

MOU SCHEDULE NO. 1 – GROUND SUPPORT EQUIPMENT

This MOU Schedule No. 1 is based on the City's AQIP measure for ground support equipment¹.

- I. PROGRAM DESCRIPTION – Require that all ground support equipment associated with commercial operations achieve a fleet average NOx emission factors of 0.93 and 0.44 g/bhp-hr by January 1, 2023 and January 1, 2031, respectively.
- II. PROGRAM TIMEFRAME – Upon execution through 2032.
- III. AIRPORT OBLIGATIONS – The City agrees to:
 - A. Implement the measure by working with airport tenants to achieve the above performance targets by specified dates through accelerated turnover to cleaner equipment. Airport shall have complete discretion as to mechanisms used to implement this measure. Such mechanisms may include leases, licenses, operational requirements, or other agreements.
 - B. Beginning in 2021, and every year thereafter through 2032, provide the following information to South Coast AQMD on an annual basis by June 1 for each preceding calendar year:
 1. List of ground support equipment subject to this GSE measure with the following information:
 - a. Equipment ID
 - b. Equipment type
 - c. Fuel type
 - d. Engine model year
 - e. Power rating (hp or kW)
 - f. Engine tier level (for diesel engines)
 - g. Annual activity data for non-zero emission equipment that is sufficient to determine emission reductions at a reasonable level of accuracy (i.e., actual operating hours from hour meter readings/maintenance records, average operating hours representative of equipment type and airport, or average operating hours by equipment/fuel type from CARB's OFFROAD model, if applicable)

¹ Ground Support Equipment or "GSE" is any vehicle or equipment used to support aircraft operations that is subject to, or included in compliance plans to meet, the requirements of the California Air Resources Board (CARB) In-Use Off-Road Diesel (ORD) Vehicle Regulation Program, CARB Off-Road Large Spark-Ignition (LSI) Engine Fleet Requirements Regulation Program, or CARB Portable Equipment Registration Program and associated Portable Diesel Engine Airborne Toxic Control Measure. Furthermore, GSE as defined here only includes equipment that is not subject to compliance with SCAQMD Rule XX - RECLAIM, or included in a mobile source emission reduction credit program under SCAQMD Rule XVI.

2. For non-zero emission ground support equipment subject to this GSE measure, information regarding the sale or retirement of equipment available through CARB's DOORS system and, for pre-Tier 4 diesel, pre-2010 gasoline, or pre-2010 LPG ground support equipment relocated from LGB to another airport within the South Coast Air Basin, identify: a) the airport to which equipment is relocated, b) date of relocation, and c) estimated projected usage hours.
3. An annual emission inventory for all ground support equipment associated with commercial operations at LGB, including methodology and calculations.

III SOUTH COAST AQMD OBLIGATIONS – South Coast AQMD agrees to:

- A. Verify emission reductions from the implementation of this AQIP measure in order to determine actual emission reductions.
- B. Ensure that any emission reduction data related to this AQIP measure and other pertinent information and accessible to the public and the USEPA.

MOU SCHEDULE NO. 1 – III.B.1. List of Commercial Ground Support Equipment

List of ground support equipment subject to this GSE measure with the following information: a) Equipment ID, b) Equipment type, c) Fuel type, d) Engine model year, e) Power rating (hp or kW), f) Engine tier level (for diesel engines), g) Annual activity data based on average operating hours from CARB's OFFROAD model

Airport GSE ID	Reported Type	Emissions Designation	Fuel Type	Engine Model Year	Power Rating (hp)	Engine Tier Level	Activity (hours/year)	Vehicle Description	Vehicle Manufacture	Designated Low Use	On-Road Equivalent Engine
LGB-OP20-002	bag tug	baggage tug	gasoline	2016	76	--	720	bag tug	tug	in-use	off-road
LGB-OP20-004	belt loader	belt loader	gasoline	2016	76	--	720	belt loader	tug	in-use	off-road
LGB-OP20-005	belt loader	belt loader	gasoline	2018	76	--	720	belt loader	tug	in-use	off-road
LGB-OP20-006	belt loader	belt loader	gasoline	2018	76	--	720	belt loader	tug	in-use	off-road
LGB-OP20-008	pushback	a/c tug narrow body	diesel	2016	94	tier 4	240	pushback	tld	in-use	off-road
LGB-OP20-010	bag tug	baggage tug	electric	2020		--	846	bag tug	ev gse	in-use	off-road
LGB-OP20-011	gpu	ground power unit	electric	2021		--	798	ground power	itw	in-use	off-road
LGB-OP20-012	gpu	ground power unit	electric	2021		--	798	ground power	itw	in-use	off-road
LGB-OP20-001	air conditioning	air conditioner	diesel	2016	82	tier 4	200	air conditioning cart	tug	low-use	off-road
LGB-OP20-013	ground power unit	ground power unit	diesel	2016	94	tier 4	798	gpu	tug	in-use	off-road
LGB-OP19-001	belt loader	belt loader	gasoline	1972	120	--	200	cochran-western	701	low-use	off-road
LGB-OP19-002	belt loader	belt loader	gasoline	1980	120	--	200	cochran-western	702	low-use	off-road
LGB-OP19-003	belt loader	belt loader	gasoline	2015	140	--	200	tug inc	777	low-use	off-road
LGB-OP19-004	stair truck	passenger stand	gasoline	2001	140	--	137	wollard	810	low-use	off-road
LGB-OP19-005	stair truck	passenger stand	gasoline	2008	140	--	137	wollard	811	low-use	off-road

Airport GSE ID	Reported Type	Emissions Designation	Fuel Type	Engine Model Year	Power Rating (hp)	Engine Tier Level	Activity (hours/year)	Vehicle Description	Vehicle Manufacture	Designated Low Use	On-Road Equivalent Engine
LGB-OP19-006	stair truck	passenger stand	gasoline	2010	140	--	137	stinar	812	low-use	off-road
LGB-OP19-007	tug	baggage tug	gasoline	1998	140	--	200	jet line	935	low-use	off-road
LGB-OP19-008	passenger stand	passenger stand	gasoline	1972	16	--	137	skyramp	897	low-use	off-road
LGB-OP07-002	fuel truck	fuel truck	diesel	1981	275	tier 0	83	jet fuel truck - 10,000 gallon	dart	low-use	off-road
LGB-OP07-003	aircraft tow tractor	a/c tug narrow body	diesel	1998	215	tier 1	--	large tug	stewart & stevenson	low-use	off-road
LGB-OP07-004	aircraft tow tractor	a/c tug narrow body	diesel	1990	90	tier 0	6	large toyota tug	toyota industrial equipment	in-use	off-road
LGB-OP07-005	aircraft tow tractor	a/c tug narrow body	diesel	2011	53	tier 4i	200	small toyota tug	toyota industrial equipment	low-use	off-road
LGB-OP07-006	lift	lift	electric	2000		--	391	scissor lift	upright	in-use	off-road
LGB-OP07-007	fork lift	forklift	gasoline	2012	53	--	591	toyota forklift	toyota	in-use	off-road
LGB-OP07-008	golf cart	cart	electric	2002	3	--	152	people mover	club cart	in-use	off-road
LGB-OP07-009	towbarless tow tractor	a/c tug narrow body	electric	2006	33	--	385	stand up lektro	lektro-8750	in-use	off-road
LGB-OP07-010	towbarless tow tractor	a/c tug narrow body	electric	2000	45	--	385	sit down lektro	lektro-8850	in-use	off-road
LGB-OP07-011	scrubber/sweeper	sweeper	electric	2004	3	--	339	scrubber	factory cat clark	in-use	off-road
LGB-OP07-012	sweeper	sweeper	gasoline	1998	32	--	339	sweeper	american lincoln	in-use	off-road
LGB-OP07-013	scrubber/sweeper	sweeper	electric	2013		--	339	sweeper/scrubber	factory cat	in-use	off-road
LGB-OP07-014	electric cart	cart	electric	2004	4	--	152	electric flat bed	club car	in-use	off-road
LGB-OP07-015	electric cart	cart	electric			--	152	golf cart	club cart	in-use	off-road

Airport GSE ID	Reported Type	Emissions Designation	Fuel Type	Engine Model Year	Power Rating (hp)	Engine Tier Level	Activity (hours/year)	Vehicle Description	Vehicle Manufacture	Designated Low Use	On-Road Equivalent Engine
LGB-OP07-016	lavatory cart	lav cart	electric	2009		--	150	lav cart	aero specialties	in-use	off-road
LGB-OP07-017	potable water cart	cart	electric	2002		--	152	water cart	aero specialties	in-use	off-road
LGB-OP07-018	fuel truck	fuel truck	diesel	2020	200	tier 4	83	jet fuel truck - 3,000 gallons	international	in-use	off-road
LGB-OP07-019	fuel truck	fuel truck	diesel	2011	220	tier 4i	83	jet fuel truck - 7,000 gallons	international	in-use	off-road
LGB-OP07-020	fuel truck	fuel truck	diesel	2011	220	tier 4i	83	jet fuel truck - 7,000 gallons	international	in-use	off-road
LGB-OP07-023	fluid cart	lav cart	electric	2008		--	150	diesel cart - 300 gallons		in-use	off-road
LGB-OP07-026	fuel truck	fuel truck	gasoline	2020	297	--	83	avgas fuel truck - 1,000 gallons	isuzu	in-use	off-road
LGB-OP07-027	fuel truck	fuel truck	gasoline	2020	297	--	83	avgas fuel truck - 1,000 gallons	isuzu	in-use	off-road
LGB-OP07-028	towbarless tow tractor	a/c tug narrow body	electric	2019	58	--	385	sit down lektro	lektro-8900	in-use	off-road
LGB-OP07-029	potable water cart	cart	electric	2023		--	152	water cart	areo specialties	in-use	off-road
LGB-OP07-030	lavatory service cart	lav cart	electric	2023		--	150	lav cart	areo specialties	in-use	off-road
LGB-OP07-024	ground power unit	ground power unit	diesel	2018	155	tier 4	798	185317	tld-gpu-406-t-cup	in-use	off-road
LGB-OP07-025	ground power unit	ground power unit	diesel	2019	74	tier 4	798	185842	jetgo 900 gpu	in-use	off-road
LGB-OP03-001	fork lift	forklift	lpg	1993	93	--	730		toyota	in-use	off-road
LGB-OP03-002	fork lift	forklift	lpg	1996	94	--	730		toyota	in-use	off-road
LGB-OP08-002	aircraft tractor	a/c tug narrow body	diesel	2011	84	tier 3	32	tug	eagle	low-use	off-road

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LGB-OP08-003	aircraft tractor	a/c tug narrow body	diesel	2014	49	tier 4	385	tug	tug	in-use	off-road
LGB-OP08-004	refueler	fuel truck	diesel	2017	250	tier 4	68	refueler	eam	in-use	off-road
LGB-OP08-005	refueler	fuel truck	diesel	2017	250	tier 4	83	refueler	eam	in-use	off-road
LGB-OP08-006	refueler	fuel truck	gasoline	1995	300	--	83	refueler	gm	in-use	off-road
LGB-OP08-007	tug	baggage tug	electric	2005		--	846	tug	lektro, inc.	in-use	off-road
LGB-OP08-008	tug	baggage tug	electric	1999		--	846	tug	lektro, inc.	in-use	off-road
LGB-OP08-010	service truck	service truck	gasoline	2000	119	--	883	service truck	ford	in-use	on-road
LGB-OP08-011	refueler	fuel truck	diesel	2018	200	--	83	refueler - hv607 sba	international	in-use	on-road
LGB-OP08-013	refueler	fuel truck	diesel	2019	260	--	83	refueler - hv607 sba	international	in-use	on-road
LGB-OP08-019	refueler	fuel truck	diesel	2021	210	--	83	avgas truck - npr7sn	isuzu	in-use	on-road
LGB-OP08-020	refueler	fuel truck	diesel	2015	250	--	7	refueler - 7300 sba	international	in-use	on-road
LGB-OP08-021	refueler	fuel truck	diesel	2014	215	--	83	refueler - 7300 sfa	international	in-use	on-road
LGB-OP08-022	refueler	fuel truck	diesel	2022	260	--	83	refueler jet - mdl-7ma-300a-mrer-cndas	garsite	in-use	on-road
LGB-OP08-023	refueler	fuel truck	diesel	2000	235	--	83	ford	f-350	in-use	on-road
LGB-OP08-024	golf cart	cart	electric	2010		--	152	e-z-go	rxv	in-use	off-road
LGB-OP08-025	refueler	fuel truck	diesel	2022	210	--	34	isuzu	npr-hd	in-use	on-road
LGB-OP08-026	refueler	fuel truck	diesel	2023	250	tier 4	32	skymark	rf10rd-2-2c-t4-xf	in-use	off-road
LGB-OP08-027	golf cart	cart	electric	2023		--	103	clubcar	villager 6	in-use	off-road
LGB-OP08-028	service truck	service truck	gasoline	2022	310	--	303	chevrolet	silverado 1500	in-use	on-road
LGB-OP08-029	floor scrubber	sweeper	electric	2012		--	339	tennant	t7	in-use	off-road
LGB-OP08-030	service truck	service truck	gasoline	1994	160	--	883	ford	ranger	in-use	on-road

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LGB-OP08-031	service truck	service truck	gasoline	2020	300	--	883	ford	explorer	in-use	on-road
LGB-OP08-015	ground power unit	ground power unit	diesel	2013	130	tier 4i	798	gpu-4060-t-cup-28	tld	in-use	off-road
LGB-OP08-018	ground power unit	ground power unit	diesel	2022	74	tier 4	432	gpu 28v gpi	aero specialties	in-use	off-road
LGB-OP08-032	ground power unit	ground power unit	electric	2023		--	180	itw	jetex mobile egpu-3gwb-28/40i	in-use	off-road
LGB-OP08-033	ground power unit	ground power unit	electric	2023		--	180	itw	jetex mobile egpu-3gwb-28/40i	in-use	off-road
LGB-OP13-001	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	off-road
LGB-OP13-002	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	off-road
LGB-OP13-003	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	off-road
LGB-OP13-004	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	off-road
LGB-OP13-005	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	off-road
LGB-OP13-006	bag tug	baggage tug	electric	2005	40	--	846		tug	in-use	off-road
LGB-OP13-007	bag tug	baggage tug	gasoline	2016	40	--	846		tug	in-use	off-road
LGB-OP13-008	belt loader	belt loader	electric	2013	60	--	706		tug	in-use	off-road
LGB-OP13-009	belt loader	belt loader	electric	2013	60	--	706		tug	in-use	off-road
LGB-OP13-010	belt loader	belt loader	electric	2017	60	--	706		tug	in-use	off-road
LGB-OP13-011	belt loader	belt loader	electric	2017	60	--	706		tug	in-use	off-road
LGB-OP13-012	belt loader	belt loader	electric	2018	60	--	706		tug	in-use	off-road
LGB-OP13-013	belt loader	belt loader	electric	2018	60	--	706		tug	in-use	off-road
LGB-OP13-014	belt loader	belt loader	electric	2019	60	--	706		tug	in-use	off-road
LGB-OP13-015	belt loader	belt loader	electric	2019	60	--	706		tug	in-use	off-road
LGB-OP13-016	fork lift	forklift	lpg	2007	52	--	591		toyota	in-use	off-road
LGB-OP13-017	lav truck	lav truck	gasoline	2018	297	--	1,158		phoenix metals	in-use	on-road
LGB-OP13-018	passenger stairs	passenger stand	gasoline	2018	49	--	137		phoenix metals	in-use	off-road
LGB-OP13-019	passenger stairs	passenger stand	gasoline	2018	49	--	137		wollard	in-use	off-road

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LGB-OP13-020	removed from inventory - duplicate to lgb-op13-052										
LGB-OP13-021	provision truck	catering truck	gasoline	2019	200	--	928		mallaghan	in-use	on-road
LGB-OP13-022	aircraft tow tractor	a/c tug narrow body	diesel	2011	110	tier 3	314		stewart stevenson	in-use	off-road
LGB-OP13-032	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	off-road
LGB-OP13-033	removed from inventory - duplicate to lgb-op13-006										
LGB-OP13-034	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	off-road
LGB-OP13-035	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	off-road
LGB-OP13-036	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	off-road
LGB-OP13-037	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	off-road
LGB-OP13-038	belt loader	belt loader	electric	2017	60	--	706		tug	in-use	off-road
LGB-OP13-039	aircraft tow tractor	a/c tug narrow body	electric	1983	74	--	385		gt24	in-use	off-road
LGB-OP13-040	aircraft tow tractor	a/c tug narrow body	electric	1983	74	--	385		gt24	in-use	off-road
LGB-OP13-041	aircraft tow tractor	a/c tug narrow body	electric	1983	74	--	385		gt24	in-use	off-road
LGB-OP13-042	aircraft tow tractor	a/c tug narrow body	electric	1984	74	--	385		gt24	in-use	off-road
LGB-OP13-043	aircraft tow tractor	a/c tug narrow body	electric	2002	74	--	385	gt32	stewart stevenson	in-use	off-road
LGB-OP13-044	belt loader	belt loader	electric	2011	60	--	706	660e	tug	in-use	off-road
LGB-OP13-045	belt loader	belt loader	electric	2017	60	--	706	660e	tug	in-use	off-road
LGB-OP13-046	passenger stairs	passenger stand	gasoline	2017	40	--	137	cmpps87/137	phoenix metals	in-use	off-road
LGB-OP13-047	passenger stairs	passenger stand	gasoline	2018	40	--	137	cmpps87/137	phoenix metals	in-use	off-road

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LGB-OP13-048	passenger stairs	passenger stand	gasoline	2018	40	--	137	cmpps87/137	phoenix metals	in-use	off-road
LGB-OP13-056	aircraft tow tractor	a/c tug narrow body	diesel	2014	100	tier 4	106	gt35	tug	in-use	off-road
LGB-OP13-057	passenger stairs	passenger stand	gasoline	2018	84	--	102	cmpps170	wollard	in-use	off-road
LGB-OP13-058	passenger stairs	passenger stand	gasoline	2018	84	--	120	cmpps170	wollard	in-use	off-road
LGB-OP13-059	belt loader	belt loader	electric	2023	60	--	254	660e	tug	in-use	off-road
LGB-OP13-060	belt loader	belt loader	electric	2023	60	--	254	660e	tug	in-use	off-road
LGB-OP13-061	bag tug	baggage tug	electric	2023	40	--	516	t-137 v3	charlatte	in-use	off-road
LGB-OP13-062	bag tug	baggage tug	electric	2023	40	--	516	t-137 v3	charlatte	in-use	off-road
LGB-OP13-063	bag tug	baggage tug	electric	2023	40	--	516	t-137 v3	charlatte	in-use	off-road
LGB-OP13-064	bag tug	baggage tug	electric	2023	40	--	516	t-137 v3	charlatte	in-use	off-road
LGB-OP13-065	bag tug	baggage tug	electric	2023	40	--	516	t-137 v3	charlatte	in-use	off-road
LGB-OP13-066	aircraft tow tractor	a/c tug narrow body	electric	2023	75	--	21	tmx 150 12e	tld	in-use	off-road
LGB-OP13-067	aircraft tow tractor	a/c tug narrow body	electric	2023	75	--	21	tmx 150 12e	tld	in-use	off-road
LGB-OP13-068	aircraft tow tractor	a/c tug narrow body	electric	2023	75	--	21	tmx 150 12e	tld	in-use	off-road
LGB-OP13-069	aircraft tow tractor	a/c tug narrow body	electric	2023	75	--	21	tmx 150 12e	tld	in-use	off-road
LGB-OP13-070	aircraft tow tractor	a/c tug narrow body	electric	2023	75	--	21	tmx 150 12e	tld	in-use	off-road
LGB-OP13-071	aircraft tow tractor	a/c tug narrow body	electric	2023	75	--	21	tmx 150 12e	tld	in-use	off-road
LGB-OP13-024	air start	air start unit	diesel	2018	333	tier 4	79		182491	in-use	off-road
LGB-OP13-025	ground power unit	ground power unit	electric	2021	155	--	798			in-use	off-road
LGB-OP13-026	ground power unit	ground power unit	electric	2021	155	--	798			in-use	off-road
LGB-OP13-027	ground power unit	ground power unit	electric	2016	155	--	798			in-use	off-road
LGB-OP13-028	ground power unit	ground power unit	electric	2018	155	--	798			in-use	off-road

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LGB-OP13-029	air conditioner	air conditioner	electric	2018	131	--	391			in-use	off-road
LGB-OP13-030	air conditioner	air conditioner	electric	2011	131	--	391			in-use	off-road
LGB-OP13-031	air conditioner	air conditioner	electric	2011	131	--	391			in-use	off-road
LGB-OP13-049	ground power unit	ground power unit	electric	2019	155	--	798	2400 mobile	itw gse	in-use	off-road
LGB-OP13-050	ground power unit	ground power unit	electric	2022	155	--	798	2400 mobile	itw gse	in-use	off-road
LGB-OP13-051	ground power unit	ground power unit	electric	2022	155	--	798	2400 mobile	itw gse	in-use	off-road
LGB-OP13-052	air conditioner	air conditioner	electric	2001	131	--	391	ace-h-302-emp	tld	in-use	off-road
LGB-OP13-053	air conditioner	air conditioner	electric	2011	131	--	391	ace-h-302-emp	tld	in-use	off-road
LGB-OP13-054	air conditioner	air conditioner	electric	2011	131	--	391	ace-h-302-emp	tld	in-use	off-road
LGB-OP13-055	air conditioner	air conditioner	electric	2011	131	--	391	ace-h-302-emp	tld	in-use	off-road
LGB-OP18-010	aircraft tractor	a/c tug narrow body	diesel	2019	83.5	tier 4	385	eagle ttr-12	other	in-use	off-road
LGB-OP18-009	aircraft tractor	a/c tug narrow body	diesel	2019	75	tier 4	385	gt35	tug technologies, inc.	in-use	off-road
LGB-OP18-011	belt loader	belt loader	diesel	2014	49	tier 4	706	tc-88	other	in-use	off-road
LGB-OP18-001	baggage tractor	baggage tug	gasoline	2019	61	--	846	av50pk25	other	in-use	off-road
LGB-OP18-002	baggage tractor	baggage tug	gasoline	2019	61	--	846	av50pk25	other	in-use	off-road
LGB-OP18-003	baggage tractor	baggage tug	gasoline	2019	61	--	846	av50pk25	other	in-use	off-road
LGB-OP18-006	belt loader	belt loader	gasoline	2019	64.3	--	706	663-28	tug technologies, inc.	in-use	off-road

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LGB-OP18-007	belt loader	belt loader	gasoline	2019	64.3	--	706	663-28	tug technologies, inc.	in-use	off-road
LGB-OP18-004	baggage tractor	baggage tug	gasoline	2019	61	--	846	av50pk25	other	in-use	off-road
LGB-OP18-005	air start	air start unit	diesel	2014	435	tier 4	79	tmd-180	tug tech	in-use	off-road
LGB-OP18-012	air conditioning	air conditioner	diesel	2015	130	tier 4	391	acu 302-h-cup	tld	in-use	off-road
LGB-OP18-013	ground power unit	ground power unit	diesel	2019	173	tier 4	669	ga90v13c1100	guinault	in-use	off-road
LGB-OP18-014	air conditioner	air conditioner	diesel	2015	130	tier 4	314	acu 302-h-cup	tld	in-use	off-road
LGB-OP16-001	fork lift	forklift	lpg	2015	155	--	591	af105	hyster h50ft	in-use	off-road
LGB-OP16-004	light tower	generator	diesel	2017	24	tier 4	913	aplđ	generac	in-use	off-road
LGB-OP16-005	light tower	generator	diesel	2017	24	tier 4	913	aplđ	generac	in-use	off-road
LGB-OP16-006	light tower	generator	diesel	2018	24	tier 4	913	aplđ	generac	in-use	off-road
LGB-OP16-007	light tower	generator	diesel	2018	24	tier 4	913	aplđ	generac	in-use	off-road
LGB-OP16-008	pushback tractor	a/c tug narrow body	diesel	1998	210	tier 1	385	ata27	stewart-stevenson	in-use	off-road
LGB-OP16-009	belt loader	belt loader	electric	2000	85	--	706	acme	tug 660e	in-use	off-road
LGB-OP16-010	belt loader	belt loader	electric	1999	85	--	694	acme	tug 660e	in-use	off-road
LGB-OP16-011	belt loader	belt loader	electric	2000	85	--	706	acme	tug 660e	in-use	off-road
LGB-OP16-012	baggage tractor	baggage tug	electric	1999	85	--	834	atgoe	tug m3a	in-use	off-road
LGB-OP16-013	baggage tractor	baggage tug	electric	1999	85	--	834	atgoe	tug m3a	in-use	off-road
LGB-OP16-014	baggage tractor	baggage tug	electric	1999	85	--	834	atgoe	tug m3a	in-use	off-road
LGB-OP16-015	baggage tractor	baggage tug	electric	2000	85	--	834	atgoe	tug m3a	in-use	off-road
LGB-OP16-016	baggage tractor	baggage tug	electric	2000	85	--	834	atgoe	tug m3a	in-use	off-road
LGB-OP16-017	baggage tractor	baggage tug	electric	2000	85	--	834	atgoe	tug m3a	in-use	off-road
LGB-OP16-018	baggage tractor	baggage tug	electric	2000	85	--	834	atgoe	tug m3a	in-use	off-road

Airport GSE ID	Reported Type	Emissions Designation	Fuel Type	Engine Model Year	Power Rating (hp)	Engine Tier Level	Activity (hours/year)	Vehicle Description	Vehicle Manufacture	Designated Low Use	On-Road Equivalent Engine
LGB-OP16-019	cargo loader	cargo loader	gasoline	2015	154	--	556	al220	tld	in-use	off-road
LGB-OP16-020	ramp pickup truck	service truck	gasoline	2017	285	--	883	apk22	ford f250	in-use	on-road
LGB-OP16-022	ground power unit	ground power unit	diesel	2010	155	tier 3	420	agpu	tld gpu 4090-t-cup	in-use	off-road
LGB-OP16-024	cargo loader	cargo loader	diesel	2021	154	tier 4	556	al22d	tld 929	in-use	off-road
LGB-OP16-023	air start	air start unit	diesel	2019	513	tier 4	79	as270	asu-600-270-cup	in-use	off-road
LGB-OP16-025	ground power unit	ground power unit	diesel	2012	154	tier 4i	129	agpu	tld gpu 4090-t-cup	in-use	off-road
LGB-OP16-034	baggage tractor	baggage tug	electric	2023	85	--	435	atgoe	taylor dun l40	in-use	off-road
LGB-OP16-035	baggage tractor	baggage tug	electric	2023	85	--	435	atgoe	taylor dun l40	in-use	off-road
LGB-OP16-036	baggage tractor	baggage tug	electric	2023	85	--	435	atgoe	taylor dun l40	in-use	off-road
LGB-OP16-026	aircraft tractor	a/c tug narrow body	diesel	2022	175	tier 4	308	ata27	tld- tmx350	in-use	off-road
LGB-OP16-027	baggage tractor	baggage tug	electric	2023	85	--	435	atgoe	taylor dun l40	in-use	off-road
LGB-OP16-028	baggage tractor	baggage tug	electric	2023	85	--	435	atgoe	taylor dun l40	in-use	off-road
LGB-OP16-029	baggage tractor	baggage tug	electric	2023	85	--	435	atgoe	taylor dun l40	in-use	off-road
LGB-OP16-030	baggage tractor	baggage tug	electric	2023	85	--	435	atgoe	taylor dun l40	in-use	off-road
LGB-OP16-031	ground power unit	ground power unit	diesel	2018	154	tier 4	50	agpu	tld gpu 4090-t-cup	in-use	off-road
LGB-OP16-032	cargo loader	cargo loader	gasoline	2018	385	--	61	al220	tld 929	in-use	off-road
LGB-OP16-033	cargo loader	cargo loader	diesel	2019	154	tier 4	24	al22d	tld 929	in-use	off-road
LGB-OP12-001	aircraft tow tractor	a/c tug narrow body	gasoline	1982	95	--	10		harlan	low-use	off-road
LGB-OP12-002	fork lift	forklift	lpg	1998	50	--	591	gc30k	cat	in-use	off-road
LGB-OP12-003	tug	baggage tug	electric	2008	5	--	846	ap8600	lektro	in-use	off-road

Airport GSE ID	Reported Type	Emissions Designation	Fuel Type	Engine Model Year	Power Rating (hp)	Engine Tier Level	Activity (hours/year)	Vehicle Description	Vehicle Manufacture	Designated Low Use	On-Road Equivalent Engine
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Notes: Reported Type, Fuel Type, Engine Model Year, Power Rating, Vehicle Description, Vehicle Manufacture, Low Use Designation, and On-Road Equivalent Engine data are provided directly by airport GSE operators. A unit's Emissions Designation is the representative emissions unit's type from which its emission rates are derived. A unit's Airport GSE ID is a unique ID assigned by the airport for tracking and identification of the unit in subsequent years.

MOU SCHEDULE NO. 1 – III.B.2. List of Sold, Retired, or Relocated Equipment

For non-zero emission ground support equipment subject to this GSE measure, information regarding the sale or retirement of equipment available through CARB's DOORS system and, for pre-Tier 4 diesel, pre-2010 gasoline, or pre-2010 LPG ground support equipment relocated from LGB to another airport within the South Coast Air Basin, identify: a) the airport to which equipment is relocated, b) date of relocation, and c) estimated projected usage hours.

The annual activities for these units, presented in the *MOU Schedule No. 1 – III.B.1. List of Ground Support Equipment* table and in the table below are prorated to account for equipment in operation at the airport for fewer than 12 months of the reporting year.

The following pre-Tier 4 diesel, pre-2010 gasoline, or pre-2010 LPG ground support equipment at Long Beach Airport was identified as having been retired, scrapped, relocated, or sold in the reporting year.

Airport GSE ID	Reported Type	Emissions Designation	Fuel Type	Engine Model Year	Power Rating (hp)	Engine Tier Level	Activity at LGB (hours)	Designated Low Use	On-Road Equivalent Engine	Retired / Transferred?
LGB-OP20-003	BAG TUG	Baggage Tug	Gasoline	2016	76	--	0	In-Use	Off-Road	Moved from LGB to other airport (Sept 2022)
LGB-OP08-004	REFUELER	Fuel Truck	Diesel	2017	250	Tier 4	68	In-Use	Off-Road	Moved from LGB to other airport (PSP, transferred 10/26/2023)
LGB-OP08-020	REFUELER	Fuel Truck	Diesel	2015	250	--	7	In-Use	On-Road	Moved from LGB to other airport (Provo, UT, January 31, 2023)
LGB-OP08-018	Ground Power Unit	Ground Power Unit	Diesel	2022	74	Tier 4	432	In-Use	Off-Road	Moved from LGB to other airport (PDK the week of 7/17/2023)
LGB-OP13-022	AIRCRAFT TOW TRACTOR	A/C Tug Narrow Body	Diesel	2011	110	Tier 3	314	In-Use	Off-Road	Moved out of state 10/25/2023
LGB-OP16-008	PUSHBACK TRACTOR	A/C Tug Narrow Body	Diesel	1998	210	Tier 1	385	In-Use	Off-Road	SCRAPPED 2/13/2024
LGB-OP16-010	BELT LOADER	Belt Loader	Electric	1999	85	--	694	In-Use	Off-Road	Moved to ONT on 12/25/23
LGB-OP16-012	Baggage Tractor	Baggage Tug	Electric	1999	85	--	834	In-Use	Off-Road	Scrapped 12/26/23
LGB-OP16-013	Baggage Tractor	Baggage Tug	Electric	1999	85	--	834	In-Use	Off-Road	Scrapped 12/26/23

Airport GSE ID	Reported Type	Emissions Designation	Fuel Type	Engine Model Year	Power Rating (hp)	Engine Tier Level	Activity at LGB (hours)	Designated Low Use	On-Road Equivalent Engine	Retired / Transferred?
LGB-OP16-014	Baggage Tractor	Baggage Tug	Electric	1999	85	--	834	In-Use	Off-Road	Scrapped 12/26/23
LGB-OP16-015	Baggage Tractor	Baggage Tug	Electric	2000	85	--	834	In-Use	Off-Road	Scrapped 12/26/23
LGB-OP16-016	Baggage Tractor	Baggage Tug	Electric	2000	85	--	834	In-Use	Off-Road	Scrapped 12/26/23
LGB-OP16-017	Baggage Tractor	Baggage Tug	Electric	2000	85	--	834	In-Use	Off-Road	Scrapped 12/26/23
LGB-OP16-018	Baggage Tractor	Baggage Tug	Electric	2000	85	--	834	In-Use	Off-Road	Scrapped 12/26/23
LGB-OP16-025	Ground Power Unit	Ground Power Unit	Diesel	2012	154	Tier 4i	129	In-Use	Off-Road	Moved to LAS on 3//2023

MOU SCHEDULE NO. 1 – III.B.3. Emission Inventory

An annual emission inventory for all ground support equipment associated with commercial operations at LGB, including methodology and calculations.

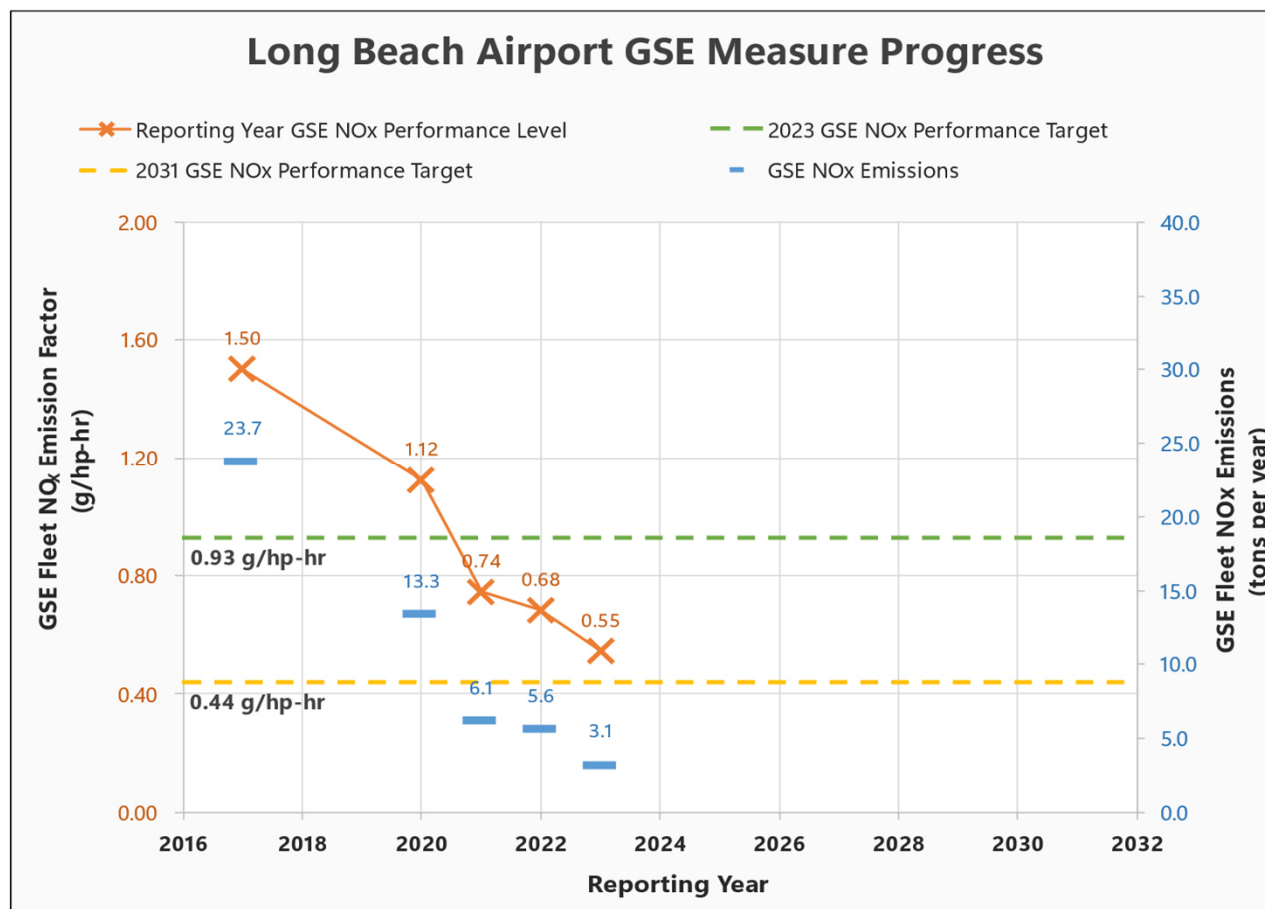
Fleet Mix					Emissions (tons per year; metric tons for CO ₂ e)							
Total	Electric	Diesel	Gas	Other	CO	ROG	NO _x	PM ₁₀	PM _{2.5}	SO _x	CO ₂ e	
173	96	40	32	5	11.3	0.8	3.1	0.10	0.08	<0.01	891	

Notes:

1. Fleet counts include ≥ 25 horsepower in-use equipment used in the calculation of the NO_x performance factor.
2. Fleet emissions include the operation of all reported equipment, including <25 horsepower and low-use (<200 hours per year) equipment.

Fleet NO_x performance factor:

0.55 grams per brake horsepower-hour



Collection of Data

In February 2024, reporting forms were distributed to all operators of GSE at the airport. Operators were supplied with the final versions of their fleet reporting forms from the previous MOU reporting year and were instructed to provide information on any equipment added to their fleet during the reporting year and to verify the data for the existing fleet, which include the model years, horsepower ratings, equipment categories, fuel types, and other identifying characteristics of the GSE in operation at the airport. Operators were instructed to specify the status of all previously reported equipment and, if the status of that equipment had changed, to indicate the nature of the change (such as a unit of GSE having been scrapped, relegated to emergency use, or relocated to a different airport). Operators were also instructed to provide specific dates for the status change. For equipment relocated to a different airport, operators were instructed to further report to which airport the equipment was relocated.

All operators had completed and submitted the reporting forms by the end of April. Additional follow-up with operators was completed throughout April and May.

Each unit of reported GSE was reviewed for accuracy and program applicability based on previously submitted data, MOU requirements, and professional judgement. Non-electric GSE with power ratings less than or equal to 25 horsepower are exempt from the California Air Resource Board (CARB) in-use off-road diesel-fueled (ORD) fleets, and large spark-ignition (LSI) fleets regulations, upon which the MOU's GSE agreement is predicated and thus were excluded from the performance level calculations. Consistent with the MOU requirements, low-use equipment (defined as operating fewer than 200 hours per year), were also excluded from performance level calculations. Both non-electric GSE with power ratings less than or equal to 25 horsepower and low- and emergency-use equipment were retained in the inventory for the purposes of determining total annual NOX emissions from GSE. Emergency-use equipment were evaluated as low-use equipment to ensure any emergency equipment use was adequately captured. Quality review was performed for each reported unit and adjustments were made to irregular data as needed. Such adjustments may include but are not limited to: adjustments to engine model year, horsepower, or fuel type data based on discussions with equipment operators or review of previously reported data; and the use of surrogate horsepower or model year data for equipment for which such data was not reported or otherwise attainable from manufacturer specifications or prior reports. For units which were reported without complete horsepower or model year data, the average horsepower or model year for similar equipment in-use at the airport were used.

During the 2023 survey year data collection process, it was identified that GSE related to non-commercial operations (i.e., general aviation [GA] operations), including as flight schools, firefighting and law enforcement, and other non-commercial entities, had reported equipment for the 2023 survey and each other prior survey year except for the 2017 MOU baseline. For the purposes of the MOU, commercial operations constitute all GSE operators which support cargo, airline, or charter aircraft operations.

Upon discussion with South Coast AQMD, it was determined that the MOU, both in its emission and performance level reporting requirements, is specific in its applicability to commercial GSE only, therefore moving forward only commercial GSE will be included in these MOU metrics. For this 2023 survey report, noncommercial GSE metrics have also been included for transparency and disclosure purposes. Additionally, both commercial GSE metrics for prior reporting periods have also been included in Section 3.4 to illustrate like-to-like year-over-year

Performance Calculations

The fleet performance factor was estimated using California regulatory standard emissions models, OFFROAD2017 and EMFAC2017, developed by CARB. For each unit of GSE, a representative equipment type was identified from either the OFFROAD2017 model (for off-road engine units) or EMFAC2017 model (for on-road engine units) based on Table 2-3 in the Long Beach Airport AQIP Technical Support Document. Emission factors from the emissions models were queried for the Los Angeles (South Coast) region for CY 2023, assuming all adopted rules for exhaust controls. All fuel types, model years, and horsepower bins (OFFROAD2017 only) were selected, and an aggregated speed was assumed (EMFAC2017 only). Emission

factors were assigned to each reported unit of GSE based on the GSE category, model year, horsepower rating, and fuel type of the equipment.

Emission factors were obtained in units of grams per brake horsepower-hour from OFFROAD2017, and in units of grams per mile from EMFAC2017. For equipment paired to the EMFAC2017 model, an average on-airport speed of 15 miles per hour was multiplied against the model's emission factor and the resulting factor was divided by a reported equipment's respective horsepower to convert to the appropriate grams per brake horsepower-hour unit. The resultant factors, with units of grams per brake horsepower-hour, were weighted by reported equipment horsepower and averaged to determine the NOX fleet performance factor.

Emission Calculations

On July 12, 2021, it was determined that the publicly available version of CARB's OFFROAD2017 model did not incorporate the engine-standard requirements associated with CARB's 2006 LSI rulemaking and subsequent 2010 amendments. These standards required new LSI equipment certified for sale in the state of California to meet stringent emission standards for NOX and hydrocarbons which far exceeded previous requirements. As a result, LSI engine emissions calculated using the OFFROAD2017 factors resulted in vastly overpredicted emissions, particularly for new equipment. South Coast AQMD was informed of this discrepancy and discussed the issue with CARB on July 14, 2021. Updated emission factors were developed by CARB based on actual historical engine certifications in the state of California since the 2006 rulemaking came into effect. These updated factors were provided initially on July 16, 2021, and updated on July 23, 2021, with final load factors and deterioration caps provided on August 13, 2021. These finalized LSI factors were used alongside CARB's ORDAS factors for diesel equipment (which also incorporated the most recent engine standard requirements) to develop the emissions inventory.

Although the emission factors were updated, the fundamental calculation methodology was not changed from the methodology used in the 2017 AQIP and MOU. Equipment categories were paired to each reported unit and emission factors were looked up based on the model year, fuel type, horsepower rating, and equipment category of a given unit. In the CY 2017 MOU calculations, base emission factors were back calculated from the OFFROAD2017 model's tons per year per equipment population outputs. The CARB-provided updated base factors were calculated using zero-hour emissions, emission deterioration rates, fuel correction factors, and load factors.

Per unit emissions were calculated using the following formula and summed across all equipment listed at the

Emissions (grams per year) =

Activity (hours per year) × **Power Rating** (horsepower) × **Load Factor** (dimensionless) × {**Zero-hour Emission Factor** (grams per brake horsepower-hour) + [**Deterioration Rate** (grams per brake horsepower-hour per hour) × **Equipment Lifetime Cumulative Operational Hours** (hours)]} × **Fuel Correction Factor** (dimensionless)