Final Supplemental Environmental Impact Report
(SCH No. 1998092072)

Applied Materials Building 100 Equipment and Process Innovation and Commercialization Center Semiconductor Research and Development Laboratory

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Acronyms and Defined Terms

AB	Assembly Bill
Air District	Bay Area Air Quality Management District
ATC	Authority to Construct
BACT	Best Available Control Technology
Btu	British thermal units
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
CARB	California Air Resources Board
CEQA	California Environmental Quality Act
City	City of Sunnyvale
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
EIR	Environmental Impact Report
EPIC	Equipment and Process Innovation and Commercialization
GHG	greenhouse gas
gsf	gross square foot or feet
GWP	global warming potential
HAP	hazardous air pollutant
HF	hydrogen fluoride
HI	hazard index
HRA	health risk assessment
IPA	isopropyl alcohol
lb/day	pounds per day
LUTE	Land Use and Transportation Element

MMRP	Mitigation Monitoring and Reporting Program
$MTCO_2e$	metric tons of carbon dioxide equivalent
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NF_3	nitrogen trifluoride
NOA	Notice of Availability
NOD	Notice of Determination
NOP	Notice of Preparation
NO_X	oxides of nitrogen
NPOC	non-precursor organic compounds
NSR	New Source Review
OBC	Overburdened Community
OEHHA	Office of Environmental Health Hazard Assessment
$PM_{2.5}$	fine particulate matter (2.5 microns or less)
PM_{10}	respirable particulate matter (10 microns or less)
PMI	point of maximum impact
POC	precursor organic compounds
POU	point of use
PRC	Public Resources Code
PSD	Prevention of Significant Deterioration
PTE	potential to emit
R&D	research and development
RACT	Reasonably Available Control Technology
ROG	reactive organic gases
RTO	regenerative thermal oxidizer
SB	Senate Bill
scfm	standard cubic feet per minute
SCH	State Clearinghouse
SEIR	Supplemental Environmental Impact Report

SF_6	sulfur hexafluoride
SMOP	Synthetic Minor Operating Permit
SO_2	sulfur dioxide
SVCE	Silicon Valley Clean Energy
TAC	toxic air contaminant
TBACT	Toxic Best Available Control Technology
tpy	tons per year
US EPA	U.S. Environmental Protection Agency
VOC	volatile organic compound

Executive Summary

Introduction

This Final Supplemental Environmental Impact Report (Final SEIR) has been prepared by the Bay Area Air Quality Management District (Bay Area Air District or Air District) as a Responsible Agency under the California Environmental Quality Act (CEQA) in connection with the Air District's consideration of an application for Authority to Construct and Permit to Operate under Air District Permit Application No. 700650 for the operation of the Applied Materials Building 100 Equipment and Process Innovation and Commercialization Center Semiconductor Research and Development Laboratory (Project). The application proposes authorization of two new permitted sources of emissions at the Applied Materials Arques Campus in the City of Sunnyvale (City), California:

- S-264, the Building 100 (B100) Semiconductor Research and Development Laboratory, and
- S-265, B100 Surface Preparation (Wipe Cleaning).

The physical structure that houses these sources, a 592,567 gross square feet (gsf) research and development (R&D) building, together with a parking structure, an expanded PG&E substation, utility improvements, and related site work, was analyzed by the City in the 1999 Arques Campus Specific Plan Environmental Impact Report (EIR) (herein referred to as the "1999 Arques EIR") (State Clearinghouse No. 1998092072), the General Plan Land Use and Transportation Plan Update EIR (LUTE Update EIR) (State Clearinghouse No. 2012032003), and the 2024 Addendum to the 1999 Arques Specific Plan EIR Phase 1 Project (herein referred to as the "2024 Addendum"). The Air District's issuance of a stationary source permit is a separate and later discretionary approval for the same Project as a responsible agency under CEQA pursuant to its statutory jurisdiction to regulate and permit stationary sources of air pollutants emissions.

Project Location

The Project site is located at 974 East Arques Avenue in the City of Sunnyvale, Santa Clara County, California, within the Applied Materials Arques Campus (Air District Facility ID 11002 / Site ID B1002). The emissions sources subject to the Air District's permit decision occupy the R&D Building of the 45.6-acre Arques Campus Specific Plan, bounded by East Arques Avenue to the north, commercial buildings to the east, Central Expressway to the south, and Commercial Street to the west. Surrounding land uses are industrial and commercial, including the City corporation yard and a landscaping company to the west, an office and R&D campus to the east, office buildings to the north, and industrial and office uses south of Central Expressway.

Project Overview

Applied Materials, Inc. has applied to the Air District for Authority to Construct and Permit to Operate two new permitted sources at its Arques Campus (Air District Facility ID 11002 / Site ID B1002). The two sources are:

- **Source S-264, B100 Semiconductor Research and Development Laboratory.** A cleanroom laboratory containing dry process tools (vacuum deposition and plasma etching chambers) and wet process tools (batch tools, manual wet benches, and two types of single wafer tools). Emissions are controlled by integral point of use abatement devices at some of the dry process tools, eight packed bed acid scrubbers, point of use multi-stage wet scrubbers, a two-stage concentrator wheel, and an electric regenerative thermal oxidizer, discharging through nine exhaust stacks.
- **Source S-265, B100 Surface Preparation (Wipe Cleaning).** Use of presoaked wipes to clean tool mechanisms and interior tool enclosure surfaces, limited to 900 gallons per year of isopropyl alcohol and 100 gallons per year of acetone.

The sources would be housed in Building 100, the Equipment and Process Innovation and Commercialization (EPIC) Center. The EPIC Center is intended to serve as a collaboration hub for Applied Materials, chipmakers, equipment and materials suppliers, universities, and research institutions, providing laboratory and cleanroom space for research, process development, proof of concept testing, and optimization of semiconductor manufacturing technologies before implementation at commercial fabrication facilities. Applied Materials has stated that it will conduct R&D activities only, with no intention of manufacturing products for commercial sale.

Building 100 is part of a larger 45-acre development approved by the City of Sunnyvale in April 2024 that continues to implement Phase I of the 1999 Arques Campus Specific Plan. The City's 2024 approval includes a three story, 592,567 gross square foot research and development building 100 feet in height, a seven-level parking structure, expanded surface parking, expansion of the existing PG&E substation, a new parallel sanitary sewer pipeline approximately 2,100 feet long, demolition of seven existing structures, and related site improvements. The campus would accommodate up to 2,800 employees at a floor area ratio of 0.72. The City analyzed these improvements in an Addendum to the 1999 Arques EIR and the LUTE Update EIR, and the City's approvals for them are complete.

The Air District's discretionary action is limited to the approval of the air emissions permit that is within its statutory jurisdiction as a responsible agency. The Air District cannot alter the location, size, or land use of the building, all of which the City approved, and which are already constructed. The Air District's discretion extends only to the permitting of the emissions sources that are the subject of the application, and any associated permit conditions and/or mitigation measures that are allowed by law related only to these emissions sources.

Purpose and Use of this Supplemental EIR

This Final SEIR has been prepared to satisfy the Air District's obligations as a responsible agency under the California Environmental Quality Act (CEQA), Public Resources Code Section 21000 *et seq.*, and the State CEQA Guidelines, Title 14 of the California Code of Regulations (CCR) Section 15000 *et seq.*, in connection with its consideration of Authority to Construct and Permit to Operate under Air District Permit Application No. 700650. The City remains the Lead Agency. The Air District is a Responsible Agency under CEQA and is preparing this SEIR pursuant to CEQA Guidelines Section 15163(a), which provides that either the Lead Agency or a Responsible Agency may choose to prepare a supplement to an EIR.

The issuance of an Authority to Construct subject to "Best Available Control Technology" and "Best Review Control Technology for Toxics" requirements under Air District Regulation 2 is a discretionary approval subject to CEQA. Before acting on a discretionary approval, a responsible agency must determine whether the environmental review already completed for the Project is adequate for the action the responsible agency proposes to take. The Air District has determined that an SEIR is required to make the environmental review adequate for the Project as revised, to support its decision.

This Final SEIR tiers from and supplements the Arques Campus Specific Plan Environmental Impact Report, certified by the City in June 1999 (State Clearinghouse No. 1998092072), as modified by the 2024 Addendum.

Through its evaluation of Application No. 700650, the Air District developed a Project-specific emissions inventory for the proposed sources. That inventory quantifies maximum abated operational emissions of approximately 80,000 metric tons of carbon dioxide equivalent ($MTCO_2e$) per year from Source S-264. It also quantifies maximum abated criteria pollutant emissions of about 22.5 tons per year of oxides of nitrogen (NO_X) and about 12.1 tons per year of precursor organic compounds (POC).

These emissions are new information of substantial importance within the meaning of CEQA Guidelines Section 15162(a)(3). They were not known and could not have been known when the 1999 Arques EIR was certified, because the point sources of these emissions relate to tools and technology that either did not exist or were not determined to be used in the Project facilities in 1999, among other reasons. The Air District's emissions inventory shows that the Project will have a significant effect not discussed in the 1999 Arques EIR, consisting of GHG emissions, which the 1999 Arques EIR did not evaluate, and emissions of reactive organic gases (ROG), which the 1999 Arques EIR did not identify as exceeding the applicable threshold. The inventory further shows that the significant effects related to NO_X, which the 1999 Arques EIR examined and found significant and unavoidable, will be substantially more severe than described in that document.

The Air District also considered the 2024 Addendum in its evaluation of the adequacy of the 1999 Arques EIR. The City evaluated updated information about the Project, and determined that the conditions for a subsequent or supplemental EIR were not present. However, the 2024 Addendum still did not evaluate the GHG emissions impacts from the stationary sources that are subject to the Air District's permit, and the Project applicant provided limited data to the City for its consideration of the NO_X and POC. Thus, the 1999 Arques EIR remains inadequate for the Air District's decision.

Because only minor additions and changes to the air quality and GHG analyses are necessary to make the 1999 Arques EIR adequately apply to the Air District's action, the Air District is proceeding by way of a SEIR under CEQA Guidelines Section 15163. The analysis of all other environmental topics in the 1999 Arques EIR remains in effect and is not revisited here.

Summary of Environmental Impacts and Mitigation Measures

Table ES-1 summarizes the impact conclusions of this Final SEIR.

Areas of Known Controversy

At the time of preparation of this SEIR, there are no known areas of controversy related to the Project. Public comments received for the 2024 Addendum related to the Project did not include issues related to Project components considered in this SEIR.

Issues to be Resolved

Section 15123(b)(3) of the CEQA Guidelines requires that an SEIR contain issues to be resolved, including the choice among alternatives and whether or how to mitigate significant impacts. With regard to the proposed Project, the major issues to be resolved include decisions by the responsible agency as to:

1. Whether the Project's GHG emissions would make a cumulatively considerable contribution to a significant cumulative effect on the environment.
2. Whether the Project's air quality impacts from NO_X and POC are individually or cumulatively significant effects on the environment.
3. Whether there are other mitigation measures that should be applied to the Project in addition, or in the alternative, to the mitigation measures identified in the 1999 Arques EIR.
4. Whether the benefits of the proposed Project outweigh the environmental impacts, if any, that cannot be feasibly avoided or mitigated to below a level of significance.

Table ES-1. Summary of Project Environmental Impacts and Mitigation Measures

Would the Project:	Significance with Mitigation	New Mitigation Measure(s) Not Previously Identified in the 1999 EIR
Air Quality		
a) Conflict with or obstruct implementation of the applicable air quality plan?	Less than Significant	None
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	Significant and Unavoidable	None
c) Expose sensitive receptors to substantial pollutant concentrations?	Less than Significant	None
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Less than Significant	None
Greenhouse Gases		
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Significant and Unavoidable	None
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Significant and Unavoidable	None

SECTION 1 Introduction

1.1 Purpose of this Document

This Final Focused Supplemental Environmental Impact Report (Final SEIR) has been prepared to satisfy the Bay Area Air District's obligations under the California Environmental Quality Act (CEQA), Public Resources Code (PRC) Section 21000 *et seq.*, and the State CEQA Guidelines, Title 14 of the California Code of Regulations (CCR) Section 15000 *et seq.*, in connection with its consideration of Authority to Construct and Permit to Operate under Air District Permit Application No. 700650.

An EIR is an informational document. Its purpose is to inform decision makers and the public of the significant environmental effects of a project, to identify possible ways to minimize those effects, and to describe reasonable alternatives (CEQA Guidelines Section 15121). This Final SEIR does not recommend approval or denial of the permit application. Under CEQA Guidelines Section 15163(e), when the Air District acts as a responsible agency and decides whether to approve the portion of the Project within its expertise and jurisdiction, the Air District's decision maker must consider the prior environmental documents as revised by this SEIR and must make a finding under CEQA Guidelines Section 15091 for each significant effect identified.

1.2 Lead Agency and Responsible Agency Roles

The City is the Lead Agency. The City certified the Arques Campus Specific Plan Environmental Impact Report in June 1999 (1999 Arques EIR; State Clearinghouse No. 1998092072) and adopted the Arques Campus Specific Plan. The City holds land use authority over the Project site and has issued entitlements for the development of buildings that house the sources of emissions analyzed in this Final SEIR. Nothing in this Final SEIR alters the City's role as lead agency or its analysis, conclusions, or prior approvals. Similarly, the City's analysis of project alternatives is outside the scope of this Final EIR.

The Air District is a Responsible Agency. A responsible agency is a public agency, other than the lead agency, that has discretionary approval power over the project (CEQA Guidelines Section 15381). The Air District regulates sources of air emissions in the nine-county San Francisco Bay Area under Health and Safety Code Section 40000 *et seq.*, implemented through Air District Regulation 2 (Permits). Its issuance of an Authority to Construct subject to Best Available Control Technology requirements under Regulation 2 is a discretionary action subject to CEQA. The Air District is a responsible agency for this Project.

Authority for a Responsible Agency to prepare this supplement. CEQA Guidelines Section 15163(a) provides that "[t]he Lead or Responsible Agency may choose to prepare a supplement

to an EIR rather than a subsequent EIR" if the conditions described in Section 15162 would require a subsequent EIR and only minor additions or changes would be necessary to make the previous EIR adequately apply to the project. The CEQA Guidelines thus expressly contemplate that a responsible agency may prepare a supplemental environmental impact report, and the Air District is doing so here.

Two further provisions support the preparation of this Final SEIR. CEQA Guidelines Section 15162(c) provides that once a project has been approved, if any of the conditions described in Section 15162(a) occurs, a subsequent or supplemental environmental document "shall only be prepared by the public agency which grants the next discretionary approval for the project, if any." The Air District's action on Application No. 700650 is a subsequent discretionary approval. CEQA Guidelines Section 15096(a) provides that a responsible agency complies with CEQA by considering the environmental document prepared by the lead agency and by reaching its own conclusions about whether and how to approve the project, and Section 15096(e) addresses what a responsible agency must do when it determines that the lead agency's document is not adequate for the responsible agency's own use.

What the Air District will do with this SEIR. As a responsible agency, the Air District will consider the 1999 Arques EIR as revised by this supplement, and the 2024 Addendum, before acting on Application No. 700650. It will make the findings required by the CEQA Guidelines Sections 15091 and 15096(g)(1) for each significant effect, may adopt a Statement of Overriding Considerations under CEQA Guidelines Section 15093 for each significant and unavoidable effect, may adopt a Mitigation Monitoring and Reporting Program under Public Resources Code Section 21081.6 covering the measures within its responsibility and jurisdiction, and will file a Notice of Determination under CEQA Guidelines Sections 15094 and 15096(i).

1.3 Tiering and Relationship to Prior Environmental Documents

This Final SEIR tiers from and supplements the 1999 Arques EIR consistent with CEQA Guidelines Sections 15152 and 15163. The 1999 Arques EIR was a program level document prepared for the Arques Campus Specific Plan, which was developed to accommodate transformation of an older light industrial cluster into a coordinated semiconductor research and development campus for Applied Materials, analyzing a proposed increase in the building floor area on the Project site from approximately 521,000 gross square feet to approximately 1,114,600 gross square feet. It acknowledged that development would occur in multiple phases over a number of years.

Tiering under CEQA Guidelines Section 15152 allows an agency to rely on the analysis in a program EIR for general matters and to concentrate later environmental review on the issues specific to the later activity that were not examined as potentially significant effects in the prior EIR. That is the approach taken here. As a responsible agency, the Air District is limited to analysis of potentially significant impacts within its area of expertise. Therefore, this

supplement concentrates on the air quality effects and GHG effects of the permitted sources, which the 1999 Arques EIR did not examine.

The 1999 Arques EIR concluded at Air Quality Impact 2 that operational NO_X emissions, produced principally by mobile sources, would exceed the then applicable Air District threshold of 80 pounds per day and would combine with the emissions of other projects to result in a cumulatively considerable increase in NO_X. The City adopted Mitigation Measure 3.5-2.1 (Vehicular Trip Reduction Measures), which did not reduce the impact below a significant level. At Air Quality Impact 3.5-3, the City concluded that construction particulate matter emissions could exceed Air District thresholds but would be reduced to less than significant with mitigation. It addressed odors at Land Use Impact 3.2-2.

The 1999 Arques EIR did not evaluate GHG emissions or climate change, did not evaluate conflicts with or obstruction of an air quality plan, did not evaluate exposure of sensitive receptors to toxic air contaminants, and did not quantify annual criteria pollutant emissions or stationary source emissions from semiconductor stationary source equipment.

Two later adopted City documents are referenced in this Final SEIR. The Air District considered these documents when determining whether there was sufficient analysis of the issues within its expertise to determine whether the 1999 Arques EIR, plus these later analyses, provides adequate CEQA review.

- The Land Use and Transportation Element Update Environmental Impact Report, certified by the City in 2017 (LUTE Update EIR), which addressed air quality and GHGs at a General Plan element level and found construction and operational criteria pollutant impacts significant and unavoidable, and that after updating the City's Climate Action Plan there would be a less than significant cumulative GHG impact.
- The Addendum to the 1999 Arques EIR and the LUTE Update EIR, approved by the City in April 2024 (2024 Addendum), which evaluated more specific buildout details within the scope of the 1999 Arques EIR, including the 592,567 gross square foot R&D building, the parking structure, the PG&E substation expansion, and related improvements. The 2024 Addendum quantified operational emissions using the California Emissions Estimator Model (CalEEMod) and evaluated Project health risks associated with operational sources of toxic air contaminants (TACs).

1.4 Changed Circumstances and New Information

CEQA Guidelines Section 15163(a) allows a responsible agency to prepare a supplemental EIR where the conditions in CEQA Guidelines Section 15162 are met, and only minor additions or changes would be necessary to make the previous EIR adequately apply to the project. The changed circumstances and new information are confined to two topics, air quality and GHG emissions, arising from a single element of the Project, the permitted sources of those

emissions. Although the analysis in this Final SEIR shows that there are substantial new and/or more severe environmental effects, there are no additional mitigation measures proposed to reduce those effects because no feasible mitigation measures have been identified. Thus, this Final SEIR fulfills CEQA's purpose of providing adequate information to the public about the significant effects of the Project on the environment, but does not require major additions or changes to the 1999 Arques EIR. The analysis of aesthetics, agriculture and forestry, biological resources, cultural resources, energy, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, mineral resources, noise, population and housing, public services, recreation, transportation, utilities and service systems, and wildfire in the 1999 Arques EIR is unaffected.

Under CEQA Guidelines Section 15163(b), a supplement need contain only the information necessary to make the previous EIR adequate for the project as revised. Under CEQA Guidelines Section 15163(d), this supplement may be circulated by itself, without recirculating the 1999 Arques EIR.

1.4.1 Changed Circumstances

A responsible agency must prepare a subsequent or supplemental EIR if: "Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or Negative Declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects." (CEQA Guidelines, § 15162(a)(2).) The circumstances under which the Air District will consider the permit(s) in this Final SEIR have substantially changed, because there have been considerable advancements in technology, tools, computing, semiconductors, and related processes since the 1999 Arques EIR. Those advancements and the related circumstances that produce air emissions effects were not and could not have been known in 1999. Additionally, state, national, and global scientific understanding about the effects of human-caused climate change and the severity of the problem have advanced substantially, and the urgency of addressing it has increased considerably since 1999.

1.4.2 New Information

A responsible agency should prepare a subsequent or supplemental EIR if: "New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete or the Negative Declaration was adopted, shows any of the following:

(A) The project will have one or more significant effects not discussed in the previous EIR or negative declaration;

(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;

(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or

(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative."

(CEQA Guidelines, § 15162(a)(3).)

The air emissions sources that are the subject of this Final SEIR involve advancements in technology, tools, computing, semiconductors, and related processes that were not known and could not have been known when the 1999 Arques EIR analyzed air emissions. The significant emissions of NO_X, POC, and GHG from the tools and processes subject to Air District permitting constitute new information of substantial importance that shows new and/or more severe significant effects as further discussed in this Final SEIR.

The emissions quantified in the Air District's Engineering Evaluation are the authoritative figures for the permitted sources, and they are the basis for the significance determinations in Section 3 of this Final SEIR. Specifically, the Engineering Evaluation is the Air District's determination, developed by Air District staff from the material usage limits, vendor data, and abatement efficiencies that will be secured by the permit conditions the Air District proposes to adopt. It is the emissions limits that the permit will enforce. Table 1.4-1 compares the emissions disclosed in the prior City analysis with the emissions quantified in the Air District's Engineering Evaluation for Application No. 700650. The methods of calculation are not identical, however, and Section 3.1.2 addresses how the Air District's figures relate to the mobile sources evaluated in both the 1999 Arques EIR and mobile and area source emissions evaluated in the 2024 Addendum.

GHG Emissions are a Significant Effect not Discussed in the 1999 Arques EIR and 2024 Addendum. The principal and independently sufficient basis for this Final SEIR is due to the inadequate analysis of GHG emissions in prior environmental documents. Specifically, the 1999 Arques EIR did not evaluate GHG emissions or climate change. No adopted CEQA document for this Project has quantified emissions of nitrous oxide (N_2O) or fluorinated process gases from the semiconductor process equipment. The Engineering Evaluation quantifies maximum abated operational emissions of approximately 80,000 $MTCO_2e$ per year from Source S-264. When compared to the Air District's stationary source emissions threshold of significance of 10,000 $MTCO_2e$ per year, these GHG emissions may have a significant cumulative effect as described further in Section 3.2.2.

The Criteria Air Pollutant Effects Include a New Significant Effect and a Substantially More Severe Effect than Previously Shown. The 1999 Arques EIR reported 63 pounds per day of ROG against the then applicable Air District threshold of 80 pounds per day, and did not identify an annual exceedance for ROG. The 2024 Addendum reported 38 pounds per day of ROG and did not identify an annual exceedance. As shown in Table 1.4-1 and Table 3.1-7, new information from the applicant provides that total Project emissions of ROG/POC are now 134.2 pounds per day. The current threshold is 54 pounds per day. The new information about ROG/POC from the revised Project plans reveals a significant effect not analyzed in the 1999 Arques EIR or in the 2024 addendum.

For NO_X, the 1999 Arques EIR reported 103 pounds per day and identified an exceedance of the then applicable threshold of 80 pounds per day. The 1999 Arques EIR determined there would be a significant and unavoidable impact attributable to mobile and area emissions sources. New information from the applicant provides that Project NO_X emissions are now approximately 201 pounds per day. The current threshold is 54 pounds per day. Emissions from the revised Project plans have nearly doubled as compared to the estimates provided in the 1999 Arques EIR. The new information reveals that the NO_X effect is substantially more severe than shown in the 1999 Arques EIR.

The permitted stationary sources alone (not including mobile and area sources previously analyzed) account for 123.0 pounds per day of NO_X and 95.2 pounds per day of POC, from process equipment that neither the 1999 Arques EIR nor the 2024 Addendum quantified or analyzed.

The comparison between the previously analyzed emissions and the new information is presented in Section 3.1.

Table 1.4-1. Summary of Project Average Daily Operational Emissions of Criteria Pollutants and Precursors Compared to Emissions Originally Disclosed in 1999 Arques EIR and 2024 Addendum.

Pollutant	1999 Arques EIR (Vehicular Emissions Only)	2024 Addendum as Approved	Potential to Emit, Air District Engineering Evaluation, Permitted Sources Only (Abated)	Air District CEQA Threshold of Significance
ROG / POC (pounds per day)	63	38	95.2	54
NO_X (pounds per day)	103	78	123.0	54
SO_2	Not reported	Not reported	3.4	Not applicable
CO (pounds per day)	654	Not reported	95.8	Not applicable (local concentration standard)
PM_{10} (pounds per day)	39	38	8.7	82
$PM_{2.5}$ (pounds per day)	Not reported	14	8.7	54
ROG / POC (tons per year)	Not reported	Not reported	12.1	10
NO_X (tons per year)	Not reported	Not reported	22.5	10
SO_2	Not reported	Not reported	0.6	Not applicable
CO (tons per year)	Not reported	Not reported	19.2	Not applicable (local concentration standard)
PM_{10} (tons per year)	Not reported	Not reported	1.6	15
$PM_{2.5}$ (tons per year)	Not reported	Not reported	1.6	10
Operational GHG emissions ($MTCO_2e$ per year)	Not reported	7,733	80,062	10,000

Sources: 1999 Arques EIR Table 3.5-5; 2024 Addendum Table 4.3-6 and Section 4.8; Air District Engineering Evaluation for Application No. 700650, Tables 11 and 19.

Notes: The 1999 Arques EIR column reports vehicular traffic (i.e., mobile source) emissions only. The 2024 Addendum column reports whole project operational emissions, including mobile sources, area sources and building energy use. The Engineering Evaluation column reports the permitted stationary sources only. The three columns are not directly additive; total project emissions are assembled in Table 3.1-7.

ROG – reactive organic gas; POC – precursor organic compounds; NO_X – nitrogen oxides; SO_2 – sulfur dioxide; CO – carbon monoxide; PM_{10} – particulate matter with aerodynamic diameter smaller than or equal to a nominal 10 micrometers; $PM_{2.5}$ –particulate matter with aerodynamic diameter smaller than or equal to a nominal 2.5 micrometers.

1.5 Environmental Review Process

Notice of Preparation. The Notice of Preparation for this Project was issued on September 24, 1998 which initiated a scoping process for the 1999 Arques EIR. No additional Notice of Preparation is required for this Final SEIR.

Notice of Availability and Public Review. Concurrent with the release of the Draft SEIR, the Air District filed a Notice of Completion with the State Clearinghouse and published a Notice of Availability on October 13, 2026 in accordance with CEQA Guidelines Sections 15085, 15087, and 15105. The public review period for a draft EIR submitted to the State Clearinghouse is generally 45 days. On October 12, 2026, the State Clearinghouse approved the Air District's request to shorten the review period to 20 days pursuant to Public Resources Code Section 21091(e), State CEQA Guidelines Sections 15105(a) and 15205(d), and Appendix K of the State CEQA Guidelines. The public review period began on October 13, 2026 and closed on November 13, 2026.

Final SEIR and Certification. This Final SEIR has been prepared following the close of the public review period, in accordance with CEQA Guidelines 15132. Pursuant to that section, a Final EIR consists of the Draft EIR or a revision of the draft, the comments and recommendations received on the Draft EIR, the responses of the lead agency to significant environmental points raised in the review process, and any other information added by the lead agency. The contents of this Final SEIR are identified in Section 1.5.1 below.

1.5.1 Comments Received on the Draft SEIR and Responses

No comments were received on the Draft SEIR during the public review period. Accordingly, no responses to comments are required under CEQA Guidelines Section 15088, and this Final SEIR consists of the Draft SEIR as revised, together with this Section 1.5.1 and the revisions identified in Section 1.5.2.

1.5.2 Revisions to the Draft SEIR

No revisions have been made to the environmental analysis, impact conclusions, or supporting information presented in the Draft SEIR. The only changes from the Draft SEIR are those necessary to convert the document to a Final SEIR, consisting of the title and headings, the description of the environmental review process in Section 1.5, and corresponding references to the document throughout.

1.5.3 Certification and Air District Action

The Air District will consider this Final SEIR before acting on Application No. 700650, and will then take the actions described in Section 1.2, including making the findings required by CEQA Guidelines Sections 15091 and 15096(g)(1) for each significant effect, adopting a Statement of

Overriding Considerations under CEQA Guidelines Section 15093 for each significant and unavoidable effect it determines to accept, and filing a Notice of Determination under CEQA Guidelines Sections 15094 and 15096(i).

1.6 Documents Incorporated by Reference

The following documents are incorporated into this Final SEIR by reference pursuant to CEQA Guidelines Section 15150:

1. City of Sunnyvale, Arques Campus Specific Plan, approved June 18, 1999.
2. City of Sunnyvale, Arques Campus Specific Plan Draft Environmental Impact Report and Final EIR, certified June 1999. SCH No. 1998092072.
3. City of Sunnyvale, General Plan Land Use and Transportation Element Update, updated March 2024.
4. City of Sunnyvale, Land Use and Transportation Element Update Draft Environmental Impact Report and Final EIR, certified April 11, 2017. SHC No. 2012032003.
5. City of Sunnyvale, Addendum to the 1999 Arques Campus Specific Plan EIR and the LUTE Update EIR, April 2024.
6. Bay Area Air District, Engineering Evaluation, Applied Materials, Application 700650.
7. Bay Area Air District, Health Risk Assessment Results, Application No. 700650, 706979, and 708141.
8. Bay Area Air District, California Environmental Quality Act Air Quality Guidelines, 2022, as revised May 2025.
9. Bay Area Air District, 2017 Clean Air Plan: Spare the Air, Cool the Climate.
10. City of Sunnyvale, Climate Action Playbook Update and Game Plan 2028.
11. California Air Resources Board, 2022 Scoping Plan for Achieving Carbon Neutrality.

1.7 Organization of this SEIR

The following describes the organization of this SEIR:

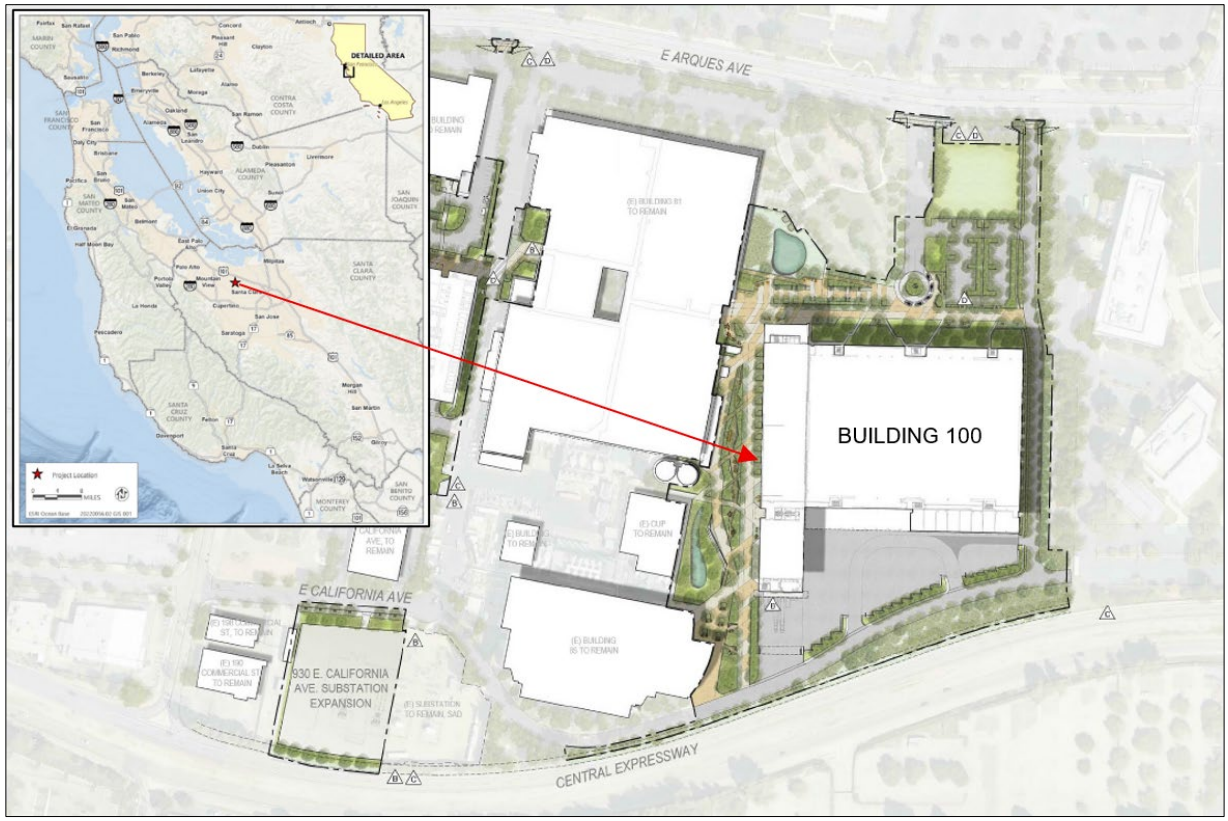
- **Executive Summary.** This section summarizes the contents of the Final SEIR.
- **Section 1: Introduction.** This section discusses the purpose of the Final SEIR, the Air District's role, project background, the legal basis for a supplement, and the review process.
- **Section 2: Project Description.** This section provides a detailed description of the Project as defined for purposes of this supplement, including the permitted sources, and the permits and approvals required.

- **Section 3: Environmental Setting, Impacts, and Mitigation Measures.** This section describes the environmental setting and identifies potential impacts of the proposed Project for Air Quality and Greenhouse Gas Emissions.
- **Section 4: Other CEQA Considerations.** This section identifies areas of the SEIR where significant environmental effects cannot be avoided, if any.
- **Section 5: References.** This section provides a complete list of all references used to prepare the SEIR.
- **Section 6: List of Preparers.** This section identifies authors involved in preparing the SEIR, including persons and organizations consulted.

SECTION 2 Project Description

2.1 Project Location

The Project site is located at 974 East Arques Avenue in the City of Sunnyvale, Santa Clara County, California, within the Applied Materials Arques Campus (Air District Facility ID 11002 / Site ID B1002). The Project facility occupies the R&D Building of the 45.6-acre Arques Campus Specific Plan, bounded by East Arques Avenue to the north, commercial buildings to the east, Central Expressway to the south, and Commercial Street to the west. Surrounding land uses are industrial and commercial, including the City corporation yard and a landscaping company to the west, an office and R&D campus to the east, office buildings to the north, and industrial and office uses south of Central Expressway (Figure 2.1-1).



Source: adapted from City of Sunnyvale 2024

Figure 2.1-1. Project Location

2.2 Project Objectives

CEQA Guidelines Section 15124(b) requires the project description to include a statement of objectives for the proposed project, including the underlying purpose of the proposed project.

The applicable objectives of the Arques Campus Specific Plan and of this phase of buildout, as stated in the 1999 Arques EIR and the 2024 Addendum, include:

- Transforming a loose configuration of poorly organized work spaces, originally designed for light industrial use, into an integrated high-technology research and development campus that set a standard for design quality and workplace environment;
- Facilitating the phased expansion of existing research and development operations to an ultimate size of approximately 1.1 million gross square feet of floor space;
- Providing a state-of-the-art facility to attract and retain highly qualified personnel in the semiconductor industry;
- Providing a self-mitigating specific plan, whereby any significant environmental impacts are minimized to the extent feasible;
- Providing adequate office, laboratory, and support space to house the anticipated 2,800 employees necessary to (a) support the growth in Applied Materials' business projected to occur within the next 5 to 10 years and (b) make full use of the tool testing and demonstration capacity that the Maydan Technology Center at 978 East Arques Avenue is designed to accommodate; and
- Providing the office, laboratory, and support space necessary to research, design, and develop equipment prototypes for testing and demonstration in the Maydan Technology Center.

As stated in the Engineering Evaluation, the objective of the B100 EPIC Center is to:

- Serve as a collaboration hub for Applied Materials, chipmakers, equipment and materials suppliers, universities, and research institutions; provide laboratory and cleanroom space, equipment, and materials for customers to conduct research, process development, proof of concept testing, and optimization of semiconductor manufacturing technologies before implementation at commercial manufacturing facilities.

2.3 Physical Development Previously Analyzed

The physical development that houses the permitted sources was analyzed in the 2024 Addendum. It is not the subject of new analysis in this Final SEIR except insofar as it generates air quality and GHG emissions. Construction of the R&D building has been completed.

2.4 The Permitted Sources

Application No. 700650, submitted by Applied Materials, seeks an Authority to Construct and Permit to Operate for two sources, including Source S-264 and S-265 as detailed further below. Some details of the permitted sources and related information are confidential trade secrets under the California Public Records Act (Gov. Code section 7924.510(c) and (f)), so this Final

SEIR describes processes and other information in general terms to support an informed publicly available analysis of the potential environmental effects.

2.4.1 Source S-264, B100 Semiconductor Research and Development Laboratory

Source S-264 comprises two general categories of process tools, including dry process tools and wet process tools.

Dry process tools. Vacuum deposition chambers and plasma etching chambers that use process chemicals to etch, layer, dope, and sputter silicon wafers. Process chemicals include fluorinated gases, organic solvents, and other compounds classified as toxic air contaminants, in gas or liquid form. Some dry process tool are equipped with an integral point of use (POU) thermal gas treatment device that treats exhaust gases at high temperatures in a small combustion chamber. Treated exhaust is routed to a common header connected to eight identical packed bed acid scrubbers (each rated at a maximum flow of 70,000 standard cubic feet per minute [scfm]), collectively the Acid Exhaust.

Wet process tools. Wet process tools include three categories of tools:

- *Batch tools*, each containing a series of process baths with integral chemical supply tanks and a low pressure isopropyl alcohol (IPA) dryer, exhausting to the packed bed acid scrubbers.
- *Manual wet bench tools*, each containing a series of process baths with an integral low pressure IPA dryer, exhausting to the packed bed acid scrubbers.
- *Single wafer tools*. Type 1 tools use inorganic compounds and are equipped with an IPA dryer; inorganic emissions route to the packed bed acid scrubbers and IPA emissions route to the solvent abatement system (two-stage concentrator wheel and an electric regenerative thermal oxidizer). Type 2 tools use both organic and inorganic compounds and a wet scrubber that treats acid and alkali emissions before routing to the solvent abatement system (two state concentrator wheel and electric regenerative thermal oxidizer). This emission point is the Solvent Exhaust.

Solvent abatement system. A two-stage concentrator wheel (with maximum flow 10,000 scfm each) followed by an electric regenerative thermal oxidizer (with a maximum flow 10,000 scfm).

Exhaust configuration. Emissions from S-264 discharge through nine exhaust stacks with eight stacks servicing acid gas exhaust and one stack servicing solvent exhaust. The applicant has stated that the solvent exhaust stack will always operate, while the number of acid exhaust stacks in use will depend on customer demand.

2.4.2 Source S-265, B100 Surface Preparation (Wipe Cleaning)

Source S-265 consists of the use of presoaked wipes to clean tool mechanisms and the interior surfaces of tool enclosures within the laboratory. Permitted material usage is a maximum of

900 gallons per year of isopropyl alcohol and 100 gallons per year of acetone. Emissions are unabated and are assumed to equal 100 percent of solvent used.

2.5 Emissions Characterization

Table 2.5-1 summarizes the emissions quantified in the Air District's Engineering Evaluation of unabated and abated potential to emit. Abated emissions are the basis for the CEQA analysis in Section 3 because the abatement equipment is integral to the Project and its performance will be secured through enforceable permit conditions, consistent with Air District Regulation 2-1-217.

Table 2.5-1. Application No. 700650 Emission Summary

Pollutant	S-264 Pre-Abatement (tons/year)	S-264 Abated (tons/year)	S-265 (tons/year)	Total Abated (tons/year)
POC	252.7	9.2	2.9	12.1
NPOC	26.4	1.5	0.3	1.9
CO	--	19.2	--	19.2
NOx	--	22.5	--	22.5
SO_2	--	0.6	--	0.6
PM_{10}	--	1.6	--	1.6
$PM_{2.5}$	--	1.6	--	1.6
Hazardous air pollutants, combined	264.08	2.1	--	2.1
GHGs ($MTCO_2e$ per year)	2,595,870	80,062	--	80,062

Source: Air District Engineering Evaluation for Application No. 700650, Tables EX-1, 9, 11, 16, and 19.

Notes:

POC = precursor organic compounds; NPOC = non-precursor organic compounds. Pre-abatement values reflect emissions before treatment by point of use devices, packed bed acid scrubbers, and the electric regenerative thermal oxidizer. GHG values are $MTCO_2e$ per year. NO_X, CO, SO_2, PM_{10}, and $PM_{2.5}$ from S-264 are combustion products formed within the point of use devices and the electric regenerative thermal oxidizer and therefore have no pre-abatement analogue.

2.6 Permits and Approvals Required

2.6.1 Bay Area Air District

The following permits and approvals are required by the Air District:

- Authority to Construct and Permit to Operate for Sources S-264 and S-265 under Regulation 2, Rules 1, 2, and 5 (Application No. 700650). This is the discretionary action for which this Final SEIR has been prepared.
- Synthetic Minor Operating Permit under Regulation 2, Rule 6. The Engineering Evaluation states that on a pre-abatement basis Applied Materials would be a major facility under

Regulation 2-6-212 requiring a federal operating permit, that the proposed permit conditions will limit emissions below major stationary source thresholds, that those conditions do not by themselves meet the practical enforceability criteria required for a Synthetic Minor Operating Permit, and that Applied Materials will be required to submit a Synthetic Minor Operating Permit application within the deadline in Regulation 2, Rule 6.

2.7 Regulatory Requirements Applicable to the Permitted Sources

The permitted sources are subject to mandatory requirements under Air District regulations and state law that will control emissions and that will be imposed as enforceable conditions of the Authority to Construct and Permit to Operate. These requirements are components of the Project as it will be permitted, not discretionary measures the Air District is choosing to add as CEQA mitigation. Consistent with standard CEQA practice, the impact analysis assumes compliance with those requirements. Specifically, each requirement is triggered by an objective standard rather than by agency discretion. The Air District has separately prepared the specific permit conditions implementing each requirement, which are set out in the Engineering Evaluation. Therefore, there is substantial evidence in the record that the requirements will be imposed and that they will have the effects assumed in the analysis.

In addition to these mandatory permit conditions, this section describes the federal, state, and local regulations and policies that apply to the air quality and GHG emissions analyses. The analysis of air quality and GHG emissions have overlapping policies, so they are presented together here to simplify this focused document.

2.7.1 Federal Law

2.7.1.1 Clean Air Act

The federal Clean Air Act was passed by Congress in 1970 and last comprehensively amended in 1990. The Clean Air Act gives the federal government authority, by way of the United States Environmental Protection Agency (US EPA), to establish air quality standards. The US EPA is responsible for implementing most aspects of the Clean Air Act, including setting National Ambient Air Quality Standards (NAAQS) for major air pollutants; setting hazardous air pollutant standards; approving state attainment plans; setting motor vehicle emission standards; issuing stationary source emission standards and permits; and establishing acid rain control measures, stratospheric O_3 protection measures, and enforcement provisions. NAAQS are established for criteria pollutants under the Clean Air Act and consist of O_3, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead.

States with areas that exceed the NAAQS must prepare a state implementation plan (SIP) that demonstrates how those areas will attain the standards within mandated time frames. The federal Clean Air Act Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution.

2.7.2 State Law

2.7.2.1 California Clean Air Act

The California Air Resources Board (CARB) is responsible for administering the California Clean Air Act and establishing the California Ambient Air Quality Standards (CAAQS). The California Clean Air Act requires all air districts in the state to achieve and maintain the CAAQS, which are generally more stringent than the federal standards and incorporate additional standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

CARB has broad authority to regulate mobile air pollution sources, such as motor vehicles. It is responsible for setting emission standards for vehicles sold in California and for other emission sources, such as consumer products and certain off-road equipment. CARB oversees the functions of local air pollution control districts and air quality management districts, which, in turn, administer air quality activities at the regional and county levels. The state standards are summarized on Table 3.1-2.

The California Clean Air Act requires CARB to designate areas within California as either in "attainment" or "non-attainment" for each criteria pollutant based on whether the CAAQS have been achieved. Under the California Clean Air Act, areas are designated as in "non-attainment" for a pollutant if air quality data shows that a state standard for the pollutant was violated at least once during the previous three calendar years.

2.7.2.2 Air Toxics "Hot Spots" Information and Assessment Act of 1987

Under this act, stationary sources are required to report the types and quantities of certain substances that their facilities routinely release into the air. Emissions of interest are those that result from the routine operation of a facility or that are predictable, including continuous and intermittent releases and process upsets or leaks. The goals of the Air Toxics "Hot Spots" Act are to collect emission data, identify facilities having localized impacts, ascertain health risks, and notify nearby residents of significant risks. In September 1992, the "Hot Spots" Act was amended by SB 1731 (Calderon) to address the reduction of significant risks. The bill requires that owners of significant-risk facilities reduce their risks below the level of significance.

The *OEHHA Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* (2015) establishes the methodology used to estimate cancer risk and non-cancer hazard from TAC exposure, including age sensitivity factors that account for the greater susceptibility of infants, children, and adolescents.

2.7.2.3 California Global Warming Solutions Act of 2006

In September 2006, the California Global Warming Solutions Act of 2006, also known as Assembly Bill 32 (AB 32), was signed into law. AB 32 focuses on reducing GHG emissions in California and required CARB to adopt rules and regulations that would achieve GHG emissions

equivalent to statewide levels in 1990 by 2020. CARB initially determined that the total statewide aggregated GHG 1990 emissions level and 2020 emissions limit was 427 million $MTCO_2e$. The 2020 target reduction was estimated to be 174 million $MTCO_2e$.

To achieve the goal, AB 32 mandates that CARB establish a quantified emissions cap, institute a schedule to meet the cap, implement regulations to reduce statewide GHG emissions from stationary sources, and develop tracking, reporting, and enforcement mechanisms to ensure that reductions are achieved.

Senate Bill 32 (SB 32), signed in September 2016, updated AB 32 to include an emissions reduction goal for the year 2030. Specifically, SB 32 requires CARB to ensure that statewide GHG emissions are reduced to 40 percent below the 1990 level by 2030. The new plan, outlined in SB 32, involves increasing renewable energy use, imposing lower limits on the carbon content of gasoline and diesel fuel, putting more electric cars on the road, improving energy efficiency, and curbing emissions from key industries.

The California Climate Crisis Act of 2022 (Assembly Bill 1279) declares the state will achieve net zero GHG emissions as soon as possible, but no later than 2045. In addition, it declares the state will achieve and maintain net negative GHG emissions and ensure that by 2045, statewide anthropogenic GHG emissions are reduced to at least 85 percent below the 1990 levels. The bill requires updates to the CARB scoping plan every 5 years to implement various policies and strategies that enable CO_2 reduction solutions and carbon capture, utilization, and storage technologies.

2.7.2.4 CARB Scoping Plan

The 2022 Scoping Plan for Achieving Carbon Neutrality outlines the state’s path to the 2045 target and adopts a 2030 goal of 48 percent below 1990 levels. Its strategies include decarbonizing the energy supply, reducing non-combustion emissions, and reducing demand for fossil fuels.

2.7.2.5 California Cap-and-Invest Program

California's market-based compliance mechanism, established under Assembly Bill 32 and formerly known as Cap-and-Trade, was extended through December 31, 2045 and renamed Cap-and-Invest by Assembly Bill 1207 and Senate Bill 840, signed September 19, 2025. CARB's implementing amendments took effect September 1, 2026. The program places a declining cap on emissions from covered sectors and requires covered entities to surrender allowances or offset credits equal to their compliance obligations. Industrial facilities in covered sectors that report annual emissions at or above 25,000 $MTCO_2e$ are covered entities.

2.7.2.6 CARB Regulation to Reduce Greenhouse Gas Emissions from Semiconductor Operations

Title 17 CCR Sections 95320 through 95326 establish emission standards for semiconductor operations expressed as maximum kilograms of CO_2e per square centimeter of wafer surface area processed per calendar year and requires annual reporting under Section 95324.

2.7.2.7 Building Energy Efficiency Standards and CALGreen

Title 24, CCR, Part 6 is the Building Energy Efficiency Standards, or California Energy Code. This code, originally enacted in 1978, establishes energy-efficiency standards for residential and non-residential buildings in order to reduce California's energy demand. New construction and major renovations must demonstrate their compliance with the current California Energy Code through submittal and approval of a Title 24 Compliance Report to the local building permit review authority and the California Energy Commission.

The California Green Building Standards Code, referred to as CALGreen, was added to Title 24 as Part 11, first in 2009 as a voluntary code, which then became mandatory on January 1, 2011 (as part of the 2010 California Building Standards Code). The 2025 CALGreen includes mandatory minimum environmental performance standards for all ground-up new construction of residential and non-residential structures. It also includes voluntary tiers with stricter environmental performance standards for these same categories of residential and non-residential buildings. Local jurisdictions must enforce the minimum mandatory CALGreen standards and may adopt stricter requirements.

2.7.3 Local Regulations and Policies

2.7.3.1 Bay Area Air Quality Management District

The Air District has jurisdiction over an approximately 5,600 square mile area encompassing the nine San Francisco Bay Area counties, including Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, southwestern Solano, and southern Sonoma counties. The Air District develops plans to attain and maintain the NAAQS and CAAQS, has permit authority over most types of stationary emission sources, and is responsible for permitting and inspection of stationary sources, enforcement of its regulations, and abatement of public nuisances. The following Air District regulations and policies are applicable to the Project:

- **Air District Regulation 2, Rule 1 (General Requirements)**. Establishes permit requirements and the definition of potential to emit. Section 2-1-217 provides that control equipment may be treated as part of a source's design only where the effect on emissions is enforceable by the Air District, EPA, or both. Section 2-1-403 authorizes the Air District to impose any permit condition it deems reasonably necessary to ensure compliance. Section 2-1-412 requires public notice for sources near schools and in Overburdened Communities.

- **Air District Regulation 2, Rule 2 (New Source Review)**. Section 2-2-301 requires Best Available Control Technology (BACT) for any new source with a potential to emit 10.0 or more pounds per day of a BACT pollutant. Section 2-2-302 requires federally enforceable emission offsets for any new or modified source at a facility that emits or will be permitted to emit more than 10 tons per year of POC or NO_X, on a pollutant specific basis. Section 2-2-608 establishes the baseline date from which the cumulative increase is calculated.
- **Air District Regulation 2, Rule 5 (New Source Review of Toxic Air Contaminants)**. Section 2-5-101 requires evaluation of new or modified sources of TACs for public exposure and health risk. Section 2-5-216 governs which prior applications are included in the Project risk evaluation. Section 2-5-302 requires TBACT where a new or modified source has an estimated cancer risk greater than 1.0 in one million or a chronic hazard index greater than 0.20, and establishes project risk limits.
- **Air District Regulation 2, Rule 6 (Major Facility Review)**. Governs federal operating permits and synthetic minor operating permits. Section 2-6-212 defines a major facility as one with the potential to emit 100 tons per year or more of any regulated air pollutant, 10 tons per year or more of a single hazardous air pollutant, or 25 tons per year or more of a combination of hazardous air pollutants.
- **Air District Regulation 1, Section 1-106 (Separation of Emissions)**. Provides that where air contaminants from a single source are emitted through two or more emission points, the total quantity emitted shall not exceed the quantity allowable through a single emission point.
- **Air District Regulation 7 (Odorous Substances) and Regulation 1-301 (Public Nuisance)**. Regulation 7 prohibits the discharge of odorous substances to ambient air that results in frequent odor complaints. Regulation 1-301 prohibits the discharge of air contaminants that cause a public nuisance.
- **2017 Clean Air Plan.** The Air District's 2017 Clean Air Plan: Spare the Air, Cool the Climate, adopted in April 2017, is the currently adopted regional air quality plan for the San Francisco Bay Area. It identifies a broad range of control measures across stationary and area sources, mobile sources, transportation, buildings, energy, agriculture, natural and working lands, waste, and water, organized around four priorities: reducing emissions of criteria air pollutants and TACs from all key sources; reducing emissions of super GHGs such as methane, black carbon, and fluorinated gases; decreasing demand for fossil fuels; and decarbonizing the energy system.
- **Bay Area Air Quality Management District CEQA Guidelines**. The Air District's CEQA Air Quality Guidelines assist lead and responsible agencies in evaluating air quality and climate impacts under CEQA. They establish recommended thresholds of significance,

screening criteria, and analytical methodologies for criteria air pollutants, toxic air contaminants, and GHG emissions, and distinguish between land use development projects and plans as well as stationary source projects requiring an Air District permit.

2.7.3.2 City of Sunnyvale

As Lead Agency, the City applies its General Plan policies and Municipal Code requirements to development on the Project site. The City's General Plan includes policies for the purpose of avoiding or mitigating environmental impacts resulting from planned development projects within the City.

- Land Use and Transportation Element
    - LT-2.1: Enhance the public's health and welfare by promoting the city's environmental and economic health through sustainable practices for the design, construction, maintenance, operation, and deconstruction of buildings, including measures in the Climate Action Plan.
    - Policy LT-2.2: Reduce greenhouse gas emissions that affect climate and the environment through land use and transportation planning and development.
- City of Sunnyvale Climate Action Playbook
    - Adopted August 13, 2019, building on the City's 2014 Climate Action Plan, with a Game Plan 2028 (adopted in 2024) identifying near term actions. The Playbook and Game Plan 2028 lays out strategies for achieving an 85 percent reduction below 1990 levels by 2045, organized around clean electricity, decarbonizing buildings, transportation, and resources, with individual plays under each strategy identifying areas for action and measurable targets.

2.7.3.3 Best Available Control Technology (Regulation 2-2, New Source Review)

Air District Regulation 2, Rule 2 governs New Source Review for new and modified sources of criteria air pollutants and their precursors. Section 2-2-301 requires that any new source with a potential to emit 10.0 pounds per day or more of a pollutant for which BACT is required be equipped with BACT for that pollutant. BACT is triggered for both Project sources with the maximum daily POC and NPOC emissions from Source S-264, and maximum daily POC emissions from Source S-265, each exceeding 10.0 pounds per day. The Air District determines BACT on a case-by-case basis, considering the most effective emission control device or technique that has been achieved in practice for the class and category of source, or any other emission control device or technique determined to be technologically feasible and cost effective.

2.7.3.4 Reasonably Available Control Technology for the Point of Use Devices (Regulation 2-2-102)

Air District Regulation 2-2-102 provides that BACT does not apply to emissions generated by an abatement device or technique implemented to comply with BACT, although such emissions remain subject to Reasonably Available Control Technology (RACT). The Air District determined that the point of use devices are required in order to meet BACT for POC and NPOC from the dry process tools, and that the NO_X and CO generated by combusting natural gas in those devices are secondary pollutants resulting from the use of an abatement device implemented to comply with BACT. NO_X and CO from the point of use devices are therefore subject to RACT rather than BACT.

2.7.3.5 Electric Regenerative Thermal Oxidizer Avoidance Limit (RACT Avoidance)

Where a source's potential to emit would otherwise trigger a control requirement, an applicant may accept an enforceable permit limit that keeps emissions below the applicable trigger. Vendor design specifications indicate that NO_X and CO will form within the electric regenerative thermal oxidizer at rates that would cause NO_X to exceed 10.0 pounds per day. Applied Materials has elected to accept an enforceable avoidance limit of 9.0 pounds per day for both NO_X and CO at the Solvent Exhaust, which will be imposed as a permit condition.

2.7.3.6 Federally Enforceable Emission Offsets (Regulation 2-2-302)

Air District Regulation 2-2-302 requires federally enforceable emission offsets for any new or modified source at a facility that emits or will be permitted to emit more than 10 tons per year of POC or NO_X, determined on a pollutant-specific basis. For facilities emitting more than 10 but not more than 35 tons per year, offsets are provided at a ratio of 1:1 and may be provided from the Small Facility Bank. Above 35 tons per year, offsets are provided at a ratio of 1:1.15 and must be provided by the applicant.

The facility will be permitted to emit more than 10 tons per year but less than 35 tons per year of both POC and NO_X. Offsets will therefore be required at a 1:1 ratio for the un-offset cumulative increase in emissions at the facility and any related sources since the baseline date determined under Regulation 2-2-608, and will be provided from the Small Facility Bank.

2.7.3.7 Toxics Best Available Control Technology (Regulation 2-5-302)

Air District Regulation 2, Rule 5 governs New Source Review of toxic air contaminants. Section 2-5-302 requires that a new or modified source implement Toxics Best Available Control Technology (TBACT) where the estimated cancer risk from the source exceeds 1.0 in one million or the estimated chronic hazard index exceeds 0.20. TBACT is required for Source S-264 because the estimated worker chronic hazard index exceeds the 0.20 trigger.

2.7.3.8 Carbon Dioxide Equivalent Emission Cap

The Air District may impose permit conditions establishing enforceable limits on a source's emissions. The draft permit conditions establish a facility-wide cap on carbon dioxide equivalent emissions from semiconductor operations, applicable in any consecutive 12-month period, with compliance determined using the CARB semiconductor emission calculator.

2.7.3.9 CARB Regulation to Reduce Greenhouse Gas Emissions from Semiconductor Operations

Sources S-264 and S-265 are subject to the CARB's *Regulation to Reduce Greenhouse Gas Emissions from Semiconductor Operations*, Title 17 CCR Sections 95320 through 95326. The regulation establishes emission standards for chemical vapor deposition chamber cleaning and etching processes, expressed in Table 1 of Section 95322 as a maximum emission limit per square centimeter of wafer surface area processed per calendar year on a sliding scale by annual wafer surface area processed, and requires annual reporting to CARB under Section 95324. The permit conditions require that, prior to issuance of the Permit to Operate for Source S-264, the owner or operator shall submit to the Air District a demonstration of compliance with the applicable Table 1 emission standard, and shall thereafter submit to the Air District a copy of each annual report filed with CARB under Section 95324 within 30 days of filing.

2.7.4 Other Applicable Requirements

Regulation 1, Section 1-106 (separation of emissions), Regulation 1-301 (public nuisance), Regulation 7 (odorous substances), and the Synthetic Minor Operating Permit requirement under Regulation 2, Rule 6 apply to the Project.

SECTION 3 Environmental Analysis

This section analyzes the air quality and GHG emissions effects of Application No. 700650 using the significance criteria in Appendix G of the State CEQA Guidelines and the thresholds of significance and CEQA Guidelines adopted by the Air District. As discussed in Section 1.3, only Air Quality and GHG emissions are analyzed in detail in this section.

3.1 Air Quality

This section describes the air quality impacts that would result from the Air District's issuance of an Authority to Construct and Permit to Operate under Application No. 700650. It addresses criteria air pollutants, toxic air contaminants, and odors. The discussion is based on the Air District's Engineering Evaluation, Applied Materials, Application 700650, dated September 10, 2026, and the accompanying Health Risk Assessment Results for Application Nos. 700650, 706979, and 708141. Table 3.1-1 summarizes the air quality impacts that could result from implementation of the Project.

Table 3.1-1. Summary of Air Quality Impacts

Would the Project:	Significance with Mitigation	Mitigation Measure(s)
a) Conflict with or obstruct implementation of the applicable air quality plan?	Less than Significant	None
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	Significant and Unavoidable	None
c) Expose sensitive receptors to substantial pollutant concentrations?	Less than Significant	None
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Less than Significant	None

3.1.1 Existing Conditions

3.1.1.1 Air Basin and Climate

The Project site is in the City of Sunnyvale, in Santa Clara County, within the San Francisco Bay Area air basin. The climate is Mediterranean, characterized by warm, dry summers and mild, wet winters, which contributes to seasonal variation in pollutant dispersion and accumulation. Summer conditions combine higher temperatures, light winds, moderate subsidence inversions,

and limited rainfall, which favor the formation and accumulation of ground level ozone. Winter conditions bring cooler temperatures, occasional rain, and stronger vertical mixing at times, but also periods of stagnation that favor accumulation of particulate matter. Santa Clara County lies at the southern end of San Francisco Bay, in the southern portion of the basin, where ozone concentrations tend to be higher than in the coastal and central bay subregions because the area is downwind of upwind emission sources.

3.1.1.2 Criteria Air Pollutants of Concern

High ozone levels result from the cumulative emissions of ROG and NO_X, which react in the atmosphere under certain meteorological conditions. Controlling emissions of these precursor pollutants is the focus of the Bay Area's efforts to reduce environmental effects from increased ozone. High ozone levels aggravate respiratory and cardiovascular disease, reduce lung function, and increase coughing and chest discomfort.

Particulate matter is the other principal pollutant of concern in the Bay Area. It is measured as respirable particulate matter, particles with a diameter of 10 micrometers or less (PM_{10}), and fine particulate matter, particles with a diameter of 2.5 micrometers or less ($PM_{2.5}$). High particulate matter levels aggravate respiratory and cardiovascular disease, reduce lung function, increase mortality, and reduce lung function growth in children.

3.1.1.3 Ambient Air Quality Standards

As required by the federal Clean Air Act, NAAQS have been established for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur oxides (SO_X), and lead (Pb). Pursuant to the California Clean Air Act, the state has established CAAQS. Both are summarized in Table 3.1-2.

Table 3.1-2. Ambient Air Quality Standards

Pollutant	Averaging Period	California Standard	Federal Standard
Ozone (O_3)	1 hour	0.09 ppm (180 µg/m^3)	Revoked[a]
Ozone (O_3)	8 hour	0.070 ppm (137 µg/m^3)	0.07 ppm[b] (137 µg/m^3)
Respirable Particulate Matter (PM_{10})	24 hour	50 µg/m^3	150 µg/m^3
PM_{10}	Annual	20 µg/m^3	Revoked[a]
Fine Particulate Matter ($PM_{2.5}$)	24 hour	none	35 µg/m^3

Pollutant	Averaging Period	California Standard	Federal Standard
$PM_{2.5}$	Annual	12 µg/m³	9 µg/m³
Carbon Monoxide (CO)	1 hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)
CO	8 hour	9 ppm (10 mg/m³)	9 ppm (10 mg/m³)
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm (339 µg/m³)	0.100 ppm[b] (188 µg/m³)
NO_2	Annual	0.030 ppm (57 µg/m³)	0.053 ppm[b] (100 µg/m³)
Lead (Pb)	30 Day Average	1.5 µg/m³	--
Pb	Rolling three-month period, evaluated over a three-year period	--	0.15 µg/m³
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm (655 µg/m³)	0.075 ppm[b] (196 µg/m³)
SO_2	3 hour	--	0.5 ppm[b] (1300 µg/m³)
SO_2	24 hour	0.04 ppm (105 µg/m³)	0.14 ppm (for certain areas)[b]
Hydrogen Sulfide (H_2S)	1 Hour	0.03 ppm (42 µg/m³)	--
Sulfates	24 hour	25 µg/m³	--
Vinyl Chloride	24 hour	0.010 ppm (26 µg/m³)	--
Visibility-Reducing Particles	8 hour	Extinction coefficient of 0.23 per kilometer (visibility of ten miles or more due to particles when relative humidity is less than 70 percent)	--

Sources: CARB 2025, US EPA 2025

Notes: ppm = parts per million; ppb = parts per billion; mg/m³ = milligram per cubic meter; µg/m³ = micrograms per cubic meter; "--" = no standard.

a. The 1-hour O_3 NAAQS was revoked effective June 15, 2005, and the annual PM_{10} NAAQS was revoked effective December 18, 2006. The 24-hour SO_2 NAAQS was revoked effective August 23, 2010, but remains in effect for certain areas until the applicable State Implementation Plan is revised.

b. Federal standards for O_3, NO_2, and SO_2 are promulgated in parts per billion (ppb) and are shown above in parts per million (ppm) for direct comparison with the California standards. The federal standards are: 8-hour O_3, 70 ppb; 1-hour NO_2, 100 ppb; annual NO_2, 53 ppb; 1-hour SO_2, 75 ppb.

3.1.1.4 Attainment Status

As summarized in Table 3.1-3, the Bay Area is designated nonattainment for the NAAQS for 8-hour ozone and for $PM_{2.5}$, and nonattainment for the CAAQS for ozone, $PM_{2.5}$, and PM_{10}. The basin has attained the NAAQS for PM_{10} and is in attainment or unclassified for the remaining criteria pollutants.

Table 3.1-3. Bay Area State and Federal Attainment Status

Pollutant	Federal Designation	State Designation
Ozone (8-hour)	Nonattainment (marginal)	Nonattainment - Transitional
Ozone (1-hour)	Not applicable (standard revoked)	Nonattainment - Transitional
$PM_{2.5}$	Nonattainment	Nonattainment
PM_{10}	Attainment / Unclassifiable	Nonattainment
Carbon monoxide	Attainment / Unclassifiable	Attainment
Nitrogen dioxide	Attainment / Unclassifiable	Attainment
Sulfur dioxide	Attainment / Unclassifiable	Attainment
Lead	Attainment / Unclassifiable	Attainment

Source: Bay Area Air District 2026

3.1.1.5 Toxic Air Contaminants

Toxic air contaminants (TACs) are a class of compounds known to cause morbidity or mortality, often because they cause cancer or other health effects. They are found in ambient air, particularly in urban areas, and originate from industry, fuel combustion, and commercial operations, among other sources. Because chronic and acute exposure can result in adverse health effects, TACs are regulated at the federal, state, and regional level. Health risks from TACs are estimated using the Office of Environmental Health Hazard Assessment (OEHHA) risk assessment guidelines published in 2015. The TACs of concern for this Project are those emitted by the semiconductor process equipment and by the standby generator diesel engines.

1.1.1.1 Receptors

Receptors are the people that may potentially be affected by the TAC emissions from a project, such as residential receptors, worker receptors, acute receptors, and sensitive receptors. Sensitive receptors are individuals who are more susceptible to poor air quality, *i.e.*, children, the elderly, and those with preexisting serious health problems affected by air quality. The Project site is surrounded by industrial, commercial, and office uses. The nearest residential receptors are approximately 2,850 feet to the southeast and off-site worker receptors are approximately 1,250 feet to the southeast.

3.1.1.6 Existing Permitted Emissions at the Facility

The Applied Materials Arques Campus is an existing permitted facility. Table 3.1-4 shows the emissions associated with the previously permitted emergency diesel engines (i.e., Application Nos. 706979 and 708141) and potential to emit at the facility and the effect of Application No. 700650.

Table 3.1-4. Baseline and Proposed Air Emissions at the Arques Campus Permitting Facility

Pollutant	Pre-Existing PTE (tpy)	Application Increase (tpy)	Final PTE (tpy)
NO_X	8.1	22.5	30.5
POC	5.8	12.1	20.2
SO_2	0.6	0.6	0.7
CO	6.9	19.2	24.4
PM_{10}	3.4	1.6	5.0
$PM_{2.5}$	0.3	1.6	1.9

Source: Air District Engineering Evaluation for Application No. 700650, Table 22.

Notes:

tpy = tons per year; PTE = potential to emit. Potential to emit reflects existing emissions plus 100 hours of emergency operation for all permitted emergency diesel engines at the facility. Existing potential to emit was reviewed in Application No. 708141.

3.1.2 Impacts Assessment

This section describes the method and significance criteria that were used to analyze the potential impacts of the Project on air quality. The analysis of air quality impacts is inherently cumulative, because no single project causes an air basin to exceed an ambient standard. An exceedance of the Air District's mass emissions thresholds is the Air District's adopted indicator that a project's contribution to the Bay Area's air quality impacts is cumulatively considerable and significant. Therefore, this section satisfies the requirement that the Air District consider the cumulative impacts of the Project on air quality.

3.1.2.1 Thresholds of Significance

The Air District reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts to air quality. The CEQA Guidelines suggest a project may have a potentially significant effect if it would:

a) Conflict with or obstruct implementation of the applicable air quality plan?

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?

c) Expose sensitive receptors to substantial pollutant concentrations?

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

The Air District has adopted the following quantitative thresholds of significance for criteria air pollutants and precursors from stationary source projects (Table 3.1-5).

Table 3.1-5. Air District Thresholds of Significance, Criteria Air Pollutants and Precursors

Pollutant	Operational, Average Daily (lb/day)	Operational, Annual (tons/year)
ROG / POC	54	10
NO_X	54	10
PM_{10}	82	15
$PM_{2.5}$	54	10
PM_{10} / $PM_{2.5}$ (fugitive dust)	Best management practices	Not applicable

Source: Bay Area Air District 2022

For toxic air contaminants and risk, the Air District has two thresholds. One evaluates whether the project's emissions will cause an excess cancer risk of more than 10 in one million, a chronic or acute hazard index of more than 1.0, or an annual average $PM_{2.5}$ concentration increase of more than 0.3 micrograms per cubic meter. The second evaluates whether emissions from all sources within 1,000 feet will cause an excess cancer risk of more than 100 in one million, a hazard index of more than 10.0, or an annual average $PM_{2.5}$ concentration increase of more than 0.8 micrograms per cubic meter.

For odors, the Air District considers the nature of the source, the distance to receptors, and the facility's complaint history. The Air District considers a substantial number of odor complaints to be five or more confirmed complaints per year averaged over three years.

3.1.2.2 Methodology

Operational criteria pollutant emissions from the permitted sources were quantified by Air District engineering staff in the Engineering Evaluation for Application No. 700650, using material usage limits proposed by the applicant, vendor data, emission factors from EPA AP-42 Chapter 1.4 for natural gas combustion in the point of use devices, and the Air District's policy on emission factors for toxic air contaminants from miscellaneous natural gas combustion sources. Abatement efficiencies for the point of use devices were assumed to range from 90 percent to 99.9 percent depending on the device and compound.

Health risks were quantified in accordance with the OEHHA 2015 guidance and the Air District's *Air Toxics NSR Program Health Risk Assessment Guidelines* (December 2021). The Hotspots Analysis and Reporting Program Air Dispersion Modeling and Risk Tool (HARP2) was used to

evaluate cancer risk and chronic hazard index for residential and off-site worker receptors and acute hazard index for the highest potential one-hour exposure. Residential exposure assumes annual average TAC concentrations occurring 350 days per year for 30 years. Off-site worker exposure assumes 8 hours per day, 250 days per year, for 25 years. Age sensitivity factors were applied. Because source operation is not continuous, a worker adjustment factor of 4.2, the maximum value, was applied to worker cancer risk estimates.

Dispersion modeling used AERMOD version 22112 with a five-year set of San José International Airport meteorological data (2013 through 2017) prepared by Air District meteorology staff. The meteorological tower is approximately 4.6 miles southeast of the Project site and was determined to be representative given proximity and the absence of significant intervening terrain. The model was referenced in NAD 83 UTM coordinates using 10-meter resolution terrain data for Santa Clara County. Land use was classified as Urban under the Auer method, with urban categories comprising 85.4 percent of the area within a 3-kilometer radius, and the urban dispersion algorithm was applied. The model included 14 point sources representing the exhaust stacks and an area source representing the wipe cleaning operation. Consistent with Regulation 2-5-216, the health risk assessment also included emissions from Applications 706979 and 708141.

3.1.2.3 Project Impacts

a) Would the Project conflict with or obstruct implementation of the applicable air quality plan?

A project may conflict with or obstruct implementation of an air quality plan by determining whether the project supports the primary goals of the plan, whether it includes all applicable control measures, and whether it would disrupt or hinder implementation of the plan's control measures.

The 2017 Clean Air Plan does not contain control measures that apply directly to individual stationary sources. However, the 2017 Clean Air Plan's 40 stationary source control measures propose amendments and new requirements to be incorporated into the rulemaking, permitting, and enforcement programs for stationary sources. One of the mechanisms by which the Clean Air Plan accounts for growth in stationary source emissions is New Source Review itself: new and modified sources must apply BACT as applicable, and facilities whose emissions exceed 10 tons per year of POC or NO_X must provide federally enforceable emission offsets so that there is no net increase in regional emissions of those ozone precursors.

Two different control standards apply to the permitted sources, distinguished by pollutant rather than by equipment. BACT is triggered for both sources (S-264 and S-265) because maximum daily POC and NPOC emissions from S-264 and maximum daily POC emissions from S-265 each exceed 10.0 pounds per day. What has been achieved in practice was found to differ by type of process tool and operation, so the Air District made separate determinations for the

acid gas exhaust system, the solvent exhaust system, and the wipe cleaning operation, which require at least 90 percent volatile organic compound destruction or removal, or a 10 parts per million by volume outlet concentration, on the acid gas exhaust system, a tiered destruction efficiency of greater than 98 percent when inlet concentration is between 200 and 2,000 parts per million by volume and greater than 90 percent when it is below 200, or the same outlet concentration limit, on the solvent exhaust system, and material content limits and work practices for the wipe cleaning operation.

NO_X and CO from the point of use devices are subject to RACT rather than BACT. These pollutants are not emitted by the process tools but are generated by the abatement equipment installed to control the organic compounds that the process tools do emit. The applicable control standard therefore differs by pollutant: BACT applies to POC and NPOC, and RACT applies to the NO_X and CO produced in abating them. The Air District determined that the point of use devices are required in order to meet BACT for POC and NPOC from the dry process tools, and that the NO_X and CO generated by combusting natural gas in them are secondary pollutants resulting from an abatement device implemented to comply with BACT. Regulation 2-2-102 provides that BACT does not apply to such emissions but that they remain subject to RACT. The Air District's RACT determination for these devices is 0.20 pound of NO_X and 0.80 pound of CO per million Btu. Maximum NO_X emissions will be 4.8 pounds per hour and 20.8 tons per year and maximum CO emissions will be 4.0 pounds per hour and 17.52 tons per year at a maximum combined fuel rate of 425,341 million Btu per year, equating to 0.10 pound of NO_X and 0.08 pound of CO per million Btu. Those rates are half and one tenth of the respective RACT levels, and permit conditions will limit emissions to the proposed values and require source testing to verify compliance (see Section 2.7.3.4).

Separately from the control standards described above, the Project will provide emissions offsets at a 1:1 ratio for the un-offset cumulative increase, which the Engineering Evaluation calculates as 18.4 tons per year of POC and 26.6 tons per year of NO_X, to be taken from the Small Facility Bank. Because the offsets are federally enforceable and are provided at a 1:1 ratio, the Project's ozone precursor emissions will not increase the regional inventory of criteria pollutants beyond the levels contemplated in the Clean Air Plan and the State Implementation Plan.

A separate avoidance limit applies to the electric regenerative thermal oxidizer. Vendor specifications indicate approximately 1.24 pounds per hour of NO_X and 0.06 pound per hour of CO will form within it, at which rates NO_X would exceed 10.0 pounds per day, and Applied Materials has accepted a 9.0 pound per day avoidance limit for both pollutants at the Solvent Exhaust.

Accordingly, the Project would emit POC and NO_X in excess of 10 tons per year, which absent offsets and BACT would have the potential to conflict with the assumptions underlying the Clean Air Plan. Both requirements are mandatory under Regulation 2-2-301 and Regulation 2-2-

302 and will be imposed as enforceable permit conditions, as described in Sections 2.7.3.3 and 2.7.3.6. With those requirements in place, the Project would apply BACT and would fully offset its un-offset cumulative increase in POC and NO_X at a 1:1 ratio with federally enforceable emission reduction credits. The Project would not increase regional ozone precursor emissions beyond the levels accounted for in the Clean Air Plan and would not conflict with or obstruct its implementation. No mitigation is required and impacts would be **less than significant**.

b) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard?

As summarized in Table 3.1-3, the Bay Area is designated nonattainment for the NAAQS for 8-hour ozone and for $PM_{2.5}$, and nonattainment for the CAAQS for ozone, $PM_{2.5}$, and PM_{10}. Therefore, this analysis evaluates the Project's emissions for those criteria pollutants. Because the area is in nonattainment for ozone, ROG/POC and NO_X are analyzed as ozone precursor emissions.

The 1999 Arques EIR concluded at Air Quality Impact 2 that operational NO_X emissions, driven by mobile sources, would exceed the then-applicable Air District threshold of 80 pounds per day and would combine with the emissions of other projects to result in a cumulatively considerable increase in NO_X. Mitigation Measure 3.5-2.1 was adopted but did not reduce the impact below the level of significance.[1] The 1999 Arques EIR did not identify an exceedance for ROG/POC, did not report annual criteria pollutant emissions, and did not quantify emissions from semiconductor process equipment.

The Engineering Evaluation covers the permitted stationary sources only. Table 3.1-6 presents the maximum abated operational emissions of the permitted sources against the applicable thresholds.

[1] Per the 1999 Arques EIR: *The following measures would reduce this air quality impact, but it would not be sufficient to diminish the effect to less than significant.*

2.1 Vehicular Trip Reduction Measures. The Applied Materials Arques Campus Specific Plan incorporates vehicular trip reduction measures that are credited with achieving a 5 % reduction in total trip generation and that are described in Section 3.4, Transportation. The emissions estimates in Table 3.5-5 incorporate the estimated trip reduction that would be brought about by these measures. To achieve greater emissions reduction, Applied Materials will develop their Transportation Demand Management Strategy to achieve a 15 percent reduction in total trip generation. Applied Materials shall employ a variety of techniques to accomplish this trip reduction. Such measures could include vanpools, subsidized transit passes, staggering work hours to reduce travel during the peak commute hours, and shuttles to transit stops and centers.

Table 3.1-6. Permitted Source Operational Criteria Pollutant Emissions Compared to Thresholds

Pollutant	Abated Daily Emissions (lb/day)	Daily Threshold (lb/day)	Exceeds?	Abated Annual Emissions (tpy)	Annual Threshold (tpy)	Exceeds?
POC	95.2	54	**Yes**	12.1	10	**Yes**
NO_X	123.0	54	**Yes**	22.5	10	**Yes**
PM_{10}	8.7	82	No	1.6	15	No
$PM_{2.5}$	8.7	54	No	1.6	10	No

Source: Air District Engineering Evaluation for Application No. 700650, Tables 9 and 11

Notes:

N/A = not applicable
Daily POC includes 71.7 lb/day from S-264 and 23.6 lb/day from S-265. Daily NO_X from S-264 comprise emissions from the point of use devices (114.0 lb/day NO_X) plus emissions formed by oxidation of process compounds within the electric regenerative thermal oxidizer, which will be limited by permit condition to 9.0 pounds per day.

Table 3.1-7 assembles a total Project figure by combining the controlling stationary source emissions with the mobile source emissions quantified in the prior documents.

Table 3.1-7. Total Project Operational Criteria Pollutant Emissions

Emission Source	Basis	ROG (lb/day)	NO_X (lb/day)	PM_{10} (lb/day)	$PM_{2.5}$ (lb/day)
Permitted stationary sources, S-264 and S-265	Air District Engineering Evaluation	95.2	123.0	8.7	8.7
Mobile	2024 Addendum	15	12	33	9
Area	2024 Addendum	20	<1	<1	--
Laboratory energy use[1]	2024 Addendum	4	66	38	14
Total Project operational emissions	--	134.2	201	79.7	31.7
Air District significance threshold (lb/day)	--	**54**	**54**	**82**	**54**
Exceeds significance threshold?		***Yes***	***Yes***	*No*	*No*

Source: Air District Engineering Evaluation for Application No. 700650, Table 11; 2024 Addendum

Notes:

1. The 2024 Addendum's Energy component of 4 pounds per day of ROG and 66 pounds per day of NO_X reflects 245,000 MMBtu per year of natural gas used by laboratory pollution control equipment. The permitted stationary source row reflects combustion of the full 425,341 MMBtu per 12 consecutive months allowed under permit. The two rows address the same equipment, and the total conservatively sums both. Excluding the Energy component as duplicative would yield 110.2 pounds per day of ROG and POC and 135.0 pounds per day of NO_X. Either way, ROG, POC, and NO_X exceed the 54 pound per day threshold.

The Project's emissions of POC and NO_X exceed the Air District's daily and annual thresholds of significance. The Project's emissions of particulate matter (PM_{10} and $PM_{2.5}$) do not exceed the Air District's thresholds and will not be further analyzed.

As shown in Table 1.4-1, the 1999 Arques EIR quantified vehicular emissions only, at 63 pounds per day of ROG and 103 pounds per day of NO_X, evaluated against the Air District threshold then in effect of 80 pounds per day. On that basis the 1999 Arques EIR identified an exceedance for NO_X but not for ROG.

The 2024 Addendum reported 38 pounds per day of ROG and identified no exceedance for that pollutant. As shown in Table 3.1-7, new information about the revised Project plans provides total Project operational emissions are 134.2 pounds per day of ROG/POC and approximately 201 pounds per day of NO_X. The applicable Air District threshold for both pollutants is now 54 pounds per day. For ROG/POC, neither the 1999 Arques EIR nor the 2024 Addendum identified an exceedance of the threshold, and Project emissions now exceed the applicable threshold by more than twofold. This is a significant effect that neither document analyzed.

For NO_X, emissions have increased from the 103 pounds per day disclosed in the 1999 Arques EIR to approximately 201 pounds per day. At nearly double the emissions estimated in the 1999 Arques EIR, the effect of the increase in NO_X emissions is considered to be substantially more severe than the 1999 Arques EIR described.

The emissions in Table 3.1-6 are the emissions that will occur with the required controls applied, since the Engineering Evaluation quantifies abated emissions. No feasible mitigation beyond the regulatory BACT, RACT requirements, or the federally enforceable offsets described in the above impact analysis, have been identified to reduce POC and NO_X emissions from Building 100 while allowing the Project to achieve its basic objectives. The emission offsets required under Regulation 2-2-302 substantially reduce the Project's contribution to regional ozone precursor emissions. However, they do not eliminate the exceedance of the daily thresholds. Specifically, the offset obligation applies to the permitted stationary sources and is expressed on an annual tonnage basis. It does not extend to the mobile source or laboratory energy use components of Project emissions, and it does not address the daily exceedances shown in Table 3.1-7, which are relevant to peak ozone formation. Total Project emissions of ROG/POC at 134.2 pounds per day and NO_X at approximately 201 pounds per day would continue to exceed the Air District's threshold of 54 pounds per day for each pollutant. This impact is therefore **significant and unavoidable**, consistent within the conclusion the City reached for the whole Project in the 1999 Arques EIR.

c) Would the project expose sensitive receptors to substantial pollutant concentrations?

While the 1999 Arques EIR includes a discussion of potential TAC emissions from the facility, it did not evaluate exposure of sensitive receptors to substantial pollutant concentrations. Per Section 3.5 of the 1999 Arques EIR,

> *"Emissions from stationary sources of air contaminants that might exist in the recently completed Technology Center have already received environmental review. The future emissions from sources within the Technology Center and possibly from other facilities on the site may partly consist of air contaminants classified for regulatory purposes as toxic air contaminants. Such emissions are subject to control by the BAAQMD under the District's Toxic Air Contaminant Control Program. Permits are required from the BAAQMD for such stationary sources before a facility is permitted to construct or operate such sources, and the permitting process involves health risk assessments of all toxic releases to be permitted."*

Accordingly, this SEIR summarizes the results of the Air District's health risk assessment (Table 3.1-8), which includes emissions from Applications 700650, 706979, and 708141, and evaluates the potential risk in comparison to the Air District's quantitative thresholds.

Table 3.1-8. Health Risk Assessment Results for the Project

Receptor	Cancer Risk (per million)	Chronic Hazard Index	Acute Hazard Index	Air District Project Threshold
Resident	0.84	0.12	Not applicable	10 per million cancer; 1.0 hazard index
Worker	0.29	0.32	Not applicable	10 per million cancer; 1.0 hazard index
Point of maximum impact	Not applicable	Not applicable	0.27	1.0 hazard index

Source: Air District Engineering Evaluation for Application No. 700650, Table 24

All results are well below the Air District's CEQA thresholds. The worker chronic hazard index of 0.32 does, however, exceed the 0.20 threshold in Regulation 2-5-302, which requires the source to implement TBACT. The TBACT limits are mandatory under Regulation 2-5-302 and will be imposed as permit conditions, as described in Section 2.7.3.7. With the TBACT limits in place, Project health risk would remain at or below the levels in Table 3.1-8 and well below the Air District's thresholds and impacts would be **less than significant**.

d) Would the project result in other emissions, such as those leading to odors, adversely affecting a substantial number of people?

The 1999 Arques EIR addressed odors at Land Use Impact 2. Chapter 5 of the Air District's CEQA Guidelines identifies odor screening distances for specific odor-generating land uses and types of operation, presented in Table 5-4 of the Guidelines. The Project is a semiconductor research and development laboratory. It is not among the land uses or types of operation identified in Table 5-4, and no screening distance applies. The Project is not a chemical manufacturing

operation, as Applied Materials has stated that the facility will conduct research and development activities only, with no intention of manufacturing products for commercial sale.

The Guidelines provide that screening distances should not be used in isolation, but considered together with odor parameters and complaint history. Because Sources S-264 and S-265 have not yet been permitted or constructed, they have no operating history and no associated odor complaints. The Air District considers more than five confirmed odor complaints per year, averaged over three years, to constitute a substantial number of complaints.

The Project sources are subject to Air District Regulation 1-301, which prohibits the discharge of air contaminants that cause a public nuisance, and to Air District Regulation 7, Odorous Substances. Regulation 7 sets limits on how strong an odor a facility may discharge, both at the source and at or beyond its property line, and caps the emission concentrations of certain odorous compounds. Those limits take effect if the Air District receives odor complaints from ten or more people within a 90-day period. Regulation 1-301 applies at all times, and the Air District retains authority under it to abate any public nuisance that may arise from operation of the permitted sources. Because the Project is not an odor source of a type identified in Table 5-4 of the Air District's CEQA Guidelines, and given the applicable requirements of Regulations 1-301 and 7, the Project would not result in other emissions, such as those leading to odors, adversely affecting a substantial number of people and impacts would be **less than significant**.

3.1.2.4 Mitigation Measure(s)

No feasible mitigation measures are identified that would further reduce or avoid potentially significant air quality impacts.

3.2 Greenhouse Gas Emissions

This section describes existing GHG conditions in California; identifies regulations applicable to GHG emissions that could occur due to the Project; and addresses potential impacts related to GHG emissions that could result from the Project as they relate to human made climate change, defined as changes to the Earth’s climate that affect weather, oceans, ecosystems, and global temperatures. Table 3.2-1 summarizes GHG impacts that could result from implementation of the Project.

Table 3.2-1. Summary of GHG Emissions Impacts

Would the Project:	Project	Mitigation Measure(s)
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Significant and Unavoidable	None
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Significant and Unavoidable	None

3.2.1 Existing Conditions

3.2.1.1 Greenhouse Gases

GHGs trap heat in the atmosphere, which increases global temperatures. Resulting climate impacts include more frequent and severe heatwaves, rain and snow, floods, droughts, and wildfires. Climate change also raises ocean temperatures, acidity, and sea level due to rapid melting of glaciers and sea ice. Common GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, sulfur hexafluoride (SF_6), and other fluorinated gases including nitrogen trifluoride and hydrofluorinated ethers. GHGs occur naturally in association with volcanoes, forest fires, and biological processes such as enteric fermentation and aerobic decomposition. They are also produced by combustion of fuels, industrial processes, agricultural operations, waste management, and land use changes, such as loss of farmland to urbanization. The most common GHG from human activity (primarily fuel combustion) is CO_2, followed by CH_4 and N_2O. Most GHGs persist in the atmosphere for a long time. Consequently, emissions accumulate in the atmosphere, resulting in higher atmospheric concentrations over time.

3.2.1.2 Climate Change

Over the past century, human activities have released large amounts of CO_2 and other GHGs into the atmosphere. The majority of GHGs are the by-product of burning fossil fuels to release energy in the form of heat, although deforestation, industrial processes, and some agricultural practices also emit GHGs into the atmosphere. GHGs trap solar energy in the atmosphere and cause it to warm. This phenomenon is called the greenhouse effect and is necessary to support life on Earth; however, excessive buildup of GHGs can change Earth's climate and result in undesirable effects on ecosystems, which affect human health and welfare (US EPA 2020).

Average temperatures have risen across the contiguous 48 states since 1901, with an increased rate of warming over the past 30 years. Eight of the top ten warmest years on record, both in the United States and globally, have occurred since 1998 (US EPA 2016). Within the United States, temperatures in parts of the North, the West, and Alaska have experienced the greatest

increases in average temperatures over this period (US EPA 2020). Seemingly small changes in the average temperature of the planet can translate to large and potentially hazardous shifts in climate and weather.

3.2.1.3 Statewide Summary

The total GHG inventory for California for 2023 was 360.4 million metric tons of CO_2 equivalent[2] ($MTCO_2e$) (CARB 2025). This mass of GHG emissions is less than the 2020 target of 431 million $MTCO_2e$ set by the California Global Warming Solutions Act (Assembly Bill 32). GHG emissions in California have been below this target since 2016.

3.2.2 Impacts Assessment

3.2.2.1 Thresholds of Significance

The Air District reviewed Appendix G of the CEQA Guidelines to determine whether the Project would result in significant impacts related to GHG emissions. The CEQA Guidelines consider whether the Project would:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The Air District's CEQA Guidelines establish a threshold of significance of 10,000 $MTCO_2e$ per year for stationary source projects, defined as land uses that would accommodate processes and equipment that emit GHGs and that would require an Air District Permit to Operate. That threshold applies to Source S-264, which is the subject of the discretionary action before the Air District.

The April 2022 update to the Air District's CEQA Guidelines established new methodologies and thresholds for the climate impacts of land use development projects and plans, expressed either as building and transportation design elements (Option A) or as consistency with a qualified GHG reduction strategy meeting the criteria of CEQA Guidelines Section 15183.5(b) (Option B). The 2022 update did not replace the stationary source threshold.

The City analyzed land use GHG impacts under the Air District's Guidelines, Option B, in the 2024 Addendum and found the Project consistent with the City's Climate Action Playbook. That approach was directed to land use development, comprising the building, the parking structure, and the associated vehicle trips and building energy use. It is not the applicable approach for stationary source emissions. The CalEEMod-based analysis supporting the 2024 Addendum

[2] "Carbon dioxide equivalent" or "CO_2e" is a term for describing different GHGs in a common unit. For any quantity and type of GHG, CO_2e signifies the amount of CO_2 which would have the equivalent global warming impact.

does not quantify the significant process emissions from semiconductor manufacturing tools. The City did not analyze stationary source GHG impacts.

3.2.2.2 Methodology

GHG emissions from the permitted sources were quantified by Air District engineering staff in the Engineering Evaluation. Emissions of individual compounds were converted to a CO_2e basis using 100-year global warming potentials from Table A-1 of 40 CFR Part 98. Emissions from natural gas combustion in the point of use devices were estimated using emission factors from Tables C-1 and C-2 of Part 98, assuming a natural gas higher heating value of 1,020 Btu per standard cubic foot.

3.2.2.3 Project Impacts

a) Would the Project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

As analyzed by the Air District, the Project would result in maximum annual emissions of approximately 80,000 $MTCO_2e$ (Table 3.2-2).

Table 3.2-2. Project Maximum Annual GHG Emissions by Processes Compared to Threshold

Process	Pre-Abatement ($MTCO_2e$ per year)	Abated ($MTCO_2e$ per year)
Dry process tools	2,595,870	57,518
Point of use devices at dry process tools (natural gas combustion)	Not applicable	22,543
Total	**2,595,870**	**80,062**
Air District threshold of significance, stationary source projects	--	10,000
Exceeds threshold?	**--**	***Yes***

Source: Source: Air District Engineering Evaluation for Application No. 700650, Table 19.

The single largest contributor to total GHG emissions from the Project is N_2O, which is entirely unabated. At approximately 31,900 $MTCO_2e$ per year, N_2O accounts for roughly 55 percent of abated dry process tool emissions and 40 percent of total Project emissions. The Air District has not identified any feasible abatement options to reduce these emissions. Fluorinated gases also remain a major contributor despite high abatement, up to approximately 99 percent. Even so, fluorinated gases have extremely high global warming potential causing it to be the second largest contributor at roughly 40 percent of abated dry process tool emissions. With abatement as required in the permit, total dry process tool emissions decrease from approximately 2,595,900 to 57,500 $MTCO_2e$ per year, a reduction of approximately 98 percent.

Maximum abated operational GHG emissions from the permitted sources exceed the Air District's threshold of significance of 10,000 $MTCO_2e$ per year for stationary source projects,

which is identified as a significant impact. No feasible mitigation has been identified that would further reduce the Project's operational GHG emissions while allowing the Project to achieve its basic objectives. As such, impacts would be **significant and unavoidable**.

b) Would the Program conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

The Project's consistency with applicable GHG plans, policies, and regulations is analyzed in Table 3.2-3.

Table 3.2-3. Project Consistency with Applicable GHG Plans, Policies, and Regulations

Plan, Policy, or Regulation	Project Consistency
Assembly Bill 1279 and the CARB Scoping Plan (carbon neutrality and 85 percent reduction below 1990 levels by 2045)	**Potentially inconsistent.** The Project would add approximately 80,000 $MTCO_2e$ per year to the statewide inventory, of which approximately 57,500 $MTCO_2e$ per year is process emissions including compounds with atmospheric lifetimes measured in centuries to millennia. The Scoping Plan's path to carbon neutrality assumes declining emissions across all sectors. Emissions are constrained by CARB's semiconductor regulation and by the permit limits, but the Project may not contribute a fair share to a declining trajectory.
CARB Regulation to Reduce Greenhouse Gas Emissions from Semiconductor Operations (17 CCR 95320 *et seq.*)	**Consistent.** Compliance with the Table 1 emission standards and with the annual reporting requirement of Section 95324 is mandatory and is directly enforceable by CARB. As described in Section 2.7.20, the Air District will require, as a permit condition, that the owner or operator demonstrate compliance with the applicable Table 1 emission standard before the permit issues; and submit each annual CARB report to the Air District. The Project would therefore would not conflict with this regulation.
Air District CEQA Guidelines stationary source threshold (10,000 $MTCO_2e$ per year)	**Inconsistent.** Emissions exceed the threshold by approximately eight times. See impact (a).
2017 Clean Air Plan, super GHG priority	**Partially consistent.** The abatement system reduces fluorinated gas emissions by approximately 99 percent, consistent with the plan's priority of reducing super GHGs. However, nitrous oxide is unabated, and the residual fluorinated gas emissions remain substantial in absolute terms.
City of Sunnyvale Climate Action Playbook, Strategy 2 (decarbonizing buildings)	**Consistent.** The City's 2024 Addendum determined that the Project is consistent with its Climate Action Plan.
2025 Building Energy Efficiency Standards (Title 24, Part 6) and CALGreen (Title 24, Part 11)	**Consistent.** Compliance with the Building Energy Efficiency Standards and the California Green Building Standards Code is mandatory and is verified by the City of Sunnyvale, as Lead Agency and building permit authority, through plan check and acceptance testing. The permitted stationary sources are regulated by the Air District under Regulation 2 rather than by Title 24, except to the extent the building's laboratory exhaust system falls within the covered process provisions of the CALGreen code.

The Project would exceed the Air District's stationary source threshold of significance, which the Air District adopted for the purpose of identifying stationary source projects whose GHG emissions make a cumulatively considerable contribution to climate change. Exceedance by a

factor of approximately eight is a significant impact. For the reasons given under impact (a), mitigation would not reduce emissions below the applicable threshold and impacts are considered **significant and unavoidable**.

3.2.2.4 Mitigation Measure(s)

No feasible mitigation measures have been identified that would minimize, reduce, or avoid potentially significant impacts.

SECTION 4 Other CEQA Concerns

4.1 Significant and Unavoidable Impacts

CEQA Guidelines Section 15126.2(c) requires identification of significant environmental effects that cannot be avoided if the project is implemented. Based on the analysis in Sections 3.1 and 3.2, the following impacts would be significant and unavoidable:

- Impact AQ-b. Cumulatively considerable net increase in emissions of ozone precursors (POC and NO_X) for which the Bay Area is designated nonattainment, notwithstanding the BACT and 1:1 federally enforceable emission offset requirements described in Sections 2.7.3.1 and 2.7.3.6.
- Impact GHG-a. Cumulatively considerable net increase in GHG emissions of about 80,000 $MTCO_2e$ per year from the permitted stationary sources, approximately eight times the Air District's threshold of significance.
- Impact GHG-b. Conflict with the Air District's adopted stationary source GHG threshold and potential inconsistency with the state's carbon neutrality trajectory.

4.2 Significant Irreversible Environmental Changes

CEQA Guidelines Section 15126.2(d) requires a discussion of significant irreversible environmental changes, including the use of nonrenewable resources.

The Project would consume natural gas, a nonrenewable resource, in the point of use abatement devices on an ongoing basis. In addition, the emission of long-lived compounds, including nitrogen trifluoride with an atmospheric lifetime on the order of 500 years, sulfur hexafluoride on the order of 3,200 years, tetrafluoromethane on the order of 50,000 years, and nitrous oxide on the order of 110 years, constitutes an irreversible commitment in the sense that these compounds will persist in the atmosphere for decades to millennia after emission, with no practical removal mechanism.

SECTION 5 References

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5.3 Environmental Analysis

5.3.1 Air Quality

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5.4 Other CEQA Concerns

None

SECTION 6 List of Preparers

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6.2 Consultant Team

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	Greenhouse Gas Emissions
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