AIR QUALITY IMPACTS FROM HELICOPTER FLIGHTS AT THE PROVIDENCE SANTA ROSA MEMORIAL HOSPITAL

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GLOSSARY OF TERMS AND ACRONYMS

Acronym	Description
ADMRT	Air Dispersion Modeling and Risk Assessment Tool
AEGL-1	Acute Exposure Guideline Level - 1
AERMAP	AERMOD Terrain Preprocessor
AERMET	AERMOD Meteorological Preprocessor
AERMOD	USEPA Regulatory Air Dispersion Model
APCO	Air Pollution Control Officer
ARM2	Tier 2 Ambient Ratio Method
Avgas	Aviation Gasoline
BAAQMD	Bay Area Air Quality Management District
CAAQS	California Ambient Air Quality Standards
CO	Carbon Monoxide
CARB	California Air Resource Board
CEQA	California Environmental Quality Act
DEM	Digital Elevation Model
EMS	Emergency Medical Services
ft	Foot
FOCA	Swiss Federal Office of Civil Aviation
g/s	Grams Per Second
HARP2	Hotspots Analysis and Reporting Program Version 2
HHI	Health Hazard Index
HRA	Health Risk Assessment
HC	Hydrocarbons
hr	Hour
km	Kilometers
LTO	Landing Take Off
m	Meter
NAAQS	National Ambient Air Quality Standards
NRC	National Research Council
NO_2	Nitrogen Dioxide
NO_X	Nitrogen Oxides
OEHHA	Office of Environmental Health Hazard Assessment
PF	Peaking Factor
PM	Particulate Matter
PM_{10}	Particulate Matter Less Than 10 Micrometers in Aerodynamic Diameter
$PM_{2.5}$	Particulate Matter Less Than 2.5 Micrometers in Aerodynamic Diameter
REACH	REACH Air Medical Services
RPM	Revolutions per Minute
SHP	Shaft Horsepower
SIL	Significant Impact Level
SRMH	Santa Rosa Memorial Hospital
SO_2	Sulfur Dioxide
SO_X	Sulfur Oxides
TACs	Toxic Air Contaminants
USEPA	US Environmental Protection Agency
UTM	Universal Transverse Mercator
VOCs	Volatile Organic Compounds
$\mu g/m^3$	Microgram per Cubic Meter

I. Executive Summary

This report presents an air quality modeling study performed to assess the potential health impacts on residents living in the vicinity of the Providence Santa Rosa Memorial Hospital (SRMH) from trauma center helicopter flights, currently operated by REACH Air Medical Services (REACH). SRMH is located at 1165 Montgomery Drive in Santa Rosa, California. This study has been completed to satisfy Item 5c of the contract detailing requirements for a Level II Trauma Permit in the County of Sonoma, which states:

Hospital agrees to, at its sole expense, and within 18 months of the effective date of this Agreement, deliver to EMS Agency a final completed air quality study that (1) examines the potential of trauma related flights to and from the hospital to affect air quality in the residential areas in the vicinity of the hospital, and (2) identify recommendations, if any, to respond to the study's conclusions.

Two (2) trauma center helicopter approach routes were reviewed for the air quality impact study, as well as one departure route. The College A route takes an approach path directly over residents to the north of SRMH. The College B route diverts helicopters away from that residential area. Because helicopter flights to SRMH depend upon unpredictable trauma events, it is not expected that future helicopter flight operational patterns will differ from recent, past operations. The maximum expected future hourly, daily and annual helicopter exhaust emissions modeled in this study were estimated from recent helicopter operation logs, from January 2001 through July 2023.

The air quality study used the United States Environmental Protection Agency (USEPA)- approved air dispersion model, AERMOD, to review the potential for residential health impacts due to helicopter jet fuel combustion exhaust, from the following criteria pollutant emissions: nitrogen dioxide (NO_2), carbon monoxide (CO), fine particulate matter with diameter less than 10 microns and 2.5 microns (PM_{10} and $PM_{2.5}$), and sulfur dioxide (SO_2). Residential cancer and non-cancer chronic and acute health risks from toxic air contaminants (TACs) emitted in helicopter jet fuel combustion exhaust were reviewed using AERMOD and the California state-approved Hot Spots Analysis and Reporting Program-Version 2 (HARP2) risk assessment model. Odors from jet fuel combustion exhaust were reviewed using modeled 1-hour average (short term) SO_2 concentrations as representative for helicopter exhaust odors.

This study finds that modeled criteria pollutant concentrations in the exhaust emitted by trauma center helicopter flights at SRMH are less than the agency-approved health impact significant thresholds, and therefore, criteria pollutants are not expected to cause health impacts of concern in residential areas. Similarly, modeled cancer and non-cancer chronic and acute health risks at the residential area near SRMH are below the significance thresholds established by agencies regulating air quality, including the local Bay Area Air Quality Management District (BAAQMD); TAC emissions are not expected to cause health impacts of concern. Modeled short-term SO_2 concentrations are well below the threshold associated with the human perception of SO_2 odors. As a result, odor issues in the residential areas near the

hospital due to helicopter SO_2 emissions, or from other components in jet fuel combustion exhaust such as organic compounds, are not expected. The highly conservative nature of this air quality analysis and the intermittent nature of helicopter operations means that the actual air pollution health impacts on residences located near SRMH are likely to be much lower than those estimated in this study.

The study found that the highest modeled pollutant concentrations from helicopter exhaust will occur when helicopters are in operating modes closest to ground level, approaching for landing, idling, and taking off. Because nearly all helicopter emissions that could potentially impact residential areas occur at the SRMH helipad in common with all expected flight routes, it is not expected that any flight route that helicopters take will make any difference in potential air pollutant exposures in the residential areas.

II. Introduction

At the request of the County of Sonoma and on behalf of Providence Santa Rosa Memorial Hospital (SRMH), BlueScape Environmental (BlueScape) completed an air quality study to review the potential for health impacts on nearby residents from air emissions from helicopters travelling to and from the SRMH Level II Trauma Center. SRMH is located at 1165 Montgomery Drive in Santa Rosa, California. Helicopters are currently operated by REACH Air Medical Services (REACH). This air quality impact study has been completed to satisfy Item 5c of the contract with SRMH detailing requirements for a Level II Trauma Permit in the County of Sonoma, which states:

Hospital agrees to, at its sole expense, and within 18 months of the effective date of this Agreement, deliver to EMS Agency a final completed air quality study that (1) examines the potential of trauma related flights to and from the hospital to affect air quality in the residential areas in the vicinity of the hospital, and (2) identify recommendations, if any, to respond to the study's conclusions.

Based upon review of recent operational records, BlueScape estimated maximum expected future helicopter operational scenarios on an hourly, daily and annual basis, in order to develop the air emissions used in the air study. Air emissions from helicopter jet fuel exhaust include criteria pollutants: nitrogen dioxide (NO_2), carbon monoxide (CO), particulate matter with aerodynamic diameter 10 microns or less (PM_{10}), particulate matter with aerodynamic diameter 2.5 microns or less ($PM_{2.5}$) (or fine particulate matter) and sulfur dioxide (SO_2). The jet fuel used by the helicopters does not contain lead, so exposure to lead is not a consideration for this study. Helicopter exhaust may contain specific compounds known as toxic air contaminants (TACs), including common chemicals from engine fuel combustion, such as acetaldehyde, acrolein, benzene, 1,3-butadiene, ethyl benzene, formaldehyde, hexane, propylene, toluene, and p-xylene. Odors in helicopter exhaust may result from such compounds as SO_2 and other compounds.

To present findings, air concentrations for criteria pollutants were compared against health impact significance thresholds established by air quality regulatory agencies.

The hospital is in the jurisdiction of the Bay Area Air Quality Management District (BAAQMD), which has primary jurisdiction for regulating air quality in Sonoma County. The California Air Resources Board (CARB) and the US Environmental Protection Agency (USEPA) also regulate air quality in the Sonoma County region. Air quality impact analysis guidelines from the regulatory agencies were followed to review the potential health impacts of helicopter exhaust criteria pollutant emissions on nearby residents.

For criteria pollutants, study results were compared to health impact significance thresholds, to determine if there is a potential for health impacts of concern to occur in the community. Following BAAQMD guidelines, the potential residential health risk impacts, cancer risk and non-cancer chronic and acute risks, due to TACs present in the helicopter exhaust were also reviewed and compared against the cancer risk significance threshold of 10 in one million, and the non-cancer chronic and acute risk significance threshold of a 1.0 health hazard index (HHI). These are the significance risk thresholds have been established by BAAQMD.

The evaluation of possible odor impacts from helicopter exhaust was completed for SO_2, using SO_2 as a surrogate for other chemicals in jet fuel combustion exhaust, and also for the exhaust as a whole. The concentrations of 1-hr SO_2 in residential areas were compared to SO_2 odor thresholds established by the National Research Council (NRC) of the National Academies.

This report discusses the helicopter flight air quality impact study methodology and results. Section III describes the area surrounding SRMH and the locations where helicopter flights and emissions near residential areas may occur. Section IV provides details on the air pollutants addressed in the study. The study methodology and results are presented in Sections V and VI. Study conclusions are discussed at the end of this report in Section VII.

III. Description of the Area and Location of SRMH Helicopter Flights

SRMH is located at 1165 Montgomery Drive in Santa Rosa, California, just north of Montgomery Drive, west of Doyle Park Drive, and south of Fair Oaks Avenue. See Figure 1 in Attachment A. There are single family homes located to the north and east of the hospital, and mixed retail and medical offices to the west and south of the hospital. Residents may be located near the flight routes of the trauma center helicopters as they arrive and depart SRMH. Figure 2 in Attachment A shows the flight routes that the helicopters take, and that were considered for inclusion in this study. The flight routes labeled College A, College B, Montgomery, and Doyle are all flight routes that incoming (approaching) helicopters may take. Outgoing (departing) helicopters follow the flight route labeled "All Departures."

As shown in Figure 1, the hospital's helicopter landing pad is located almost in the center of the SRMH campus, approximately 400 feet from the nearest residence on Fair Oaks Avenue. The landing pad is approximately thirty (30) feet above the hospital's parking lot. As the helicopters approach the hospital landing pad, they descend from a height of approximately 500 feet to about twenty (20) feet above the

landing pad over an approximate distance of ¾ of a mile. After landing, the helicopter either idles on the landing pad for about two (2) minutes on average (no less than 30 seconds) while a patient is unloaded and taken into the hospital, or is powered down completely to be restarted later when the crew are ready to takeoff. At takeoff, the helicopter ascends up to approximately twenty (20) feet above the landing pad and departs using the "All Departures" flight route, ascending to a height of approximately 500 feet above ground level over an approximate distance of ¾ of a mile, and finally to a cruising altitude of about 1,000 feet above ground level.

IV. Air Pollutants Reviewed

The study reviewed potential residential impacts from trauma center helicopter jet fuel exhaust, including from the emissions of criteria pollutants, toxic air contaminants (TACs), and odors. Criteria pollutants include those pollutants for which the USEPA and the CARB have established national ambient air quality standards (NAAQS) and/or California ambient air quality standards (CAAQS). These include the following pollutants: NO_2, CO, PM_{10}, $PM_{2.5}$, SO_2, and lead. Certain air quality standards are designed to protect the public from adverse health impacts that can occur after being exposed for a short time, such as an hour or a day. Other standards are designed to protect people from adverse health effects that are associated with long-term exposures (months to years). All of the criteria pollutants listed above, except for lead, are reviewed in this study. Because jet fuel combustion emissions do not contain lead in the US (as the sale of leaded jet fuel is illegal), potential health impacts from lead were not considered for this study.

The BAAQMD regulates emissions from the five (5) criteria pollutants reviewed for this study[1], as well as of TACs, which can contribute to cancer and non-cancer chronic and acute risk impacts.[2] TACs from helicopter exhaust considered for this study are specific compounds commonly associated with fuel combustion in engines, including acetaldehyde, acrolein, benzene, 1,3-butadiene, ethyl benzene, formaldehyde, hexane, propylene, toluene, and p-xylene. The California OEHHA is charged with providing technical guidance to assist local agencies, such as BAAQMD, in performing HRAs to review potential cancer and non-cancer chronic and acute risk impacts.[3] The BAAQMD and OEHHA guidelines were followed to review potential health risk impacts from helicopter TAC emissions.

Odors are regulated by BAAQMD under Regulation 7 but the Regulation does not set an odor concentration limit for pollutants from fuel combustion.[4] Instead, BAAQMD states that "The limitations of this Regulation shall not be applicable until the APCO

[1] *2022 CEQA Guidelines*, BAAQMD, Revised April 20, 2023. www.baaqmd.gov/plans-and-climate/california-environmental-quality-act-ceqa/updated-ceqa-guidelines.
[2] BAAQMD Health Risk Assessment Modeling Protocol, BAAQMD, December 2020. www.baaqmd.gov/~/media/files/ab617-community-health/facility-risk-reduction/documents/baaqmd_hra_modeling_protocol-pdf.pdf?la=en.
[3] *Air Toxics Hot Spots Program Risk Assessment Guidelines: Guidance Manual for Preparation of Health Risk Assessments*, OEHHA, February 2015. https://oehha.ca.gov/air/crnr/notice-adoption-air-toxics-hot-spots-program-guidance-manual-preparation-health-risk-0.
[4] Regulation 7: Odorous Substances, BAAQMD, March 17, 1982. www.baaqmd.gov/~/media/dotgov/files/rules/reg-7-odorous-substances/documents/rg0700.pdf?la=en

[Air Pollution Control Officer] receives odor complaints from ten or more complainants within a 90-day period…" To review possible odor impacts due to jet fuel combustion in helicopters, this study reviews odors due to SO_2 emissions, and uses SO_2 as a surrogate for odor for other chemicals such as organic compounds. The study compares short term (less than 1-hour) SO_2 impacts at residential receptors to concentration thresholds set by the NRC.[5]

V. Air Quality Impact Study Methodology

This section describes the methodology used to complete the air quality impact study for helicopter flights to and from the SRMH trauma center, including a discussion on the helicopter operational details, approach and departure routes selected for review, and the methods used to develop helicopter exhaust emissions. The health impact significance thresholds used to obtain the study findings and recommendations are presented in this section. This section also discusses the computer air dispersion and health risk modeling methods performed to obtain the maximum modeled residential criteria pollutant, cancer and non-cancer health risk, and odor results discussed in Section VI.

Helicopter Routes Selected

As shown in Figure 2 in Attachment A, four helicopter flight approach routes were considered in this study: College A, College B, Montgomery, and Doyle. Because the College A route passes over more residential homes at lower heights above ground than the other flight routes, the College A route was included as the baseline approach case. The College B route was chosen as a comparative approach case, because helicopters are diverted from the residential areas to the north of SRMH. For both sets of modeling runs, the "All Departures" flight route was modeled as the only departure route.

Helicopter Exhaust Emissions Developed for the Air Quality Impact Study

Helicopter exhaust emissions for the air quality impact study were developed from the Swiss Federal Office of Civil Aviation (FOCA) *Guidance on the Determination of Helicopter Emissions* and the accompanying *Helicopter Emissions Table*.[6] Information from FOCA is used widely in the European Union and many other countries, including the United States. Helicopter exhaust emission calculations using FOCA data are presented in Attachment B.

Helicopter models, proportions of operational activity for each helicopter model, duration in each operational mode, altitude above ground, engine shaft horsepower (SHP), number of Landing Take Off (LTO) cycles per hour, day, and year were

[5] Acute Exposure Guideline Levels for Selected Airborne Chemicals, Volume 8, National Research Council of the National Academies, 2010. https://www.epa.gov/aegl.
[6] The *Guidance on the Determination of Helicopter Emissions*, Switzerland Federal Department for the Environment, Transport, Energy and Communications: Federal Office for Civil Aviation, March 27, 2013, Helicopter Table dated July 7, 2017).
www.bazl.admin.ch/bazl/de/home/themen/umwelt/schadstoffe/triebwerkemissionen/anleitung-zur-abschaetzung-von-helikopteremissionen.html.

provided by REACH. The assumptions made based upon the information received from REACH are shown in Attachment B. From this information, the helicopter used by REACH with the largest SHP was chosen for emissions modeling. It is important to note that this selection will likely result in an overestimation of emissions for most helicopters expected to travel to SRMH, and therefore is considered to be conservative. This assumption and others used to calculate helicopter exhaust emissions are described in more detail below.

As the information in the FOCA database is helicopter model- and engine-specific, engine SHPs were ratioed between the engines expected to be in use at SRMH and similar engines available in the database. In addition, FOCA emission factors are generally based on airport use cases; the fuel flow rate has been increased to match the expected fuel flow rate in very steep descents and takeoffs typical of emergency patient transport. These steep descents and takeoffs serve to decrease patient transport time but have the added effect of reducing noise and emissions in the area, as the time a helicopter spends near ground level is minimized.

FOCA emission rates are based on fuel flow at each different SHP expected for each use type (landing, idling, takeoff, approach, etc.). Available emissions in the FOCA database are nitrogen oxides (NO_x), hydrocarbons (HC), CO, and total particulate matter (PM). Emissions of PM with diameter equal to or less than 10 µm or 2.5 µm (PM_{10}, $PM_{2.5}$) were evaluated. PM_{10}/total PM and $PM_{2.5}$/total PM ratios are from CARB's Speciation Profiles.[7] Volatile Organic Compounds (VOCs) were scaled to HCs using a ratio from the USEPA for turbine engines.[8] Organic Gas TACs, also from CARB's Speciation Profiles for source category 5861 (Aircraft exhaust - jet fuel), were compared to the HARP2 database for constituents which had listed health effects. TACs not present in the HARP2 database were removed from evaluation, as there are no listed health effects to evaluate. The weight fraction of these resulting TACs were multiplied by the VOC content to get emission rates per TAC.

As sulfur oxide (SO_x) emissions are not available in the FOCA database, they were evaluated using information from the USEPA reference[9] for turbine engines, which are based on fuel burned; this was applied to fuel flow as calculated above. Because Jet A fuel is used in the helicopters flying to and from SRMH, and lead is not added to Jet A fuel, lead is not a constituent of the exhaust from the helicopters travelling to/from SRMH, and therefore, was not considered for this study.[10]

The study found that the highest air pollutant concentrations could be expected to occur in residential areas near SRMH when helicopters are located on or near the

[7] Speciation Profiles Used in CARB Modeling, California Air Resources Board, ww2.arb.ca.gov/speciation-profiles-used-carb-modeling.
[8] *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources,* EPA 420-R-92-009,December 1992.
[9] The SO_x emission factor in lb/1000 lb fuel was obtained from the *Procedures for Emission Inventory Preparation Volume IV: Mobile Sources*, UEEPA 420-R-92-009, December 1992. Table 5-4.
[10] Aviation gasoline (avgas) may contain a small amount of lead additive, but turboprop engines - such as those used in transporting patients to and from SRMH - cannot use avgas. See www.faa.gov/newsroom/leaded-aviation-fuel-and-environment.

helipad, closest to ground level. Several conservative assumptions were used to calculate emissions at this helipad location. When calculating maximum future emissions scenarios for the helipad location, the following scenarios were considered: (1) idling on the rooftop; or (2) power down, cold power up, and takeoff in the same hour. SRMH and REACH have stated that 2 minutes is the average time for idling in the first scenario, with 30 seconds minimum, but that the helicopters almost always shut down to conserve fuel.

In the case that the pilot shuts down, then powers up and takes off in the same hour, the time required to shut down is approximately 30 seconds. The startup sequence is 1-2 minutes engine run time, after battery on. As excerpted from the Eurocopter EC145 UH-72 Lakota Helicopter Flight Manual:[11]

… "The fuel control of each engine is controlled by twist grips… By turning a twist grip, the setting of the fuel control is changed via a ball bearing control cable (Flexball)…. The twist grip positions are:

(a) Position "0". The twist grip is turned fully to the right until its stop. This position allows no fuel flow.
(b) Position "20". This is the position used to start the engine…
(c) Position "30". The "30" position is the idle position…For engine shut down the twist grip must be unlocked by depressing the unlock button.
(d) Position "F". The flight position is marked "F" and is reached when turning the twist grip to the left until the stop. This position is used during all normal flight operations. The main valve is fully open and the fuel flow is controlled automatically to keep the N2 speed (rotor RPM) constant."

As noted in the text above, Position "30" is the idle position, and will be passed through for the startup and shutdown sequence. To be conservative, idle power was assumed for anything at Position "30" or less and the full time of shutdown and power up at the idle power rate (6%), as provided in the FOCA database for EC145, is included.

Also note that, as stated in the text above, the fuel flow once turned to the "F" position is controlled automatically, and when thrust is required during takeoff (not when helicopter is stationary on the rooftop), the fuel flow will increase to the takeoff power percentage. This was conservatively assumed in this study to be 90%, which is much higher than the FOCA database power percentage assumption of 66%. The power for approach was also assumed to be much higher in this study, at 60%, than the FOCA database power of 32%.

For additional conservatism, the emissions from the initial vertical climb typical of hospital helipads takeoffs were incorporated into the modeling, with the emissions from the initial 20-ft climb above the helipad incorporated into the emissions location directly on the rooftop. Since scenario 1 assumes only 2 minutes at idle power, and scenario 2 – the shutdown and startup scenario – includes the total shutdown and

[11] *Aircrew Training Manual Eurocopter UH-72A Light Utility Helicopter Aircrew Training Manual* – TC 3-04.21 (TC 1-272), Headquarters, Department of the Navy.

startup times of 2.5 minutes at idle power, and also includes the initial vertical climb at 90% power, scenario 2 was chosen as a worst-case rooftop scenario. This scenario would create higher emissions estimates in the rooftop area.

Trauma helicopter flights to SRMH are not scheduled and will occur based on demand due to unpredictable medical events. SRMH and REACH staff do not expect helicopter operations in the future to differ from recent operations. Helicopter logs from January 2021 to July 2023 were reviewed to determine expected future operations. A summary of this information is provided in Attachment C. From these logs, the maximum estimated hourly, daily and annual helicopter flight operations that may be expected to occur in the future were developed in order to calculate helicopter emissions for different modeling time-averaging periods.

For maximum helicopter flights per hour, up to three (3) landings/takeoffs in an hour each flight calendar day are expected in the future. In January 2021 to July 2023, this happened in fifteen (15) of 627 flight days (1,410 flights total), or on about 2.4% of flight days. For maximum daily operations, up to eleven (11) flights per day are expected, as estimated from the records, occurring on two (2) flight days out of 627, or about 0.3% of flight days. Therefore, 3 landing/takeoffs per hour or 11 landing/takeoffs per day have happened a low percentage of the time and have a very low probability of occurring on any specific flight day in the future. In January 2021 through July 2023 as many as 590 flights per calendar year occurred. In the past few years prior to 2021 (2018-2020, please see Attachment C), as many as 617 helicopter flights per calendar year were recorded by REACH. For the air quality impact study and based on community concerns that annual flights could increase in the future, this number was conservatively increased to 1,000 flights per year.

Air Quality Impact Study Significance Thresholds

The health impact significance thresholds used for the study were obtained from agencies that regulate air quality, including the BAAQMD, CARB, and USEPA. The thresholds are used by the agencies to review the potential impacts from proposed projects, to assess whether an emissions source could cause or contribute to an exceedance of the regulatory health standards, and thus, be capable of causing health impact concerns in the community.

When air emissions impacts from a modeling study are estimated to be below a health impact significance threshold, an agency approving a permit (such as in this case County of Sonoma) can conclude that the impacts will be insignificant, and not of concern. If air quality impacts are above a significance threshold, then an approving agency would likely require mitigation measures be used to lower impacts to below the threshold, thus ensuring that health impacts of concern will be much less likely to occur in the community. This approach to using significance thresholds was used to evaluate potential impacts to the community from helicopters travelling to/from SRMH. The approach is consistent with technical studies that are completed for review by such approving agencies as the County of Sonoma, for California Environmental Quality Act (CEQA) environmental impact reviews.

For criteria pollutant emissions impacts, the NAAQS and the CAAQS are designed to protect human health with an adequate margin of safety. To evaluate the potential for projects to cause or contribute to an exceedance of the NAAQS or CAAQS, the USEPA has developed Significant Impact Levels (SILs) that are thresholds that can be used as a screening tool to review impacts for each of the criteria pollutants and applicable averaging times. These SILs are defined concentrations of criteria pollutants in the ambient air due to a project's emissions, that are considered to be inconsequential in comparison to the NAAQS or CAAQS, and therefore an insignificant impact. If impacts from a facility do not exceed these SILs, then impacts are deemed to be insignificant and no further analysis of health impacts is needed. If a pollutant(s)/averaging time(s) exceed(s) the SILs, then a cumulative study using background concentrations in the facility's vicinity can demonstrate that the facility emissions plus background concentration does not exceed the NAAQS or CAAQS, and thus does not contribute to localized health impacts of concern. For this study, the USEPA SILs listed in the San Joaquin Valley Air Pollution Control District APR 1925 for Class II areas were used.[12] The exception is for annual $PM_{2.5}$ impacts, because the BAAQMD has adopted a lower SIL than has been adopted by USEPA.[13]

For TACs, the health impact significance thresholds for cancer and non-cancer chronic and acute risk are set by BAAQMD.[14] These include the cancer risk significance threshold of 10 in one million and the non-cancer chronic and acute risk significance threshold of 1.0 HHI. Cancer and chronic risk impacts include those impacts that can develop over long periods of exposure to TACs, such as over months or years. Acute risk impacts are generally those health impacts which happen over an hour or less.

For the odor analysis, potential SO_2 odor impacts were reviewed. SO_2 was used as a surrogate for other chemicals that can be present in jet fuel combustion exhaust (including various organic and sulfur compounds), since there are no published odor thresholds established for jet fuel exhaust. The NRC lists a perceptible odor threshold for SO_2.[15] The NRC SO_2 odor threshold is the Acute Exposure Guideline Level-1 (AEGL-1) value, which is defined as the level of exposure above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic non-sensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure. The AEGL-1 level is the most restrictive odor concentration threshold, and therefore the most conservative threshold to use to review SO_2 odor impacts.

[12] APR 1925: *Policy for District Rule 2201 AAQA Modeling*, San Joaquin Valley Air Pollution Control District, Revised March 10, 2019. www.valleyair.org/policies_per/policies/apr-1925.pdf.
[13] *2022 California Environmental Quality Act Guidelines*, Bay Area Air Quality Management District, April 20, 2023, Chapter 3, www.baaqmd.gov/~/media/files/planning-and-research/ceqa/ceqa-guidelines-2022/ceqa-guidelines-chapter-0-cover-page-pdf.pdf?la=en.
[14] *Ibid*, Chapter 3.
[15] *Acute Exposure Guideline Levels for Selected Airborne Chemicals, Volume* 8, National Research Council of the National Academies, www.epa.gov/aegl.

Table 1
Air Pollutant Significance Thresholds

Pollutant	Averaging Time	Class II SIL[1] (μg/m³)	NAAQS (μg/m³)	NAAQS Design Basis	CAAQS (μg/m³)	CAAQS Design Basis
Criteria Pollutant Thresholds						
NO_2	1-hr	7.5	N/A[2]	N/A[2]	339	High-1st-High
	Annual	1	100	Highest Annual	57	Highest Annual
CO	1-hr	2000	40,000	High-2nd-High any Year	23,000	High-1st-High
	8-hr	500	10,000	High-2nd-High any Year	10,000	High-1st-High
$PM_{2.5}$	24-hr	1.2	35	98th Percentile (H8H) Avg. over 5 Years	--	--
	Annual	0.3[3]	12.0	Annual Avg. over 5 Years	12	Highest Annual
PM_{10}	24-hr	5	150	High-6th-High over 5 Years	50	High-1st-High
	Annual	1	--	--	20	Highest Annual
SO_2	1-hr	7.8	N/A[2]	N/A[2]	655	High-1st-High
	24-hr	5	--	--	105	Not to be Exceeded More than Once per Year (H2H)
	Annual	1	--	--	--	--
Toxic Air Contaminants (TACs) and Odor Thresholds						
TACs[3]	Maximum Incremental Cancer Risk >/= 10 in one million Chronic & Acute Health Hazard Index (HHI) >/= 1.0					
SO_2 Odor[4]	520 μg/m³ (AEGL-1)					

1. Reference for Class II SILs (except for annual $PM_{2.5}$): APR 1925: Policy for District Rule 2201 AAQA Modeling, San Joaquin Valley Air Pollution Control District, Revised March 10, 2019. www.valleyair.org/policies_per/policies/apr-1925.pdf.
2. According to USEPA (www.epa.gov/sites/default/files/2015-07/documents/appwno2_2.pdf), the federal 1-hr NO_2 and 1-hr SO_2 standards are applicable to "…emission scenarios that can logically be assumed to be relatively continuous…" and they should not be applied to intermittent emissions from non-continuous sources, such as the helicopter traffic at the hospital. For this reason, federal 1-hr NO_2 and 1-hr SO_2 are not evaluated in this study.
3. The SIL for $PM_{2.5}$ and thresholds for cancer, chronic and acute risk are from BAAQMD CEQA Thresholds of Significance: www.baaqmd.gov/~/media/files/planning-and-research/ceqa/tools/ceqa-guidelines-may-2017-thresholds-table-pdf.pdf?la=fil-ph
4. The SO_2 odor threshold is from National Research Council of the National Academies, *Acute Exposure Guideline Levels for Selected Airborne Chemicals, Volume 8*: www.epa.gov/aegl.

Table 1 above summarizes the NAAQS, CAAQS and SILs for criteria pollutants, the cancer and non-cancer chronic and acute risk thresholds set by BAAQMD, and the SO_2 odor threshold listed by the NRC. When conducting air dispersion modeling for demonstrating compliance against the NAAQS and/or CAAQS, the highest modeled concentrations at residential receptor locations are compared to the SILs listed in Table 1 for each pollutant and averaging time. Background concentrations are obtained by choosing the highest value of the most recent 3 years of available monitoring data in the area.

Criteria Pollutant Impact Modeling Methodology

To review potential criteria pollutant impacts from helicopter exhaust to residents located near SRMH, the air quality modeling software or air dispersion model, AERMOD (v.22112) was used.[16] AERMOD is a Gaussian plume dispersion model that is based on planetary boundary layer principles for characterizing atmospheric stability. AERMOD has three components: AERMAP is the terrain preprocessor program, AERMET is the meteorological data preprocessor and AERMOD includes the dispersion modeling algorithms. The model accounts for convective updrafts and downdrafts and meteorological data throughout the plume depth. AERMOD is an appropriate model for calculating ambient concentrations around SRMH based on the model's ability to incorporate local meteorological conditions, terrain, and emissions along the helicopter flight routes.

AERMOD was run with urban dispersion coefficients. NO_X concentrations were converted to NO_2 using the Tier 2 (Ambient Ratio Method, or ARM2) employed with USEPA recommended minimum and maximum ambient NO_2/NO_X ratios of 0.5 and 0.9 respectively. The terrain map type used was the Digital Elevation Model (DEM) 7.5-min (USA ~30 m), digital elevation model files from the US Geological survey consisting of terrain elevations for ground positions at regularly spaced horizontal intervals. The receptor grid was about 4 kilometers (km) by 4 km with SRMH centered in the middle. Receptors were only placed over residential areas.

The criteria pollutants/averaging periods evaluated in this study were for 1-hour average NO_2 (for comparison to CAAQS only), annual average NO_2, 1-hour and 8-hour average CO, 24-hour and annual average PM_{10}, 24-hour and annual average $PM_{2.5}$, and 1-hour average SO_2 (for comparison to CAAQS and the odor threshold only), 24-hour and annual average SO_2. The 1-hour average NO_2 and SO_2 averaging periods (for comparison to NAAQS) were not evaluated for potential health impacts due to the USEPA recommendation that "…compliance demonstrations for the 1-hour NO_2 [and 1-hour SO_2] NAAQS address emission scenarios that can logically be assumed to be relatively continuous or which occur frequently enough to contribute significantly to the annual distribution of daily maximum 1-hour concentrations based on existing modeling guidelines…"[17] The helicopter flights are not considered to be

[16] Air Quality Dispersion Modeling – Preferred and Recommended Models, USEPA, Version 22112 released on April 22, 2022.
www.epa.gov/scram/air-quality-dispersion-modeling-preferred-and-recommended-models#aermod

[17] *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 National Ambient Air Quality Standard*, USEPA, March 1, 2011.
www.epa.gov/sites/default/files/2015-07/documents/appwno2_2.pdf.

continuous sources of emissions, since they occur sporadically throughout the day and year, and the flight date/time occurrences are generally unpredictable.

The modeled concentrations were reviewed and compared to the significance thresholds listed in Table 1 above. Emissions of these pollutants were modeled using AERMOD. The two approach route scenarios (College A and College B) were modeled with the departure route as outlined above. Helicopter shut-down/startup upon landing on the helicopter landing pad and then startup to depart with initial vertical takeoff was modeled as a separate surface-based volume source. The flight paths were modeled using separate elevated volume sources at varying heights above the ground. There were six volume sources for the College A approach route; six volume sources for the College B approach route; four volume sources for the departure flight route; and one volume source for the emissions on the helicopter landing pad. Pre-processed meteorological data files used in the modeling were from the nearby Sonoma County airport (2013–2017) were obtained from the BAAQMD website. AERMOD source parameters and setup are shown in Attachment D.

Each pollutant/averaging time had a separate modeling run (for each of the two approach route scenarios, and each including the departure route scenario) with calculated maximum hourly, 24-hour average, and/or average annual emissions inputs for each volume source (see Attachment B for emissions inputs). The modeling runs produced concentrations of each criteria pollutant/averaging time at the residential locations in the vicinity of SRMH. The highest concentrations at a residential receptor for each route scenario are reported in Section VI.

Health Risk Impact Modeling Methodology

Cancer and non-cancer chronic and acute risks due to jet fuel combustion emissions from the trauma helicopters were calculated using concentrations of TACs estimated at residential receptor locations, from the dispersion modeling runs performed using AERMOD as described above. The cancer, chronic and acute risks were reviewed for TACs found in jet fuel exhaust (see Attachment B for TACs analyzed and maximum hourly and average annual emissions entered into HARP2). To review potential cancer and non-cancer health risk impacts, AERMOD and CARB's HARP2 Air Dispersion Modeling and Risk Assessment Tool (ADMRT) (v.22118)[18] were used. The two approach route modeling scenarios (College A and College B) and departure route scenario were modeled following BAAQMD HRA guidance.[19] Emissions inputs into AERMOD were 1 gram/sec for each volume source. Resulting AERMOD plotfiles were imported into the HARP2 ADMRT module.

For the approach and departure route scenarios, the cancer, chronic and acute risks from helicopter flight emissions at residential receptors were compared to the

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and *SO_2 NAAQS Designations Modeling Technical Assistance Document Draft*, USEPA, August 2016. www.epa.gov/sites/default/files/2016-06/documents/so2modelingtad.pdf.

[18] HARP Air Dispersion Modeling and Risk Tool, CARB, Version 22118 released on April 28, 2022. ww2.arb.ca.gov/resources/documents/harp-air-dispersion-modeling-and-risk-tool.

[19] BAAQMD Health Risk Assessment Modeling Protocol, December 2020. www.baaqmd.gov/~/media/files/ab617-community-health/facility-risk-reduction/documents/baaqmd_hra_modeling_protocol-pdf.pdf?la=en.

thresholds listed in Table 1 above. For long-term cancer and non-cancer chronic risk, the residential receptor chosen was a receptor on a house, because that is the location that a resident would be most of the time for exposure to long-term risks. For short-term non-cancer acute risk, the residential receptor chosen was a receptor in a backyard of a house, since this is a place that a resident could be for an hour.

Odor Impact Modeling Methodology

Since odors can be sensed on short time scales such as only a few minutes, the odor analysis used a peaking factor to scale the modeled 1-hour SO_2 concentrations at the residential location to the shorter-than-one-hour timeframe of helicopter exhaust emissions. To calculate the peaking factor for wind-born odors,[20] the following equation is used:

$PF = (t_p/t_m)^{-p}$

Where PF is the peaking factor that is to be multiplied by the measure of mean concentration over an averaging time scale t_m for which meteorological conditions are persistent (60 min); t_p is the shorter sampling time (3 min); and the exponent p is 0.21 for a line-source plume, which is the closest match to this study's source setup.[21]

This equation yields a PF of 1.88 to estimate a 3-minute averaging time.

1-hour SO_2 was evaluated for odor concentrations. Modeled concentrations were multiplied by the PF of 1.88 and were compared to the NRC odor threshold listed in Table 1.

VI. Summary of Air Quality Impact Study Results

Criteria Pollutant Concentrations

The estimated criteria pollutant concentrations at residential areas for the College A and College B helicopter flights routes, each including the departure route, are provided below in Tables 2 and 3, as compared with the SILs from Table 1.

TABLE 2
COLLEGE A FLIGHT ROUTE AND DEPARTURE
CRITERIA POLLUTANT CONCENTRATIONS AT RESIDENTIAL AREA FROM HELICOPTERS COMPARED WITH SIGNIFICANT IMPACT LEVELS

Pollutant/Averaging Time	Conc (µg/m³)	Significant Impact Level (µg/m³)	Exceed?
NO_2 1-Hour	7.3	7.5	No
NO_2 Annual Avg.	0.032	1	No
CO 1-Hour	348	2000	No

[20] Reference CSIRO Marine and Atmospheric Research, Peak to Mean Ratio Calculation. https://www.cmar.csiro.au/airquality/peaktomean.html.
[21] D. Bruce Turner, *Workbook of Atmospheric Dispersion Estimates*. US Environmental Protection Agency Office of Air Programs, Research Triangle Park, North Carolina, 1979.

TABLE 2
COLLEGE A FLIGHT ROUTE AND DEPARTURE
CRITERIA POLLUTANT CONCENTRATIONS AT RESIDENTIAL AREA FROM HELICOPTERS COMPARED WITH SIGNIFICANT IMPACT LEVELS

Pollutant/Averaging Time	Conc ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)	Exceed?
CO 8-Hour	159	500	No
$PM_{2.5}$ 24-Hour	0.018	1.2	No
$PM_{2.5}$ Annual Avg.	0.0021	0.3	No
PM_{10} 24-Hour	0.021	5	No
PM_{10} Annual Avg.	0.021	1	No
SO_2 1-hr	2.3	7.8	No
SO_2 24-hr	0.10	5	No
SO_2 Annual	0.0098	1	No

TABLE 3
COLLEGE B FLIGHT ROUTE AND DEPARTURE
CRITERIA POLLUTANT CONCENTRATIONS AT RESIDENTIAL AREA FROM HELICOPTERS COMPARED WITH SIGNIFICANT IMPACT LEVELS

Pollutant/Averaging Time	Conc ($\mu g/m^3$)	Significant Impact Level ($\mu g/m^3$)	Exceed?
NO_2 1-Hour	7.4	7.5	No
NO_2 Annual	0.032	1	No
CO 1-Hour	349	2000	No
CO 8-Hour	159	500	No
$PM_{2.5}$ 24-Hour	0.018	1.2	No
$PM_{2.5}$ Annual	0.0021	0.3	No
PM_{10} 24-Hour	0.021	5	No
PM_{10} Annual	0.021	1	No
SO_2 1-hr	2.3	7.8	No
SO_2 24-hr	0.10	5	No
SO_2 Annual	0.0098	1	No

Tables 2 and 3 show that modeled concentrations from all of the criteria pollutants/averaging times reviewed are well below the SILs and therefore the potential health impacts to residents are considered to be insignificant and below levels of concern. The two tables also show that the differences in modeled concentrations between the two approach routes are very slight, which demonstrates that the results in the residential areas in the vicinity from helicopter flights are almost identical, no matter which approach route is used by the trauma helicopters. Most of the concentration results from modeling are from emissions at the helipad, and not from the flights in or out of the hospital area, at higher locations above ground level. This study finding for criteria pollutant emissions from helicopter flights

to/from SRMH is that the potential health impacts in residential areas will be insignificant. Therefore, the residential areas near SRMH are not expected to experience any health impacts of concern from criteria pollutants emitted by helicopters.

Cancer and Non-cancer Risks from TACs

The cancer and non-cancer chronic and acute risks from jet fuel combustion emissions from helicopter traffic on College A and College B routes, each including the departure route, were reviewed at the residential locations with the maximum estimated health risks. In Tables 4 and 5, the results are compared to the cancer risk significance threshold of 10 in one million, and the chronic and acute risk threshold of 1.0 HHI.

TABLE 4
COLLEGE A ROUTE AND DEPARTURE
CANCER, CHRONIC AND ACUTE RISK IMPACTS FROM HELICOPTER FLIGHTS
COMPARED WITH THE HEALTH RISK THRESHOLDS

Risk Scenario	Residential Location (UTM, m)	Risk Results	Risk Threshold	Exceed Threshold?
Cancer	526005, 4255206	1.5 in one million	10 in one million	No
Chronic	526005, 4255206	0.014 HHI	1.0 HHI	No
Acute	526030, 4255181	0.70 HHI	1.0 HHI	No

TABLE 5
COLLEGE B ROUTE AND DEPARTURE
CANCER, CHRONIC AND ACUTE RISK IMPACTS FROM HELICOPTER FLIGHTS
COMPARED WITH THE HEALTH RISK THRESHOLDS

Risk Scenario	Residential Location (UTM, m)	Risk Results	Risk Threshold	Exceed Threshold?
Cancer	526005, 4255206	1.5 in one million	10 in one million	No
Chronic	526005, 4255206	0.014 HHI	1.0 HHI	No
Acute	526030, 4255181	0.70 HHI	1.0 HHI	No

Tables 4 and 5 show that the maximum health risks calculated at residential areas from helicopter flights to/from SRMH are well below the significance risk thresholds.

The maximum estimated cancer risk result is about 15% of the 10 in one million threshold. The maximum estimated non-cancer chronic risk result is about 1.4% of the 1.0 HHI threshold. The location of these estimated risks is at residential houses just north of the SRMH facility. The maximum estimated residential acute risk is about 70% the 1.0 HHI acute risk threshold, located in the backyard of a house just north of the hospital's property line and near Santa Rosa Creek. The two tables show that there are no differences in estimated health risks between the two approach routes, which demonstrates that the risks to residents in the vicinity are identical, regardless of the approach route used by the helicopters.

This study finding for TAC emissions from helicopter flights to/from SRMH is that the cancer and non-cancer chronic and acute health impacts in residential areas near SRMH will be insignificant, well below the health risk thresholds. Therefore, the residential areas near SRMH are not expected to experience any cancer or non-cancer chronic or acute health impacts of concern from TACs emitted by helicopters.

Odor Impacts

Potential odor impacts from jet fuel combustion emissions from helicopter flights on the College A and College B routes were reviewed at the residential location of maximum concentrations. In Table 6, the modeled 1-hour average SO_2 concentration results are multiplied by the peaking factor of 1.88 and compared to the NRC SO_2 concentration threshold.

TABLE 6
COLLEGE A AND B ROUTES
1-HOUR AVERAGE SO_2 CONCENTRATIONS FROM HELICOPTER FLIGHTS
COMPARED WITH THE NRC ODOR THRESHOLD

Pollutant/ Averaging Time	Conc ($\mu g/m^3$)	Peaking Factor	3 min. Concentration at Residents ($\mu g/m^3$)	NRC Odor Threshold ($\mu g/m^3$)	Exceed?
SO_2, 1-Hour	2.3	1.88	4.3	520	No

Table 6 shows that the modeled SO_2 odor concentrations in residential areas from helicopter flights on both of the approach routes are well below the NRC significance threshold. Because SO_2 modeled odor concentrations are below the odor threshold, odors from other individual compounds in helicopter exhaust, and odors from helicopter exhaust as a whole are not expected to be a concern in residential areas.

That said, when the meteorological conditions are just right, it is possible that persons located outside in residential areas near SRMH could perceive helicopter exhaust odors. The conditions required would be stable, calm weather conditions that are more common in late night or early morning hours, with typically a surface layer temperature inversion (where temperature increases, not decreases, with height) existing above ground. On colder mornings, initial helicopter startup can result in higher fumes for a short time. These fumes can potentially be trapped and travel under the low-level inversion. Another potential condition is that a helicopter

travelling above residences can break the stable inversion layer, causing helicopter exhaust to briefly be mixed to ground.

Uncertainties

Helicopter flights are highly sporadic and unpredictable, with uncertain timing relying on trauma medical events. To address uncertainties, this air quality study uses highly conservative assumptions that overestimate emissions and predicted pollutant concentrations and health risks. It is very unlikely that enough flights will occur in the same hour or day, under exactly the right conditions for persons in residential areas to experience the exposures estimated in this study. The highly conservative nature of this air quality impact study, and the intermittent nature of helicopter operations, means that the actual air pollution health impacts on residences near SRMH are likely to be much lower than estimated in this study.

VII. Conclusions

This air quality impact study found that the potential health impacts at nearby residences from the trauma center helicopter flights' exhaust emissions at SRMH are expected to be less than significant for criteria pollutants and for TACs, and odor impacts are expected to be below odor thresholds. The modeled criteria pollutant concentrations for NO_2, CO, $PM_{2.5}$, PM_{10}, and SO_2 were all below the significance thresholds, or SILs, associated with the ambient health standards set by the BAAQMD, the state of California, and USEPA. Modeled cancer and non-cancer chronic and acute risks were also found to be below the health-protective significance thresholds set by BAAQMD. Short-term odors based upon SO_2 emissions from jet fuel combustion were calculated to be below the odor threshold for SO_2 listed by the NRC, and therefore, odor impacts are not expected for other compounds in helicopter exhaust. Potential odors from helicopter flights cannot be ruled out but are generally not expected to be a concern for most flights.

The air quality modeling results from the College A and College B routes were comparable, even though the approach for the College A route is over the residential area to the north of SRMH. This is due to the fact that nearly all helicopter emissions that impact nearby residential areas occur at the helipad close to ground level when helicopters are landing, idling or taking off. When helicopters are in flight they are moving too high above ground and too quickly for air emissions to have any consequential impact at ground level. Because nearly all helicopter emissions that could potentially impact residential areas occur at the SRMH helipad in common with all expected flight routes, it is not expected that any flight route that helicopters take will make any difference in potential air pollutant exposures in the residential areas.

Based upon the findings in this air quality impacts study, the County of Sonoma can permit continued helicopter flights to SRMH without concerns about allowing unacceptable health and odor impacts to occur in the community due to helicopter exhaust emissions.

ATTACHMENT A

SITE MAPS

Figure 1 – Providence SRMH Campus and Helicopter Landing Pad Location

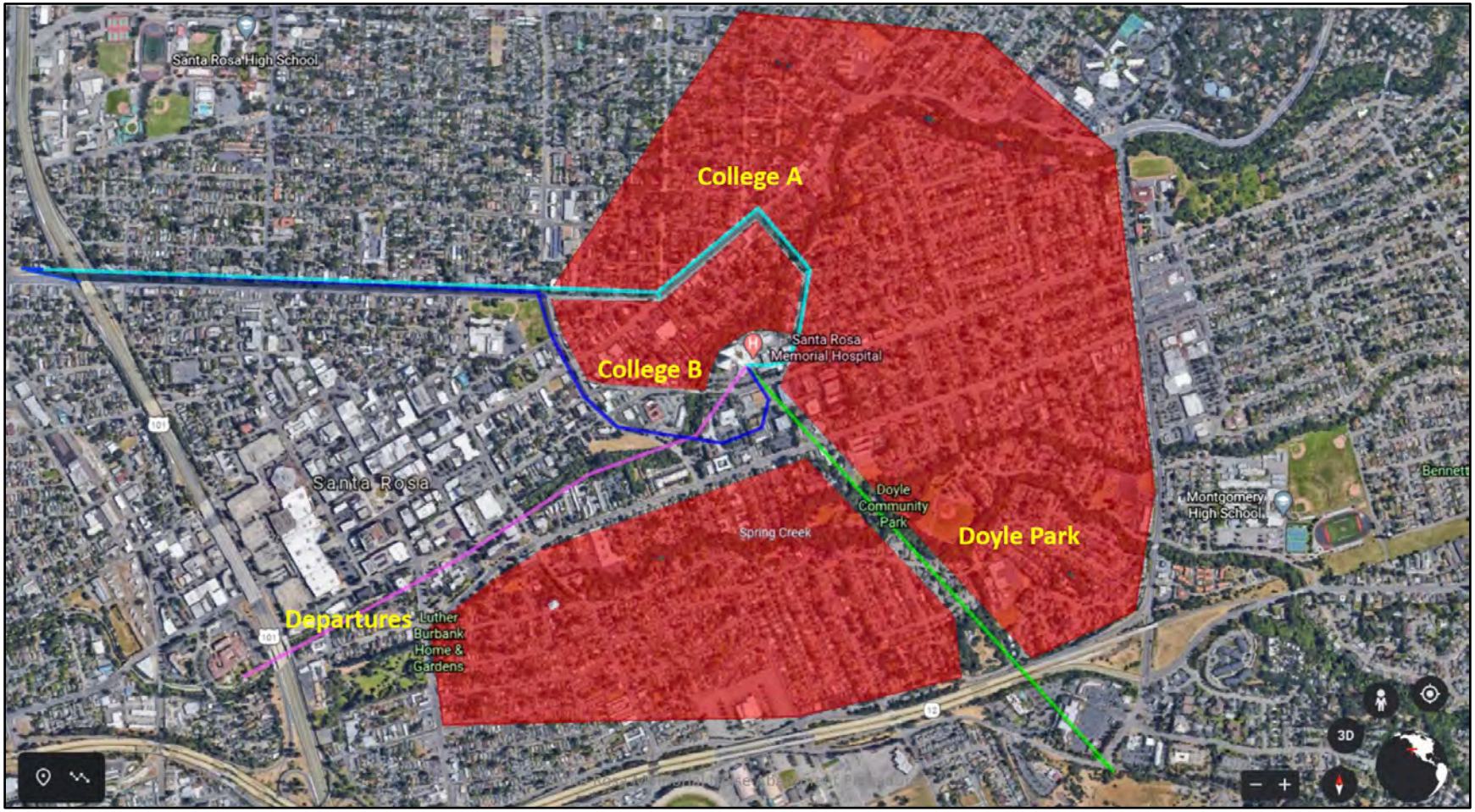


Figure 2 – Providence SRMH Trauma Helicopter Routes

ATTACHMENT B

HELICOPTER EXHAUST EMISSIONS CALCULATIONS

Providence Santa Rosa Memorial Hospital
Helicopter Emission Factors
Emissions: College A Route
8/2/2023

Parameter	Value	Units/notes
Probable Fuel Type	Jet A	
Density Jet A	0.8	kg/L @15C; Note 1
SO_x EF	0.54	g/kg jet fuel; Note 2
VOC/HC	1.0631	Proportion; Note 3
PM_{10}/TPM	0.976	Proportion; Note 4
$PM_{2.5}$/TPM	0.967	Proportion; Note 4
Propylene	0.03939	Weight Fraction of Organics Note 4
1,3-Butadiene	0.00198	
Hexane	0.00064	
Formaldehyde	0.04272	
Acetaldehyde	0.00727	
Acrolein	0.00429	
Benzene	0.00642	
Toluene	0.00174	
Ethyl benzene	0.00166	
p-Xylene	0.00054	

1) Jet A density mid range of https://www.mobil.com/en-al/commercial-fuel/pds/gl-xx-jetfuel-series
2) SO_x EF in lb/1000 lb fuel from Procedures for Emission Inventory Preparation Volume IV: Mobile Sources. December 1992. EPA 420-R-92-009
3) VOC/HC ratio for turbine engines from Procedures for Emission Inventory Preparation Volume IV: Mobile Sources. December 1992. EPA 420-R-92-009
4) PM_{10}/TPM, $PM_{2.5}$/TPM, and speciation weight fraction of organics from https://ww2.arb.ca.gov/speciation-profiles-used-carb-modeling
Organic Profile number 5861, Aircraft Exhaust Jet Fuel
Organics not present in HARP database removed from evaluation

General Craft Info

Craft Name	**EC145**
Craft Code	H109
Number of Engines	2
DB HP	738
Actual HP	760

Helicopter models servicing hospital are EC135 and EC145.
To be conservative, chose EC145 for emissions, as this was the larger helicopter with higher emissions.

Mode Per Engine from FOCA

Mode	AP	GI	TO
Mode description	Approach	Ground Idle	Takeoff
% SHP	32%	6%	66%
Fuel Flow (kg/s)	0.028	0.013	0.040

Local operations

Max Cycles per hour	3
Max Cycles per day	11
Cycles per year	1000
Cruising Altitude (m)	304.8

Max cycles per hour and per day from REACH.
617 Cycles per year from REACH, based on 2019 data of all interfacility transfers and 911 calls to SRMH. Increased to 1000 cycles per year to be conservative.

Mode Per Engine for Local Operations

Mode	AP	ROOFTOP ACTIVITY	TO
Mode description	Approach	Ground Idle or Shutdown/Power Up at Rooftop	Takeoff
% SHP	60%	10%	90%
Fuel Flow (kg/s)	0.055	0.023	0.056

Initial Fuel flow from Swiss Federal Office of Civil Aviation Helicopter Emissions, Available at:
https://www.bazl.admin.ch/bazl/de/home/themen/umwelt/schadstoffe/triebwerkemissionen/anleitung-zur-abschaetzung-von-helikopteremissionen.html
Fuel flow is then proportioned from the FOCA database to account for for local conditions (%SHP within mode as operated) and slight engine HP differences between engines in the database and engines used in craft.

Mode	AP	GI	TO	TO
Mode description	Approach	Ground Idle or Shutdown/Power Up at Rooftop	Takeoff at rooftop	Takeoff
Climb/descent rate (m/s)	5.08	0	2.54	3.81
Forward speed (m/s)	46.3	0	0	33.4
Time (s)	26.9	120	6	22.73
Height at beginning of cycle (m)	151.8	9.144	9.144	15.24
Height at end of cycle (m)	9.144	9.144	15.24	101.8
Distance at beginning of cycle (m)	1245	0	0	0
Distance at end of cycle (m)	0	0	0	760
Rise/run	0.110			0.114

Climb and descent rates from REACH, which may differ from FOCA database due to local operations differences
REACH states idling time per LTO cycle is 2 min avg, 30 sec required.
Startup procedure for EC145 approx 2 minutes of engine time (this excludes battery-on time).

Providence Santa Rosa Memorial Hospital
Helicopter Emission Factors
Emissions: College A Route

Cycle	College A Node (Approach)							Takeoff			
Node	6	5	4	3	2	1	Ground Idle	DPT	1	2	3
AERMOD Source ID	CA500FT_UP	CA400FT_UP	CA264FT_UP	CA185FT_UP	CA100FT_UP	CA50FT_UP	ROOFTOP	DPT50FT_UP	DPT70FT_UP	DPT150FT_UP	DPT300FT_UP
Horizontal Distance to node (m)	265	385	220	240	135	0	0	0	60	200	500
Height (m)	151.8	122.8	80.5	56.4	30.1	15.2	9.144	15.2	22.1	44.9	101.8
Height (ft)	498.2	402.8	264.2	185.0	98.6	50.0	30.0	50.0	72.4	147.2	334.1
Time in/ between nodes (s)	5.72	8.32	4.75	5.18	2.92	1.2	126	1.6	1.79	6.0	15.0

Cruising altitude of 1,000 ft provided from REACH.
Transition between Takeoff and Climbout is about 500-1000 ft, from Procedures for Emission Inventory Preparation Volume IV: Mobile Sources. December 1992. EPA 420-R-92-009
Therefore, emissions are only modeled using takeoff emissions rates, up to 500 ft elevation maximum, where impacts at that elevation are expected to be low.
Departure route modeled to approximately same radius from hospital, with elevation of 300 ft; this route is mostly over a non-residential area.
Rooftop activity chosen as the higher of idling in place or shutdown/startup sequence.
To be conservative, rooftop horsepower determined by including the full idling power through the entire engine-on startup sequence, and also includes the initial vertical climb at 100%.

	Emission Indices, g/kg fuel			Emission Rates if constant (max)					
				Emissions Per Mode, g/engine-cycle-s			Emissions Per Mode, g/s		
Pollutant	AP	GI	TO	AP	GI	TO	AP	GI	TO
CO	13.1	84.2	5.9	0.7182	1.918	0.329	1.436	3.835	0.658
HC	10.440	63.660	4.780	0.5724	1.450	0.267	1.145	2.900	0.533
VOC	11.099	67.677	5.082	0.6085	1.541	0.284	1.217	3.083	0.567
NO_x	4.700	1.800	7.100	0.2577	0.041	0.396	0.515	0.082	0.792
SO_x	0.54	0.54	0.54	0.0296	0.012	0.030	0.059	0.025	0.060
PM	0.159	0.116	0.209	0.0087	0.003	0.012	1.74E-02	5.28E-03	2.33E-02
PM_{10}	0.155	0.113	0.204	0.0085	0.003	0.011	1.70E-02	5.16E-03	2.28E-02
$PM_{2.5}$	0.154	0.112	0.202	0.0084	0.003	0.011	1.69E-02	5.11E-03	2.26E-02

CO, HC, NO_x, and PM Emission Indices from Swiss Federal Office of Civil Aviation Helicopter Emissions, Available at:
https://www.bazl.admin.ch/bazl/de/home/themen/umwelt/schadstoffe/triebwerkemissionen/anleitung-zur-abschaetzung-von-helikopteremissionen.html

Emission Rates by source

	College A Hourly Emission Rates, g/s										
	Approach						Ground Idle	Takeoff			
Pollutant	CA500FT_UP	CA400FT_UP	CA264FT_UP	CA185FT_UP	CA100FT_UP	CA50FT_UP	ROOFTOP	DPT50FT_UP	DPT70FT_UP	DPT150FT_UP	DPT300FT_UP
CO	6.85E-03	9.95E-03	5.69E-03	6.20E-03	3.49E-03	1.44E-03	4.03E-01	8.78E-04	9.85E-04	3.28E-03	8.21E-03
HC	5.46E-03	7.93E-03	4.53E-03	4.94E-03	2.78E-03	1.14E-03	3.04E-01	7.11E-04	7.98E-04	2.66E-03	6.65E-03
VOC	5.80E-03	8.43E-03	4.82E-03	5.26E-03	2.96E-03	1.22E-03	3.24E-01	7.56E-04	8.48E-04	2.83E-03	7.07E-03
NO_x	2.46E-03	3.57E-03	2.04E-03	2.23E-03	1.25E-03	5.15E-04	8.61E-03	1.06E-03	1.18E-03	3.95E-03	9.87E-03
SO_x	2.82E-04	4.10E-04	2.34E-04	2.56E-04	1.44E-04	5.92E-05	2.58E-03	8.04E-05	9.01E-05	3.00E-04	7.51E-04
PM	8.32E-05	1.21E-04	6.90E-05	7.53E-05	4.24E-05	1.74E-05	5.55E-04	3.11E-05	3.49E-05	1.16E-04	2.91E-04
PM_{10}	8.12E-05	1.18E-04	6.74E-05	7.35E-05	4.13E-05	1.70E-05	5.41E-04	3.04E-05	3.40E-05	1.13E-04	2.84E-04
$PM_{2.5}$	8.04E-05	1.17E-04	6.68E-05	7.28E-05	4.10E-05	1.69E-05	5.36E-04	3.01E-05	3.37E-05	1.12E-04	2.81E-04

	College A Daily Emission Rates, g/s										
	Approach						Ground Idle	Takeoff			
Pollutant	CA500FT_UP	CA400FT_UP	CA264FT_UP	CA185FT_UP	CA100FT_UP	CA50FT_UP	ROOFTOP	DPT50FT_UP	DPT70FT_UP	DPT150FT_UP	DPT300FT_UP
CO	1.05E-03	1.52E-03	8.69E-04	9.48E-04	5.33E-04	2.19E-04	6.15E-02	1.34E-04	1.50E-04	5.01E-04	1.25E-03
HC	8.34E-04	1.21E-03	6.93E-04	7.55E-04	4.25E-04	1.75E-04	4.65E-02	1.09E-04	1.22E-04	4.06E-04	1.02E-03
VOC	8.87E-04	1.29E-03	7.36E-04	8.03E-04	4.52E-04	1.86E-04	4.95E-02	1.16E-04	1.30E-04	4.32E-04	1.08E-03
NO_x	3.76E-04	5.46E-04	3.12E-04	3.40E-04	1.91E-04	7.87E-05	1.32E-03	1.61E-04	1.81E-04	6.03E-04	1.51E-03
SO_x	4.31E-05	6.27E-05	3.58E-05	3.91E-05	2.20E-05	9.05E-06	3.95E-04	1.23E-05	1.38E-05	4.59E-05	1.15E-04
PM	1.27E-05	1.85E-05	1.05E-05	1.15E-05	6.47E-06	2.66E-06	8.48E-05	4.75E-06	5.33E-06	1.78E-05	4.44E-05
PM_{10}	**1.24E-05**	**1.80E-05**	**1.03E-05**	**1.12E-05**	**6.32E-06**	**2.60E-06**	**8.27E-05**	**4.64E-06**	**5.20E-06**	**1.73E-05**	**4.33E-05**
$PM_{2.5}$	1.23E-05	1.78E-05	1.02E-05	1.11E-05	6.26E-06	2.58E-06	8.20E-05	4.59E-06	5.15E-06	1.72E-05	4.29E-05

	College A Yearly Emission Rates, g/s										
	Approach						Ground Idle	Takeoff			
Pollutant	CA500FT_UP	CA400FT_UP	CA264FT_UP	CA185FT_UP	CA100FT_UP	CA50FT_UP	ROOFTOP	DPT50FT_UP	DPT70FT_UP	DPT150FT_UP	DPT300FT_UP
CO	2.61E-04	3.79E-04	2.16E-04	2.36E-04	1.33E-04	5.47E-05	1.53E-02	3.34E-05	3.75E-05	1.25E-04	3.12E-04
HC	2.08E-04	3.02E-04	1.72E-04	1.88E-04	1.06E-04	4.36E-05	1.16E-02	2.71E-05	3.04E-05	1.01E-04	2.53E-04
VOC	2.21E-04	3.21E-04	1.83E-04	2.00E-04	1.13E-04	4.63E-05	1.23E-02	2.88E-05	3.23E-05	1.08E-04	2.69E-04
NO_x	9.35E-05	1.36E-04	7.76E-05	8.47E-05	4.76E-05	1.96E-05	3.28E-04	4.02E-05	4.51E-05	1.50E-04	3.76E-04
SO_x	1.07E-05	1.56E-05	8.92E-06	9.73E-06	5.47E-06	2.25E-06	9.83E-05	3.06E-06	3.43E-06	1.14E-05	2.86E-05
PM	3.16E-06	4.60E-06	2.63E-06	2.87E-06	1.61E-06	6.63E-07	2.11E-05	1.18E-06	1.33E-06	4.42E-06	1.11E-05
PM_{10}	3.09E-06	4.49E-06	2.56E-06	2.80E-06	1.57E-06	6.47E-07	2.06E-05	1.16E-06	1.30E-06	4.32E-06	1.08E-05
$PM_{2.5}$	3.06E-06	4.45E-06	2.54E-06	2.77E-06	1.56E-06	6.42E-07	2.04E-05	1.14E-06	1.28E-06	4.28E-06	1.07E-05

Conversion Factors	
3.79	L/gal
60	sec/min
60	min/hr
24	hours/day
365	days/yr

Providence Santa Rosa Memorial Hospital
Helicopter Emission Factors
Emissions: College B Route
8/2/2023

Parameter	Value	Units/notes
Probable Fuel Type	Jet A	
Density Jet A	0.8	kg/L @15C; Note 1
SO_x EF	0.54	g/kg jet fuel; Note 2
VOC/HC	1.0631	Proportion; Note 3
PM_{10}/TPM	0.976	Proportion; Note 4
$PM_{2.5}$/TPM	0.967	Proportion; Note 4
Propylene	0.03939	Weight Fraction of Organics Note 4
1,3-Butadiene	0.00198	
Hexane	0.00064	
Formaldehyde	0.04272	
Acetaldehyde	0.00727	
Acrolein	0.00429	
Benzene	0.00642	
Toluene	0.00174	
Ethyl benzene	0.00166	
p-Xylene	0.00054	

1) Jet A density mid range of https://www.mobil.com/en-al/commercial-fuel/pds/gl-xx-jetfuel-series
2) SO_x EF in lb/1000 lb fuel from Procedures for Emission Inventory Preparation Volume IV: Mobile Sources. December 1992. EPA 420-R-92-009
3) VOC/HC ratio for turbine engines from Procedures for Emission Inventory Preparation Volume IV: Mobile Sources. December 1992. EPA 420-R-92-009
4) PM_{10}/TPM, $PM_{2.5}$/TPM, and speciation weight fraction of organics from https://ww2.arb.ca.gov/speciation-profiles-used-carb-modeling
Organic Profile number 5861, Aircraft Exhaust Jet Fuel
Organics not present in HARP database removed from evaluation

General Craft Info

Craft Name	**EC145**
Craft Code	H109
Number of Engines	2
DB HP	738
Actual HP	760

Helicopter models servicing hospital are EC135 and EC145.
To be conservative, chose EC145 for emissions, as this was the larger helicopter with higher emissions.

Mode Per Engine from FOCA

Mode	AP	GI	TO
Mode description	Approach	Ground Idle	Takeoff
% SHP	32%	6%	66%
Fuel Flow (kg/s)	0.028	0.013	0.040

Local operations

Max Cycles per hour	3
Max Cycles per day	11
Cycles per year	1000
Cruising Altitude (m)	304.8

Max cycles per hour and per day from REACH.
617 Cycles per year from REACH, based on 2019 data of all interfacility transfers and 911 calls to SRMH. Increased to 1000 cycles per year to be conservative.

Mode Per Engine for Local Operations

Mode	AP	ROOFTOP ACTIVITY	TO
Mode description	Approach	Ground Idle or Shutdown/Power Up at Rooftop	Takeoff
% SHP	60%	10%	90%
Fuel Flow (kg/s)	0.055	0.023	0.056

Initial Fuel flow from Swiss Federal Office of Civil Aviation Helicopter Emissions, Available at:
https://www.bazl.admin.ch/bazl/de/home/themen/umwelt/schadstoffe/triebwerkemissionen/anleitung-zur-abschaetzung-von-helikopteremissionen.html
Fuel flow is then proportioned from the FOCA database to account for for local conditions (%SHP within mode as operated) and slight engine HP differences between engines in the database and engines used in craft.

Mode	AP	GI	TO	TO
Mode description	Approach	Ground Idle or Shutdown/Power Up at Rooftop	Takeoff at rooftop	Takeoff
Climb/descent rate (m/s)	5.08	0	2.54	3.81
Forward speed (m/s)	46.3	0	0	33.4
Time (s)	26.9	120	6	22.73
Height at beginning of cycle (m)	151.8	9.144	9.144	15.24
Height at end of cycle (m)	9.144	9.144	15.24	101.8
Distance at beginning of cycle (m)	1245	0	0	0
Distance at end of cycle (m)	0	0	0	760
Rise/run	0.110			0.114

Climb and descent rates from REACH, which may differ from FOCA database due to local operations differences
REACH states idling time per LTO cycle is 2 min avg, 30 sec required.
Startup procedure for EC145 approx 2 minutes of engine time (this excludes battery-on time).

Providence Santa Rosa Memorial Hospital
Helicopter Emission Factors
Emissions: College B Route

Cycle	College B Node (Approach)							Takeoff			
Node	6	5	4	3	2	1	Ground Idle	DPT	1	2	3
AERMOD Source ID	CB500FT_UP	CB400FT_UP	CB264FT_UP	CB185FT_UP	CB100FT_UP	CB50FT_UP	ROOFTOP	DPT50FT_UP	DPT70FT_UP	DPT150FT_UP	DPT300FT_UP
Horizontal Distance to node (m)	265	385	220	240	135	0	0	0	60	200	500
Height (m)	151.8	122.8	80.5	56.4	30.1	15.2	9.144	15.2	22.1	44.9	101.8
Height (ft)	498.2	402.8	264.2	185.0	98.6	50.0	30.0	50.0	72.4	147.2	334.1
Time in/ between nodes (s)	5.72	8.32	4.75	5.18	2.92	1.2	126	1.6	1.79	6.0	15.0

Cruising altitude of 1,000 ft provided from REACH.
Transition between Takeoff and Climbout is about 500-1000 ft, from Procedures for Emission Inventory Preparation Volume IV: Mobile Sources. December 1992. EPA 420-R-92-009
Therefore, emissions are only modeled using takeoff emissions rates, up to 500 ft elevation maximum, where impacts at that elevation are expected to be low.
Departure route modeled to approximately same radius from hospital, with elevation of 300 ft; this route is mostly over a non-residential area.
Rooftop activity chosen as the higher of idling in place or shutdown/startup sequence.
To be conservative, rooftop horsepower determined by including the full idling power through the entire engine-on startup sequence, and also includes the initial vertical climb at 100%.

	Emission Indices, g/kg fuel			Emission Rates if constant (max)					
				Emissions Per Mode, g/engine-cycle-s			Emissions Per Mode, g/s		
Pollutant	AP	GI	TO	AP	GI	TO	AP	GI	TO
CO	13.1	84.2	5.9	0.7182	1.918	0.329	1.436	3.835	0.658
HC	10.440	63.660	4.780	0.5724	1.450	0.267	1.145	2.900	0.533
VOC	11.099	67.677	5.082	0.6085	1.541	0.284	1.217	3.083	0.567
NO_x	4.700	1.800	7.100	0.2577	0.041	0.396	0.515	0.082	0.792
SO_x	0.54	0.54	0.54	0.0296	0.012	0.030	0.059	0.025	0.060
PM	0.159	0.116	0.209	0.0087	0.003	0.012	1.74E-02	5.28E-03	2.33E-02
PM_{10}	0.155	0.113	0.204	0.0085	0.003	0.011	1.70E-02	5.16E-03	2.28E-02
$PM_{2.5}$	0.154	0.112	0.202	0.0084	0.003	0.011	1.69E-02	5.11E-03	2.26E-02

CO, HC, NO_x, and PM Emission Indices from Swiss Federal Office of Civil Aviation Helicopter Emissions, Available at:
https://www.bazl.admin.ch/bazl/de/home/themen/umwelt/schadstoffe/triebwerkemissionen/anleitung-zur-abschaetzung-von-helikopteremissionen.html

Emission Rates by source

	College B Hourly Emission Rates, g/s										
	Approach						Ground Idle	Takeoff			
Pollutant	CB500FT_UP	CB400FT_UP	CB264FT_UP	CB185FT_UP	CB100FT_UP	CB50FT_UP	ROOFTOP	DPT50FT_UP	DPT70FT_UP	DPT150FT_UP	DPT300FT_UP
CO	6.85E-03	9.95E-03	5.69E-03	6.20E-03	3.49E-03	1.44E-03	4.03E-01	8.78E-04	9.85E-04	3.28E-03	8.21E-03
HC	5.46E-03	7.93E-03	4.53E-03	4.94E-03	2.78E-03	1.14E-03	3.04E-01	7.11E-04	7.98E-04	2.66E-03	6.65E-03
VOC	5.80E-03	8.43E-03	4.82E-03	5.26E-03	2.96E-03	1.22E-03	3.24E-01	7.56E-04	8.48E-04	2.83E-03	7.07E-03
NOx	2.46E-03	3.57E-03	2.04E-03	2.23E-03	1.25E-03	5.15E-04	8.61E-03	1.06E-03	1.18E-03	3.95E-03	9.87E-03
SOx	2.82E-04	4.10E-04	2.34E-04	2.56E-04	1.44E-04	5.92E-05	2.58E-03	8.04E-05	9.01E-05	3.00E-04	7.51E-04
PM	8.32E-05	1.21E-04	6.90E-05	7.53E-05	4.24E-05	1.74E-05	5.55E-04	3.11E-05	3.49E-05	1.16E-04	2.91E-04
PM10	8.12E-05	1.18E-04	6.74E-05	7.35E-05	4.13E-05	1.70E-05	5.41E-04	3.04E-05	3.40E-05	1.13E-04	2.84E-04
PM2.5	8.04E-05	1.17E-04	6.68E-05	7.28E-05	4.10E-05	1.69E-05	5.36E-04	3.01E-05	3.37E-05	1.12E-04	2.81E-04

	College B Daily Emission Rates, g/s										
	Approach						Ground Idle	Takeoff			
Pollutant	CB500FT_UP	CB400FT_UP	CB264FT_UP	CB185FT_UP	CB100FT_UP	CB50FT_UP	ROOFTOP	DPT50FT_UP	DPT70FT_UP	DPT150FT_UP	DPT300FT_UP
CO	1.05E-03	1.52E-03	8.69E-04	9.48E-04	5.33E-04	2.19E-04	6.15E-02	1.34E-04	1.50E-04	5.01E-04	1.25E-03
HC	8.34E-04	1.21E-03	6.93E-04	7.55E-04	4.25E-04	1.75E-04	4.65E-02	1.09E-04	1.22E-04	4.06E-04	1.02E-03
VOC	8.87E-04	1.29E-03	7.36E-04	8.03E-04	4.52E-04	1.86E-04	4.95E-02	1.16E-04	1.30E-04	4.32E-04	1.08E-03
NOx	3.76E-04	5.46E-04	3.12E-04	3.40E-04	1.91E-04	7.87E-05	1.32E-03	1.61E-04	1.81E-04	6.03E-04	1.51E-03
SOx	4.31E-05	6.27E-05	3.58E-05	3.91E-05	2.20E-05	9.05E-06	3.95E-04	1.23E-05	1.38E-05	4.59E-05	1.15E-04
PM	1.27E-05	1.85E-05	1.05E-05	1.15E-05	6.47E-06	2.66E-06	8.48E-05	4.75E-06	5.33E-06	1.78E-05	4.44E-05
PM10	1.24E-05	1.80E-05	1.03E-05	1.12E-05	6.32E-06	2.60E-06	8.27E-05	4.64E-06	5.20E-06	1.73E-05	4.33E-05
PM2.5	1.23E-05	1.78E-05	1.02E-05	1.11E-05	6.26E-06	2.58E-06	8.20E-05	4.59E-06	5.15E-06	1.72E-05	4.29E-05

	College B Yearly Emission Rates, g/s										
	Approach						Ground Idle	Takeoff			
Pollutant	CB500FT_UP	CB400FT_UP	CB264FT_UP	CB185FT_UP	CB100FT_UP	CB50FT_UP	ROOFTOP	DPT50FT_UP	DPT70FT_UP	DPT150FT_UP	DPT300FT_UP
CO	2.61E-04	3.79E-04	2.16E-04	2.36E-04	1.33E-04	5.47E-05	1.53E-02	3.34E-05	3.75E-05	1.25E-04	3.12E-04
HC	2.08E-04	3.02E-04	1.72E-04	1.88E-04	1.06E-04	4.36E-05	1.16E-02	2.71E-05	3.04E-05	1.01E-04	2.53E-04
VOC	2.21E-04	3.21E-04	1.83E-04	2.00E-04	1.13E-04	4.63E-05	1.23E-02	2.88E-05	3.23E-05	1.08E-04	2.69E-04
NOx	9.35E-05	1.36E-04	7.76E-05	8.47E-05	4.76E-05	1.96E-05	3.28E-04	4.02E-05	4.51E-05	1.50E-04	3.76E-04
SOx	1.07E-05	1.56E-05	8.92E-06	9.73E-06	5.47E-06	2.25E-06	9.83E-05	3.06E-06	3.43E-06	1.14E-05	2.86E-05
PM	3.16E-06	4.60E-06	2.63E-06	2.87E-06	1.61E-06	6.63E-07	2.11E-05	1.18E-06	1.33E-06	4.42E-06	1.11E-05
PM10	3.09E-06	4.49E-06	2.56E-06	2.80E-06	1.57E-06	6.47E-07	2.06E-05	1.16E-06	1.30E-06	4.32E-06	1.08E-05
PM2.5	3.06E-06	4.45E-06	2.54E-06	2.77E-06	1.56E-06	6.42E-07	2.04E-05	1.14E-06	1.28E-06	4.28E-06	1.07E-05

Conversion Factors	
3.79	L/gal
60	sec/min
60	min/hr
24	hours/day
365	days/yr

Providence Santa Rosa Memorial Hospital
Helicopter Emission Factors - TACs
Emissions: College A Route
8/2/2023

Source ID	Source Description	CAS	Pollutant	Annual Emissions (lb/yr)	Max. Hour Emissions (lb/hr)
CA500FT_UP	College A Arrival 500 ft up	115071	Propylene	6.05E-01	1.81E-03
		106990	1,3-Butadiene	3.04E-02	9.12E-05
		110543	Hexane	9.83E-03	2.95E-05
		50000	Formaldehyde	6.56E-01	1.97E-03
		75070	Acetaldehyde	1.12E-01	3.35E-04
		107028	Acrolein	6.59E-02	1.98E-04
		71432	Benzene	9.86E-02	2.96E-04
		108883	Toluene	2.67E-02	8.02E-05
		100414	Ethyl Benzene	2.55E-02	7.65E-05
		106423	p-Xylene	8.29E-03	2.49E-05
CA400FT_UP	College A Arrival 400 ft up	115071	Propylene	8.79E-01	2.64E-03
		106990	1,3-Butadiene	4.42E-02	1.33E-04
		110543	Hexane	1.43E-02	4.28E-05
		50000	Formaldehyde	9.53E-01	2.86E-03
		75070	Acetaldehyde	1.62E-01	4.87E-04
		107028	Acrolein	9.57E-02	2.87E-04
		71432	Benzene	1.43E-01	4.30E-04
		108883	Toluene	3.88E-02	1.16E-04
		100414	Ethyl Benzene	3.70E-02	1.11E-04
		106423	p-Xylene	1.20E-02	3.61E-05
CA264FT_UP	College A Arrival 264 ft up	115071	Propylene	5.02E-01	1.51E-03
		106990	1,3-Butadiene	2.52E-02	7.57E-05
		110543	Hexane	8.16E-03	2.45E-05
		50000	Formaldehyde	5.45E-01	1.63E-03
		75070	Acetaldehyde	9.27E-02	2.78E-04
		107028	Acrolein	5.47E-02	1.64E-04
		71432	Benzene	8.18E-02	2.46E-04
		108883	Toluene	2.22E-02	6.65E-05
		100414	Ethyl Benzene	2.12E-02	6.35E-05
		106423	p-Xylene	6.88E-03	2.07E-05
CA185FT_UP	College A Arrival 185 ft up	115071	Propylene	5.48E-01	1.64E-03
		106990	1,3-Butadiene	2.75E-02	8.26E-05
		110543	Hexane	8.90E-03	2.67E-05
		50000	Formaldehyde	5.94E-01	1.78E-03
		75070	Acetaldehyde	1.01E-01	3.03E-04
		107028	Acrolein	5.97E-02	1.79E-04
		71432	Benzene	8.93E-02	2.68E-04
		108883	Toluene	2.42E-02	7.26E-05
		100414	Ethyl Benzene	2.31E-02	6.93E-05
		106423	p-Xylene	7.51E-03	2.25E-05
CA100FT_UP	College A Arrival 100 ft up	115071	Propylene	3.08E-01	9.24E-04
		106990	1,3-Butadiene	1.55E-02	4.65E-05
		110543	Hexane	5.01E-03	1.50E-05
		50000	Formaldehyde	3.34E-01	1.00E-03
		75070	Acetaldehyde	5.69E-02	1.71E-04
		107028	Acrolein	3.36E-02	1.01E-04
		71432	Benzene	5.02E-02	1.51E-04
		108883	Toluene	1.36E-02	4.08E-05
		100414	Ethyl Benzene	1.30E-02	3.90E-05
		106423	p-Xylene	4.22E-03	1.27E-05

Providence Santa Rosa Memorial Hospital
Helicopter Emission Factors - TACs
Emissions: College A Route
8/2/2023

Source ID	Source Description	CAS	Pollutant	Annual Emissions (lb/yr)	Max. Hour Emissions (lb/hr)
CA50FT_UP	College A Arrival 50ft up	115071	Propylene	1.27E-01	3.80E-04
		106990	1,3-Butadiene	6.37E-03	1.91E-05
		110543	Hexane	2.06E-03	6.18E-06
		50000	Formaldehyde	1.38E-01	4.13E-04
		75070	Acetaldehyde	2.34E-02	7.02E-05
		107028	Acrolein	1.38E-02	4.14E-05
		71432	Benzene	2.07E-02	6.20E-05
		108883	Toluene	5.60E-03	1.68E-05
		100414	Ethyl Benzene	5.34E-03	1.60E-05
		106423	p-Xylene	1.74E-03	5.22E-06
ROOFTOP	Helipad Rooftop	115071	Propylene	3.37E+01	1.01E-01
		106990	1,3-Butadiene	1.70E+00	5.09E-03
		110543	Hexane	5.48E-01	1.64E-03
		50000	Formaldehyde	3.66E+01	1.10E-01
		75070	Acetaldehyde	6.23E+00	1.87E-02
		107028	Acrolein	3.67E+00	1.10E-02
		71432	Benzene	5.50E+00	1.65E-02
		108883	Toluene	1.49E+00	4.47E-03
		100414	Ethyl Benzene	1.42E+00	4.26E-03
		106423	p-Xylene	4.62E-01	1.39E-03
DPT50FT_UP	Departure Route 50ft Up	115071	Propylene	7.88E-02	2.36E-04
		106990	1,3-Butadiene	3.96E-03	1.19E-05
		110543	Hexane	1.28E-03	3.84E-06
		50000	Formaldehyde	8.55E-02	2.56E-04
		75070	Acetaldehyde	1.45E-02	4.36E-05
		107028	Acrolein	8.58E-03	2.57E-05
		71432	Benzene	1.28E-02	3.85E-05
		108883	Toluene	3.48E-03	1.04E-05
		100414	Ethyl Benzene	3.32E-03	9.96E-06
		106423	p-Xylene	1.08E-03	3.24E-06
DPT70FT_UP	Departure Route 70ft Up	115071	Propylene	8.84E-02	2.65E-04
		106990	1,3-Butadiene	4.44E-03	1.33E-05
		110543	Hexane	1.44E-03	4.31E-06
		50000	Formaldehyde	9.58E-02	2.88E-04
		75070	Acetaldehyde	1.63E-02	4.89E-05
		107028	Acrolein	9.62E-03	2.89E-05
		71432	Benzene	1.44E-02	4.32E-05
		108883	Toluene	3.90E-03	1.17E-05
		100414	Ethyl Benzene	3.72E-03	1.12E-05
		106423	p-Xylene	1.21E-03	3.63E-06
DPT150FT_UP	Departure Route 150ft Up	115071	Propylene	2.95E-01	8.84E-04
		106990	1,3-Butadiene	1.48E-02	4.44E-05
		110543	Hexane	4.79E-03	1.44E-05
		50000	Formaldehyde	3.19E-01	9.58E-04
		75070	Acetaldehyde	5.44E-02	1.63E-04
		107028	Acrolein	3.21E-02	9.62E-05
		71432	Benzene	4.80E-02	1.44E-04
		108883	Toluene	1.30E-02	3.90E-05
		100414	Ethyl Benzene	1.24E-02	3.72E-05
		106423	p-Xylene	4.04E-03	1.21E-05
DPT300FT_UP	Departure Route 300ft Up	115071	Propylene	7.36E-01	2.21E-03
		106990	1,3-Butadiene	3.70E-02	1.11E-04
		110543	Hexane	1.20E-02	3.59E-05
		50000	Formaldehyde	7.99E-01	2.40E-03
		75070	Acetaldehyde	1.36E-01	4.08E-04
		107028	Acrolein	8.02E-02	2.41E-04
		71432	Benzene	1.20E-01	3.60E-04
		108883	Toluene	3.25E-02	9.76E-05
		100414	Ethyl Benzene	3.10E-02	9.31E-05
		106423	p-Xylene	1.01E-02	3.03E-05

Providence Santa Rosa Memorial Hospital
Helicopter Emission Factors - TACs
Emissions: College B Route
8/2/2023

Source ID	Source Description	CAS	Pollutant	Annual Emissions (lb/yr)	Max. Hour Emissions (lb/hr)
CB500FT_UP	College B Arrival 500 ft up	115071	Propylene	6.05E-01	1.81E-03
		106990	1,3-Butadiene	3.04E-02	9.12E-05
		110543	Hexane	9.83E-03	2.95E-05
		50000	Formaldehyde	6.56E-01	1.97E-03
		75070	Acetaldehyde	1.12E-01	3.35E-04
		107028	Acrolein	6.59E-02	1.98E-04
		71432	Benzene	9.86E-02	2.96E-04
		108883	Toluene	2.67E-02	8.02E-05
		100414	Ethyl Benzene	2.55E-02	7.65E-05
		106423	p-Xylene	8.29E-03	2.49E-05
CB400FT_UP	College B Arrival 400 ft up	115071	Propylene	8.79E-01	2.64E-03
		106990	1,3-Butadiene	4.42E-02	1.33E-04
		110543	Hexane	1.43E-02	4.28E-05
		50000	Formaldehyde	9.53E-01	2.86E-03
		75070	Acetaldehyde	1.62E-01	4.87E-04
		107028	Acrolein	9.57E-02	2.87E-04
		71432	Benzene	1.43E-01	4.30E-04
		108883	Toluene	3.88E-02	1.16E-04
		100414	Ethyl Benzene	3.70E-02	1.11E-04
		106423	p-Xylene	1.20E-02	3.61E-05
CB264FT_UP	College B Arrival 264 ft up	115071	Propylene	5.02E-01	1.51E-03
		106990	1,3-Butadiene	2.52E-02	7.57E-05
		110543	Hexane	8.16E-03	2.45E-05
		50000	Formaldehyde	5.45E-01	1.63E-03
		75070	Acetaldehyde	9.27E-02	2.78E-04
		107028	Acrolein	5.47E-02	1.64E-04
		71432	Benzene	8.18E-02	2.46E-04
		108883	Toluene	2.22E-02	6.65E-05
		100414	Ethyl Benzene	2.12E-02	6.35E-05
		106423	p-Xylene	6.88E-03	2.07E-05
CB185FT_UP	College B Arrival 264 ft up	115071	Propylene	5.48E-01	1.64E-03
		106990	1,3-Butadiene	2.75E-02	8.26E-05
		110543	Hexane	8.90E-03	2.67E-05
		50000	Formaldehyde	5.94E-01	1.78E-03
		75070	Acetaldehyde	1.01E-01	3.03E-04
		107028	Acrolein	5.97E-02	1.79E-04
		71432	Benzene	8.93E-02	2.68E-04
		108883	Toluene	2.42E-02	7.26E-05
		100414	Ethyl Benzene	2.31E-02	6.93E-05
		106423	p-Xylene	7.51E-03	2.25E-05
CB100FT_UP	College B Arrival 100 ft up	115071	Propylene	3.08E-01	9.24E-04
		106990	1,3-Butadiene	1.55E-02	4.65E-05
		110543	Hexane	5.01E-03	1.50E-05
		50000	Formaldehyde	3.34E-01	1.00E-03
		75070	Acetaldehyde	5.69E-02	1.71E-04
		107028	Acrolein	3.36E-02	1.01E-04
		71432	Benzene	5.02E-02	1.51E-04
		108883	Toluene	1.36E-02	4.08E-05
		100414	Ethyl Benzene	1.30E-02	3.90E-05
		106423	p-Xylene	4.22E-03	1.27E-05

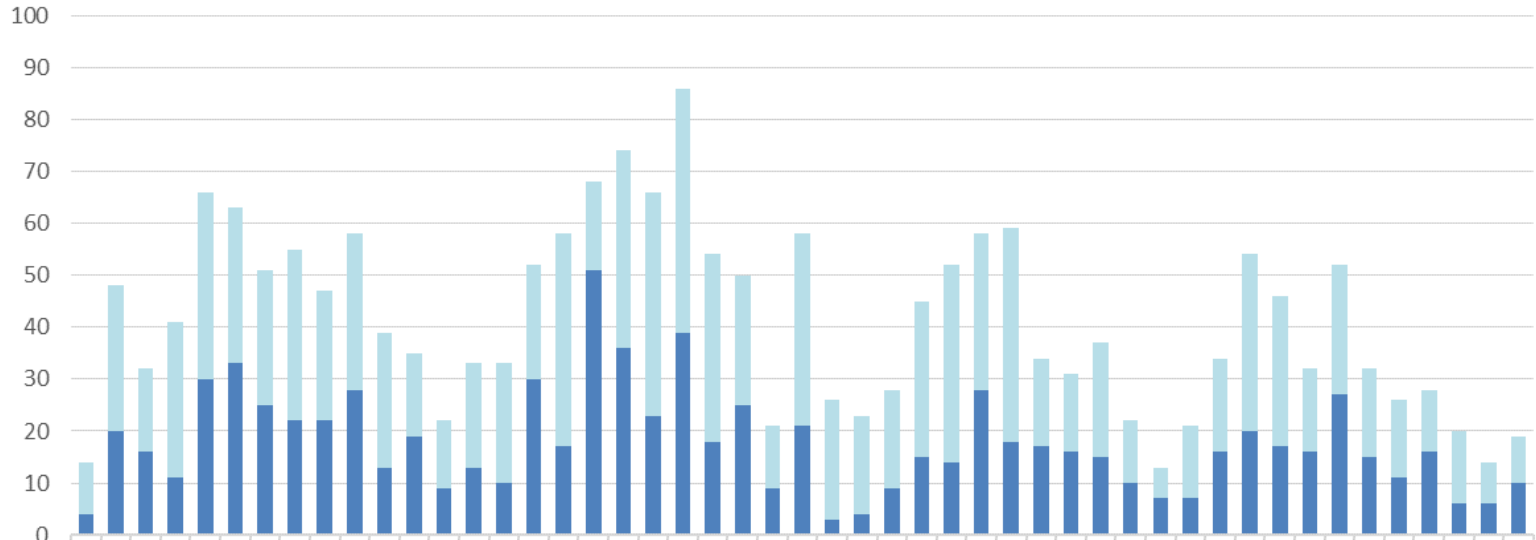
Providence Santa Rosa Memorial Hospital
Helicopter Emission Factors - TACs
Emissions: College B Route
8/2/2023

Source ID	Source Description	CAS	Pollutant	Annual Emissions (lb/yr)	Max. Hour Emissions (lb/hr)
CB50FT_UP	College B Arrival 50ft up	115071	Propylene	1.27E-01	3.80E-04
		106990	1,3-Butadiene	6.37E-03	1.91E-05
		110543	Hexane	2.06E-03	6.18E-06
		50000	Formaldehyde	1.38E-01	4.13E-04
		75070	Acetaldehyde	2.34E-02	7.02E-05
		107028	Acrolein	1.38E-02	4.14E-05
		71432	Benzene	2.07E-02	6.20E-05
		108883	Toluene	5.60E-03	1.68E-05
		100414	Ethyl Benzene	5.34E-03	1.60E-05
		106423	p-Xylene	1.74E-03	5.22E-06
ROOFTOP	Helipad Rooftop	115071	Propylene	3.37E+01	1.01E-01
		106990	1,3-Butadiene	1.70E+00	5.09E-03
		110543	Hexane	5.48E-01	1.64E-03
		50000	Formaldehyde	3.66E+01	1.10E-01
		75070	Acetaldehyde	6.23E+00	1.87E-02
		107028	Acrolein	3.67E+00	1.10E-02
		71432	Benzene	5.50E+00	1.65E-02
		108883	Toluene	1.49E+00	4.47E-03
		100414	Ethyl Benzene	1.42E+00	4.26E-03
		106423	p-Xylene	4.62E-01	1.39E-03
DPT50FT_UP	Departure Route 50ft Up	115071	Propylene	7.88E-02	2.36E-04
		106990	1,3-Butadiene	3.96E-03	1.19E-05
		110543	Hexane	1.28E-03	3.84E-06
		50000	Formaldehyde	8.55E-02	2.56E-04
		75070	Acetaldehyde	1.45E-02	4.36E-05
		107028	Acrolein	8.58E-03	2.57E-05
		71432	Benzene	1.28E-02	3.85E-05
		108883	Toluene	3.48E-03	1.04E-05
		100414	Ethyl Benzene	3.32E-03	9.96E-06
		106423	p-Xylene	1.08E-03	3.24E-06
DPT70FT_UP	Departure Route 70ft Up	115071	Propylene	8.84E-02	2.65E-04
		106990	1,3-Butadiene	4.44E-03	1.33E-05
		110543	Hexane	1.44E-03	4.31E-06
		50000	Formaldehyde	9.58E-02	2.88E-04
		75070	Acetaldehyde	1.63E-02	4.89E-05
		107028	Acrolein	9.62E-03	2.89E-05
		71432	Benzene	1.44E-02	4.32E-05
		108883	Toluene	3.90E-03	1.17E-05
		100414	Ethyl Benzene	3.72E-03	1.12E-05
		106423	p-Xylene	1.21E-03	3.63E-06
DPT150FT_UP	Departure Route 150ft Up	115071	Propylene	2.95E-01	8.84E-04
		106990	1,3-Butadiene	1.48E-02	4.44E-05
		110543	Hexane	4.79E-03	1.44E-05
		50000	Formaldehyde	3.19E-01	9.58E-04
		75070	Acetaldehyde	5.44E-02	1.63E-04
		107028	Acrolein	3.21E-02	9.62E-05
		71432	Benzene	4.80E-02	1.44E-04
		108883	Toluene	1.30E-02	3.90E-05
		100414	Ethyl Benzene	1.24E-02	3.72E-05
		106423	p-Xylene	4.04E-03	1.21E-05
DPT300FT_UP	Departure Route 300ft Up	115071	Propylene	7.36E-01	2.21E-03
		106990	1,3-Butadiene	3.70E-02	1.11E-04
		110543	Hexane	1.20E-02	3.59E-05
		50000	Formaldehyde	7.99E-01	2.40E-03
		75070	Acetaldehyde	1.36E-01	4.08E-04
		107028	Acrolein	8.02E-02	2.41E-04
		71432	Benzene	1.20E-01	3.60E-04
		108883	Toluene	3.25E-02	9.76E-05
		100414	Ethyl Benzene	3.10E-02	9.31E-05
		106423	p-Xylene	1.01E-02	3.03E-05

ATTACHMENT C

SRMH HELICOPTER LOG

AIRCRAFT TRANSPORTS TO SRMH 2018-2022



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
	2018												2019												2020												2021												2022
Interfacility Transfer	10	28	16	30	36	30	26	33	25	30	26	16	13	20	23	22	41	17	38	43	47	36	25	12	37	23	19	19	30	38	30	41	17	15	22	12	6	14	18	34	29	16	25	17	15	12	14	8	9
911 Response	4	20	16	11	30	33	25	22	22	28	13	19	9	13	10	30	17	51	36	23	39	18	25	9	21	3	4	9	15	14	28	18	17	16	15	10	7	7	16	20	17	16	27	15	11	16	6	6	10

Providence Santa Rosa Memorial Hospital
Helicopter Activity Log Summary
January 2021 - July 2023

Parameter	Number of Flights per Time Period			
	Per 60-minute period	Per 24-hour period	Monthly (calendar)	Yearly (calendar)
Maximum	3	11	86	590
Maximum # over time period	15	2		
% at Max, over total days in period	1.6%	0.2%		
% at Max, over total flight days	2.4%	0.3%		
Minimum	0	0	8	335
Average over time period	0.06	1.5	45.5	470
Average over flight days	0.09	2.2		

1,410 Total flights in time period evaluated
938 Total calendar days in time period evaluated
627 Total calendar days when flights occurred (flight days)

0.01% hours with 3 flights per hour (over entire time period)
0.02% hours with 3 flights per hour (out of number of flight days)

1.17% of days with 11 flights per day (over entire time period)
1.75% of days with 11 flights per day (out of number of flight days)

Providence Santa Rosa Memorial Hospital
Helicopter Activity Logs
January 2021 - July 2023

Date	Land	Take Off	Duration (min)
1/2/21	4:00 PM	4:25 PM	0:25
1/4/21	9:47 PM	10:10 PM	0:23
1/4/21	10:50 PM	11:15 PM	0:25
1/5/21	5:26 PM	6:00 PM	0:34
1/7/21	5:05 PM	5:33 PM	0:28
1/8/21	5:58 PM	6:23 PM	0:25
1/9/21	2:46 PM	3:18 PM	0:32
1/9/21	4:40 PM	5:06 PM	0:26
1/9/21	5:35 PM	6:01 PM	0:26
1/9/21	6:46 PM	7:20 PM	0:34
1/12/21	11:48 AM	12:31 PM	0:43
1/12/21	9:51 PM	10:41 PM	0:50
1/13/21	6:12 PM	6:35 PM	0:23
1/14/21	4:28 PM	5:10 PM	0:42
1/15/21	4:30 PM	4:56 PM	0:26
1/15/21	7:03 PM	7:24 PM	0:21
1/16/21	9:08 AM	9:48 AM	0:40
1/16/21	1:58 PM	2:39 PM	0:41
1/16/21	4:02 PM	4:32 PM	0:30
1/17/21	12:09 PM	12:32 PM	0:23
1/18/21	2:24 PM	2:53 PM	0:29
1/20/21	12:23 PM	1:04 PM	0:41
1/20/21	4:14 PM	6:06 PM	1:52
1/23/21	1:50 AM	2:15 AM	0:25
1/23/21	11:30 AM	11:58 AM	0:28
1/23/21	12:22 PM	12:26 PM	0:04
1/23/21	12:32 PM	1:02 PM	0:30
1/23/21	1:16 PM	1:20 PM	0:04
1/23/21	5:49 PM	6:19 PM	0:30
1/25/21	11:50 AM	12:11 PM	0:21
1/25/21	6:29 PM	7:55 PM	1:26
1/25/21	10:06 PM	10:45 PM	0:39
1/29/21	2:41 PM	3:30 PM	0:49
1/30/21	11:07 AM	11:20 AM	0:13
1/30/21	12:54 PM	12:55 PM	0:01
1/30/21	4:26 PM	4:48 PM	0:22
1/30/21	6:21 PM	7:21 PM	1:00
1/31/21	4:41 PM	4:56 PM	0:15

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

2/1/21	5:45 AM	6:25 AM	0:40
2/1/21	12:59 PM	1:31 PM	0:32
2/1/21	5:37 PM	5:50 PM	0:13
2/4/21	12:43 PM	1:10 PM	0:27
2/4/21	3:26 PM	4:04 PM	0:38
2/4/21	11:50 PM	11:55 PM	0:05
2/5/21	9:16 PM	9:45 PM	0:29
2/5/21	11:16 PM	11:47 PM	0:31
2/6/21	12:44 PM	1:10 PM	0:26
2/6/21	6:02 PM	6:23 PM	0:21
2/6/21	7:52 PM	8:25 PM	0:33
2/7/21	10:32 AM	10:59 AM	0:27
2/7/21	3:13 PM	4:09 PM	0:56
2/7/21	8:34 PM	8:54 PM	0:20
2/8/21	3:38 PM	3:54 PM	0:16
2/8/21	11:03 PM	11:22 PM	0:19
2/9/21	10:34 AM	11:14 AM	0:40
2/9/21	7:31 PM	7:51 PM	0:20
2/9/21	11:17 PM	11:54 PM	0:37
2/10/21	3:04 PM	3:32 PM	0:28
2/10/21	5:24 PM	5:53 PM	0:29
2/12/21	5:11 PM	5:38 PM	0:27
2/13/21	10:53 PM	11:16 PM	0:23
2/14/21	5:08 AM	5:33 AM	0:25
2/14/21	10:49 AM	11:09 AM	0:20
2/14/21	11:21 AM	11:42 AM	0:21
2/15/21	9:42 PM	10:14 PM	0:32
2/16/21	2:32 PM	2:59 PM	0:27
2/16/21	5:57 PM	6:23 PM	0:26
2/16/21	11:41 PM	11:53 PM	0:12
2/17/21	12:14 AM	12:40 AM	0:26
2/17/21	3:11 AM	3:38 AM	0:27
2/17/21	2:44 PM	3:10 PM	0:26
2/17/21	7:51 PM	8:20 PM	0:29
2/17/21	8:30 PM	8:56 PM	0:26
2/18/21	3:55 AM	6:11 AM	2:16
2/20/21	10:50 PM	11:30 PM	0:40
2/21/21	6:14 PM	6:52 PM	0:38
2/21/21	8:15 PM	8:43 PM	0:28
2/24/21	12:37 PM	12:57 PM	0:20
2/24/21	12:48 PM	1:17 PM	0:29
2/24/21	3:06 PM	3:25 PM	0:19
2/25/21	2:10 AM	2:15 AM	0:05
2/25/21	3:40 AM	3:47 AM	0:07
2/26/21	1:14 AM	1:39 AM	0:25

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

2/26/21	2:25 AM	2:48 AM	0:23
2/26/21	4:49 AM	5:35 AM	0:46
2/26/21	1:53 PM	2:32 PM	0:39
2/26/21	5:59 PM	6:23 PM	0:24
2/27/21	12:44 AM	1:15 AM	0:31
2/27/21	8:36 PM	9:04 PM	0:28
2/28/21	3:50 AM	4:22 AM	0:32
2/28/21	2:30 PM	3:17 PM	0:47
2/28/21	11:44 PM	12:04 AM	0:20
3/1/21	1:43 PM	12:00 AM	10:17
3/1/21	5:45 PM	6:12 PM	0:27
3/1/21	11:00 PM	11:36 PM	0:36
3/2/21	9:41 PM	10:07 PM	0:26
3/3/21	12:04 AM	12:32 AM	0:28
3/3/21	1:08 AM	1:20 AM	0:12
3/3/21	10:00 AM	10:26 AM	0:26
3/4/21	9:51 AM	10:32 AM	0:41
3/4/21	11:53 PM	11:59 PM	0:06
3/5/21	4:38 PM	5:08 PM	0:30
3/6/21	12:02 AM	12:30 AM	0:28
3/6/21	9:27 AM	10:03 AM	0:36
3/6/21	4:00 PM	4:25 PM	0:25
3/6/21	8:50 PM	9:18 PM	0:28
3/7/21	4:12 AM	5:10 AM	0:58
3/7/21	5:40 AM	6:13 AM	0:33
3/7/21	7:42 AM	8:01 AM	0:19
3/7/21	1:09 PM	1:35 PM	0:26
3/7/21	5:20 PM	5:40 PM	0:20
3/7/21	9:35 PM	10:11 PM	0:36
3/8/21	1:33 AM	1:53 AM	0:20
3/11/21	10:11 AM	10:30 AM	0:19
3/11/21	11:14 AM	11:51 AM	0:37
3/11/21	12:20 PM	12:41 PM	0:21
3/11/21	3:24 PM	3:46 PM	0:22
3/12/21	10:54 AM	11:29 AM	0:35
3/13/21	11:30 PM	12:18 AM	0:48
3/14/21	9:28 AM	10:23 AM	0:55
3/15/21	11:14 AM	11:48 AM	0:34
3/15/21	10:58 PM	11:22 PM	0:24
3/16/21	1:50 AM	2:06 AM	0:16
3/16/21	6:38 AM	7:00 AM	0:22
3/16/21	9:33 AM	9:52 AM	0:19
3/16/21	3:33 PM	4:00 PM	0:27
3/16/21	4:58 PM	5:47 PM	0:49
3/16/21	10:36 PM	11:09 PM	0:33

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

3/17/21	6:46 AM	7:21 AM	0:35
3/17/21	2:19 PM	2:44 PM	0:25
3/19/21	2:38 PM	3:00 PM	0:22
3/19/21	7:55 PM	8:54 PM	0:59
3/19/21	9:52 PM	10:19 PM	0:27
3/23/21	2:29 AM	2:53 AM	0:24
3/23/21	5:37 AM	6:08 AM	0:31
3/23/21	2:39 PM	3:29 PM	0:50
3/23/21	5:12 PM	5:37 PM	0:25
3/24/21	4:03 AM	4:36 AM	0:33
3/24/21	7:12 PM	7:37 PM	0:25
3/24/21	10:08 PM	10:43 PM	0:35
3/25/21	1:53 AM	2:13 AM	0:20
3/25/21	9:39 AM	10:28 AM	0:49
3/25/21	12:48 PM	1:35 PM	0:47
3/25/21	5:30 PM	5:54 PM	0:24
3/25/21	11:29 PM	11:58 PM	0:29
3/26/21	12:56 PM	1:20 PM	0:24
3/26/21	4:25 PM	4:58 PM	0:33
3/26/21	9:31 PM	9:43 PM	0:12
3/26/21	9:48 PM	10:23 PM	0:35
3/26/21	10:27 PM	10:37 PM	0:10
3/27/21	3:37 AM	4:23 AM	0:46
3/27/21	6:55 PM	7:26 PM	0:31
3/27/21	9:28 PM	9:57 PM	0:29
3/28/21	12:11 PM	12:41 PM	0:30
3/28/21	6:01 PM	6:32 PM	0:31
3/28/21	8:50 PM	9:14 PM	0:24
3/29/21	9:08 PM	9:31 PM	0:23
3/29/21	11:19 PM	11:59 PM	0:40
3/30/21	11:26 AM	11:55 AM	0:29
3/30/21	2:05 PM	2:58 PM	0:53
3/30/21	5:47 PM	6:19 PM	0:32
3/30/21	11:53 PM	12:00 AM	0:07
3/31/21	9:53 AM	10:25 AM	0:32
3/31/21	12:49 PM	1:39 PM	0:50
3/31/21	6:13 PM	6:38 PM	0:25
3/31/21	9:04 PM	9:22 PM	0:18
4/1/21	9:42 AM	10:17 AM	0:35
4/1/21	4:45 PM	5:04 PM	0:19
4/2/21	5:35 AM	5:57 AM	0:22
4/2/21	6:47 PM	7:21 PM	0:34
4/3/21	9:17 AM	9:38 AM	0:21
4/3/21	5:16 PM	5:26 PM	0:10
4/3/21	5:31 PM	5:40 PM	0:09

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

4/3/21	5:50 PM	6:10 PM	0:20
4/3/21	6:22 PM	6:40 PM	0:18
4/3/21	7:15 PM	7:40 PM	0:25
4/4/21	1:32 AM	2:01 AM	0:29
4/4/21	4:03 PM	4:57 PM	0:54
4/4/21	7:29 PM	7:52 PM	0:23
4/4/21	9:32 PM	10:00 PM	0:28
4/5/21	2:50 AM	3:25 AM	0:35
4/5/21	3:39 PM	4:01 PM	0:22
4/5/21	5:15 PM	6:10 PM	0:55
4/5/21	9:47 PM	10:07 PM	0:20
4/6/21	2:03 PM	2:33 PM	0:30
4/6/21	7:50 PM	8:12 PM	0:22
4/7/21	1:06 PM	1:38 PM	0:32
4/7/21	3:37 PM	4:01 PM	0:24
4/7/21	9:06 PM	9:30 PM	0:24
4/7/21	9:56 PM	10:30 PM	0:34
4/7/21	11:48 PM	12:09 AM	0:21
4/8/21	12:24 AM	1:10 AM	0:46
4/8/21	9:51 PM	10:17 PM	0:26
4/9/21	12:04 PM	12:40 PM	0:36
4/9/21	12:58 PM	1:17 PM	0:19
4/10/21	9:24 PM	10:38 PM	1:14
4/11/21	12:32 AM	12:40 AM	0:08
4/11/21	12:43 AM	1:15 AM	0:32
4/11/21	2:02 PM	2:37 PM	0:35
4/11/21	3:34 PM	3:54 PM	0:20
4/12/21	9:20 AM	9:52 AM	0:32
4/12/21	10:25 AM	10:44 AM	0:19
4/12/21	3:32 PM	3:59 PM	0:27
4/12/21	7:37 PM	7:38 PM	0:01
4/12/21	7:40 PM	8:10 PM	0:30
4/13/21	2:16 PM	2:35 PM	0:19
4/13/21	9:34 PM	10:00 PM	0:26
4/14/21	2:06 PM	2:19 PM	0:26
4/14/21	2:45 PM	3:10 PM	0:25
4/14/21	4:41 PM	5:05 PM	0:24
4/14/21	6:54 PM	7:12 PM	0:18
4/15/21	6:34 PM	7:01 PM	0:27
4/15/21	11:11 PM	11:35 PM	0:24
4/16/21	2:55 PM	3:30 PM	0:35
4/16/21	4:43 PM	5:11 PM	0:28
4/17/21	11:34 AM	12:04 PM	0:30
4/17/21	12:08 PM	12:32 PM	0:24
4/17/21	3:20 PM	3:32 PM	0:12

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

4/17/21	3:40 PM	4:09 PM	0:29
4/17/21	6:49 PM	7:13 PM	0:24
4/18/21	7:45 AM	8:08 AM	0:23
4/18/21	1:35 PM	1:58 PM	0:23
4/18/21	5:13 PM	5:30 PM	0:17
4/18/21	7:35 PM	8:00 PM	0:25
4/19/21	11:27 AM	11:45 AM	0:18
4/20/21	2:58 PM	3:19 PM	0:21
4/20/21	8:19 PM	8:22 PM	0:03
4/20/21	8:37 PM	8:44 PM	0:07
4/20/21	8:50 PM	9:17 PM	0:27
4/21/21	12:47 PM	1:08 PM	0:21
4/21/21	2:12 PM	3:20 PM	1:08
4/21/21	4:17 PM	4:35 PM	0:18
4/21/21	6:38 PM	7:07 PM	0:29
4/21/21	10:49 PM	11:06 PM	0:17
4/22/21	5:16 PM	5:37 PM	0:21
4/23/21	12:52 PM	1:29 PM	0:37
4/23/21	1:53 PM	2:20 PM	0:27
4/23/21	3:28 PM	3:55 PM	0:27
4/23/21	6:32 PM	7:32 PM	1:00
4/25/21	5:35 PM	6:10 PM	0:35
4/26/21	5:56 PM	6:16 PM	0:20
4/27/21	5:26 PM	6:30 PM	1:04
4/27/21	7:10 PM	7:24 PM	0:14
4/27/21	7:57 PM	8:17 PM	0:20
4/27/21	8:23 PM	8:48 PM	0:25
4/28/21	12:18 PM	12:35 PM	0:17
4/28/21	6:24 PM	7:00 PM	0:36
4/29/21	2:39 PM	3:10 PM	0:36
4/29/21	6:29 PM	6:54 PM	0:25
4/30/21	4:14 PM	4:44 PM	0:30
4/30/21	9:05 PM	9:28 PM	0:23
5/1/21	9:38 AM	9:56 AM	0:18
5/1/21	9:51 AM	10:18 AM	0:27
5/1/21	7:14 PM	7:45 PM	0:31
5/1/21	10:40 PM	11:10 PM	0:30
5/2/21	7:20 PM	7:46 PM	0:26
5/2/21	11:27 PM	11:52 PM	0:25
5/3/21	9:40 AM	10:00 AM	0:20
5/3/21	12:13 PM	12:29 PM	0:16
5/3/21	2:06 PM	2:22 PM	0:16
5/3/21	7:41 PM	8:41 PM	1:00
5/3/21	8:55 PM	9:40 PM	0:45
5/4/21	2:45 AM	3:15 AM	0:30

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

5/4/21	1:35 PM	1:58 PM	0:23
5/4/21	7:40 PM	8:21 PM	0:41
5/4/21	9:32 PM	10:22 PM	0:50
5/4/21	11:20 PM	12:10 AM	Q
5/5/21	3:06 AM	3:21 AM	0:15
5/5/21	6:55 AM	7:39 AM	0:44
5/5/21	12:32 PM	1:02 PM	0:30
5/5/21	1:45 PM	2:47 PM	1:02
5/5/21	5:00 PM	6:07 PM	1:07
5/5/21	8:34 PM	8:48 PM	0:14
5/8/21	6:19 AM	6:53 AM	0:34
5/8/21	6:45 PM	7:11 PM	0:26
5/10/21	2:20 AM	8:40 PM	18:20
5/10/21	8:11 PM	8:34 PM	0:23
5/11/21	1:42 AM	2:05 AM	0:23
5/11/21	9:42 AM	10:03 AM	0:21
5/11/21	11:09 PM	11:30 PM	0:21
5/12/21	1:00 AM	1:08 AM	0:08
5/12/21	1:19 PM	3:48 PM	2:29
5/12/21	8:02 PM	9:00 PM	0:58
5/13/21	2:22 PM	2:55 PM	0:33
5/13/21	5:26 PM	5:46 PM	0:20
5/15/21	12:02 PM	12:40 PM	0:38
5/15/21	6:55 PM	7:26 PM	0:31
5/15/21	7:52 PM	8:10 PM	0:18
5/17/21	7:54 PM	8:22 PM	0:28
5/17/21	11:00 PM	11:32 PM	0:32
5/18/21	12:21 PM	12:58 PM	0:37
5/18/21	1:50 PM	2:30 PM	0:40
5/18/21	4:38 PM	5:25 PM	0:47
5/19/21	7:01 AM	7:26 AM	0:25
5/19/21	9:15 AM	9:35 AM	0:20
5/19/21	11:01 AM	11:31 AM	0:30
5/20/21	1:55 AM	2:25 AM	0:30
5/20/21	11:12 PM	11:33 PM	0:21
5/21/21	1:59 AM	2:27 AM	0:28
5/21/21	2:39 AM	3:05 AM	0:26
5/21/21	10:00 AM	10:25 AM	0:25
5/21/21	8:40 PM	9:00 PM	0:20
5/21/21	11:23 PM	11:51 PM	0:28
5/22/21	7:59 PM	8:18 PM	0:19
5/23/21	9:53 AM	10:27 AM	0:34
5/23/21	2:57 PM	3:00 PM	0:03
5/23/21	7:49 PM	8:12 PM	0:23
5/23/21	10:14 PM	10:51 PM	0:37

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

5/26/21	1:49 AM	2:18 AM	0:29
5/26/21	4:15 AM	4:25 AM	0:10
5/26/21	4:30 AM	4:51 AM	0:21
5/26/21	6:06 AM	6:41 AM	0:35
5/26/21	9:51 AM	10:23 AM	0:32
5/26/21	1:44 PM	2:10 PM	0:26
5/27/21	2:57 PM	3:22 PM	0:25
5/27/21	3:24 PM	3:58 PM	0:34
5/27/21	10:27 PM	11:04 PM	0:37
5/28/21	12:34 AM	1:06 AM	0:32
5/28/21	11:43 AM	1:00 PM	1:17
5/28/21	1:17 PM	1:37 PM	0:20
5/28/21	5:17 PM	5:33 PM	0:16
5/29/21	12:00 AM	12:58 AM	0:58
5/29/21	12:40 PM	1:14 PM	0:34
5/29/21	7:46 PM	8:08 PM	0:22
5/29/21	8:23 PM	8:54 PM	0:31
5/30/21	4:20 PM	4:51 PM	0:31
5/30/21	6:21 PM	6:47 PM	0:26
5/30/21	8:09 PM	8:45 PM	0:36
5/31/21	12:32 AM	1:09 AM	0:37
5/31/21	1:30 AM	2:06 AM	0:36
5/31/21	2:45 AM	3:20 AM	0:35
5/31/21	4:10 AM	4:38 AM	0:28
5/31/21	10:42 AM	11:04 AM	0:22
5/31/21	11:18 AM	11:45 AM	0:27
5/31/21	1:40 PM	2:27 PM	0:47
5/31/21	2:45 PM	3:29 PM	0:44
6/1/21	10:18 AM	11:19 AM	1:01
6/1/21	6:01 PM	6:29 PM	0:28
6/1/21	8:51 PM	9:17 PM	0:26
6/2/21	5:11 PM	5:33 PM	0:22
6/2/21	9:11 PM	9:26 PM	0:15
6/3/21	11:48 AM	12:06 PM	0:18
6/3/21	3:42 PM	4:02 PM	0:20
6/3/21	5:54 PM	6:30 PM	0:36
6/4/21	5:15 AM	6:28 AM	1:13
6/5/21	1:02 AM	1:53 AM	0:51
6/5/21	5:28 AM	6:07 AM	0:39
6/5/21	6:30 AM	7:07 AM	0:37
6/5/21	12:18 PM	12:32 PM	0:14
6/5/21	5:43 PM	6:04 PM	0:21
6/6/21	7:49 PM	8:05 PM	0:16
6/6/21	8:42 PM	9:00 PM	0:18
6/6/21	10:45 PM	11:15 PM	0:30

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

6/7/21	5:04 PM	5:35 PM	0:31
6/7/21	6:52 PM	7:24 PM	0:32
6/8/21	2:39 PM	3:10 PM	0:31
6/8/21	6:17 PM	6:40 PM	0:23
6/8/21	7:05 PM	7:25 PM	0:20
6/9/21	5:09 PM	5:40 PM	0:31
6/9/21	9:47 PM	10:08 PM	0:21
6/10/21	6:28 AM	7:08 AM	0:40
6/10/21	8:23 AM	8:45 AM	0:22
6/11/21	4:13 AM	4:20 AM	0:07
6/13/21	5:31 AM	6:04 AM	0:33
6/13/21	12:46 PM	1:19 PM	0:33
6/14/21	8:22 PM	8:45 PM	0:23
6/15/21	1:34 AM	1:55 AM	0:21
6/15/21	8:19 AM	8:42 AM	0:23
6/15/21	3:19 PM	3:44 PM	0:25
6/15/21	9:43 PM	10:09 PM	0:26
6/16/21	11:35 AM	12:19 PM	0:44
6/16/21	2:27 PM	2:48 PM	0:21
6/16/21	3:18 PM	3:29 PM	0:11
6/16/21	3:30 PM	3:58 PM	0:28
6/16/21	8:08 PM	8:20 PM	0:12
6/16/21	8:26 PM	8:44 PM	0:18
6/16/21	8:51 PM	9:19 PM	0:28
6/16/21	10:00 PM	10:18 PM	0:18
6/17/21	1:10 AM	1:39 AM	0:29
6/17/21	10:17 AM	10:36 AM	0:19
6/17/21	10:50 AM	11:04 AM	0:14
6/17/21	2:38 PM	3:03 PM	0:25
6/17/21	10:00 PM	10:40 PM	0:40
6/17/21	11:38 PM	12:07 AM	Q
6/18/21	4:00 PM	4:28 PM	0:28
6/18/21	7:11 PM	7:25 PM	0:14
6/19/21	12:06 PM	12:30 PM	0:24
6/20/21	4:05 AM	9:12 AM	5:07
6/20/21	1:13 PM	1:55 PM	0:42
6/21/21	6:35 PM	7:05 PM	0:30
6/22/21	2:43 AM	3:05 AM	0:22
6/22/21	1:15 PM	1:45 PM	0:30
6/22/21	2:54 PM	3:20 PM	0:26
6/23/21	3:20 PM	3:49 PM	0:29
6/24/21	12:00 PM	12:56 PM	0:56
6/25/21	7:43 PM	8:10 PM	0:27
6/26/21	8:36 AM	9:02 AM	0:26
6/26/21	9:24 AM	9:51 AM	0:27

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

6/26/21	1:28 PM	1:58 PM	0:30
6/26/21	2:17 PM	2:39 PM	0:22
6/26/21	2:45 PM	3:20 PM	0:35
6/28/21	5:36 PM	5:59 PM	0:23
6/28/21	11:25 PM	12:55 AM	Q
6/29/21	2:26 PM	3:00 PM	0:34
6/29/21	4:23 PM	4:49 PM	0:26
6/29/21	6:20 PM	6:40 PM	0:20
6/29/21	8:21 PM	8:45 PM	0:24
6/30/21	4:31 AM	5:01 AM	0:30
6/30/21	1:37 PM	1:57 PM	0:20
6/30/21	7:00 PM	7:43 PM	0:43
6/30/21	8:00 PM	8:31 PM	0:31
7/2/21	11:46 AM	12:14 PM	0:28
7/2/21	7:22 PM	7:49 PM	0:27
7/3/21	1:39 PM	2:12 PM	0:33
7/4/21	3:03 PM	4:09 PM	1:06
7/4/21	5:07 PM	5:27 PM	0:20
7/5/21	3:48 PM	4:24 PM	0:36
7/6/21	10:27 PM	11:06 PM	0:39
7/7/21	12:41 PM	1:03 PM	0:22
7/7/21	1:13 PM	1:40 PM	0:27
7/7/21	4:25 PM	4:52 PM	0:27
7/7/21	6:21 PM	6:41 PM	0:20
7/7/21	6:58 PM	7:35 PM	0:37
7/7/21	11:06 PM	11:27 PM	0:21
7/7/21	11:56 PM	12:32 AM	Q
7/8/21	8:43 PM	8:58 PM	0:15
7/8/21	9:00 PM	9:40 PM	0:40
7/8/21	9:53 PM	10:26 PM	0:33
7/9/21	2:23 PM	2:47 PM	0:24
7/10/21	12:55 AM	1:25 AM	0:30
7/10/21	2:14 AM	3:30 AM	1:16
7/10/21	2:19 AM	2:40 AM	0:21
7/10/21	4:50 AM	5:12 AM	0:22
7/10/21	6:36 AM	6:47 AM	0:11
7/10/21	8:24 AM	9:01 AM	0:37
7/10/21	2:50 PM	3:19 PM	0:29
7/10/21	3:56 PM	4:02 PM	0:06
7/10/21	4:20 PM	4:49 PM	0:29
7/10/21	8:50 PM	9:15 PM	0:25
7/11/21	11:13 AM	11:46 AM	0:33
7/12/21	10:48 AM	11:20 AM	0:32
7/12/21	3:50 PM	4:16 PM	0:26
7/12/21	4:20 PM	4:43 PM	0:23

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

7/13/21	12:20 PM	12:45 PM	0:25
7/13/21	3:18 PM	3:53 PM	0:35
7/13/21	7:57 PM	8:15 PM	0:18
7/14/21	5:13 PM	5:32 PM	0:19
7/14/21	8:05 PM	8:25 PM	0:20
7/15/21	3:54 PM	4:20 PM	0:26
7/17/21	10:56 PM	12:16 AM	Q
7/19/21	9:07 AM	10:01 AM	0:54
7/19/21	2:58 PM	3:38 PM	0:40
7/20/21	2:21 PM	2:56 PM	0:35
7/21/21	8:00 PM	8:30 PM	0:30
7/22/21	4:55 AM	5:25 AM	0:30
7/24/21	5:31 PM	6:35 PM	1:04
7/27/21	3:40 PM	4:02 PM	0:22
7/29/21	12:26 PM	2:06 PM	1:40
7/29/21	6:05 PM	8:43 PM	2:38
8/1/21	8:54 AM	9:34 AM	0:40
8/1/21	7:30 PM	8:12 PM	0:42
8/2/21	3:40 AM	3:52 AM	0:12
8/3/21	2:45 PM	3:14 PM	0:29
8/4/21	3:00 PM	3:32 PM	0:32
8/5/21	5:00 PM	5:19 PM	0:19
8/5/21	10:54 PM	11:21 PM	0:27
8/6/21	9:20 AM	9:56 AM	0:36
8/6/21	11:23 AM	11:44 AM	0:21
8/8/21	11:48 PM	12:41 AM	Q
8/9/21	6:12 AM	6:31 AM	0:19
8/9/21	4:21 PM	5:00 PM	0:39
8/9/21	9:25 PM	10:25 PM	1:00
8/10/21	10:19 AM	10:33 AM	0:14
8/10/21	10:50 AM	11:38 AM	0:48
8/14/21	12:30 AM	1:22 AM	0:52
8/14/21	8:18 PM	9:10 PM	0:52
8/15/21	9:15 AM	9:47 AM	0:32
8/17/21	1:20 AM	1:47 AM	0:27
8/17/21	11:17 AM	11:45 AM	0:28
8/17/21	2:03 PM	2:43 PM	0:40
8/17/21	5:13 PM	5:33 PM	0:20
8/18/21	4:40 AM	5:15 AM	0:35
8/23/21	7:20 PM	7:46 PM	0:26
8/23/21	8:20 PM	8:46 PM	0:26
8/24/21	1:04 PM	1:47 PM	0:43
8/27/21	2:32 PM	2:56 PM	0:24
8/28/21	8:50 PM	9:31 PM	0:41
9/1/21	10:15 PM	11:00 PM	0:45

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

9/2/21	12:06 AM	1:02 AM	0:56
9/2/21	6:41 PM	7:20 PM	0:39
9/3/21	3:10 PM	3:50 PM	0:40
9/5/21	11:01 AM	11:37 AM	0:36
9/5/21	6:10 PM	6:25 PM	0:15
9/5/21	10:55 PM	11:19 PM	0:24
9/8/21	11:05 AM	11:51 AM	0:46
9/8/21	8:31 PM	8:56 PM	0:25
9/9/21	8:25 AM	8:56 AM	0:31
9/11/21	3:22 AM	3:44 AM	0:22
9/11/21	9:30 AM	9:48 AM	0:18
9/11/21	6:28 PM	7:01 PM	0:33
9/12/21	3:40 PM	4:14 PM	0:34
9/12/21	4:28 PM	4:55 PM	0:27
9/13/21	8:15 AM	8:31 AM	0:16
9/13/21	3:00 PM	3:57 PM	0:57
9/14/21	1:00 AM	1:27 AM	0:27
9/16/21	4:10 PM	4:28 PM	0:18
9/16/21	5:00 PM	5:46 PM	0:46
9/16/21	6:31 PM	6:47 PM	0:16
9/20/21	8:50 AM	9:11 AM	0:21
9/21/21	3:10 PM	3:27 PM	0:17
9/21/21	3:45 PM	4:20 PM	0:35
9/22/21	4:00 AM	4:21 AM	0:21
9/22/21	12:30 PM	1:12 PM	0:42
9/23/21	4:33 PM	4:53 PM	0:20
9/27/21	5:08 PM	5:15 PM	0:07
10/2/21	9:10 PM	9:34 PM	0:24
10/6/21	12:41 PM	1:07 PM	0:26
10/6/21	6:20 PM	6:37 PM	0:17
10/6/21	6:52 PM	7:00 PM	0:08
10/7/21	9:28 AM	10:02 AM	0:34
10/7/21	1:39 PM	2:00 PM	0:21
10/7/21	2:58 PM	3:21 PM	0:23
10/8/21	7:47 PM	8:13 PM	0:26
10/9/21	7:24 AM	7:54 AM	0:30
10/9/21	10:40 AM	11:13 AM	0:33
10/9/21	6:31 PM	7:43 PM	1:12
10/10/21	3:23 AM	4:10 AM	0:47
10/12/21	3:11 PM	3:33 PM	0:22
10/13/21	2:30 PM	2:59 PM	0:29
10/13/21	10:58 PM	11:45 PM	0:47
10/14/21	8:56 PM	9:36 PM	0:40
10/14/21	11:00 PM	11:30 PM	0:30
10/15/21	11:10 PM	11:46 PM	0:36

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

10/16/21	4:20 AM	5:00 AM	0:40
10/18/21	12:52 PM	1:16 PM	0:24
10/18/21	3:24 PM	4:00 PM	0:36
10/18/21	6:35 PM	7:00 PM	0:25
10/19/21	12:44 AM	1:25 AM	0:41
10/25/21	12:57 PM	1:36 PM	0:39
10/25/21	6:09 PM	7:08 PM	0:59
10/30/21	4:40 PM	5:07 PM	0:27
11/4/21	5:55 PM	6:22 PM	0:27
11/5/21	10:21 PM	11:06 PM	0:45
11/7/21	1:22 AM	1:41 AM	0:19
11/8/21	2:14 AM	2:37 AM	0:23
11/8/21	9:40 AM	10:10 AM	0:30
11/10/21	2:40 PM	3:25 PM	0:45
11/11/21	10:47 AM	11:15 AM	0:28
11/15/21	3:44 PM	4:10 PM	0:26
11/16/21	11:30 AM	12:10 PM	0:40
11/16/21	4:40 PM	5:10 PM	0:30
11/18/21	12:30 PM	12:57 PM	0:27
11/20/21	10:25 PM	11:09 PM	0:44
11/21/21	11:09 PM	12:23 AM	0:33
11/23/21	11:39 AM	12:30 PM	0:51
11/26/21	12:07 AM	12:35 AM	0:28
11/26/21	2:32 AM	3:01 AM	0:29
11/26/21	11:16 PM	11:46 PM	0:30
11/27/21	1:47 AM	2:24 AM	0:37
11/30/21	4:10 PM	4:38 PM	0:28
12/1/21	5:54 PM	6:47 PM	0:53
12/1/21	7:01 PM	7:11 PM	0:10
12/1/21	7:15 PM	7:45 PM	0:30
12/2/21	1:50 PM	2:26 PM	0:36
12/2/21	6:30 PM	6:53 PM	0:23
12/5/21	1:06 PM	1:24 PM	0:18
12/7/21	4:26 PM	4:50 PM	0:24
12/7/21	5:11 PM	5:38 PM	0:27
12/10/21	11:38 AM	12:18 PM	0:40
12/10/21	6:25 PM	6:51 PM	0:26
12/10/21	6:58 PM	7:13 PM	0:15
12/11/21	1:20 AM	1:56 AM	0:36
12/11/21	12:44 PM	1:15 PM	0:31
12/14/21	12:43 PM	1:05 PM	0:22
12/14/21	6:04 PM	6:31 PM	0:27
12/16/21	3:12 PM	3:36 PM	0:24
12/17/21	11:58 AM	12:07 PM	0:09
12/17/21	12:07 PM	12:42 PM	0:35

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

12/17/21	1:05 PM	1:34 PM	0:29
12/17/21	11:30 PM	12:19 AM	0:49
12/18/21	2:30 PM	2:52 PM	0:22
12/18/21	3:43 PM	4:20 PM	0:37
12/18/21	5:40 PM	6:39 PM	0:59
12/19/21	7:00 PM	7:30 PM	0:30
12/27/21	4:30 PM	4:48 PM	0:18
12/31/21	5:50 PM	6:15 PM	0:25
12/31/21	6:16 PM	6:57 PM	0:41
1/1/22	1:02 PM	1:26 PM	0:24
1/1/22	3:18 PM	3:41 PM	0:23
1/9/22	7:22 PM	7:55 PM	0:33
1/10/22	11:27 AM	12:02 PM	0:35
1/11/22	4:20 PM	4:49 PM	0:29
1/13/22	7:42 PM	8:07 PM	0:25
1/20/22	2:18 PM	2:47 PM	0:29
1/21/22	4:36 PM	5:13 PM	0:37
1/24/22	9:15 AM	9:45 AM	0:30
1/29/22	9:30 AM	9:57 AM	0:27
1/29/22	4:43 PM	5:10 PM	0:27
1/30/22	7:48 PM	8:17 PM	0:29
2/1/22	6:42 AM	7:33 AM	0:51
2/1/22	12:13 PM	1:53 PM	1:40
2/1/22	4:58 PM	5:45 PM	0:47
2/1/22	8:08 PM	8:32 PM	0:24
2/2/22	2:55 AM	3:41 AM	0:46
2/2/22	2:30 PM	3:05 PM	0:35
2/2/22	5:45 PM	6:15 PM	0:30
2/2/22	7:08 PM	7:45 PM	0:37
2/3/22	7:50 PM	8:25 PM	0:35
2/4/22	10:26 PM	11:05 PM	0:39
2/5/22	12:41 AM	1:26 AM	0:45
2/5/22	1:42 AM	2:10 AM	0:28
2/6/22	10:41 AM	11:25 AM	0:44
2/6/22	2:39 PM	3:12 PM	0:33
2/6/22	5:30 PM	6:24 PM	0:54
2/7/22	12:15 PM	12:58 PM	0:43
2/7/22	4:12 PM	7:10 PM	2:58
2/8/22	11:00 AM	11:52 AM	0:52
2/8/22	1:59 PM	2:16 PM	0:17
2/8/22	8:39 PM	9:13 PM	0:34
2/9/22	4:51 PM	5:15 PM	0:24
2/9/22	7:30 PM	7:50 PM	0:20
2/10/22	1:14 AM	1:35 AM	0:21
2/10/22	6:13 AM	6:45 AM	0:32

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

2/10/22	10:06 AM	10:42 AM	0:36
2/10/22	6:05 PM	6:54 PM	0:49
2/10/22	8:05 PM	8:33 PM	0:28
2/12/22	8:49 AM	9:16 AM	0:27
2/12/22	11:10 AM	12:32 PM	1:22
2/12/22	3:09 PM	3:28 PM	0:19
2/12/22	7:27 PM	8:25 PM	0:58
2/13/22	1:37 AM	2:07 AM	0:30
2/13/22	9:32 AM	10:02 AM	0:30
2/13/22	2:22 PM	2:23 PM	0:01
2/13/22	2:34 PM	3:08 PM	0:34
2/14/22	8:59 PM	9:47 PM	0:48
2/15/22	10:50 PM	11:25 PM	0:35
2/16/22	11:32 AM	12:08 PM	0:36
2/16/22	1:21 PM	1:58 PM	0:37
2/16/22	6:40 PM	7:05 PM	0:25
2/16/22	9:14 PM	9:47 PM	0:33
2/16/22	10:20 PM	10:50 PM	0:30
2/17/22	1:37 AM	2:10 AM	0:33
2/17/22	4:27 PM	4:50 PM	0:23
2/17/22	6:00 PM	7:08 PM	1:08
2/18/22	5:40 PM	6:22 PM	0:42
2/18/22	9:18 PM	9:53 PM	0:35
2/19/22	12:23 PM	12:51 PM	0:28
2/19/22	2:29 PM	2:56 PM	0:27
2/19/22	3:41 PM	4:28 PM	0:47
2/19/22	5:39 PM	6:31 PM	0:52
2/21/22	10:20 AM	10:52 AM	0:32
2/22/22	1:52 PM	2:12 PM	0:20
2/23/22	2:48 AM	3:14 AM	0:26
2/23/22	6:48 AM	7:20 AM	0:32
2/23/22	7:42 AM	8:27 AM	0:45
2/23/22	9:47 AM	10:20 AM	0:33
2/23/22	10:41 AM	10:44 AM	0:03
2/23/22	10:46 AM	11:02 AM	0:16
2/23/22	3:46 PM	4:16 PM	0:30
2/24/22	12:41 AM	1:01 AM	0:20
2/24/22	2:35 AM	3:11 AM	0:36
2/24/22	9:14 AM	9:30 AM	0:16
2/24/22	4:25 PM	4:54 PM	0:29
2/24/22	5:12 PM	5:55 PM	0:43
2/25/22	12:35 AM	1:09 AM	0:34
2/25/22	2:43 AM	3:10 AM	0:27
2/25/22	5:06 AM	5:34 AM	0:28
2/25/22	6:36 PM	7:20 PM	0:44

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

2/26/22	4:04 AM	4:31 AM	0:27
2/26/22	9:50 PM	10:23 PM	0:33
2/27/22	3:08 AM	3:36 AM	0:28
2/27/22	6:54 AM	7:17 AM	0:23
2/28/22	3:25 PM	3:55 PM	0:30
2/28/22	6:06 PM	6:34 PM	0:28
2/28/22	10:40 PM	11:21 PM	0:41
3/4/22	9:59 AM	10:30 AM	0:31
3/5/22	4:21 PM	4:45 PM	0:24
3/9/22	10:31 PM	11:02 PM	0:31
3/12/22	6:08 AM	6:44 AM	0:36
3/20/22	10:35 PM	10:57 PM	0:22
3/21/22	9:10 AM	9:36 AM	0:26
3/26/22	3:34 PM	3:59 PM	0:25
3/30/22	9:32 PM	10:07 PM	0:35
4/1/22	4:30 PM	5:20 PM	0:50
4/2/22	1:42 AM	2:14 AM	0:32
4/3/22	12:12 PM	12:56 PM	0:44
4/4/22	11:00 AM	11:26 AM	0:26
4/6/22	2:50 PM	3:33 PM	0:43
4/8/22	8:00 PM	8:46 PM	0:46
4/9/22	10:14 PM	10:30 PM	0:16
4/9/22	10:45 PM	11:15 PM	0:30
4/11/22	8:07 PM	8:49 PM	0:42
4/12/22	10:14 AM	10:42 AM	0:28
4/17/22	1:00 AM	1:38 AM	0:38
4/17/22	1:05 PM	1:56 PM	0:51
4/17/22	5:08 PM	5:46 PM	0:38
4/22/22	9:14 PM	10:05 PM	0:51
4/24/22	11:13 PM	11:35 PM	0:22
4/25/22	1:47 AM	2:11 AM	0:24
4/25/22	1:00 PM	1:30 PM	0:30
4/27/22	11:36 AM	12:03 PM	0:27
4/27/22	1:58 PM	2:27 PM	0:29
4/28/22	10:41 AM	11:07 AM	0:26
4/28/22	11:30 AM	12:02 PM	0:32
4/28/22	2:44 PM	3:27 PM	0:43
4/29/22	2:31 AM	3:01 AM	0:30
4/29/22	10:25 PM	10:48 PM	0:23
4/30/22	7:32 PM	7:57 PM	0:25
5/1/22	1:30 PM	1:32 PM	0:33
5/1/22	1:51 PM	2:24 PM	0:12
5/1/22	4:03 PM	4:15 PM	0:17
5/1/22	4:19 PM	4:36 PM	1:06
5/2/22	8:31 AM	9:37 AM	0:26

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

5/2/22	5:20 PM	5:46 PM	0:28
5/4/22	8:20 AM	8:48 AM	0:28
5/5/22	9:40 AM	10:29 AM	0:49
5/6/22	7:58 PM	8:31 PM	0:33
5/7/22	2:58 AM	3:47 AM	0:49
5/7/22	11:40 AM	11:50 AM	0:10
5/9/22	8:31 AM	9:00 AM	0:29
5/11/22	12:58 PM	1:29 PM	0:31
5/13/22	8:53 PM	9:14 PM	0:21
5/13/22	9:19 PM	9:44 PM	0:25
5/16/22	10:19 PM	10:44 PM	0:25
5/17/22	5:05 PM	5:51 PM	0:46
5/17/22	8:15 PM	9:14 PM	0:59
5/18/22	10:18 PM	10:22 PM	0:04
5/19/22	5:29 PM	6:13 PM	0:44
5/20/22	4:10 PM	4:20 PM	0:10
5/21/22	8:32 PM	9:02 PM	0:30
5/23/22	7:32 PM	7:55 PM	0:23
5/25/22	2:20 AM	2:46 AM	0:26
5/26/22	3:14 PM	3:44 PM	0:30
5/27/22	2:00 AM	2:43 AM	0:43
5/28/22	7:25 AM	7:55 AM	0:30
5/28/22	8:46 AM	9:14 AM	0:28
5/28/22	2:23 PM	2:58 PM	0:35
5/29/22	2:00 AM	2:36 AM	0:36
5/29/22	1:29 PM	1:57 PM	0:28
5/30/22	12:00 AM	12:10 AM	0:10
5/30/22	12:20 AM	12:35 AM	0:15
5/30/22	12:55 AM	1:13 AM	0:18
5/30/22	2:50 AM	3:24 AM	0:34
5/30/22	9:15 AM	9:46 AM	0:31
5/30/22	11:24 AM	11:45 AM	0:21
6/1/22	10:11 AM	10:34 AM	0:23
6/1/22	7:27 PM	8:00 PM	0:33
6/1/22	11:35 PM	11:59 PM	0:24
6/2/22	12:36 AM	12:56 AM	0:20
6/3/22	1:23 PM	1:52 PM	0:29
6/4/22	2:28 AM	2:56 AM	0:28
6/4/22	1:58 PM	2:44 PM	0:46
6/5/22	8:40 PM	9:20 PM	0:40
6/6/22	3:48 AM	4:26 AM	0:38
6/6/22	7:38 AM	8:10 AM	0:32
6/6/22	4:00 PM	5:00 PM	1:00
6/7/22	3:31 AM	4:11 AM	0:40
6/8/22	10:01 AM	10:35 AM	0:34

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

6/8/22	10:45 AM	10:50 AM	0:05
6/9/22	3:30 PM	3:57 PM	0:27
6/10/22	9:05 PM	9:36 PM	0:31
6/11/22	2:30 AM	2:49 AM	0:19
6/11/22	5:14 PM	5:45 PM	0:31
6/12/22	3:30 PM	4:00 PM	0:30
6/13/22	4:10 AM	4:40 AM	0:30
6/15/22	2:28 AM	2:56 AM	0:28
6/17/22	11:51 AM	12:41 PM	0:50
6/19/22	5:29 AM	5:52 AM	0:23
6/20/22	9:40 AM	10:07 AM	0:27
6/20/22	10:22 PM	10:44 PM	0:22
6/21/22	1:19 PM	1:50 PM	0:31
6/22/22	11:54 AM	12:48 PM	0:54
6/22/22	11:00 PM	11:10 PM	0:10
6/24/22	7:45 PM	8:23 PM	0:38
6/26/22	2:07 PM	2:45 PM	0:38
6/27/22	7:55 AM	8:33 AM	0:38
6/28/22	9:50 AM	10:14 AM	0:24
6/28/22	12:32 PM	1:01 PM	0:29
6/29/22	12:00 PM	12:43 PM	0:43
6/30/22	7:53 PM	8:18 PM	0:25
7/1/22	12:42 PM	1:13 PM	0:31
7/4/22	4:10 PM	4:35 PM	0:25
7/4/22	7:18 PM	7:58 PM	0:40
7/5/22	3:58 PM	4:25 PM	0:27
7/5/22	6:30 PM	7:03 PM	0:33
7/7/22	4:05 AM	4:35 AM	0:30
7/8/22	1:10 PM	1:31 PM	0:21
7/8/22	3:00 PM	3:36 PM	0:36
7/9/22	10:44 AM	11:44 AM	1:00
7/9/22	3:00 PM	3:34 PM	0:34
7/9/22	4:25 PM	4:50 PM	0:25
7/10/22	10:50 PM	11:59 PM	1:09
7/11/22	2:10 AM	2:40 AM	0:30
7/11/22	9:20 AM	9:50 AM	0:30
7/11/22	3:25 PM	3:53 PM	0:28
7/12/22	2:53 PM	3:22 PM	0:29
7/14/22	2:55 AM	3:21 AM	0:26
7/16/22	4:42 AM	5:50 AM	1:08
7/18/22	7:00 PM	7:40 PM	0:40
7/19/22	12:55 PM	1:25 PM	0:30
7/20/22	2:40 PM	3:04 PM	0:24
7/20/22	7:59 PM	8:22 PM	0:23
7/21/22	2:35 PM	2:57 PM	0:22

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

7/21/22	7:59 PM	8:54 PM	0:55
7/22/22	11:03 AM	11:12 AM	0:09
7/22/22	11:20 AM	11:47 AM	0:27
7/22/22	7:17 PM	7:45 PM	0:28
7/23/22	6:04 PM	6:33 PM	0:29
7/23/22	10:20 PM	10:51 PM	0:31
7/24/22	11:55 AM	12:26 PM	0:31
7/24/22	3:07 PM	3:43 PM	0:36
7/24/22	4:26 PM	4:46 PM	0:20
7/25/22	2:03 PM	2:34 PM	0:31
7/26/22	11:33 AM	12:08 PM	0:35
7/27/22	3:59 PM	4:27 PM	0:28
8/1/22	2:44 PM	3:16 PM	0:32
8/1/22	10:59 PM	11:29 PM	0:30
8/3/22	12:43 AM	1:13 AM	0:30
8/3/22	1:50 PM	2:00 PM	0:10
8/3/22	5:59 PM	6:26 PM	0:27
8/3/22	8:30 PM	8:51 PM	0:21
8/4/22	4:43 PM	5:32 PM	0:49
8/4/22	6:25 PM	6:45 PM	0:20
8/6/22	12:27 AM	1:02 AM	0:35
8/6/22	5:45 PM	6:10 PM	0:25
8/7/22	3:01 AM	3:22 AM	0:21
8/7/22	3:21 PM	3:58 PM	0:37
8/8/22	9:30 PM	10:13 PM	0:43
8/9/22	2:55 PM	3:14 PM	0:19
8/10/22	12:42 AM	1:07 AM	0:25
8/11/22	12:36 PM	1:10 PM	0:34
8/11/22	4:50 PM	5:21 PM	0:31
8/11/22	10:54 PM	11:30 PM	0:36
8/12/22	12:50 AM	1:10 AM	0:20
8/12/22	9:40 PM	10:09 PM	0:29
8/13/22	12:46 AM	1:30 AM	0:44
8/13/22	12:00 PM	12:40 PM	0:40
8/13/22	7:10 PM	8:01 PM	0:51
8/14/22	4:56 PM	5:50 PM	0:54
8/14/22	6:21 PM	6:53 PM	0:32
8/14/22	11:41 PM	12:00 AM	0:19
8/15/22	6:03 PM	7:00 PM	0:57
8/15/22	8:09 PM	8:39 PM	0:30
8/15/22	8:54 PM	9:07 PM	0:13
8/15/22	10:11 PM	10:20 PM	0:09
8/15/22	11:40 PM	11:53 PM	0:13
8/16/22	3:37 AM	4:06 AM	0:29
8/16/22	6:48 PM	7:25 PM	0:37

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

8/17/22	2:21 PM	2:57 PM	0:36
8/17/22	3:35 PM	4:04 PM	0:29
8/17/22	10:40 PM	11:14 PM	0:34
8/18/22	6:04 PM	6:29 PM	0:25
8/18/22	6:40 PM	7:15 PM	0:35
8/18/22	11:56 PM	12:14 AM	0:20
8/19/22	2:44 PM	3:13 PM	0:29
8/19/22	4:58 PM	5:40 PM	0:42
8/20/22	1:07 AM	1:55 AM	0:48
8/20/22	5:13 PM	5:54 PM	0:41
8/21/22	11:47 AM	12:09 PM	0:22
8/21/22	3:55 PM	4:14 PM	0:19
8/22/22	5:18 PM	5:50 PM	0:32
8/23/22	1:18 PM	1:54 PM	0:36
8/24/22	2:40 PM	3:31 PM	0:51
8/24/22	7:56 PM	8:28 PM	0:32
8/24/22	10:27 PM	10:38 PM	0:11
8/26/22	5:00 PM	5:23 PM	0:23
8/26/22	8:06 PM	8:30 PM	0:24
8/27/22	2:15 PM	2:41 PM	0:26
8/28/22	2:22 PM	2:41 PM	0:19
8/29/22	1:45 PM	2:13 PM	0:28
8/29/22	5:06 PM	5:22 PM	0:16
8/29/22	6:00 PM	6:15 PM	0:15
8/29/22	7:03 PM	7:35 PM	0:32
8/30/22	12:01 PM	12:20 PM	0:19
8/31/22	4:00 PM	4:52 PM	0:52
8/31/22	7:50 PM	8:51 PM	1:01
9/1/22	7:30 PM	7:51 PM	0:21
9/1/22	8:48 PM	9:10 PM	0:22
9/2/22	12:29 AM	12:50 AM	0:21
9/2/22	1:09 PM	1:24 PM	0:15
9/2/22	1:19 PM	1:52 PM	0:33
9/2/22	10:32 PM	12:00 AM	0:28
9/3/22	3:40 AM	4:10 AM	0:30
9/3/22	2:00 PM	2:39 PM	0:39
9/4/22	9:39 AM	10:46 AM	1:07
9/4/22	9:13 PM	9:29 PM	0:16
9/4/22	9:48 PM	10:11 PM	0:23
9/4/22	11:13 PM	11:35 PM	0:22
9/5/22	12:05 AM	12:07 AM	0:02
9/5/22	12:10 AM	12:35 AM	0:25
9/5/22	12:58 PM	1:23 PM	0:25
9/5/22	2:30 PM	3:01 PM	0:31
9/6/22	10:30 AM	10:54 AM	0:24

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

9/6/22	9:32 PM	9:55 PM	0:23
9/6/22	10:08 PM	10:46 PM	0:38
9/7/22	4:51 PM	5:26 PM	0:35
9/7/22	7:21 PM	7:49 PM	0:28
9/8/22	1:28 AM	2:05 AM	0:37
9/8/22	3:48 PM	4:19 PM	0:31
9/9/22	3:18 PM	4:10 PM	0:52
9/9/22	6:07 PM	6:22 PM	0:15
9/9/22	7:55 PM	8:18 PM	0:23
9/10/22	10:42 PM	11:10 PM	0:28
9/11/22	8:29 AM	9:09 AM	0:40
9/11/22	3:38 PM	4:13 PM	0:35
9/11/22	8:36 PM	9:45 PM	1:09
9/12/22	10:36 AM	11:07 AM	0:31
9/12/22	6:43 PM	7:03 PM	0:20
9/13/22	6:44 PM	7:45 PM	1:01
9/14/22	2:33 AM	3:31 AM	0:58
9/14/22	2:39 PM	3:09 PM	0:30
9/14/22	5:00 PM	5:32 PM	0:32
9/16/22	6:25 PM	6:55 PM	0:30
9/17/22	10:50 AM	11:15 AM	0:25
9/20/22	7:42 PM	9:02 PM	1:20
9/21/22	4:34 PM	5:00 PM	0:26
9/21/22	5:38 PM	5:51 PM	0:13
9/21/22	6:07 PM	6:30 PM	0:23
9/21/22	7:59 PM	8:28 PM	0:29
9/22/22	12:40 AM	1:15 AM	0:35
9/22/22	3:07 AM	3:30 AM	0:23
9/22/22	3:32 PM	4:00 PM	0:28
9/22/22	9:34 PM	9:37 PM	0:03
9/22/22	11:23 PM	11:54 PM	0:31
9/23/22	3:09 AM	3:39 AM	0:30
9/23/22	11:32 AM	12:00 PM	0:28
9/23/22	6:30 PM	6:55 PM	0:25
9/24/22	7:19 PM	7:50 PM	0:31
9/24/22	11:05 PM	11:30 PM	0:25
9/26/22	4:50 PM	6:15 PM	1:25
9/27/22	6:34 PM	7:09 PM	0:35
9/27/22	6:39 PM	10:05 PM	3:26
9/30/22	3:10 PM	3:53 PM	0:43
10/1/22	3:39 PM	3:59 PM	0:20
10/2/22	5:10 PM	5:38 PM	0:28
10/3/22	4:26 PM	5:06 PM	0:40
10/4/22	12:58 PM	1:29 PM	0:31
10/4/22	3:18 PM	3:47 PM	0:29

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

10/4/22	6:57 PM	7:25 PM	0:28
10/4/22	9:30 PM	9:45 PM	0:15
10/5/22	1:24 PM	2:02 PM	0:38
10/5/22	3:11 PM	3:42 PM	0:31
10/6/22	11:10 AM	11:45 AM	0:35
10/6/22	12:00 PM	12:36 PM	0:36
10/7/22	2:19 PM	2:42 PM	0:23
10/7/22	5:17 PM	6:00 PM	0:43
10/7/22	10:40 PM	11:00 PM	0:20
10/8/22	11:37 AM	12:04 PM	0:27
10/8/22	7:47 PM	8:08 PM	0:21
10/9/22	12:56 PM	1:31 PM	0:35
10/9/22	5:38 PM	6:10 PM	0:32
10/9/22	6:21 PM	6:42 PM	0:21
10/12/22	4:30 PM	5:00 PM	0:30
10/13/22	12:45 PM	1:14 PM	0:29
10/13/22	1:33 PM	2:00 PM	0:27
10/13/22	6:02 PM	6:33 PM	0:31
10/14/22	1:28 PM	1:58 PM	0:30
10/15/22	2:35 PM	2:55 PM	0:20
10/15/22	10:31 PM	11:01 PM	0:30
10/16/22	3:55 AM	4:15 AM	0:20
10/17/22	11:05 AM	11:40 AM	0:35
10/17/22	1:47 PM	2:27 PM	0:40
10/17/22	2:08 PM	2:39 PM	0:31
10/17/22	4:43 PM	5:04 PM	0:21
10/17/22	11:40 PM	12:15 AM	0:35
10/19/22	2:55 PM	3:27 PM	0:32
10/22/22	7:43 AM	8:17 AM	0:34
10/22/22	5:54 PM	6:14 PM	0:20
10/22/22	7:30 PM	7:39 PM	0:09
10/22/22	7:45 PM	8:10 PM	0:25
10/22/22	8:14 PM	9:05 PM	0:51
10/23/22	9:25 AM	10:35 AM	1:10
10/23/22	3:45 PM	3:59 PM	0:14
10/23/22	8:16 PM	9:25 PM	1:09
10/24/22	1:36 PM	1:59 PM	0:23
10/24/22	3:40 PM	4:32 PM	0:52
10/24/22	9:31 PM	10:03 PM	0:32
10/25/22	11:00 AM	11:30 AM	0:30
10/25/22	1:17 PM	4:09 PM	2:52
10/26/22	1:15 AM	1:40 AM	0:25
10/26/22	11:39 AM	12:13 PM	0:34
10/26/22	4:14 PM	4:26 PM	0:12
10/26/22	4:30 PM	5:00 PM	0:30

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

10/26/22	7:00 PM	7:45 PM	0:45
10/27/22	4:59 AM	5:33 AM	0:34
10/28/22	2:35 AM	3:05 AM	0:30
10/28/22	11:00 AM	11:34 AM	0:34
10/28/22	12:14 PM	12:36 PM	0:22
10/28/22	12:45 PM	1:15 PM	0:30
10/28/22	10:41 PM	11:53 PM	1:12
10/29/22	8:03 PM	8:29 PM	0:26
10/29/22	10:31 PM	10:58 PM	0:27
10/30/22	11:25 AM	11:51 AM	0:26
10/30/22	1:45 PM	2:28 PM	0:43
10/31/22	2:30 PM	3:48 PM	1:18
10/31/22	5:03 PM	5:49 PM	0:46
10/31/22	7:09 PM	7:38 PM	0:29
11/2/22	10:05 AM	10:33 AM	0:28
11/2/22	1:41 PM	2:45 PM	1:04
11/3/22	1:18 PM	1:38 PM	0:20
11/4/22	2:01 PM	2:59 PM	0:58
11/4/22	5:22 PM	5:46 PM	0:24
11/4/22	6:30 PM	6:54 PM	0:24
11/4/22	6:53 PM	7:23 PM	0:30
11/6/22	3:57 PM	4:32 PM	0:35
11/10/22	3:16 PM	3:58 PM	0:42
11/11/22	3:27 PM	3:52 PM	0:25
11/11/22	9:51 PM	10:50 PM	0:59
11/12/22	12:59 PM	1:22 PM	0:23
11/12/22	6:44 PM	7:06 PM	0:22
11/12/22	7:47 PM	8:18 PM	0:31
11/13/22	11:44 AM	12:15 PM	0:31
11/13/22	6:51 PM	7:08 PM	0:17
11/14/22	10:32 AM	11:00 AM	0:28
11/14/22	11:26 AM	11:50 AM	0:24
11/14/22	1:58 PM	2:27 PM	0:29
11/16/22	2:58 AM	3:36 AM	0:38
11/16/22	10:33 AM	11:08 AM	0:35
11/16/22	6:00 PM	6:06 PM	0:06
11/16/22	6:30 PM	6:40 PM	0:10
11/16/22	11:52 PM	12:15 AM	0:23
11/17/22	1:25 AM	1:48 AM	0:23
11/17/22	3:30 PM	4:27 PM	0:57
11/18/22	1:04 PM	1:56 PM	0:52
11/19/22	4:30 AM	5:15 AM	0:45
11/19/22	7:20 PM	7:50 PM	0:30
11/20/22	1:00 AM	1:30 AM	0:30
11/20/22	2:34 PM	3:15 PM	0:41

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

11/20/22	10:16 PM	10:47 PM	0:31
11/21/22	12:11 PM	12:28 PM	0:17
11/21/22	1:45 PM	2:30 PM	0:45
11/21/22	3:30 PM	3:52 PM	0:22
11/22/22	6:19 AM	6:42 AM	0:23
11/22/22	10:50 AM	11:44 AM	0:54
11/22/22	12:56 PM	1:40 PM	0:44
11/22/22	3:56 PM	4:18 PM	0:22
11/22/22	7:06 PM	7:47 PM	0:41
11/23/22	1:17 PM	1:36 PM	0:19
11/24/22	11:52 AM	12:21 PM	0:29
11/24/22	12:53 PM	3:15 PM	2:22
11/25/22	1:59 PM	2:30 PM	0:31
11/26/22	9:44 AM	10:04 AM	0:20
11/26/22	3:08 PM	3:40 PM	0:32
11/27/22	12:20 AM	1:10 AM	0:50
11/27/22	12:40 PM	1:12 PM	0:32
11/27/22	2:36 PM	3:10 PM	0:34
11/27/22	2:45 PM	3:19 PM	0:34
11/27/22	4:38 PM	5:25 PM	0:47
11/29/22	5:15 PM	6:00 PM	0:45
11/30/22	9:50 AM	11:45 AM	1:55
11/30/22	3:59 PM	4:21 PM	0:22
12/1/22	12:39 PM	1:47 PM	1:08
12/12/22	8:02 AM	8:34 AM	0:32
12/12/22	1:19 PM	1:50 PM	0:31
12/12/22	10:28 PM	11:25 PM	0:57
12/14/22	5:14 PM	5:43 PM	0:29
12/14/22	8:48 PM	9:11 PM	0:23
12/14/22	9:28 PM	9:54 PM	0:26
12/16/22	10:45 AM	11:00 AM	0:15
12/16/22	11:11 AM	11:36 AM	0:25
12/16/22	11:50 AM	11:55 AM	0:05
12/16/22	4:58 PM	6:01 PM	1:03
12/18/22	1:34 PM	2:13 PM	0:39
12/19/22	8:39 PM	9:00 PM	0:21
12/19/22	10:53 PM	11:15 PM	0:22
12/20/22	12:10 PM	12:30 PM	0:20
12/20/22	12:41 PM	1:25 PM	0:44
12/20/22	2:25 PM	2:45 PM	0:20
12/21/22	12:18 PM	12:58 PM	0:40
12/23/22	4:03 PM	4:34 PM	0:31
12/24/22	12:47 PM	1:54 PM	1:07
12/24/22	4:01 PM	5:01 PM	1:00
12/24/22	6:37 PM	7:20 PM	0:43

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

12/31/22	10:57 PM	11:35 PM	0:38
1/3/23	4:07 AM	4:50 AM	0:43
1/6/23	9:40 PM	10:14 PM	0:34
1/9/23	12:11 PM	12:50 PM	0:39
1/9/23	1:27 PM	3:00 PM	1:33
1/15/23	1:12 PM	1:30 PM	0:18
1/16/23	1:45 PM	2:10 PM	0:25
1/18/23	12:08 PM	12:40 PM	0:32
1/19/23	10:51 AM	11:45 AM	0:54
1/20/23	6:03 PM	6:30 PM	0:27
1/20/23	8:40 PM	9:08 PM	0:28
1/21/23	3:55 PM	4:36 PM	0:41
1/21/23	11:50 PM	12:35 AM	0:45
1/22/23	1:25 AM	1:38 AM	0:13
1/22/23	1:47 AM	2:20 AM	0:33
1/22/23	11:28 AM	12:06 PM	0:38
1/22/23	12:18 PM	12:44 PM	0:26
1/24/23	5:41 PM	6:05 PM	0:24
1/25/23	5:53 PM	5:55 PM	0:02
1/25/23	6:02 PM	6:22 PM	0:20
1/26/23	12:28 AM	1:18 AM	0:50
1/26/23	10:43 PM	11:08 PM	0:25
1/27/23	11:20 AM	12:00 PM	0:40
1/27/23	12:47 PM	1:14 PM	0:27
1/27/23	3:39 PM	4:25 PM	0:46
1/27/23	5:53 PM	6:22 PM	0:29
1/30/23	11:51 PM	12:10 AM	0:19
1/31/23	2:42 AM	3:10 AM	0:28
1/31/23	7:29 AM	8:00 AM	0:31
1/31/23	12:53 PM	1:50 PM	0:57
1/31/23	3:48 PM	4:13 PM	0:25
1/31/23	10:30 PM	11:09 PM	0:39
2/1/23	12:32 AM	12:36 AM	0:04
2/1/23	10:01 AM	10:49 AM	0:48
2/1/23	12:25 PM	12:57 PM	0:32
2/2/23	2:40 PM	3:10 PM	0:30
2/2/23	3:00 PM	3:30 PM	0:30
2/4/23	8:50 AM	9:06 AM	0:16
2/6/23	7:09 AM	7:56 AM	0:47
2/6/23	3:02 PM	3:26 PM	0:24
2/6/23	7:15 PM	7:44 PM	0:29
2/7/23	8:52 AM	9:17 AM	0:25
2/7/23	11:12 PM	11:40 PM	0:28
2/8/23	6:37 PM	7:20 PM	0:43
2/8/23	8:57 PM	9:31 PM	0:34

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

2/9/23	3:27 PM	3:35 PM	0:08
2/9/23	3:47 PM	4:10 PM	0:23
2/9/23	7:36 PM	8:05 PM	0:29
2/10/23	9:39 AM	10:12 AM	0:33
2/10/23	10:05 PM	10:30 PM	0:25
2/11/23	9:59 PM	10:30 PM	0:31
2/12/23	12:36 PM	1:05 PM	0:29
2/12/23	1:35 PM	2:24 PM	0:49
2/12/23	2:29 PM	3:55 PM	1:26
2/12/23	3:10 PM	3:30 PM	0:20
2/12/23	3:45 PM	4:23 PM	0:38
2/12/23	6:56 PM	7:30 PM	0:34
2/12/23	8:54 PM	9:20 PM	0:26
2/13/23	1:15 PM	1:49 PM	0:34
2/14/23	1:00 AM	1:43 AM	0:43
2/14/23	10:31 AM	11:11 AM	0:40
2/15/23	6:18 AM	6:55 AM	0:37
2/15/23	1:41 PM	2:13 PM	0:32
2/16/23	3:24 AM	3:46 AM	0:22
2/16/23	3:44 PM	5:04 PM	1:20
2/17/23	12:59 AM	1:34 AM	0:35
2/17/23	11:30 PM	11:45 PM	0:15
2/19/23	7:24 AM	7:50 AM	0:26
2/19/23	9:10 AM	9:55 AM	0:45
2/19/23	3:21 PM	3:55 PM	0:34
2/21/23	1:52 AM	2:19 AM	0:27
2/22/23	10:25 AM	10:50 AM	0:25
2/25/23	6:52 PM	7:25 PM	0:33
2/26/23	12:45 AM	1:29 AM	0:44
2/26/23	11:09 PM	11:36 PM	0:27
3/1/23	12:46 AM	1:27 AM	0:41
3/1/23	11:15 AM	12:00 PM	0:45
3/1/23	11:56 AM	12:33 PM	0:37
3/1/23	2:19 PM	2:52 PM	0:33
3/3/23	9:35 PM	9:37 PM	0:02
3/3/23	9:39 PM	10:36 PM	0:57
3/8/23	3:32 PM	4:01 PM	0:29
3/11/23	3:33 AM	4:00 AM	0:27
3/14/23	10:50 PM	11:06 PM	0:16
3/15/23	1:09 PM	1:32 PM	0:23
3/15/23	7:06 PM	7:34 PM	0:28
3/16/23	12:47 PM	1:58 PM	1:11
3/17/23	12:03 AM	12:13 AM	0:10
3/17/23	1:39 PM	1:59 PM	0:20
3/18/23	12:21 AM	1:13 AM	0:52

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

3/22/23	8:30 PM	8:43 PM	0:13
3/25/23	4:20 AM	4:55 AM	0:35
3/25/23	8:03 AM	8:59 AM	0:56
3/25/23	12:10 PM	12:39 PM	0:29
3/25/23	5:01 PM	5:25 PM	0:24
3/25/23	11:45 PM	12:55 AM	1:10
3/27/23	8:52 AM	9:25 AM	0:33
3/30/23	12:33 PM	1:02 PM	0:29
3/30/23	6:35 PM	7:25 PM	0:50
4/2/23	11:15 PM	11:51 PM	0:36
4/3/23	3:32 PM	3:55 PM	0:23
4/3/23	10:00 PM	10:17 PM	0:17
4/3/23	10:40 PM	10:55 PM	0:15
4/3/23	11:07 PM	11:22 PM	0:15
4/6/23	11:20 PM	11:59 PM	0:39
4/7/23	4:58 PM	5:21 PM	0:23
4/7/23	7:24 PM	7:52 PM	0:28
4/8/23	1:49 AM	2:10 AM	0:21
4/8/23	10:59 AM	11:28 AM	0:29
4/8/23	6:11 PM	6:51 PM	0:40
4/10/23	3:48 AM	4:14 AM	0:26
4/10/23	9:45 AM	10:35 AM	0:50
4/12/23	2:52 AM	3:20 AM	0:28
4/12/23	8:31 AM	8:56 AM	0:25
4/12/23	6:48 PM	7:28 PM	0:40
4/12/23	7:59 PM	8:20 PM	0:21
4/13/23	3:46 AM	4:12 AM	0:26
4/13/23	6:08 PM	6:37 PM	0:29
4/14/23	11:00 AM	11:41 AM	0:41
4/14/23	4:24 PM	4:58 PM	0:34
4/14/23	7:37 PM	8:40 PM	1:03
4/16/23	1:15 PM	1:55 PM	0:40
4/16/23	4:15 PM	5:25 PM	1:10
4/16/23	9:17 PM	9:49 PM	0:32
4/16/23	11:25 PM	11:51 PM	0:26
4/18/23	7:03 AM	8:00 AM	0:57
4/18/23	10:02 AM	10:25 AM	0:23
4/18/23	7:57 PM	8:15 PM	0:18
4/20/23	5:28 AM	5:55 AM	0:27
4/20/23	8:00 AM	8:23 AM	0:23
4/20/23	6:25 PM	8:48 PM	2:23
4/20/23	9:14 PM	9:39 PM	0:25
4/21/23	10:55 PM	11:30 PM	0:35
4/22/23	12:48 AM	2:00 AM	1:12
4/28/23	3:45 AM	4:11 AM	0:26

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

4/28/23	2:58 PM	3:40 PM	0:42
4/29/23	3:33 PM	4:05 PM	0:32
4/30/23	3:25 PM	3:42 PM	0:17
5/1/23	2:58 AM	3:28 AM	0:30
5/1/23	5:32 PM	6:03 PM	0:31
5/3/23	3:15 AM	3:50 AM	0:35
5/5/23	1:17 PM	1:55 PM	0:38
5/5/23	3:09 PM	3:40 PM	0:31
5/6/23	12:10 PM	12:38 PM	0:28
5/6/23	12:45 PM	1:10 PM	0:25
5/6/23	12:50 PM	1:40 PM	0:50
5/7/23	9:22 AM	9:53 AM	0:31
5/7/23	12:49 PM	1:22 PM	0:33
5/7/23	10:19 PM	10:50 PM	0:31
5/8/23	11:03 AM	11:30 AM	0:27
5/8/23	3:56 PM	4:26 PM	0:30
5/9/23	6:09 AM	6:34 AM	0:25
5/9/23	3:38 PM	4:00 PM	0:22
5/10/23	10:27 AM	10:45 AM	0:18
5/10/23	1:16 PM	1:49 PM	0:33
5/11/23	3:00 AM	3:32 AM	0:32
5/11/23	4:47 AM	5:03 AM	0:16
5/11/23	4:17 PM	4:47 PM	0:30
5/11/23	9:05 PM	9:29 PM	0:24
5/12/23	3:30 AM	3:50 AM	0:20
5/12/23	10:38 PM	10:50 PM	0:12
5/13/23	6:55 PM	7:35 PM	0:40
5/13/23	9:00 PM	10:00 PM	1:00
5/14/23	11:02 AM	11:59 AM	0:57
5/15/23	1:08 PM	1:47 PM	0:39
5/15/23	3:27 PM	3:55 PM	0:28
5/15/23	7:02 PM	7:30 PM	0:28
5/16/23	3:30 PM	4:04 PM	0:34
5/16/23	8:21 PM	8:38 PM	0:17
5/16/23	9:42 PM	9:57 PM	0:15
5/17/23	11:53 AM	12:20 PM	0:27
5/17/23	3:37 PM	4:25 PM	0:48
5/18/23	11:16 AM	11:42 AM	0:26
5/18/23	4:17 PM	4:35 PM	0:18
5/18/23	6:07 PM	6:48 PM	0:41
5/18/23	6:21 PM	6:58 PM	0:37
5/18/23	10:00 PM	10:24 PM	0:24
5/19/23	4:25 PM	5:07 PM	0:42
5/21/23	11:15 AM	11:44 AM	0:29
5/21/23	5:50 PM	6:14 PM	0:24

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Helicopter Activity Logs

5/22/23	2:00 PM	2:24 PM	0:24
5/22/23	2:54 PM	3:30 PM	0:36
5/23/23	3:45 AM	4:24 AM	0:39
5/23/23	8:01 PM	8:40 PM	0:39
5/23/23	9:56 PM	10:29 PM	0:33
5/25/23	12:21 PM	12:54 PM	0:33
5/25/23	3:23 PM	4:04 PM	0:41
5/25/23	5:30 PM	6:02 PM	0:32
5/25/23	7:08 PM	7:23 PM	0:15
5/27/23	8:45 PM	9:10 PM	0:25
5/28/23	3:13 PM	3:49 PM	0:36
5/30/23	3:01 AM	3:28 AM	0:27
6/1/23	1:35 PM	2:05 PM	0:30
6/1/23	11:27 PM	11:53 PM	0:26
6/2/23	12:27 AM	12:53 AM	0:26
6/2/23	2:01 PM	4:10 PM	2:09
6/2/23	3:24 PM	3:45 PM	0:21
6/2/23	5:35 PM	6:10 PM	0:35
6/2/23	8:22 PM	9:08 PM	0:46
6/3/23	1:15 PM	1:51 PM	0:36
6/3/23	9:40 PM	10:58 PM	1:18
6/3/23	10:15 PM	10:45 PM	0:30
6/3/23	11:43 PM	12:30 AM	0:47
6/4/23	12:57 AM	1:30 AM	0:33
6/4/23	10:54 PM	11:25 PM	0:31
6/5/23	2:01 PM	2:28 PM	0:27
6/6/23	4:46 PM	5:04 PM	0:18
6/6/23	11:33 PM	12:09 AM	0:36
6/7/23	1:34 AM	1:57 AM	0:23
6/8/23	5:06 PM	5:38 PM	0:32
6/8/23	7:29 PM	7:57 PM	0:28
6/9/23	6:40 PM	7:10 PM	0:30
6/11/23	12:24 PM	12:51 PM	0:27
6/11/23	3:59 PM	4:55 PM	0:56
6/13/23	1:08 AM	1:38 AM	0:30
6/13/23	5:42 PM	6:04 PM	0:22
6/14/23	1:33 PM	2:16 PM	0:43
6/14/23	5:48 PM	6:13 PM	0:25
6/14/23	8:36 PM	9:19 PM	0:43
6/15/23	2:35 PM	3:00 PM	0:25
6/16/23	11:42 AM	12:15 PM	0:33
6/16/23	6:51 PM	7:16 PM	0:25
6/17/23	2:19 PM	3:25 PM	1:06
6/17/23	5:27 PM	5:30 PM	0:03
6/17/23	5:37 PM	5:55 PM	0:18

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

6/17/23	6:04 PM	6:52 PM	0:48
6/17/23	7:02 PM	7:13 PM	0:11
6/17/23	8:03 PM	???	Q
6/17/23	10:40 PM	11:03 PM	0:23
6/18/23	12:35 PM	1:20 PM	0:45
6/18/23	4:27 PM	4:57 PM	0:30
6/18/23	7:35 PM	8:12 PM	0:37
6/19/23	10:45 PM	12:07 AM	1:22
6/20/23	6:34 AM	7:02 AM	0:28
6/20/23	2:09 PM	2:13 PM	0:04
6/20/23	2:16 PM	Q	Q
6/20/23	2:31 PM	2:55 PM	0:24
6/21/23	7:55 PM	8:14 PM	0:19
6/22/23	10:33 AM	10:59 AM	0:26
6/22/23	12:20 PM	12:53 PM	0:33
6/22/23	1:52 PM	2:18 PM	0:26
6/23/23	6:50 AM	7:17 AM	0:27
6/23/23	11:20 AM	11:54 AM	0:34
6/23/23	4:33 PM	4:57 PM	0:24
6/23/23	9:00 PM	9:24 PM	0:24
6/23/23	9:33 PM	10:14 PM	0:41
6/24/23	9:37 AM	10:01 AM	0:24
6/24/23	10:58 AM	11:23 AM	0:25
6/24/23	3:24 PM	3:34 PM	0:10
6/24/23	3:38 PM	4:29 PM	0:51
6/25/23	1:08 PM	1:34 PM	0:26
6/25/23	3:22 PM	3:52 PM	0:30
6/25/23	4:17 PM	???	Q
6/25/23	5:02 PM	5:40 PM	0:38
7/1/23	10:03 AM	10:19 AM	0:16
7/1/23	2:59 PM	3:35 PM	0:36
7/2/23	6:43 PM	7:13 PM	0:30
7/3/23	3:30 AM	3:37 AM	0:07
7/3/23	12:40 PM	1:05 PM	0:25
7/3/23	1:32 PM	2:35 PM	1:03
7/3/23	7:15 PM	7:29 PM	0:14
7/3/23	7:33 PM	Q	Q
7/3/23	7:45 PM	8:10 PM	0:25
7/5/23	4:42 PM	5:10 PM	0:28
7/5/23	7:07 PM	7:15 PM	0:08
7/6/23	1:40 PM	2:14 PM	0:34
7/6/23	2:22 PM	2:50 PM	0:28
7/7/23	12:14 PM	2:35 PM	2:21
7/7/23	4:56 PM	5:51 PM	0:55
7/8/23	4:58 AM	5:20 AM	0:22

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

7/9/23	3:26 PM	3:35 PM	0:09
7/9/23	3:39 PM	3:49 PM	0:10
7/9/23	4:17 PM	4:49 PM	0:32
7/9/23	8:42 PM	9:13 PM	0:31
7/10/23	12:11 AM	12:28 AM	0:17
7/11/23	12:59 AM	1:19 AM	0:20
7/12/23	10:22 AM	10:54 AM	0:32
7/12/23	5:18 PM	5:45 PM	0:27
7/12/23	6:24 PM	6:54 PM	0:30
7/12/23	7:33 PM	7:53 PM	0:20
7/12/23	8:34 PM	9:24 PM	0:50
7/13/23	12:55 PM	1:30 PM	0:35
7/13/23	2:24 PM	3:00 PM	0:36
7/13/23	3:18 PM	3:40 PM	0:22
7/13/23	10:54 PM	11:13 PM	0:19
7/14/23	4:33 PM	5:09 PM	0:36
7/14/23	10:16 PM	10:47 PM	0:31
7/15/23	9:27 AM	9:56 AM	0:29
7/15/23	11:46 AM	12:06 PM	0:20
7/15/23	2:07 PM	2:29 PM	0:22
7/15/23	11:08 PM	11:33 PM	0:25
7/16/23	12:01 AM	12:28 AM	0:27
7/16/23	4:03 AM	4:50 AM	0:47
7/16/23	8:30 PM	8:48 PM	0:18
7/17/23	3:38 PM	3:58 PM	0:20
7/18/23	1:35 AM	1:59 AM	0:24
7/18/23	3:48 PM	4:13 PM	0:25
7/19/23	6:57 PM	7:14 PM	0:17
7/19/23	7:22 PM	7:50 PM	0:28
7/20/23	5:12 PM	5:37 PM	0:25
7/20/23	7:44 PM	8:05 PM	0:21
7/20/23	9:38 PM	Q	Q
7/20/23	10:08 PM	10:28 PM	0:20
7/20/23	10:49 PM	11:15 PM	0:26
7/21/23	1:05 PM	1:35 PM	0:30
7/22/23	2:00 AM	2:26 AM	0:26
7/22/23	7:05 AM	7:30 AM	0:25
7/22/23	4:53 PM	5:35 PM	0:42
7/22/23	10:34 PM	10:57 PM	0:23
7/23/23	1:16 AM	1:57 AM	0:41
7/23/23	9:19 AM	9:41 AM	0:22
7/23/23	10:18 AM	10:59 AM	0:41
7/23/23	11:37 AM	12:04 PM	0:27
7/23/23	12:19 PM	1:25 PM	1:06
7/23/23	2:07 PM	3:22 PM	1:15

Providence Santa Rosa Memorial Hospital

Helicopter Activity Logs

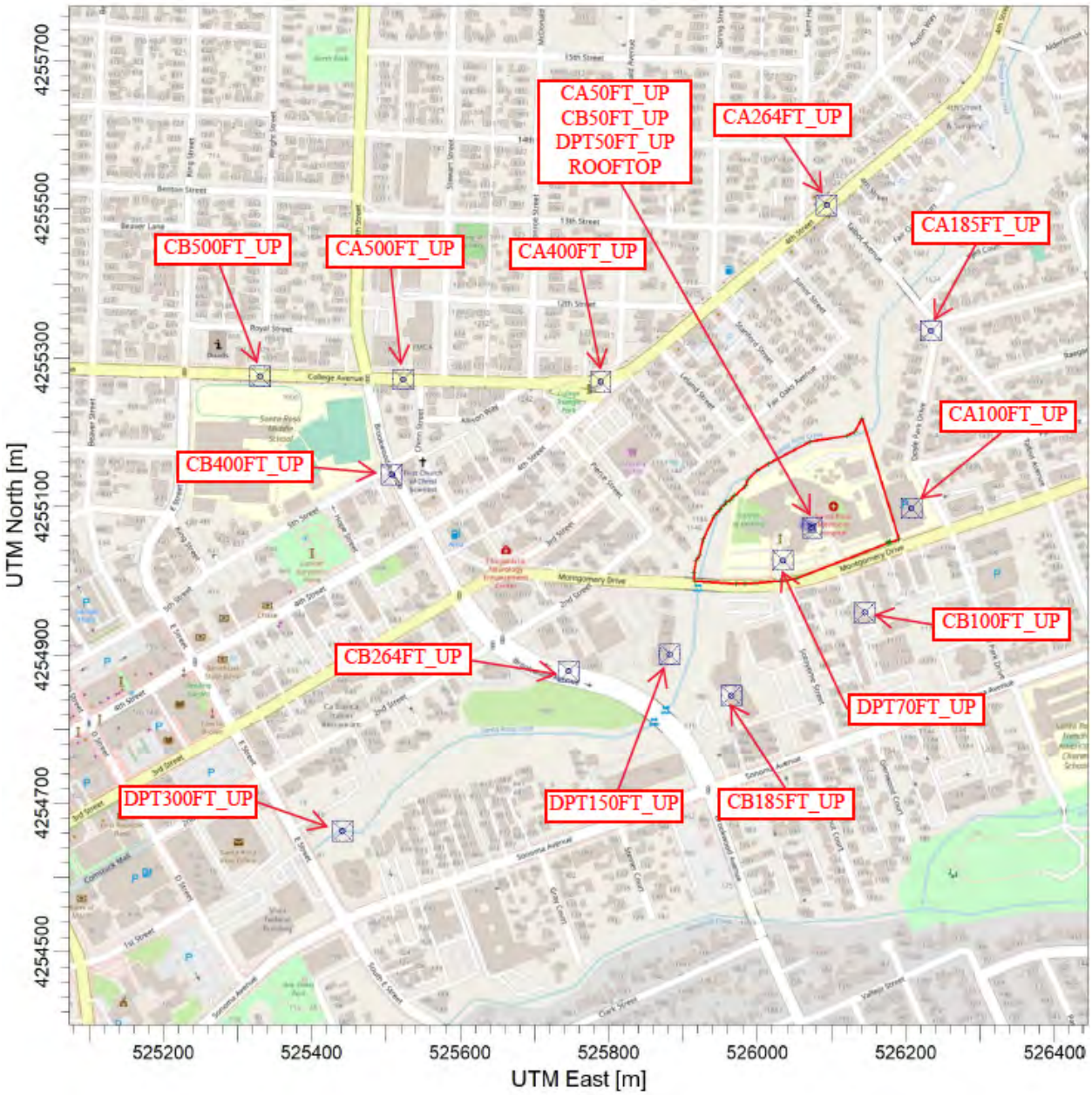
7/23/23	4:29 PM	5:17 PM	0:48
7/23/23	6:43 PM	7:00 PM	0:17
7/23/23	9:47 PM	10:22 PM	0:35
7/24/23	2:20 AM	2:39 AM	0:19
7/24/23	12:29 PM	12:57 PM	0:28
7/25/23	12:11 AM	12:37 AM	0:26
7/25/23	11:41 AM	12:04 PM	0:23
7/25/23	8:06 PM	8:31 PM	0:25
7/26/23	12:20 AM	12:45 AM	0:25
7/26/23	2:30 AM	3:25 AM	0:55
7/26/23	11:56 AM	12:28 PM	0:32
7/26/23	4:26 PM	4:55 PM	0:29
7/27/23	3:29 PM	3:59 PM	0:30
7/27/23	4:56 PM	5:28 PM	0:32
7/27/23	7:55 PM	8:24 PM	0:29
7/27/23	8:44 PM	9:12 PM	0:28
7/28/23	3:10 PM	3:37 PM	0:27
7/28/23	5:10 PM	5:13 PM	0:03
7/28/23	5:29 PM	5:55 PM	0:26
7/29/23	1:09 AM	2:00 AM	0:51
7/29/23	5:15 PM	5:35 PM	0:20
Q	Q	Q	Q

Notes:

Q indicates data quality flag

ATTACHMENT D

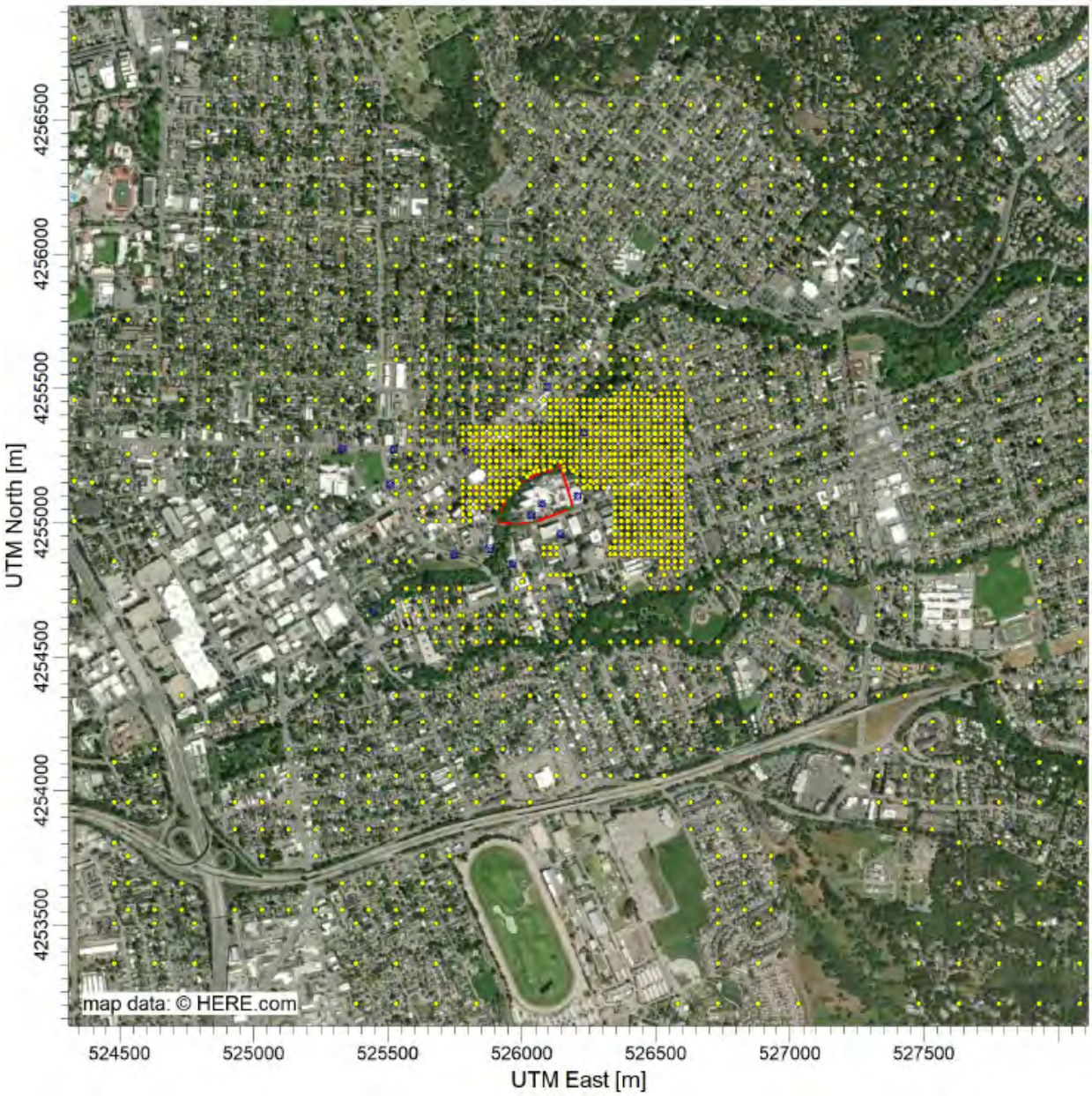
AERMOD SETUP



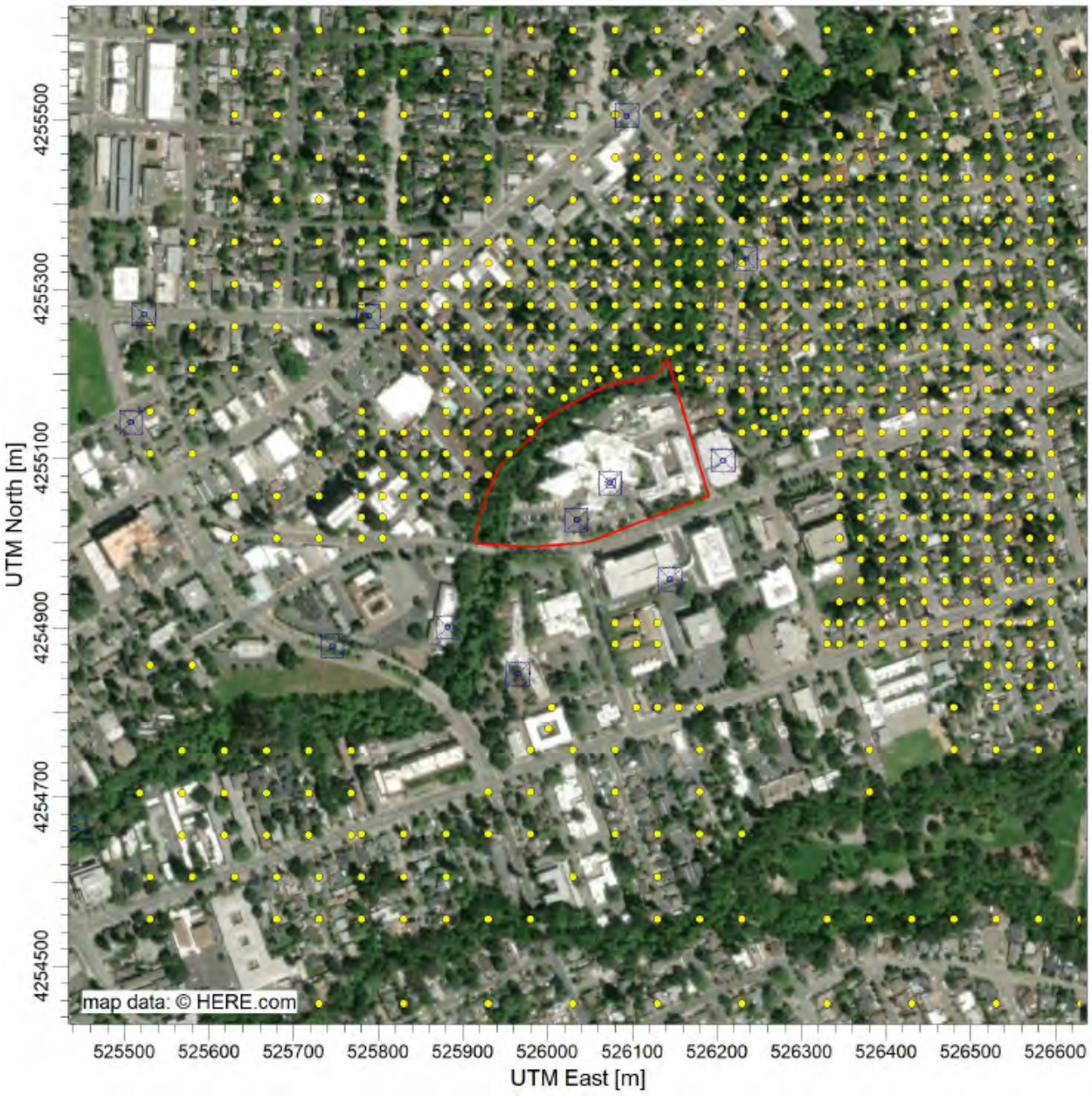
Providence SRMH Helicopter AERMOD Source Setup

Providence SRMH Helicopter Air Quality Impacts Study
AERMOD Source Parameters

Type	ID	Description	Base_Elev [m]	Height [m]	SigmaY [m]	SigmaZ [m]	Length_X [m]	X1 [m]	Y1 [m]
VOLUME	ROOFTOP	Helipad Rooftop	53.85	5.49	2.551	5.104	10.973	526074.16	4255071.07
VOLUME	CA50FT_UP	College A Arrival 50 ft up	53.85	15.24	6.380	6.379	27.432	526074.10	4255071.13
VOLUME	CB50FT_UP	College B Arrival 50 ft up	53.85	15.24	6.380	6.379	27.432	526074.10	4255071.13
VOLUME	CA100FT_UP	College A Arrival 100 ft up	55.02	30.05	6.380	6.379	27.432	526207.36	4255097.63
VOLUME	CA185FT_UP	College A Arrival 185 ft up	55.66	56.39	6.380	6.379	27.432	526233.91	4255336.17
VOLUME	CA264FT_UP	College A Arrival 264 ft up	55.41	80.53	6.380	6.379	27.432	526093.49	4255505.18
VOLUME	CB185FT_UP	College B Arrival 185 ft up	53	56.39	6.380	6.379	27.432	525965.17	4254845.63
VOLUME	CA400FT_UP	College A Arrival 400 ft up	54	122.77	6.380	6.379	27.432	525788.89	4255267.89
VOLUME	DPT50FT_UP	Departure Route 50 ft up	53.85	15.24	6.380	6.379	27.432	526074.10	4255071.13
VOLUME	DPT70FT_UP	Departure Route 70 ft up	53	22.07	6.380	6.379	27.432	526034.36	4255027.70
VOLUME	DPT150FT_UP	Departure Route 150 ft up	51.43	44.87	6.380	6.379	27.432	525882.07	4254901.01
VOLUME	DPT300FT_UP	Departure Route 300 ft up	49.42	101.83	6.380	6.379	27.432	525441.47	4254662.99
VOLUME	CA500FT_UP	College A Arrival 500 ft up	53	151.85	6.380	6.379	27.432	525523.04	4255270.63
VOLUME	CB100FT_UP	College B Arrival 100 ft up	54.36	30.05	6.380	6.379	27.432	526144.51	4254957.17
VOLUME	CB264FT_UP	College B Arrival 264 ft up	52	80.53	6.380	6.379	27.432	525745.97	4254878.61
VOLUME	CB400FT_UP	College B Arrival 400 ft up	52.08	122.77	6.380	6.379	27.432	525507.97	4255143.00
VOLUME	CB500FT_UP	College B Arrival 500 ft up	52	151.85	6.380	6.379	27.432	525330.21	4255274.99



Providence SRMH Helicopter Study
AERMOD Receptor Grid



Providence SRMH Helicopter Study
Close Up of AERMOD Receptor Grid