140	(meters) above stack 1 0.000 .0 0.57 .0 6.67 .0 12.76 .4 16.54 .0 18.86	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440	SingleStk VertVel(m/s) 7.97 6.95 5.93 5.30 4.91	Plume Temp(K)	d of jet ph	a se :	Jet Phase Eqs: Linearly interpolated from Stack Ri Spillane Equations:	<mark>20 ft Interva</mark> el.Ht to Top of Je
Height (fe above groun <i>Stack.Rel.Ht = 78</i> 800 100 120 <i>Single Jet 5.3 m/s Height = 132</i>	(meters) above stack 1 0.00 0 0.57 0 6.67 0 12.76 4 16.54 0 18.86 3 24.14	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 4.03	Plume Temp(K)		a se :	Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: V _{pluma} =((Va) ₀ ^{3+0.12F_o((z-z,)²-(6.2}	<mark>20 ft Interva</mark> el.Ht to Top of Je 5D-z _v) ²]} ^{1/3} / a
Height (fed above groun Stack.Rel.Ht = 78 00 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157	(meters) above stack 1 0.00 0 0.57 0 6.67 0 12.76 4 16.54 0 18.86 3 24.14 0 24.95	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 4.03 3.91	Plume Temp(K) 306.56		a se :	$\label{eq:constraints} \begin{array}{ c c c c c } \hline \textbf{Jet Phase Eqs:} \\ \hline \textbf{Linearly interpolated from Stack Rise Spillane Equations:} \\ \hline \textbf{V}_{pluma} = (Va)_a^3+0.12F_a](z:z_v)^2-(6.2 a) \\ a = 0.16(z:z_v) \\ \theta_p = \theta_a(1+(1-(\theta_a/\theta_a))^*(V_{exit}D^2)/c) \\ \hline \textbf{Linearly observed} = 0.16(z:z_v) \\ \hline Lin$	20 ft Interva el.Ht to Top of Je 5D-z _v) ²]] ^{1/3} / a
Height (fe above groun Stack.Rel.Ht = 73 80 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160	(meters) above stack 1 0.00 .0 0.57 .0 12.76 4 16.54 .0 24.14 .0 24.95 .0 31.05	Plume Radius(m) 1.931 1.977 2.464 3.254 3.254 3.440 3.862 3.924 4.899	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 4.03 3.91 3.25	Plume Temp(K) 306.56 306.55		a se :	Jet Phase Eqs: Linearly interpolated from Stack R Spillane Equations: $V_{pluma}=(Va)_0^{3+0}.12F_d(z-z_v)^2-(6.2$ $a = 0.16(z-z_v)$ $\theta_0=\theta_0(1+(1-(a/b_0)^*)(V_{acil}D^2/(c))$ CEC Staff Equation:	20 ft Interva el.Ht to Top of Je 5D-z _v) ²]] ^{1/3} / a
Height (fe above groun Stack.Rel.Ht = 78 80 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 180 200	(meters) above stack 1 0.00 .0 0.57 .0 0.67 .0 12.76 .0 18.86 .0 24.15 .0 24.93 .0 3.105 .0 37.15	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924 4.899 5.874	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 4.03 3.91 3.25 2.82	Plume Temp(K) 306.56 306.55 305.56		a se :	$\label{eq:constraints} \begin{array}{l} \textbf{Jet Phase Eqs:} \\ \text{Linearly interpolated from Stack Re} \\ \textbf{Spillane Equations:} \\ \\ \forall_{pluma}=((\forall a)_a^3+0.12F_a](z-z_a)^2-(6.2 a=0.16(z-z_a)) \\ \\ \theta_p=\theta_a(1+(1-(\theta_a/\theta_a))^*((V_{extR}D^2/(e_{extR}D^2/(e_{extR}D^2/$	20 ft Interva el.Ht to Top of Je 5D-z _v) ²]] ^{1/3} / a
Height (fe above groun Stack.Rel.Ht = 78 60 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220	(meters) above stack 1 0.000 0 0.577 0 0.677 0 11.776 4 16.54 0 18.86 3 24.14 0 24.95 0 31.05 0 37.15 0 43.24	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 4.392 4.489 5.874 6.850	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 4.03 3.91 3.25 2.82 2.52	Plume Temp(K) 306.56 306.55 305.56 304.89		ase:	Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{pluma}=((Va)_{a}^{3}+0.12F_{a}](z-z_{v})^{2}-(6.2$ $a = 0.16(z-z_{v})$ $\theta_{p}=\theta_{a}(1+(1-(\theta_{a}/\theta_{b}))^{*}(V_{exil}D^{2}/c$ CEC Staff Equation: $V_{mp}=r_{0}^{22}V_{xp}$ Brigg's Equation:	20 ft Interva el.Ht to Top of Je 5D-z _v) ²]] ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 78 60 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 188 200 220 240	(meters) above stack above stac	Plume Radius(m) 1.931 2.464 2.952 3.254 3.440 3.460 3.862 3.924 4.899 5.874 4.6850 5.874	SingleStk VertVel(m/s) 8.06 6.95 5.93 5.30 4.91 4.03 3.91 3.25 2.82 2.22 2.52 2.31	Plume Temp(K) 306.56 306.55 305.56 304.89 304.42		ase:	$\label{eq:2.1} \begin{array}{ c c c c c c c c c c c c c c c c c c c$	20 ft Interva el.Ht to Top of Je 5D-z _v) ²]] ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 77 80 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 220 240	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.420 3.862 3.924 4.899 5.874 6.850 7.825 8.800	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 4.03 3.91 3.25 2.82 2.52 2.52 2.51 2.31 2.14	Plume Temp(K) 306.56 306.55 305.66 304.89 304.42 304.06		359:	Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{pluma}=((Va)_{a}^{3}+0.12F_{a}](z-z_{v})^{2}-(6.2$ $a = 0.16(z-z_{v})$ $\theta_{p}=\theta_{a}(1+(1-(\theta_{a}/\theta_{b}))^{*}(V_{exil}D^{2}/c$ CEC Staff Equation: $V_{mp}=r_{0}^{22}V_{xp}$ Brigg's Equation:	20 ft Interva el.Ht to Top of Je 5D-z _v) ²]] ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 78 80 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 220 220 240 220 240 220 240 220 240 220 240 220 240 220 240 260 280	(meters) above stack 1 0.000 above stack 1 0.00 0 0.57 0 0.57 0 11.57 4 16.54 0 18.86 3 24.14 0 31.05 0 31.05 0 43.24 0 43.24 0 45.543 0 55.43 0 61.53	Plume Radius(m) 1.931 2.464 2.952 3.254 3.440 3.862 3.924 4.4899 5.874 6.850 7.825 8.800 9.776	SingleStk 8.06 7.97 6.95 5.93 5.30 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.14 2.01	Plume Temp(K) 306.56 306.55 305.66 304.89 304.42 304.06 303.79			$\label{eq:2.1} \begin{array}{ c c c c c c c c c c c c c c c c c c c$	20 ft Interva el.Ht to Top of Je 5D-z _v) ²]] ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 78 60 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 260 260 260 300	(meters) above stack 1 0.000 0 0.575 0 0.677 0 116.54 4 1654 0 18.86 3 24.14 0 24.95 0 31.05 0 43.24 0 43.24 0 45.54 0 55.43 0 61.53 0 61.53 0 67.63	Plume Radius(m) 1.931 1.977 2.464 3.252 3.254 3.440 3.862 3.924 4.899 5.874 6.850 7.825 8.800 9.5.776 10.751	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90	Plume Temp(K) 306.56 305.56 305.66 304.89 304.42 304.06 303.79 303.57			$\label{eq:2.1} \begin{array}{ c c c c c c c c c c c c c c c c c c c$	20 ft Interva el.Ht to Top of Jk 5D-z _v) ²]) ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 78 60 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 240 240 240 240 240 240 24	(meters) above stack	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924 4.899 5.874 4.650 7.825 8.800 9.776 10.751 13.189	SingleStk VertVel(m/s) 8.06 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71	Plume Temp(K) 306.56 306.55 305.56 304.69 304.42 304.06 303.79 303.57 303.40		360:	Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2CEC Staff Equation:V_{mp}=n^{0.22}V_{sp}Brigg's Equation:V_{Brigg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times Lwhere F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of Jk 5D-z _v) ²]) ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 778 60 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 222 240 240 260 280 300 350 400	(meters) above stack above statick above statick <td>Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924 4.899 5.874 4.6850 7.825 8.800 9.776 10.751 13.189 15.628</td> <td>SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 3.25 2.82 2.52 2.31 2.14 2.14 2.01 1.90 1.71</td> <td>Plume Temp(K) 306.56 306.55 305.56 304.42 304.06 303.79 303.40 303.57 303.40 303.57</td> <td></td> <td></td> <td>$\label{eq:constraints} \begin{array}{ c c c c c } \hline \textbf{Jet Phase Eqs:} \\ \hline \textbf{Linearly interpolated from Stack Ro Spillane Equations:} \\ \hline \textbf{V}_{pluma} = (Va)_{0}^{3}+0.12F_{ul}(z-z_{v})^{2}-(6.2 a = 0.16(z-z_{v}) \\ \hline \textbf{\theta}_{p} = \textbf{\theta}_{s}(1+(1-(\textbf{\theta}_{ol}/\textbf{\theta}_{s}))^{*}(V_{exil}D^{2}/(c \\ \textbf{CEC Staff Equation:} \\ \hline \textbf{V}_{mp} = \textbf{n}^{0.22}V_{xp} \\ \hline \textbf{Brigg's Equation:} \\ \hline \textbf{V}_{migp's} = (2/3)\times 1.6^{(5/2)}\times F_{mp}^{(1/2)}\times t \end{array}$</td> <td>20 ft Interva el.Ht to Top of Jk 5D-z_v)²])^{1/3} / a 4V_{plume}*a²*λ²)</td>	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924 4.899 5.874 4.6850 7.825 8.800 9.776 10.751 13.189 15.628	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 3.25 2.82 2.52 2.31 2.14 2.14 2.01 1.90 1.71	Plume Temp(K) 306.56 306.55 305.56 304.42 304.06 303.79 303.40 303.57 303.40 303.57			$\label{eq:constraints} \begin{array}{ c c c c c } \hline \textbf{Jet Phase Eqs:} \\ \hline \textbf{Linearly interpolated from Stack Ro Spillane Equations:} \\ \hline \textbf{V}_{pluma} = (Va)_{0}^{3}+0.12F_{ul}(z-z_{v})^{2}-(6.2 a = 0.16(z-z_{v}) \\ \hline \textbf{\theta}_{p} = \textbf{\theta}_{s}(1+(1-(\textbf{\theta}_{ol}/\textbf{\theta}_{s}))^{*}(V_{exil}D^{2}/(c \\ \textbf{CEC Staff Equation:} \\ \hline \textbf{V}_{mp} = \textbf{n}^{0.22}V_{xp} \\ \hline \textbf{Brigg's Equation:} \\ \hline \textbf{V}_{migp's} = (2/3)\times 1.6^{(5/2)}\times F_{mp}^{(1/2)}\times t \end{array}$	20 ft Interva el.Ht to Top of Jk 5D-z _v) ²]) ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 78 60 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 240 240 240 240 240 240 24	(meters) above stack above statick above statick <td>Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924 4.899 5.874 4.6850 7.825 8.800 9.776 10.751 13.189 15.628</td> <td>SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 3.25 2.82 2.52 2.31 2.14 2.14 2.01 1.90 1.71</td> <td>Plume Temp(K) 306.56 306.55 305.56 304.42 304.06 303.79 303.40 303.57 303.40 303.57</td> <td></td> <td></td> <td>Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$</td> <td>20 ft Interva el.Ht to Top of Jk 5D-z_v)²])^{1/3} / a 4V_{plume}*a²*λ²)</td>	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924 4.899 5.874 4.6850 7.825 8.800 9.776 10.751 13.189 15.628	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 3.25 2.82 2.52 2.31 2.14 2.14 2.01 1.90 1.71	Plume Temp(K) 306.56 306.55 305.56 304.42 304.06 303.79 303.40 303.57 303.40 303.57			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of Jk 5D-z _v) ²]) ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 778 60 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 222 240 240 260 280 300 350 400	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924 4.899 5.874 6.850 9.5874 6.850 9.776 5.8840 9.776 10.751 13.189 15.628 5.828 5.824 5.828 5.824 5.825 5.824 5.825 5.825 5.824 5.825 5.8	SingleStk 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47	Plume Temp(K) 306.56 305.56 304.89 304.42 304.06 303.79 303.67 303.40 303.40 303.40 303.40 303.40 303.40			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of Jk 5D-z _v) ²]) ^{1/3} / a 4V _{plume} *a ² *λ ²)
Height (fe above groun Stack.Rel.Ht = 78 8 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 220 220 240 260 280 300 350 350 450	(meters) above stack 1 0.000 0 0.575 0 0.677 0 116.54 4 1654 0 18.86 3 24.14 0 24.95 0 31.05 0 4.324 0 4.324 0 4.55.43 0 6.76.33 0 6.76.33 0 6.76.33 0 6.76.33 0 6.76.33 0 6.76.33 0 6.76.33 0 9.81.11 0 113.35 0 128.59	Plume Radius(m) 1.931 1.977 2.464 3.252 3.254 4.340 5.874 4.899 5.874 6.850 9.5.874 6.850 9.5.874 6.850 9.5.874 6.850 9.5.874 6.850 9.5.874 6.850 9.5.874 6.850 9.5.874 6.850 9.5.765 8.800 9.5.765 8.800 9.5.765 8.800 9.5.755 8.5.755 8.5.755 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.5000 8.50000 8.50000 8.50000 8.50000000000	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40	Plume Temp(K) 306.56 305.56 304.89 304.42 304.06 303.79 303.57 303.40 303.09 302.89 302.75			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva al.Ht to Top of Jo 5D-z _v)²]) ^{1/3} / a 4V _{plume} *a ² *λ ²) (^(1/2) x z ^(-1/2)
Height (fe above groun Stack. Rel. Ht = 78 6 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 260 300 350 400 500	(meters) above stack above stac	Plume Radius(m) 1.931 1.1977 2.464 3.254 3.254 3.340 3.862 3.924 4.899 5.874 6.850 9.5874 6.850 9.776 10.751 13.189 15.628 18.066 20.505 22.943	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40	Plume Temp(K) 306.56 306.55 305.56 304.42 304.06 303.79 303.57 303.40 303.99 302.75 302.40 302.89 302.75 302.66			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva al.Ht to Top of Jo 5D-z _v)²]) ^{1/3} / a 4V _{plume} *a ² *λ ²) (^(1/2) x z ^(-1/2)
Height (fe above groun Stack. Rel. Ht = 78 6 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 240 240 240 240 240 240 240 240 24	(meters) above stack above stac	Plume Radius(m) 1.937 2.464 2.952 3.254 3.440 3.862 3.924 4.899 5.874 4.6850 7.825 8.800 9.776 10.751 13.189 15.628 18.066 20.505 5.22.943 25.381	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 5.30 4.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28	Plume Temp(K) 306.56 306.55 305.56 304.89 304.42 304.06 303.79 303.40 303.99 302.89 302.68			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva al-Ht to Top of J 5D-z _v) ²]) ^{1/3} / a 4V _{plume} *a ² *λ ² , (^(1/2) × z ^(-1/2)
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Height (fe above groun Stack. Rei. Ht = 78 6 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 240 260 300 350 400 550 600 550 600	(meters) above stack 1 0.00 0 0.57 0 0.57 0 1.276 4 16.54 0 1.886 3 24.14 0 24.95 0 31.05 0 4.324 0 4.324 0 4.324 0 4.324 0 6.76.33 0 6.15.33 0 6.15.33 0 6.15.33 0 1.13.35 0 128.59 0 128.59 0 128.59 0 143.83 0 159.07 0 174.31 0 189.55	Plume Radius(m) 1.931 1.977 2.464 3.252 3.254 4.340 5.874 6.850 9.5.754 6.850 9.5.754 6.5.554 6.5.554 6.5.554 6.5.554 6.5.555 6.2.555 6.2.555 6.2.554 6.2.555 6.2.555 6.2.554 6.2.555 6.2.555 6.2.554 6.2.555 6.2.554 6.2.555 6.2.555 6.2.554 6.2.555 6.2.555 6.2.554 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 6.2.5556 7.5556 7.55566 7.55566 7.55566 7.55566 7.55566 7.55566 7.55566	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 2.41 2.14 2.11 1.52 1.44 1.40 1.33 1.24 1.24	Plume Temp(K) 306.56 305.56 304.89 304.42 304.06 303.79 303.57 303.40 303.28 302.75 302.66 302.58 302.58 302.58 302.58			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of J 5D-z _v) ²]) ¹³ / a 4V _{plume} *a ² *λ ² ; (¹¹²) x z ⁽⁻¹²⁾ 50 ft Interva
Height (fe above groun Stack. Rel. Ht = 78 6 100 120 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 240 240 240 250 240 250 250 250 250 250 250 250 250 260 250 260 250 260 250 260 250 260 250 260 260 260 260 260 260 260 260 260 26	(meters) above stack above stac	Plume Radius(m) 1.931 1.1977 2.464 3.254 3.254 3.324 4.399 5.874 6.850 7.825 8.800 9.776 10.751 13.189 15.628 18.066 20.505 2.2943 25.381 25.381 25.381	SingleStk VertVel(m/s) 8.06 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 1.24 4.00 1.33 1.28 1.24 1.20 1.13	Plume Temp(K) 306.56 305.56 305.56 304.89 304.42 304.06 303.79 303.40 303.77 303.40 303.97 302.89 302.75 302.66 302.58 302.53 302.48			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of J 5D-z _v) ²]) ¹³ / a 4V _{plume} *a ² *λ ² ; (¹¹²) x z ⁽⁻¹²⁾ 50 ft Interva
Height (fe above groun Stack, Rel, Ht = 78 8 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 200 220 240 260 260 260 260 260 260 260 260 260 26	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.862 3.924 4.4899 5.874 6.850 7.825 8.800 9.776 10.751 13.189 15.628 18.066 20.505 22.943 25.381 27.820 3.0.258 35.135 40.012	SingleStk VertVel(m/s) 8.066 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.24 1.20 1.33 1.28 1.24 1.24 1.24 1.24 1.24 1.24 1.24 1.24	Plume Temp(K) 306.56 306.55 305.56 304.89 304.42 304.06 303.79 303.57 302.66 302.58 302.58 302.58 302.58 302.48 302.48 302.48			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of J 5D-z _v) ²]) ¹³ / a 4V _{plume} *a ² *λ ² ; (¹¹²) x z ⁽⁻¹²⁾ 50 ft Interva
Height (fe above groun Stack. Rel. Ht = 78 8 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 260 280 300 350 600 650 650 650 650 650 650 650 650 6	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 3.252 3.254 3.324 4.399 5.874 6.850 7.825 8.800 9.776 10.751 13.189 15.628 18.066 22.943 22.943 15.628 18.066 2.2.943 22.531 22.531 27.820 3.0.258 3.5.135 40.012	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 2.01 1.90 1.71 1.47 1.40 1.33 1.28 1.24 1.20 1.13 1.28 1.24 1.20 1.13 1.28 1.24 1.20 1.13 1.28 1.24 1.20 1.13 1.28 1.24 1.20 1.24 1.20 1.24 1.20 1.24 1.20 1.24 1.20 1.24 1.20 1.24 1.20 1.24 1.20 1.24 1.20 1.24 1.24 1.24 1.24 1.24 1.24 1.24 1.24	Plume Temp(K) 306.56 306.55 305.56 304.89 304.42 304.06 303.79 303.67 303.40 302.89 302.75 302.66 302.53 302.48 302.45 302.45 302.45			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of J 5D-z _v) ²]) ¹³ / a 4V _{plume} *a ² *λ ² ; (¹¹²) x z ⁽⁻¹²⁾ 50 ft Interva
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Height (fed above groun Stack, Rel, Ht = 78 8 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 200 222 240 260 260 260 260 260 260 260 260 260 26	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 3.254 3.254 3.440 3.862 3.924 4.4899 5.874 6.850 7.825 8.800 9.776 10.751 13.189 15.628 18.066 22.943 22.943 22.943 22.943 25.381 27.820 30.258 36.135 40.012 44.889 5.874 5.519	SingleStk 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 1.24 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.24 1.20 1.33 1.28 1.24 1.24 1.20 1.33 1.28 1.24 1.24 1.24 1.24 1.24 1.24 1.24 1.24	Plume Temp(K) 306.56 306.55 305.56 304.89 304.42 304.06 303.79 303.57 302.66 302.55 302.66 302.53 302.48 302.48 302.48 302.48 302.43 302.48 302.43 302.43 302.43 302.33			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of J 5D-z _v) ²]) ¹³ / a 4V _{plume} *a ² *λ ² ; (¹¹²) x z ⁽⁻¹²⁾
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Height (fed above groun Stack, Rel, Ht = 78 8 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 200 222 240 260 260 260 260 260 260 260 260 260 26	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 3.952 3.254 3.354 4.340 3.862 3.924 4.899 5.874 6.850 7.825 8.800 9.776 10.751 13.189 15.628 18.066 2.2.943 22.943 22.531 27.820 3.0.258 3.5.135 40.012 44.889 49.765 5.4.642 5.519 64.396	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.14 1.90 1.71 1.90 1.71 1.47 1.40 1.33 1.28 1.24 4.20 1.13 1.57 1.47 1.40 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.35 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.20	Plume Temp(K) 306.56 306.55 305.56 304.89 304.42 304.06 303.79 303.67 302.89 302.75 302.66 302.53 302.48 302.53 302.48 302.45 302.45 302.45 302.45 302.40 302.32 302.30 302.32 30			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of J 5D- z_v) ²]) ^{1/3} / a 4 V_{plume} * a^2 * λ^2 $a^{(+12)}$ x $z^{(+12)}$ 50 ft Interva
Height (fed above groun Stack. Rel. Ht = 78 6 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 260 260 260 260 260 260 260 260 260 26	(meters) above stack 1 0.000 1 0.000 0 0.575 0 0.577 0 0.577 0 16.54 1 16.54 0 18.86 3 24.14 0 24.95 0 31.05 0 43.24 0 43.24 0 43.24 0 43.24 0 43.24 0 43.24 0 43.24 0 43.32 0 67.63 0 113.35 0 128.59 0 143.83 0 143.83 0 220.03 0 220.03 0 220.03 0 220.03 0 220.03 0 220.03 0 220.03 0 220.03 <td>Plume Radius(m) 1.931 1.977 2.464 3.252 3.254 4.340 5.874 6.850 9.5.874 9.5.874 6.850 9.5.8744 9.5.874 9.5.8744 9.5.8744 9.5.8</td> <td>SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.20</td> <td>Plume Temp(K) 306.56 305.56 304.89 304.42 304.06 303.79 303.57 303.40 303.29 302.89 302.75 302.66 302.58 302.48 302.45 302.43 302.43 302.40 302.28 302.43 302.42 302.43 302.43 302.42 302.45 302.40 302.28 302.45 30</td> <td></td> <td></td> <td>Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$</td> <td>20 ft Interva el.Ht to Top of J 5D-z,y²))¹⁰ / a 4V_{plume}*a²*λ²; 50 ft Interva 100 ft Interva</td>	Plume Radius(m) 1.931 1.977 2.464 3.252 3.254 4.340 5.874 6.850 9.5.874 9.5.874 6.850 9.5.8744 9.5.874 9.5.8744 9.5.8744 9.5.8	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.20	Plume Temp(K) 306.56 305.56 304.89 304.42 304.06 303.79 303.57 303.40 303.29 302.89 302.75 302.66 302.58 302.48 302.45 302.43 302.43 302.40 302.28 302.43 302.42 302.43 302.43 302.42 302.45 302.40 302.28 302.45 30			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of J 5D-z,y ²)) ¹⁰ / a 4V _{plume} *a ² *λ ² ; 50 ft Interva 100 ft Interva
Height (fed above groun Stack.Rel.Ht = 78 6 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 240 260 260 260 260 260 260 260 260 260 26	(meters) above stack above stac	Plume Radius(m) 1.931 1.1.977 2.464 3.254 3.254 3.324 4.399 5.874 6.850 7.825 8.800 9.776 10.751 13.189 15.628 18.066 20.505 22.943 25.381 27.820 30.258 3.5135 40.012 44.889 48.765 54.642 55.519 64.396 66.273 93.657	SingleStk VertVel(m/s) 8.066 7.97 6.95 5.93 5.30 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 3.1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.24 1.20 1.33 1.28 1.24 1.24 1.24 1.24 1.24 1.24 1.24 1.24	Plume Temp(K) 306.56 306.55 305.56 304.89 304.42 304.06 303.79 303.40 302.68 302.68 302.68 302.68 302.48 302.48 302.40 302.48 302.40 302.33 302.42 302.30 302.29 302.29 302.29			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of Jd 5D-z,v ²]) ^{1/3} / a 4V _{plume} *a ² *λ ²) 50 ft Interva
Height (fed above groun Stack. Rel. Ht = 78 (100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 200 222 240 260 260 260 260 260 260 260 260 260 26	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 3.254 3.254 3.440 3.862 3.324 4.4899 5.874 6.850 9.776 10.751 13.189 15.628 3.2243 22.531 22.635 22.943 22.531 27.820 30.258 35.135 40.012 44.889 49.765 5.54.642 5.54.642 5.5519 64.396 69.273 3.9.3657 118.041	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 1.24 4.201 1.93 1.75 1.47 1.40 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.35 1.20 1.35 1.20 1.20 1.20 1.20 1.20 1.20 1.20 1.20	Plume Temp(K) 306.56 305.56 304.89 304.42 304.06 303.79 303.77 303.40 302.89 302.75 302.66 302.53 302.48 302.43 302.43 302.43 302.43 302.43 302.43 302.43 302.25			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of Jc 5D-z, 2]] ^{1/3} / a 4V _{plume} *a ²⁺ λ ²) 50 ft Interva 100 ft Interva
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Height (fed above groun Stack.Rel.Ht = 78 6 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 240 260 260 300 350 350 350 350 350 350 350 350 35	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 3.252 3.254 4.340 3.862 3.924 4.899 5.874 6.850 9.5.874 6.850 9.5.874 6.850 9.5.874 6.850 9.7.76 10.751 13.189 15.628 8.800 9.776 5.2.943 12.5.931 22.5.381 22.5.381 22.5.381 25.381 25.381 25.381 25.381 25.381 25.381 2.4.889 40.012 24.4.889 40.765 5.5.159 5.5.159 40.025 3.5.351 40.012 44.889 49.765 5.5.4.642 5.5.519 40.627 3.9.567 118.0411	SingleStk VertVel(m/s) 8.06 7.97 6.95 5.93 4.91 4.03 3.91 3.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 2.01 1.90 1.71 1.47 1.40 1.33 1.28 2.01 1.90 1.71 1.47 1.40 1.33 1.28 2.01 1.90 0.171 0.94 0.092 0.89 0.81 0.75 0.92 0.89 0.81 0.757 0.94 0.92 0.89 0.81 0.757 0.94 0.92 0.89 0.81 0.757 0.94 0.92 0.89 0.81 0.757 0.94 0.92 0.92 0.92 0.92 0.92 0.92 0.92 0.92	Plume Temp(K) 306.56 305.56 304.89 304.42 304.06 303.79 303.57 303.40 303.28 302.75 302.66 302.58 302.48 302.45 302.45 302.45 302.45 302.45 302.45 302.45 302.45 302.23 302.32 302.32 302.32 302.32 302.32 302.225 302.24 302.25 302.24 302.27 302.25 302.24 302.30 302.25 302.24 302.30 302.25 302.32 302.22 3			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of Jc 5D-z, 2]] ^{1/3} / a 4V _{plume} *a ²⁺ λ ²) (^{1/2}) x z ^(-1/2) 50 ft Interva
Height (fed above groun Stack. Rel. Ht = 78 8 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 200 220 240 260 260 260 260 260 260 260 260 260 26	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 2.952 3.254 3.440 3.822 4.3.440 5.874 6.850 7.825 8.800 9.776 10.751 13.189 15.628 18.066 22.943 25.381 27.820 30.258 35.135 40.012 44.889 49.765 54.642 59.519 64.396 69.273 93.657 118.041 142.425 516.6809 9191.193	SingleStk VertVel(m/s) 8.066 5.93 5.30 4.91 4.03 3.91 4.03 3.91 4.03 3.91 4.03 1.25 2.82 2.52 2.31 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.20 1.33 1.28 1.24 1.24 1.20 1.33 1.28 1.24 1.24 1.20 1.33 1.28 1.24 1.24 1.20 1.33 1.28 1.24 1.24 1.24 1.24 1.24 1.24 1.24 1.24	Plume Temp(K) 306.56 306.55 305.56 304.89 304.42 304.06 303.79 303.67 302.66 302.68 302.68 302.68 302.48 302.48 302.40 302.28 302.40 302.23 302.30 302.22 302.30 302.22 302.22 302.22 302.22 302.22			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	20 ft Interva el.Ht to Top of Jc 5D-z, 2]] ^{1/3} / a 4V _{plume} *a ²⁺ λ ²) (^{1/2}) x z ^(-1/2) 50 ft Interva
Height (fed above groun Stack. Rel. Ht = 78 6 100 122 Single Jet 5.3 m/s Height = 132 140 Top of Single jet = 157 160 180 200 220 240 240 260 260 300 350 350 350 350 350 350 350 350 35	(meters) above stack above stac	Plume Radius(m) 1.931 1.977 2.464 3.254 3.254 3.324 4.899 5.874 6.850 9.5776 10.751 13.189 15.628 18.066 22.943 22.943 22.331 27.820 30.258 3.5135 40.012 44.889 49.765 5.4.642 5.519 64.396 64.396 69.273 39.3657 118.041 142.425	SingleStk VertVel(m/s) 8.06 5.93 5.30 4.91 4.03 3.91 3.25 2.82 2.32 2.31 2.14 2.14 2.01 1.90 1.71 1.57 1.47 1.40 1.33 1.28 2.01 1.90 1.71 1.47 1.40 1.33 1.28 1.24 1.20 1.33 1.28 2.01 1.90 1.75 0.70 0.94 0.92 0.89 0.81 0.75 0.70 0.64 0.61	Plume Temp(K) 306.56 305.56 304.92 304.06 303.79 303.77 303.40 302.89 302.75 302.48 302.45 302.45 302.45 302.45 302.43 302.45 302.43 302.45 302.43 302.45 302.43 302.25 302.24 302.22 302.22 302.22			Jet Phase Eqs: Linearly interpolated from Stack Ro Spillane Equations: $V_{plum}=[(Va)_o^3+0.12F_a](z-z_v)^2-(6.2 a = 0.16(z-z_v) \theta_p=\theta_a[1+(1-(\theta_a/\theta_b))^*(V_{exit}D^2/(c))^2(z-z_v)^2)^2(z-z_v)^2)$ CEC Staff Equation: $V_{mp}=n^{0.22}v_{sp}$ Brigg's Equation: $V_{Bergg's} = (2/3) \times 1.6^{1/2} \times F_{mp}^{-1/2} \times L$ w here $F_{mp} = nF_{sp}$	<mark>20 ft Interva</mark> el.Ht to Top of Je 5D-z _v) ²]] ^{1/3} / a 4V _{plume} *a ² *λ ²)

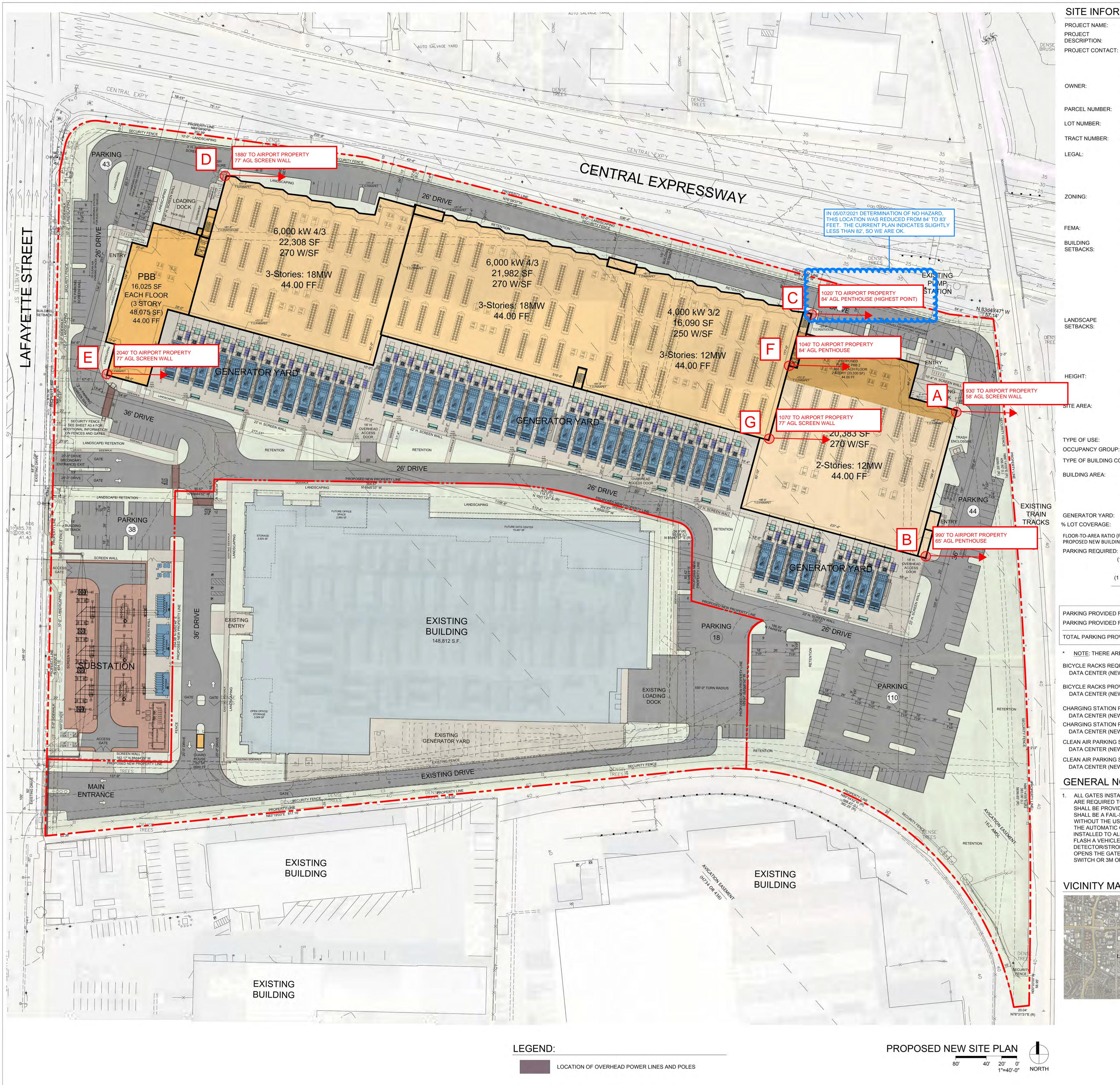


			ioyant Plumes					
	"The Evalua						/arious Heights in the Merg	
Ambient Conditions:		Plume	from Two Gas				, Queensland, Australia ," [
Ambient Conditions: Ambient Potential Temp θ_a	302.21	Kelvins	84.3		Constants:		eutral conditions (dθ/dz=0 or meters/feet	$\theta_a = \theta_e$
Plume Exit Conditions:	502.21	Renalities	04.0		Gravity g		m/s ²	
Stack Height hs	23.81	meters	78 2/12	feet-inches	λ	1.11		
Individual Stack Diameter D	3.86213661	meters	152.1	inches	λο	~1.0		
Stack Velocity V _{exit}	8.06			ft/sec	4Vol/(60πE	²)		
Individual Volumetric Flow		cu.m/sec	200,110		πV _{exit} D ² /4			Sect.2/¶1
Stack Potential Temp 0s		Kelvins	104.3		D2(4.4			0
Initial Stack Buoyancy Flux F _o Plume Buoyancy Flux F		m ⁴ /s ³ m ⁴ /s ³	20.0	ΔT(°F)			ol.Flow(g/π)(1-θ _a /θ _s) ,θ _p at plume height (see belo	Sect.2/¶1
Total Number of Stacks n	48				x gva (1-0	_a /o _p /ior a,v	, op at plume height (see belo	
Average Adjacent Stack Separation d		meters	53.5	feet	Calcs base	d on multipl	e plume treatment in Peter Be	st Paper:
Number of Stacks along Orientation N	3						used by N ^{0.25} at the height when	
					fully merge	d (interp. be	low ht, single merged stack a	bove ht)
Conditions at End (Top) of Jet Phase:								
Height above Stack z _{jet}		meters*		feet*	$z_{jet} = 6.25E$), meters*=	meters above stack top	Sect.3/¶1
Height above Ground z _{jet} +h _s		meters	157.3		$\lambda = 0.5 \lambda$	- 1/ /2		
Vertical Velocity V _{jet} Plume Top-Hat Diameter 2a _{jet}	4.031 7.724	m/s meters		ft/sec feet	$V_{jet} = 0.5V_{s}$ $2a_{jet} = 2D$	$e_{xit} = V_{exit}/2$	Conservation of momentum	
Fighter top-hat Diameter zajet	1.124	meters	20.0	1001	zajet – zo		Conservation of momentum	
Spillane Methodology - Analytical Solutions	for Calm Con	ditions for	Plume Height	s above Je	tand Mero	ing Phase	s	
Single Plume-averaged Vertical Velocity			-		-	-		
Single Plume Values: Plume Top-Hat Radius a			e Merging On				r increase with height	Sect.2/Eq.6
Virtual Source Height z _v		meters*		feet*], meters*=meters above stack top	
Height above Ground z_v + h_s		meters		feet			where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} =$	
Single Plume Values: Vertical Velocity V			e Merging On	У			/) ² - (6.25D-z _v) ²]} ^(1/3) / a	Sect.2.1(6)
Product (Va)。	15.289	m²/s			V _{exit} (D/2)(θ	e/θs)'' [∠]		
Plume Merging - Passed on Simple Plume - 2-1	culation - ···	oro:						Sect 2/42
Plume Merging - Based on Single Plume Cal Begin Merging Plume Top-Hat Diameter 2atouch		ere: meters	53 F	feet	2a _{touch} =d, (or arms = d/	2)	Sect.3/¶3
Height above Stack ztouch		meters*	168.6				z) meters*=meters above stack	top
Height above Ground ztouch+hs		meters	246.8			, <i>-</i>),		
Vertical Velocity Vtouch	2.244	m/s	7.4	ft/sec	V _{touch} = {(V	a)₀ ³ + 0.12	$F_{o} [(z-z_v)^2 - (6.25D-z_v)^2]^{(1/3)}$	/a
Total Merging Plume Top-Hat Diameter 2a _{full}	32.620	meters	107.0	feet	2a _{full} =2d(N-	-1)/2, (or a _f	ul=d(N-1)/2) FOR 2 STACKS,	2a _{full} =2d
Height above Stack z _{full}	102.369		335.9		$z_{full} = z_v + 2$	d/(2*0.16),	meters*=meters above stack	top
Height above Ground z _{full} +h _s	126.183		414.0			2		
Vertical Velocity V _{full}	1.542		5.1	ft/sec	V _{full} = {(Va) _o 3 + 0.12F,	$[(z_{full}-z_v)^2 - (6.25D-z_v)^2]^{(1/3)}$	/ a _{full}
Product (V ³ a) _{full}		m ⁴ /s ³	in Man			(has a d a m 7		
Conditions at End (Top) of Merging Phase - D Merged Plume Values: Plume Diameter 2a			Table Below	jed Plume c			z _{full})), or linear increase with I	neight
Revised Merged Plume Radius am		meters	140.8	feet			here Total Merging Occurs	leight
Revised Merged Plume Velocity Vm	4.058			ft/sec			here Total Merging Occurs	
Revised Virtual Source Height zfull		meters*	335.9				ere Total Merging Occurs (sh	own above)
Revised Vertical Velocity V	S	olutions in	Tables Below				eights above total merging ele	
					V=V _{touch} +(√m-V _{touch})*(z-z _{touch})/(z _{full} -z _{touch})	
Multiple Plume Calculations							for heights below total mergi	ng elevation
Solve for plume-averaged vertical veloc					meters abo		z+h _s)	
Gives the following Height above Stack z		meters*	921.9		REGULAR			
Plume Top-Hat Radius a Vertical Velocity V	71.509 3.424	meters	234.6	ft/sec	a=a _m +0.16 V={n(V ³ a) _{ft}			
Venical Velocity V	3.424	111/5	11.23	il/sec			z'full z'-z _{touch})/(z _{full} -z _{touch}) if z_{touch}∢	7<7
							if z <ztouch< td=""><td></td></ztouch<>	
Solve for Height of CASC critical vertical	velocity V _{crit}	5.30	m/s		BEFORE T			VV < Top of
Find Height above Stack z _{crit}	JET	meters	JET	feet	z _{crit} = z _{full} +	⊦ {[n(V³a) _{ful}	/(V _{crit}) ³]-a _m }/0.16 if V_{crit}<v< b="">_m</v<>	
Height above Ground z _{crit} +hs	JET	meters	JET	feet	z _{crit} =z _{touch} +	(Zfull=Ztouch)	*(Vcrit-Vtouch)/(Vm-Vtouch) if Vc	rit>Vm
Table of MERGED Plume-Averaged Vertical \				:		, ,	ee Single Plume spreadsheet)
Height (feet)							_v) ² -(6.25D-z _v) ²]} ^{1/3} / a	
above ground					a = 0.16(z - 0.1)		$D^2/(4)/(4n^2 + n^2 + h^2))$	
Begin Merging (touch) = 246.8 260.0	51.41 55.43				Herpolate		$x_{xit}D^2/(4V_{plume}*a^{2*}\lambda^2)))$	20 ft Interval
280.0	61.53						z'-z _{touch})/(z _{full} -z _{touch})	
300.0	67.63							
320.0	73.72							
340.0	79.82							
360.0								
380.0	92.01							
400.0	98.11				140000 1 7			
End Merging (full/mp) = 414.0	102.37				Merged Plu $M = (p(M^3 c))$			50 ft lat
450.0 500.0	113.35 128.59				V={n(V ³ a) _{ft} a=a _m +0.16			50 ft Interval
550.0	128.59				a-a _m +0.10	(⊷-~ruil)		
600.0	159.07							
650.0	174.31							
700.0	189.55							100 ft Interva
800.0	220.03							
900.0	250.51							
1000.0								
	311.47							
1100.0								
1100.0 1200.0	341.95		3.22					
1100.0 1200.0 1300.0	372.43							
1100.0 1200.0 1300.0 1400.0	372.43 402.91	91.016						
1100.0 1200.0 1300.0 1400.0 1500.0	372.43 402.91 433.39	91.016 95.893	3.10					500 ft Interva
1100.0 1200.0 1300.0 1400.0 1500.0 2000.0	372.43 402.91 433.39 585.79	91.016 95.893 120.277	3.10 2.88					500 ft Interva
1100.0 1200.0 1300.0 1400.0 1500.0 2000.0 2500.0	372.43 402.91 433.39 585.79 738.19	91.016 95.893 120.277 144.661	3.10 2.88 2.71					500 ft Interva
1100.0 1200.0 1300.0 1400.0 1500.0 2000.0 2500.0 3000.0	372.43 402.91 433.39 585.79 738.19 890.59	91.016 95.893 120.277 144.661 169.045	3.10 2.88 2.71 2.57					500 ft Interva
1100.0 1200.0 1300.0 1400.0 1500.0 2000.0 2500.0 3500.0 3500.0	372.43 402.91 433.39 585.79 738.19 890.59 1042.99	91.016 95.893 120.277 144.661 169.045 193.429	3.10 2.88 2.71 2.57 2.46					500 ft Interv
1100.0 1200.0 1300.0 1400.0 1500.0 2000.0 2500.0 3000.0	372.43 402.91 433.39 585.79 738.19 890.59	91.016 95.893 120.277 144.661 169.045 193.429 217.813	3.10 2.88 2.71 2.57 2.46 2.36					500 ft Interv



MERGED (along width) Plume Average Vertic			ioyant Plumes					
	"The Evalua	tion of Max	rimum Updraft	Speeds for	r Calm Cond	ditions at \	arious Heights in the Merg	ed
		Plume	from Two Gas				, Queensland, Australia ," I	
Ambient Conditions:					Constants:		eutral conditions (dθ/dz=0 or	$\theta_a = \theta_e$)
Ambient Potential Temp θ _a Plume Exit Conditions:	302.21	Kelvins	84.3	-1-	Gravity g		meters/feet m/s ²	
Stack Height h.	23.81	meters	78 2/12	feet-inches	διανιτγιάς	1.11	m/s	
Individual Stack Diameter D	3.86213661			inches	λο	~1.0		
Stack Velocity Vexit	8.06			ft/sec	4Vol/(60πD			
Individual Volumetric Flow	94.44	cu.m/sec	200,110		$\pi V_{exit} D^2/4$,		Sect.2/¶1
Stack Potential Temp θ _s		Kelvins	104.3					
Initial Stack Buoyancy Flux Fo	10.45	m ⁴ /s ³	20.0	ΔT(°F)	gV _{exit} D ² (1-0	$_{a}/\Theta_{s})/4 = V$	ol.Flow(g/π)(1-θ _a /θ _s)	Sect.2/¶1
Plume Buoyancy Flux F	N/A	m ⁴ /s ³			$\lambda^2 g V a^2 (1 - \theta_a$	/θ _p) for a,V	$, \theta_p$ at plume height (see belo	w)
Total Number of Stacks n	48							
Average Adjacent Stack Separation d	7.50	meters	24.6	feet			e plume treatment in Peter Be	
Number of Stacks along Orientation N	16						sed by N ^{0.25} at the height whe	
					fully merged	d (interp. be	low ht, single merged stack a	bove ht)
Conditions at End (Top) of Jet Phase:								
Height above Stack z _{jet}		meters*		feet*	z _{jet} = 6.25D	, meters*=	meters above stack top	Sect.3/¶1
Height above Ground z _{jet} +hs		meters	157.3			- 1/ /0		
Vertical Velocity V _{jet}	4.031 7 724	m/s meters	13.22 25.3	ft/sec	$V_{jet} = 0.5V_e$ $2a_{jet} = 2D$	$x_{it} = v_{exit}/2$	Conservation of momentum	
Plume Top-Hat Diameter 2a _{jet}	7.724	meters	25.3	teet	2a _{jet} = 2D		Conservation of momentum	
aillean Mathadalam, Analytical Calutions			Diverse Lisienhé			na Dhasa		
Spillane Methodology - Analytical Solutions								
Single Plume-averaged Vertical Velocity Single Plume Values: Plume Top-Hat Radius a			e Merging Onl				r increase with height	Sect.2/Eq.6
		meters*					r increase with neight , meters*=meters above stack top	
Virtual Source Height z _v Height above Ground z _v +h _s		meters*	1.4 79.5	feet*	$z_v = 0.25D[$	1-(0e/0s)"*	, meters*=meters above stack top where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} =$	
Height above Ground z _v +h _s Single Plume Values: Vertical Velocity V			79.5 Merging Onl		$(1/2)^{3} + 0$	12E [/~ -	where $(\theta_a/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} = (\theta_e/\theta_s)^{1/2} = (0.25D-z_v)^2 + $	0.9821 Sect.2.1(6)
				,	$\{(Va)_0^0 + 0.0^0 + 0.0^0\}$ $V_{exit}(D/2)(\theta_e)$, - (0.∠0D-∠v)]},, / a	JEUL2. 1(D)
Product (Va)。	15.289	rn /s			v _{exit} (D/2)(θ _e	//ðs)		
Plume Merging - Record on Single Plum- 2-1	culations wh	ere:						Sect.3/¶3
Plume Merging - Based on Single Plume Cal		ere: meters	24.6	feet	29	or a''	2)	3801.3/113
Begin Merging Plume Top-Hat Diameter 2atouch Height above Stack Z					2a _{touch} =d, (d		2) meters*=meters above stack	top
Height above Stack z _{touch}		meters* meters	78.3 156.4		$z_{touch} = z_v +$	ur (2 U. 10),	meters -meters above stack	. top
Vertical Velocity V _{touch} +n _s	47.683			ft/sec	$V_{i} = i \Omega I$	a) $^{3} + 0.12$	F _o [(z-z _y) ² - (6.25D-z _y) ²]} ^(1/3)	/a
Total Merging Plume Top-Hat Diameter 2a _{full}	4.071		369.1				li=d(N-1)/2) FOR 2 STACKS	
Height above Stack z _{full}	351,994		1154.8				meters*=meters above stack	
Height above Stack 2 _{full} +h _s	375.808		1233.0		$-tull - Z_V + Z_0$	ur (2 0.10),	motors above stack	.op
Vertical Velocity V _{full}	0.961			ft/sec	$V_{\ell,n} = I(V_{\ell})$	$^{3} \pm 0.12E$	$[(z_{full}-z_v)^2 - (6.25D-z_v)^2]$	1.90.0
Product (V ³ a) _{full}		m ⁴ /s ³	0.2	10360	vruii – ((va)	0 . 0.1210	[(210-20) - (0.230-20)]]	
Conditions at End (Top) of Merging Phase - D			and a in Mero	ed Plume c	alculations (hased on T	OTAL number of stacks):	
Merged Plume Values: Plume Diameter 2a			Table Below				z _{full})), or linear increase with	height
Revised Merged Plume Radius am	148.058		485.8	feet			here Total Merging Occurs	loight
Revised Merged Plume Velocity Vm	2.529			ft/sec			here Total Merging Occurs	
Revised Virtual Source Height z _{full}	351.994		1154.8				ere Total Merging Occurs (sl	nown above)
Revised Vertical Velocity V			Tables Below	1001			eights above total merging el	
							z-z _{touch})/(z _{full} -z _{touch})	
Multiple Plume Calculations					· touch · (*	touch/ (for heights below total mergi	ng elevation
Solve for plume-averaged vertical veloc	ity at height	1,000.0	feet	304.8	meters abo	ve ground (
Gives the following Height above Stack z	280.986		921.9				MERGING PHASE-INTERPO	DLATE
Plume Top-Hat Radius a		meters	#N/A		a=a _m +0.16(
Vertical Velocity V	2.863			ft/sec	V={n(V ³ a) _{fu}			
							z'-ztouch)/(zfull-Ztouch) if ztouch	<z<zfull< td=""></z<zfull<>
					V'=single pl			
Solve for Height of CASC critical vertical	velocity V _{crit}	5.30	m/s		BEFORE T			VV < Top of Jet
Find Height above Stack z _{crit}	JET	meters	JET	feet	$z_{crit} = z_{full} +$	{[n(V ³ a) _{full}	/(V _{crit}) ³]-a _m }/0.16 if V _{crit} <v<sub>m</v<sub>	
Height above Ground z _{crit} +h _s		meters	JET	feet			*(V _{crit} -V _{touch})/(V _m -V _{touch}) if V _c	rit>Vm
						.ouolly		
Table of MERGED Plume-Averaged Vertical \	/elocities sta	rting at Tou	uching Height:		Single Plun	ne Eqns (s	e Single Plume spreadshee	9
Height (feet)	(meters)	Plume	Vert.				,) ² -(6.25D-z _v) ²]} ^{1/3} / a	
above ground	above stack				a = 0.16(z-z			
Begin Merging (touch) = 156.4	23.86	3.750	4.07				_{xit} D²/(4V _{plume} *a²*λ²)))	
160.0	24.95	#N/A	4.07		Interpolated			20 ft Intervals
180.0	31.05						z'-z _{touch})/(z _{full} -z _{touch})	
200.0	37.15							
220.0	43.24	#N/A	3.98					
240.0	49.34	#N/A	3.95					
260.0	55.43	#N/A	3.92					
300.0	67.63	#N/A	3.87					50 ft Intervals
350.0	82.87	#N/A	3.79					
400.0	98.11							
450.0	113.35							
500.0	128.59							
550.0	143.83	#N/A						
600.0	159.07	#N/A						
650.0	174.31	#N/A						
700.0	189.55							
750.0	204.79							
800.0	220.03							100 ft Intervals
850.0	235.27	#N/A						
900.0	250.51	#N/A						
950.0	265.75							
1000.0	280.99	#N/A	2.86					
1100.0	311.47	#N/A	2.72					
1200.0	341.95							
End Merging (full/mp) = 1233.0	352.00				Merged Plu	me Eqns		
1300.0	372.43		2.51		V={n(V ³ a) _{ful}			
1500.0	433.39		2.46		a=a _m +0.16(
	585.79	185.465				,		500 ft Intervals
2000.0								
2000.0 2500.0	738.19	209.849	2.25					
	738.19 890.59							
2500.0		234.233						
2500.0 3000.0	890.59	234.233 258.617	2.17 2.10					





RMATION:					
2825 LAFAYETTE STREET NEW DATA CENTER					
T: CHAD MENDELL ENVIRONMENTAL SYSTEMS DES 233 SOUTH WACKER DRIVE, SUIT CHICAGO, ILLINOIS 60606	-				
312-372-1200 DIGITAL LAFAYETTE, LLC		DIC	GITAL	REA	LTY
2825 LAFAYETTE STREET SANTA CLARA, CA 95050-2627 NORTH PARCEL: 224-04-093			Data Cente		
NORTH PARCEL: 224-04-093 SOUTH PARCEL: 224-04-094 NORTH PARCEL: LOT 2					
SOUTH PARCEL: LOT 1 NORTH PARCEL: 93 SOUTH PARCEL: 94					
BOUNDED BY CENTRAL EXPRES		282	25 LAFAY	ETTE S	TREET
STREET (SITE) AND RAILROAD T 2805 LAFAYETTE STREET (DLR) SANTA CLARA: 1.78M POPULATIO TAX ASSESSOR'S PARCEL NUME	RACKS TO THE EAST, AND TO THE SOUTH COUNTY OF ON (2010 CENSUS)		SANTA C	김 아이지 않는 것	
MH - HEAVY INDUSTRIAL PROCESSING AND STORAGE USI	ES PERMITTED	MEP EN	IGINEER		
(MH - ZONING ORD 18.50.030) COMMERCIAL STORAGE AND WH	IOLESALE DISTRIBUTION				1
NORTH PARCEL: FLOOD ZONE X SOUTH PARCEL: FLOOD ZONE AF FRONT YARD 15'-0"	ł		E.		ノ
EACH LOT SHALL HAVE A ST OF NOT LESS THAN FIFTEEN		Er	nvironmental S	ystems Desi	ign, Inc.
SIDE YARD 15'-0" THE STREET SIDE YARD OF EXCLUSIVE OF THE FRONT Y		2		llinois 60606	
THAN FIFTEEN (15) FEET IN E REAR YARD 0'-0"				72.1200 Iglobal.com Io. 184-0008	92 IL
SETBACK ADJACENT TO NOI YARD FRONT, SIDE YARDS 10'-0"	N-RESIDEN HAL O' RÉAR	_			
A MINIMUM OF TEN FEET OF AND STREET SIDE YARDS, E	XCLUSIVE OF	ARCHIT	ECT		
CITY-PERMITTED DRIVEWAY DEVELOPED INTO AND PERM OPEN LANDSCAPED AREAS APPROVAL OF THE DIRECTO INSPECTION.	MANENTLY MAINTAINED AS SUBJECT TO THE			15	5
70 FT MAX HEIGHT (ZONING ORE MECH AND PARAPETS CAN BE F (ZONING ORD. 18.64.010). VARIAN ON FAA REGULATIONS.	PLACED ABOVE THIS BLE MAX. HEIGHT BASED		TURAL ENGINEER		
NORTH PARCEL: SOUTH PARCEL: TOTAL:	691,526.384 S.F. 299,683.550 S.F. 991,209.934 S.F. (22.755 ACRES)	STR	OPLES A		
P: BUSINESS GROUP B (CHA CONSTRUCTION: TYPE 2B (OFFICE/ DATA CENTER PTER 3, SECTION 304) FULLY SPRINKLERED) HAPTER 6, TABLE 601)		imley	»He	orn
EXISTING BUILDING - 2805: DATA CENTER:	148,812 S.F.				
NEW BUILDING - 2825: DATA CENTER:	575,401 S.F.				
TOTAL:	724,213 S.F. 108,631 S.F.				
(209 869/	30 % 691,526.384 = 0.3034)				
(1 SPACE PER 4,000 S.F.) (575,401 S.F TOTAL PARKING REQUIRED: DATA CENTER (NEW): (14 D FOR BUILDING 2805: D FOR BUILDING 2825:	182 SPACES 44 + 38 = 182 SPACES) 76 SPACES 177 SPACES				
OVIDED:	253 SPACES				
RE 0 COMPACT PARKING STALLS ON QUIRED:	I THIS SITE.				
EW): (CLASS 1 - 5% OF 182 PARKING (CLASS 2 - 5% OF 182 PARKING					
OVIDED: EW):	CLASS 1 = 10 RACKS CLASS 2 = 10 RACKS				
N PARKING SPACES REQUIRED: EW): (6% OF 182 PARKING S N PARKING SPACES PROVIDED: EW):	STALLS) = 11 SPACES 11 SPACES				
S SPACES REQUIRED: EW): (8% OF 182 PARKING S	STALLS) = 15 SPACES				
B SPACES PROVIDED: EW):	15 SPACES				
NOTES:					
TALLED ON DESIGNATED FIRE DEPAR TO ELECTRICALLY AUTOMATIC POW /IDED WITH AN EMERGENCY BATTER L-SAFE DESIGN, ALLOWING THE GAT JSE OF SPECIAL KNOWLEDGE OR EG C GATES A DETECTOR/STROBE SWIT ALLOW EMERGENCY VEHICLES (E.G., LE MOUNTED STROBE LIGHT TOWAR ROBE SWITCH, WHICH IN TURN OVER TE. THE GATES SHALL BE EQUIPPED OPTICOM DETECTOR TO FACILITATE	VERED GATES. GATES AY POWER SUPPLY, OR E TO BE PUSHED OPEN OUIPMENT. TO CONTROL TCH SHALL BE , FIRE, POLICE, EMS) TO DS THE RIDES THE SYSTEM AND WITH A TOMAR STROBE				
AP					
		2	PCC ISSI		06.19.20
et i	Answers Noted S To 2 control for the the second s	NO.	RECO		DATE
SITE	Di Pa Lamana Aligo me u Li ra chi Sa construit di Manazia Le vi andreasia Construit di Manazia Le vi andreasia Construit di Manazia Construit di Manazia Construit di Manazia Construit di Manazia Construit di Manazia		MASTE	R PLAN	
			PROPOS		w
	N.T.S.		SITE	PLAN	
	NORTH	PRINCI MC	PAL IN CHARGE	PROJECT N C190280	NUMBER
			CT MANAGER	DATE 06/19/2020	
		1	CT ENGINEER	SHEET NU	MBER
		SCALE AS NOT			1.1
			Copyright © 2019	by Environmental	Systems Design, I



Mail Processing Center Federal Aviation Administration Southwest Regional Office Obstruction Evaluation Group 10101 Hillwood Parkway Fort Worth, TX 76177

Issued Date: 05/07/2021

Digital Realty Rafal Rak 9355 Grand Avenue Franklin Park, IL 60131

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning: The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C.,

	Heights:	Longitude:	Latitude:	Location:	Structure:
58 feet above ground level (AGL) 99 feet above mean sea level (AMSL)	41 feet site elevation (SE)	121-56-45.50W	37-22-22.84N NAD 83	Santa Clara, CA	Building 2825 Lafayette A

hazard to air navigation provided the following condition(s), if any, is(are) met: This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a

project is abandoned or: It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the

At least 10 days prior to start of construction (7460-2, Part 1)

× Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M. Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/

noise from aircraft operating to and from the airport. The structure considered under this study lies in proximity to an airport and occupants may be subjected to

This determination expires on 11/07/2022 unless:

- (a) Construction or Alteration, is received by this office. the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual
- (b) extended, revised, or terminated by the issuing office.

(c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

If we can be of further assistance, please contact our office at (206) 231-2989, or dan.shoemaker@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-AWP-12505-OE.

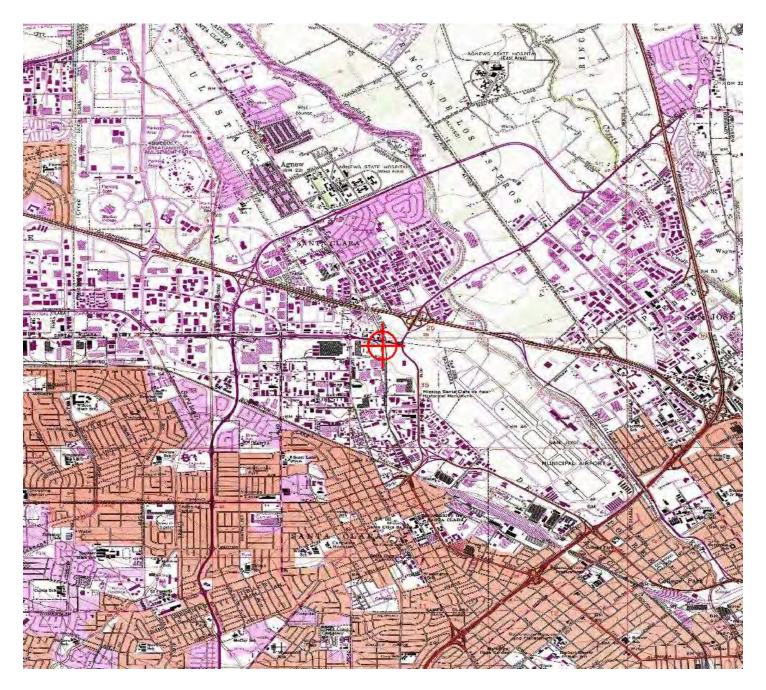
(DNE)

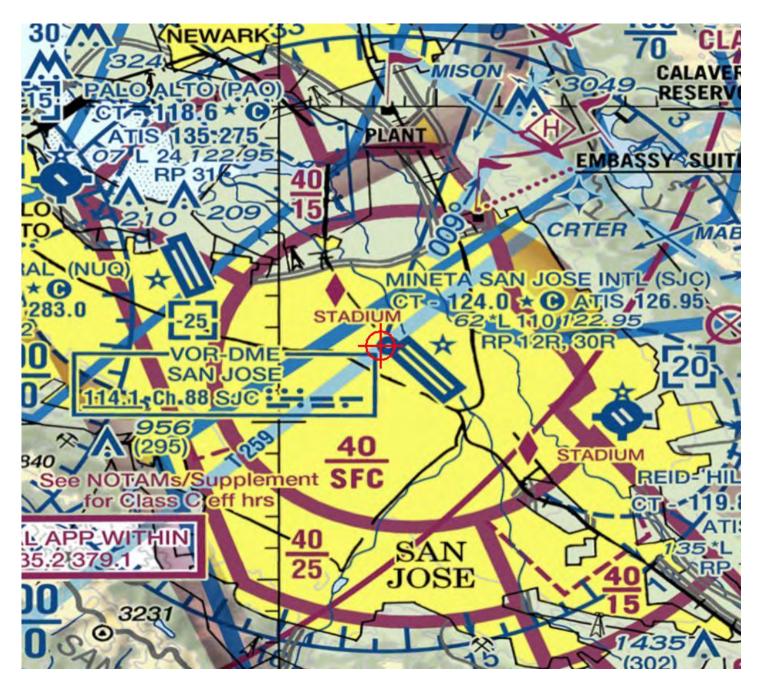
Signature Control No: 455757144-480154406 Daniel Shoemaker Specialist

Attachment(s) Additional Information Map(s)

Additional information for ASN 2020-AWP-12505-OE

This building will be located in very close proximity to the threshold of the Norman Y. Mineta San Jose International Airport (SJC) Runway (RWY) 12R. Occupants and people outside the building will be exposed to frequent loud jet aircraft noise and the sight of large commercial aircraft operating at very low altitudes near the building.







Issued Date: 05/07/2021

Digital Realty Rafal Rak 9355 Grand Avenue Franklin Park, IL 60131

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning: The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C.,

	Heights:	Longitude:	Latitude:	Location:	Structure:
65 feet above ground level (AGL) 106 feet above mean sea level (AMSL)	41 feet site elevation (SE)	121-56-45.99W	37-22-20.89N NAD 83	Santa Clara, CA	Building 2825 Lafayette B

hazard to air navigation provided the following condition(s), if any, is(are) met: This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a

project is abandoned or: It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the

At least 10 days prior to start of construction (7460-2, Part 1)

× Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M. Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/

noise from aircraft operating to and from the airport. The structure considered under this study lies in proximity to an airport and occupants may be subjected to

- (a) Construction or Alteration, is received by this office. the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual
- (b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

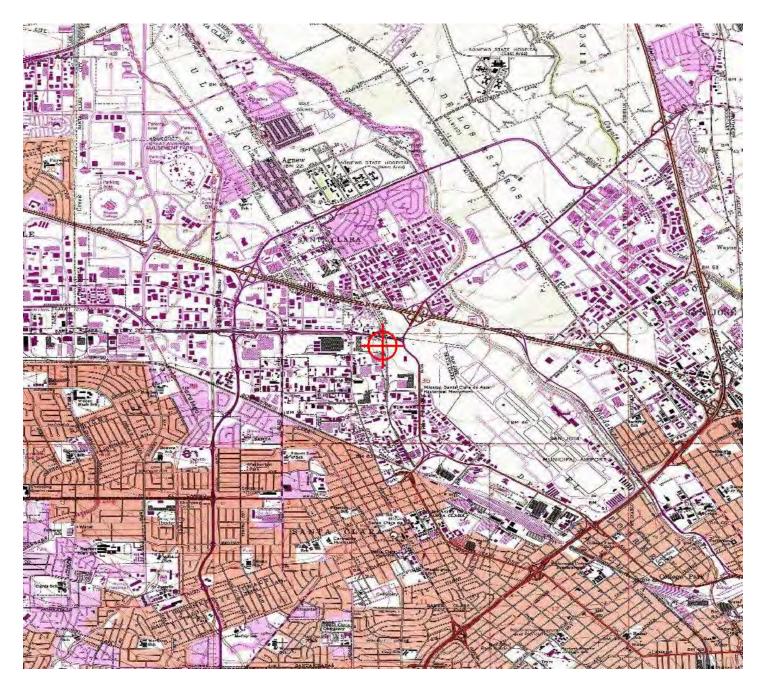
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

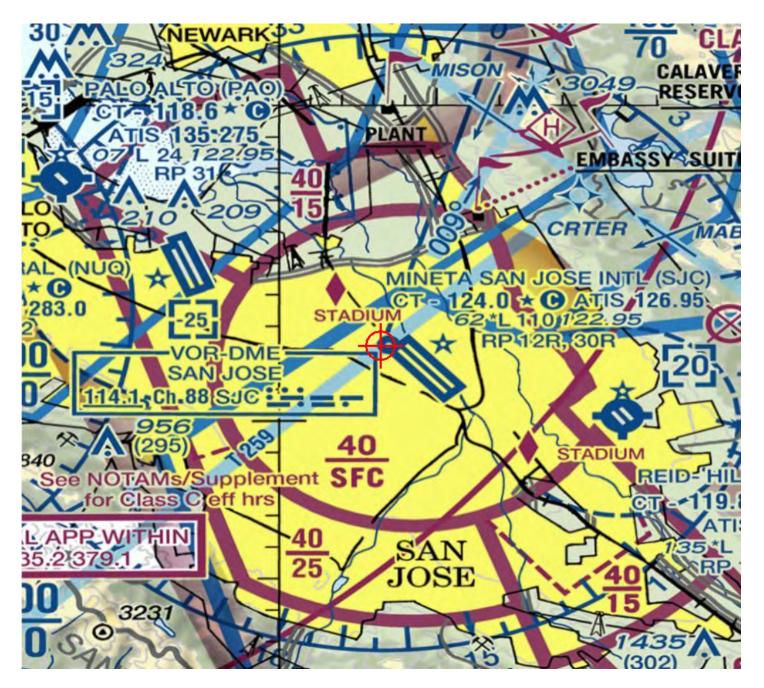
If we can be of further assistance, please contact our office at (206) 231-2989, or dan.shoemaker@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-AWP-12506-OE.

(DNE)

Signature Control No: 455757145-480154409 Daniel Shoemaker Specialist

Additional information for ASN 2020-AWP-12506-OE







Issued Date: 05/07/2021

Digital Realty Rafal Rak 9355 Grand Avenue Franklin Park, IL 60131

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning: The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C.,

	Heights:	Longitude:	Latitude:	Location:	Structure:
83 feet above ground level (AGL) 124 feet above mean sea level (AMSL)	41 feet site elevation (SE)	121-56-47.87W	37-22-24.05N NAD 83	Santa Clara, CA	Building 2825 Lafayette C

hazard to air navigation provided the following condition(s), if any, is(are) met: This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a

project is abandoned or: It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the

At least 10 days prior to start of construction (7460-2, Part 1)

× Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

circular 70/7460-1 M. lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/

noise from aircraft operating to and from the airport. The structure considered under this study lies in proximity to an airport and occupants may be subjected to

adverse effect and would warrant a Determination of Hazard to Air Navigation. Any height exceeding 83 feet above ground level (124 feet above mean sea level), will result in a substantial

- (a) the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual Construction or Alteration, is received by this office.
- (b) extended, revised, or terminated by the issuing office.
- (c) the construction is subject to the licensing authority of the Federal Communications Commission (FCC) and an application for a construction permit has been filed, as required by the FCC, within 6 months of the date of this determination. In such case, the determination expires on the date prescribed by the FCC for completion of construction, or the date the FCC denies the application.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

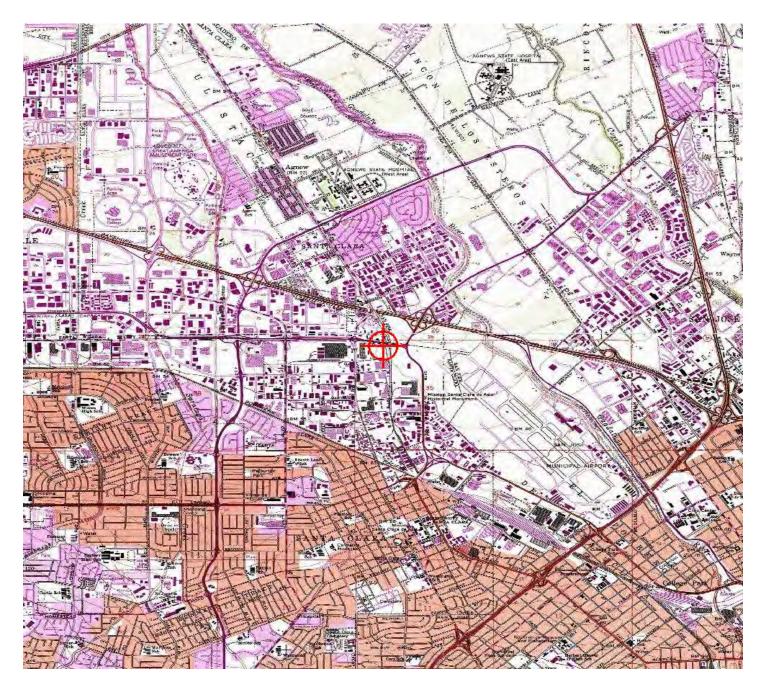
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

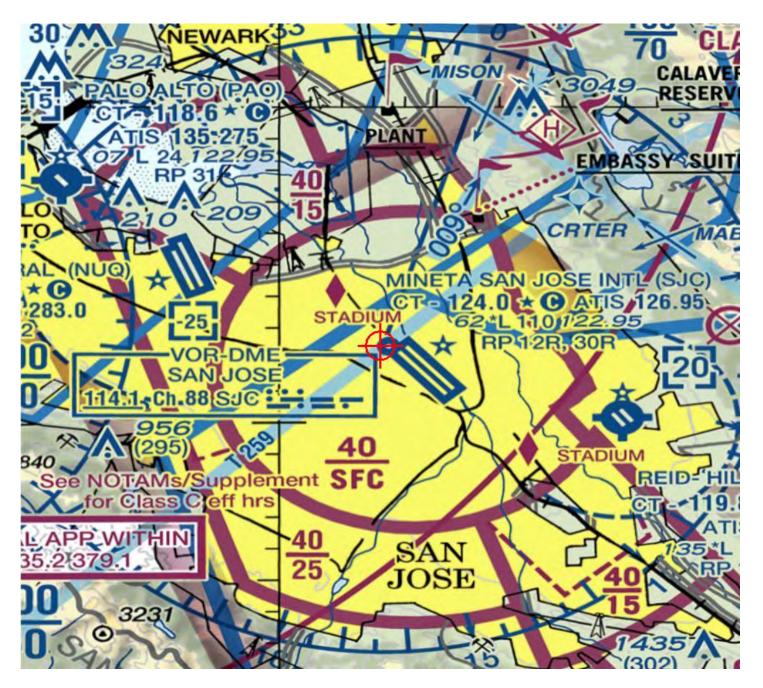
If we can be of further assistance, please contact our office at (206) 231-2989, or dan.shoemaker@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-AWP-12507-OE.

Signature Control No: 455757146-480154616 Daniel Shoemaker Specialist (DNE)

Additional information for ASN 2020-AWP-12507-OE

At the negotiated reduced height of 83 feet above ground level (AGL), 124 feet above mean sea level (AMSL), this corner of the building will be at the exact height of the Norman Y. Mineta San Jose International Airport (SJC) Runway (RWY) 12R/30L 14 CFR Part 77 transitional surface. At any height greater than 83 feet AGL/124 feet AMSL, this corner of the building would require circularization for public comment and red obstruction lighting.







Issued Date: 05/07/2021

Digital Realty Rafal Rak 9355 Grand Avenue Franklin Park, IL 60131

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning: The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C.,

	Heights:	Longitude:	Latitude:	Location:	Structure:
77 feet above ground level (AGL) 118 feet above mean sea level (AMSL)	41 feet site elevation (SE)	121-56-57.39W	37-22-25.73N NAD 83	Santa Clara, CA	Building 2825 Lafayette D

hazard to air navigation provided the following condition(s), if any, is(are) met: This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a

project is abandoned or: It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the

At least 10 days prior to start of construction (7460-2, Part 1)

× Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M. Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/

noise from aircraft operating to and from the airport. The structure considered under this study lies in proximity to an airport and occupants may be subjected to

- (a) Construction or Alteration, is received by this office. the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual
- (b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

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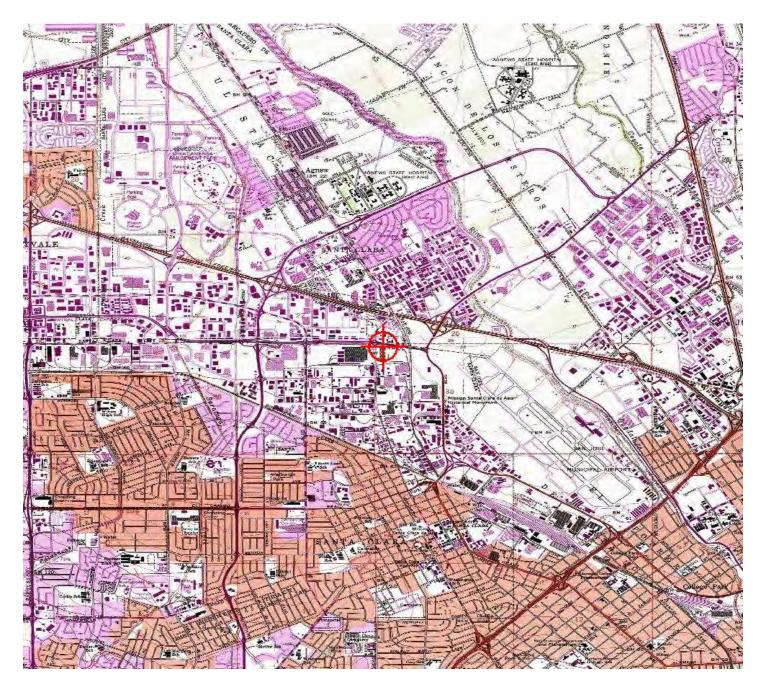
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

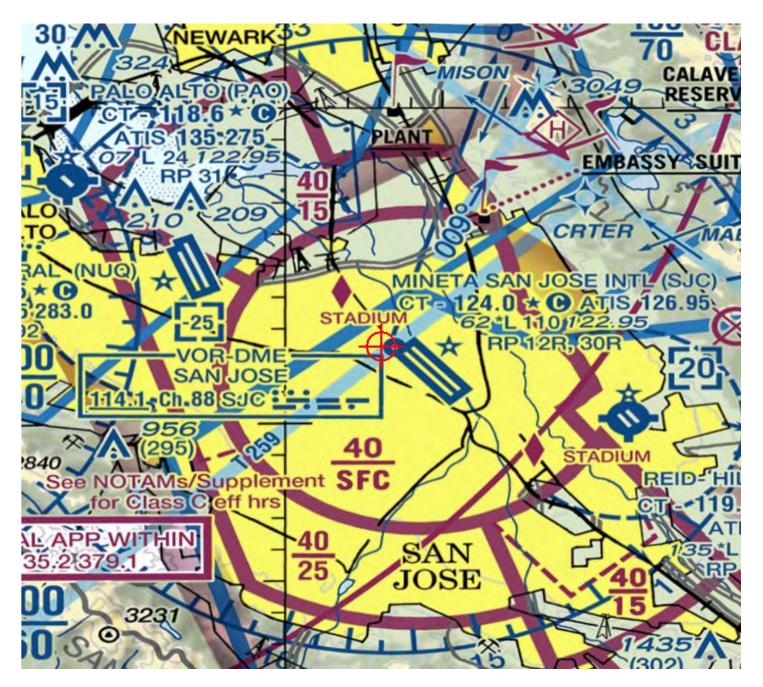
If we can be of further assistance, please contact our office at (206) 231-2989, or dan.shoemaker@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-AWP-12508-OE.

(DNE)

Signature Control No: 455757147-480154408 Daniel Shoemaker Specialist

Additional information for ASN 2020-AWP-12508-OE







Issued Date: 05/07/2021

Digital Realty Rafal Rak 9355 Grand Avenue Franklin Park, IL 60131

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning: The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C.,

	Heights:	Longitude:	Latitude:	Location:	Structure:
77 feet above ground level (AGL) 118 feet above mean sea level (AMSL)	41 feet site elevation (SE)	121-56-59.45W	37-22-23.12N NAD 83	Santa Clara, CA	Building 2825 Lafayette E

hazard to air navigation provided the following condition(s), if any, is(are) met: This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a

project is abandoned or: It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the

At least 10 days prior to start of construction (7460-2, Part 1)

× Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M. Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/

noise from aircraft operating to and from the airport. The structure considered under this study lies in proximity to an airport and occupants may be subjected to

- (a) Construction or Alteration, is received by this office. the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual
- (b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

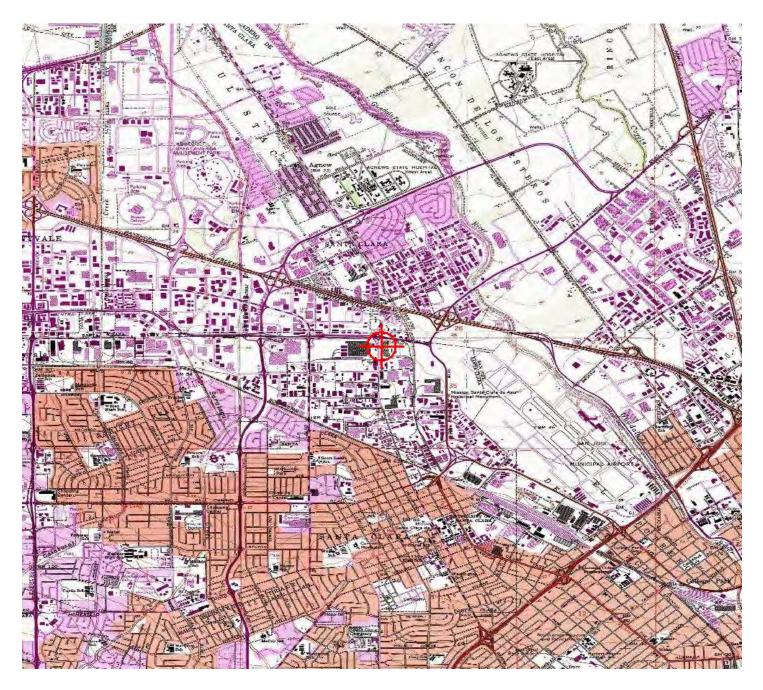
This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

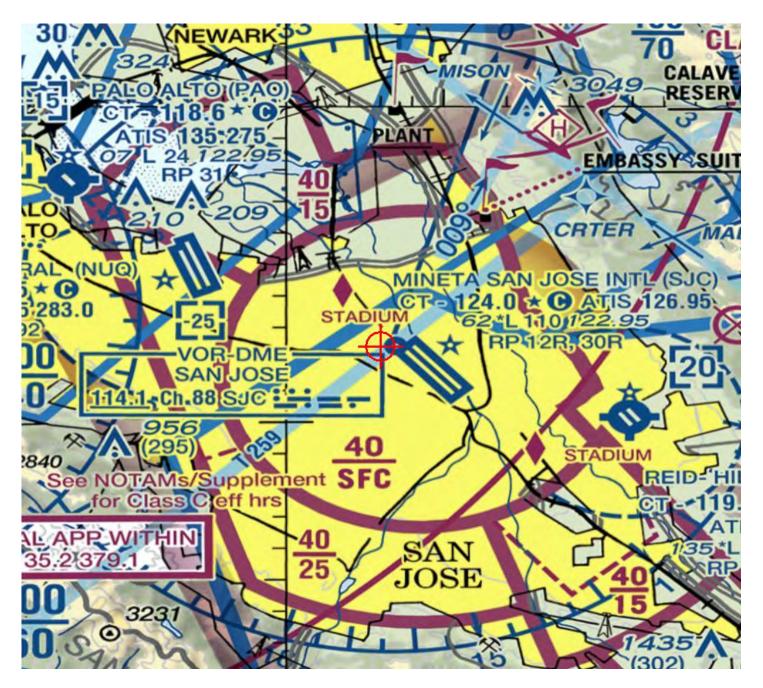
If we can be of further assistance, please contact our office at (206) 231-2989, or dan.shoemaker@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-AWP-12509-OE.

(DNE)

Signature Control No: 455757148-480154410 Daniel Shoemaker Specialist

Additional information for ASN 2020-AWP-12509-OE







Issued Date: 05/07/2021

Digital Realty Rafal Rak 9355 Grand Avenue Franklin Park, IL 60131

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning: The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C.,

	Heights:	Longitude:	Latitude:	Location:	Structure:
84 feet above ground level (AGL) 125 feet above mean sea level (AMSL)	41 feet site elevation (SE)	121-56-48.22W	37-22-23.40N NAD 83	Santa Clara, CA	Building 2825 Lafayette F

hazard to air navigation provided the following condition(s), if any, is(are) met: This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a

project is abandoned or: It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the

At least 10 days prior to start of construction (7460-2, Part 1)

× Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M. Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/

noise from aircraft operating to and from the airport. The structure considered under this study lies in proximity to an airport and occupants may be subjected to

- (a) Construction or Alteration, is received by this office. the construction is started (not necessarily completed) and FAA Form 7460-2, Notice of Actual
- (b) extended, revised, or terminated by the issuing office.

NOTE: REQUEST FOR EXTENSION OF THE EFFECTIVE PERIOD OF THIS DETERMINATION MUST BE E-FILED AT LEAST 15 DAYS PRIOR TO THE EXPIRATION DATE. AFTER RE-EVALUATION OF CURRENT OPERATIONS IN THE AREA OF THE STRUCTURE TO DETERMINE THAT NO SIGNIFICANT AERONAUTICAL CHANGES HAVE OCCURRED, YOUR DETERMINATION MAY BE ELIGIBLE FOR ONE EXTENSION OF THE EFFECTIVE PERIOD.

This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

If construction or alteration is dismantled or destroyed, you must submit notice to the FAA within 5 days after the construction or alteration is dismantled or destroyed.

This determination does include temporary construction equipment such as cranes, derricks, etc., which may be used during actual construction of the structure. However, this equipment shall not exceed the overall heights as indicated above. Equipment which has a height greater than the studied structure requires separate notice to the FAA.

This determination concerns the effect of this structure on the safe and efficient use of navigable airspace by aircraft and does not relieve the sponsor of compliance responsibilities relating to any law, ordinance, or regulation of any Federal, State, or local government body.

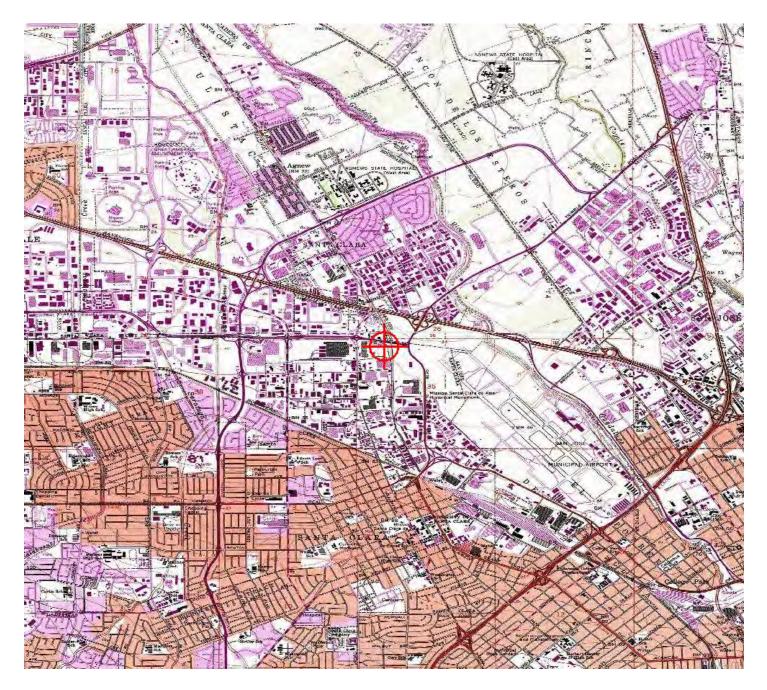
If we can be of further assistance, please contact our office at (206) 231-2989, or dan.shoemaker@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-AWP-12510-OE.

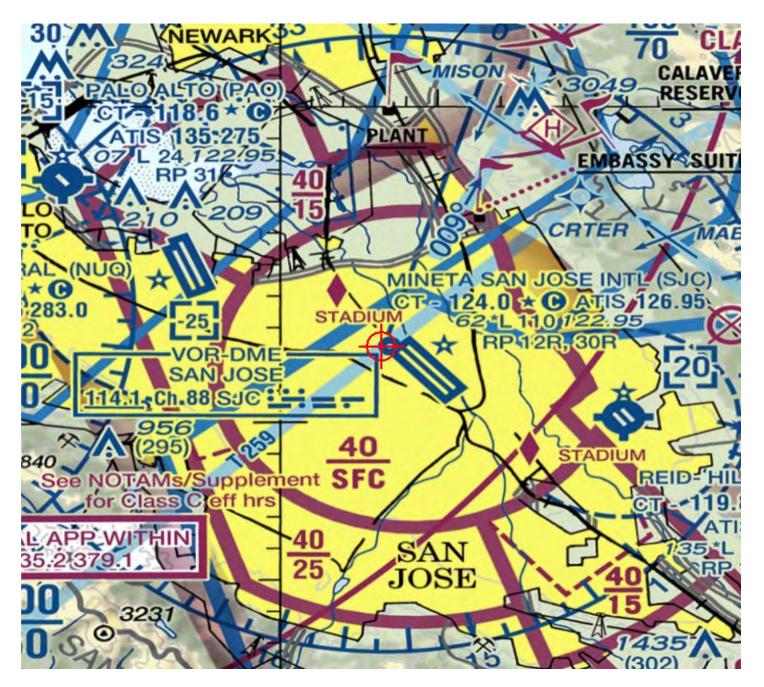
(DNE)

Signature Control No: 455757149-480154407 Daniel Shoemaker Specialist

Additional information for ASN 2020-AWP-12510-OE

TOPO Map for ASN 2020-AWP-12510-OE







Issued Date: 05/07/2021

Digital Realty Rafal Rak 9355 Grand Avenue Franklin Park, IL 60131

**** DETERMINATION OF NO HAZARD TO AIR NAVIGATION ****

Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning: The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C.,

	Heights:	Longitude:	Latitude:	Location:	Structure:
118 feet above mean sea level (AMSL)	41 feet site elevation (SE)	121-56-48.55W	37-22-22.38N NAD 83	Santa Clara, CA	Building 2825 Lafayette G

hazard to air navigation provided the following condition(s), if any, is(are) met: This aeronautical study revealed that the structure does not exceed obstruction standards and would not be a

project is abandoned or: It is required that FAA Form 7460-2, Notice of Actual Construction or Alteration, be e-filed any time the

At least 10 days prior to start of construction (7460-2, Part 1)

× Within 5 days after the construction reaches its greatest height (7460-2, Part 2)

See attachment for additional condition(s) or information.

lighting are accomplished on a voluntary basis, we recommend it be installed in accordance with FAA Advisory circular 70/7460-1 M. Based on this evaluation, marking and lighting are not necessary for aviation safety. However, if marking/

noise from aircraft operating to and from the airport. The structure considered under this study lies in proximity to an airport and occupants may be subjected to

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- (b) extended, revised, or terminated by the issuing office.

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This determination is based, in part, on the foregoing description which includes specific coordinates, heights, frequency(ies) and power. Any changes in coordinates, heights, and frequencies or use of greater power, except those frequencies specified in the Colo Void Clause Coalition; Antenna System Co-Location; Voluntary Best Practices, effective 21 Nov 2007, will void this determination. Any future construction or alteration, including increase to heights, power, or the addition of other transmitters, requires separate notice to the FAA.This determination includes all previously filed frequencies and power for this structure.

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If we can be of further assistance, please contact our office at (206) 231-2989, or dan.shoemaker@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2020-AWP-12511-OE.

(DNE)

Signature Control No: 455757150-480154411 Daniel Shoemaker Specialist

Additional information for ASN 2020-AWP-12511-OE

