

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 Airbourne 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 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-OP09-001	electric cart	cart	electric			--	152	golf cart		in-use	no
LGB-OP14-001	cart	cart	gasoline			--	152	golf cart truck	suzuki	in-use	no
LGB-OP14-002	fork lift	forklift	lpg		55	--	104	fork lift	nissan	low-use	no
LGB-OP14-003	fork lift	forklift	lpg	1992	131	--	104	fork lift	caterpillar	low-use	no
LGB-OP14-004	golf cart	cart	electric			--	152	golf cart	e-z-go	in-use	no
LGB-OP20-002	bag tug	baggage tug	gasoline	2016	76	--	846	bag tug	tug	in-use	no
LGB-OP20-003	bag tug	baggage tug	gasoline	2016	76	--	846	bag tug	tug	in-use	no
LGB-OP20-004	belt loader	belt loader	gasoline	2016	76	--	706	belt loader	tug	in-use	no
LGB-OP20-005	belt loader	belt loader	gasoline	2018	76	--	706	belt loader	tug	in-use	no
LGB-OP20-006	belt loader	belt loader	gasoline	2018	76	--	706	belt loader	tug	in-use	no
LGB-OP20-008	pushback	a/c tug narrow body	diesel	2016	94	tier 4	385	pushback	tld	in-use	no
LGB-OP20-010	bag tug	baggage tug	electric	2020		--	846	bag tug	ev gse	in-use	no
LGB-OP20-011	gpu	ground power unit	electric	2021		--	798	ground power	itw	in-use	no
LGB-OP20-012	gpu	ground power unit	electric	2021		--	798	ground power	itw	in-use	no
LGB-OP20-001	air conditioning	air conditioner	diesel	2016	82	tier 4	200	air conditioning	tug	low-use	no

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LGB-OP20-007	gpu	ground power unit	diesel	2018	94	tier 4	798	gpu	tld	in-use	no
LGB-OP20-009	ground power unit	ground power unit	diesel	2014	86	tier 4	798	perp-atcm	168615	in-use	no
LGB-OP20-013	ground power unit	ground power unit	diesel	2016	94	tier 4	798	gpu	tug	in-use	no
LGB-OP19-001	belt loader	belt loader	gasoline	1972	120	--	200	cochran-western	701	low-use	no
LGB-OP19-002	belt loader	belt loader	gasoline	1980	120	--	200	cochran-western	702	low-use	no
LGB-OP19-003	belt loader	belt loader	gasoline	2015	140	--	200	tug inc	777	low-use	no
LGB-OP19-004	stair truck	passenger stand	gasoline	2001	140	--	137	wollard	810	low-use	no
LGB-OP19-005	stair truck	passenger stand	gasoline	2008	140	--	137	wollard	811	low-use	no
LGB-OP19-006	stair truck	passenger	gasoline	2010	140	--	137	stinar	812	low-use	no
LGB-OP19-007	tug	baggage tug	gasoline	1998	140	--	200	jet line	935	low-use	no
LGB-OP19-008	passenger stand	passenger stand	gasoline	1972	16	--	137	skyramp	897	low-use	no
LGB-OP04-001	golf cart	cart	electric	2005		--	152			in-use	no
LGB-OP07-002	fuel truck	fuel truck	diesel	1981	275	tier 0	83	jet fuel truck - dart		low-use	no
LGB-OP07-003	aircraft tow	a/c tug narrow	diesel	1998	215	tier 1	200	large tug	stewart &	low-use	no
LGB-OP07-004	aircraft tow	a/c tug narrow	diesel	1990	90	tier 0	385	large toyota	toyota	in-use	no
LGB-OP07-005	aircraft tow	a/c tug narrow	diesel	2011	53	tier 4i	200	small toyota	toyota	low-use	no
LGB-OP07-006	lift	lift	electric			--	391	scissor lift	upright	in-use	no
LGB-OP07-007	fork lift	forklift	electric	2012	53	--	591	toyota forklift	toyota	in-use	no
LGB-OP07-008	golf cart	cart	electric	2002	3	--	152	people mover	club cart	in-use	no
LGB-OP07-009	towbarless tow tractor	a/c tug narrow body	electric	2006	33	--	385	stand up lektro	lektro-8750	in-use	no
LGB-OP07-010	towbarless tow tractor	a/c tug narrow body	electric	2000	45	--	385	sit down lektro	lektro-8850	in-use	no

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-OP07-011	scrubber/sweeper	sweeper	electric		3	--	339	scrubber	factory cat clark	in-use	no
LGB-OP07-012	sweeper	sweeper	gasoline	1998	32	--	339	sweeper	american lincoln	in-use	no
LGB-OP07-013	scrubber/sweeper	sweeper	electric			--	339	sweeper/scrubber	factory cat	in-use	no
LGB-OP07-014	electric cart	cart	electric	2004	4	--	152	electric flat bed	club car	in-use	no
LGB-OP07-015	electric cart	cart	electric			--	152	golf cart	club cart	in-use	no
LGB-OP07-016	lavatory cart	lav cart	electric	2009		--	150	lav cart	aero specialties	in-use	no
LGB-OP07-017	potable water cart	cart	electric			--	152	water cart	aero specialties	in-use	no
LGB-OP07-018	fuel truck	fuel truck	diesel	2020	200	tier 4	83	jet fuel truck - 3,000 gallons	international	in-use	no
LGB-OP07-019	fuel truck	fuel truck	diesel	2011	220	tier 4i	83	jet fuel truck - 7,000 gallons	international	in-use	no
LGB-OP07-020	fuel truck	fuel truck	diesel	2011	220	tier 4i	83	jet fuel truck - 7,000 gallons	international	in-use	no
LGB-OP07-021	fuel truck	fuel truck	diesel	2011	390	tier 4i	83	avgas fuel truck - 1,200		in-use	no
LGB-OP07-022	fuel truck	fuel truck	diesel	2011	390	tier 4i	83	avgas fuel truck - 1,200		in-use	no
LGB-OP07-023	fluid cart	lav cart	electric			--	150	diesel cart - 300 gallons		in-use	no
LGB-OP07-026	fuel truck	fuel truck	gasoline	2020	297	--	83	avgas fuel truck - 1,000	isuzu	in-use	no
LGB-OP07-027	fuel truck	fuel truck	gasoline	2020	297	--	83	avgas fuel	isuzu	in-use	no
LGB-OP07-028	towbarless tow	a/c tug narrow	electric	2019	58	--	385	sit down	lektro-8900	in-use	no
LGB-OP07-024	ground power	ground power	diesel	2018	155	tier 4	798	185317	tld-gpu-406-t	in-use	no
LGB-OP07-025	ground power	ground power	diesel	2019	74	tier 4	798	185842	jetgo 900 gpu	in-use	no
LGB-OP03-001	fork lift	forklift	lpg	1993	93	--	520		toyota	in-use	no
LGB-OP03-002	fork lift	forklift	lpg	1996	94	--	520		toyota	in-use	no
LGB-OP11-001	aircraft tow	a/c tug narrow	lpg	1999	230	--	385		eagle	in-use	no
LGB-OP11-002	aircraft tow	a/c tug narrow	electric	2014		--	385		jetporter	in-use	no

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-OP11-003	aircraft tow tractor	a/c tug narrow body	electric	1999		--	385		lektro	in-use	no
LGB-OP11-004	aircraft tow tractor	a/c tug narrow body	electric	1995		--	385		lektro	in-use	no
LGB-OP11-005	aircraft tow tractor	a/c tug narrow body	electric	2004		--	385		lektro	in-use	no
LGB-OP11-006	aircraft tow	a/c tug narrow	diesel	2011	110	tier 3	385		wollard	in-use	no
LGB-OP11-007	fuel truck	fuel truck	gasoline	1976	147	--	83		gmc	low-use	no
LGB-OP11-008	fork lift	forklift	lpg	1999	46	--	591	1 g/bhp-hr nett bluecat	clark	in-use	no
LGB-OP11-009	fork lift	forklift	lpg	1999	74	--	591	1 g/bhp-hr nett bluecat	yale	in-use	no
LGB-OP11-010	fork lift	forklift	lpg	2001	93	--	591	1 g/bhp-hr nett bluecat	clark	in-use	no
LGB-OP11-011	fork lift	forklift	lpg	2005	103	--	591		yale	in-use	no
LGB-OP11-012	fork lift	forklift	lpg	2008	98	--	591		hyster	in-use	no
LGB-OP11-013	fork lift	forklift	lpg	2017	62	--	591		hyster	in-use	no
LGB-OP11-014	fork lift	forklift	lpg	2008	86	--	591		yale	in-use	no
LGB-OP11-015	ground power unit	ground power unit	diesel	2011	155	tier 3	798		168966	in-use	no
LGB-OP11-016	ground power unit	ground power unit	diesel	2011	155	tier 3	798		168967	in-use	no
LGB-OP11-017	ground power unit	ground power unit	diesel	2019	155	tier 4	798		188514	in-use	no
LGB-OP10-001	fuel truck	fuel truck	gasoline	1991	300	--	83	gmc		low-use	yes
LGB-OP10-002	golf cart	cart	electric			--	152	yamaha		in-use	no

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LGB-OP06-001	refueler	fuel truck	diesel	1990	285	tier 0	83	r-11	oshkosh	in-use	no
LGB-OP06-002	refueler	fuel truck	diesel	1990	285	tier 0	83	r-11	oshkosh	in-use	no
LGB-OP06-003	refueler	fuel truck	diesel	2007	250	tier 3	83	c7500	gmc	in-use	no
LGB-OP06-004	refueler	fuel truck	gasoline	1991	217	--	83	f600	ford	in-use	no
LGB-OP06-005	golf cart	cart	electric	1998	6	--	152	r6-80	taylor dunn	in-use	no
LGB-OP06-006	golf cart	cart	gasoline	2005	22	--	152	mule	kawasaski	in-use	no
LGB-OP06-007	golf cart	cart	gasoline	2000	22	--	152	mule	kawasaski	in-use	no
LGB-OP06-008	fork lift	forklift	electric	2010	80	--	591	tmg15s	clark	in-use	no
LGB-OP06-009	fork lift	forklift	electric	2009	51	--	591	7fbcu15	toyota	in-use	no
LGB-OP06-010	fork lift	forklift	diesel	2006	154	tier 2	591	fork lift	caterpillar	in-use	no
LGB-OP06-011	supertug	a/c tug narrow body	gasoline	1998	95	--	385	tc30	taylor dunn	in-use	no
LGB-OP06-012	supertug	a/c tug narrow body	gasoline	1998	95	--	385	tc30	taylor dunn	in-use	no
LGB-OP06-013	supertug	a/c tug narrow	diesel	1994	105	tier 0	385	tug	harlan	in-use	no
LGB-OP06-014	generator	generator	diesel	2002	75	tier 1	913	400-60-28	davco	in-use	no
LGB-OP01-001	towbarless tow	a/c tug narrow	electric			--	385	ap8600	lektro, inc.	in-use	no
LGB-OP01-002	towbarless tow tractor	a/c tug narrow body	electric			--	385	ap8600	lektro, inc.	in-use	no
LGB-OP01-003	towbarless tow tractor	a/c tug narrow body	electric			--	385	ap8360	lektro, inc.	in-use	no

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LGB-OP23-001	tug	baggage tug	electric	2000	35	--	200			low-use	
LGB-OP21-002	pushback tractor	a/c tug narrow body	diesel	1994	94	tier 0	385	b300	jetway	in-use	no
LGB-OP21-003	bag tug	baggage tug	electric	2005		--	846	m3a	s/s-tug	in-use	no
LGB-OP21-004	bag tug	baggage tug	electric	1999		--	846	m3a	s/s-tug	in-use	no
LGB-OP21-005	bag tug	baggage tug	electric	1999		--	846	m3a	s/s-tug	in-use	no
LGB-OP21-006	bag tug	baggage tug	electric	1999		--	846	m3a	s/s-tug	in-use	no
LGB-OP21-008	belt loader	belt loader	electric	1987		--	706	wollard	tc886 electric	in-use	no
LGB-OP21-009	belt loader	belt loader	electric	1987		--	706	wollard	tc886 electric	in-use	no
LGB-OP21-010	belt loader	belt loader	electric	1990		--	706	wollard	tc886 electric	in-use	no
LGB-OP21-011	ground power	ground power	electric	1990		--	798	j060-115-a1-	jetway	in-use	no
LGB-OP21-012	ground power	ground power	electric	2001		--	798	davco	20ehr	in-use	no
LGB-OP21-013	ground power	ground power	lpg			--	798			in-use	no
LGB-OP21-014	air start	air start unit	diesel	2008	665	tier 3	79	asu-600-180- ddp	tld	in-use	no
LGB-OP05-001	tug	baggage tug	electric	2016		--	846	towbot model		in-use	no
LGB-OP05-002	tug	baggage tug	electric	2019		--	846	mototok		in-use	no
LGB-OP05-003	gpu	ground power	electric	2018		--	798	foxcart gse		in-use	no
LGB-OP08-001	refueler	fuel truck	diesel	2000	174	tier 1	83	refueler	eam	in-use	no
LGB-OP08-002	aircraft tractor	a/c tug narrow	diesel	2011	84	tier 3	200	tug	eagle	low-use	no
LGB-OP08-003	aircraft tractor	a/c tug narrow	diesel	2014	49	tier 4	385	tug	tug	in-use	no
LGB-OP08-004	refueler	fuel truck	diesel	2017	250	tier 4	83	refueler	eam	in-use	no
LGB-OP08-005	refueler	fuel truck	diesel	2017	250	tier 4	83	refueler	eam	in-use	no
LGB-OP08-006	refueler	fuel truck	gasoline	1995	300	--	83	refueler	gm	in-use	no
LGB-OP08-007	tug	baggage tug	electric	2005		--	846	tug	lektro, inc.	in-use	no

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LGB-OP08-008	tug	baggage tug	electric	1999		--	846	tug	lektro, inc.	in-use	no
LGB-OP08-009	service truck	service truck	gasoline	2011	195	--	883	service truck	chevrolet	in-use	yes
LGB-OP08-010	service truck	service truck	gasoline	2000	119	--	883	service truck	ford	in-use	yes
LGB-OP08-011	refueler	fuel truck	diesel	2018	200	--	83	refueler - hv607 sba	international	in-use	yes
LGB-OP08-012	refueler	fuel truck	diesel	2008	285	--	83	refueler - m2	freightliner	in-use	yes
LGB-OP08-013	refueler	fuel truck	diesel	2019	260	--	83	refueler -	international	in-use	yes
LGB-OP08-014	refueler	fuel truck	diesel	2001	290	--	83	refueler f-350	isuzu	in-use	yes
LGB-OP08-019	refueler	fuel truck	diesel	2021	210	--	83	avgas truck -	isuzu	in-use	yes
LGB-OP08-020	refueler	fuel truck	diesel	2015	250	--	83	refueler -	international	in-use	yes
LGB-OP08-015	gpu	ground power unit	diesel	2013	130	tier 4i	798	gpu-4060-t-cup-28	tld	in-use	no
LGB-OP08-016	gpu	ground power unit	diesel	2010	130	tier 3	798	gpu-28-cup	tld	in-use	no
LGB-OP08-017	gpu	ground power unit	diesel	2004	107	tier 2	798	gpu magnum 28v	stewart & stevenson tug	in-use	no
LGB-OP08-018	gpu	ground power unit	diesel	2022	74	tier 4	798	gpu 28v gpi	aero specialties	in-use	no
LGB-OP13-001	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	no
LGB-OP13-002	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	no
LGB-OP13-003	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	no
LGB-OP13-004	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	no
LGB-OP13-005	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	no
LGB-OP13-006	bag tug	baggage tug	electric	2005	40	--	846		tug	in-use	no
LGB-OP13-007	bag tug	baggage tug	gasoline	2016	40	--	846		tug	in-use	no

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LGB-OP13-008	belt loader	belt loader	electric	2013	60	--	706		tug	in-use	no
LGB-OP13-009	belt loader	belt loader	electric	2013	60	--	706		tug	in-use	no
LGB-OP13-010	belt loader	belt loader	electric	2017	60	--	706		tug	in-use	no
LGB-OP13-011	belt loader	belt loader	electric	2017	60	--	706		tug	in-use	no
LGB-OP13-012	belt loader	belt loader	electric	2018	60	--	706		tug	in-use	no
LGB-OP13-013	belt loader	belt loader	electric	2018	60	--	706		tug	in-use	no
LGB-OP13-014	belt loader	belt loader	electric	2019	60	--	706		tug	in-use	no
LGB-OP13-015	belt loader	belt loader	electric	2019	60	--	706		tug	in-use	no
LGB-OP13-016	fork lift	forklift	lpg	2007	52	--	591		toyota	in-use	no
LGB-OP13-017	lav truck	lav truck	gasoline	2018	297	--	1,158		phoenix metals	in-use	yes
LGB-OP13-018	passenger stairs	passenger stand	gasoline	2018	49	--	137		phoenix metals	in-use	no
LGB-OP13-019	passenger stairs	passenger stand	gasoline	2018	49	--	137		wollard	in-use	no
LGB-OP13-020	air conditioning	air conditioner	electric	2001	131	--	391		tld	in-use	no
LGB-OP13-021	provision truck	catering truck	gasoline	2019	200	--	928		mallaghan	in-use	yes
LGB-OP13-022	aircraft tow tractor	a/c tug narrow body	diesel	2011	110	tier 3	385		stewart stevenson	in-use	no
LGB-OP13-023	aircraft tow	a/c tug narrow	diesel	2016	74	tier 4	385		jbt	in-use	no
LGB-OP13-032	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	no
LGB-OP13-033	bag tug	baggage tug	electric	2005	40	--	846		tug	in-use	no
LGB-OP13-034	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	no

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LGB-OP13-035	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	no
LGB-OP13-036	bag tug	baggage tug	electric	2001	40	--	846		tug	in-use	no
LGB-OP13-037	bag tug	baggage tug	electric	2002	40	--	846		tug	in-use	no
LGB-OP13-038	belt loader	belt loader	electric	2017	60	--	706		tug	in-use	no
LGB-OP13-039	aircraft tow	a/c tug narrow	electric	1983	74	--	385		gt24	in-use	no
LGB-OP13-040	aircraft tow	a/c tug narrow	electric	1983	74	--	385		gt24	in-use	no
LGB-OP13-041	aircraft tow	a/c tug narrow	electric	1983	74	--	385		gt24	in-use	no
LGB-OP13-042	aircraft tow	a/c tug narrow	electric	1984	74	--	385		gt24	in-use	no
LGB-OP13-024	air start	air start unit	diesel	2018	333	tier 4	79		182491	low-use	no
LGB-OP13-025	ground power	ground power	electric	2021	155	--	798			in-use	no
LGB-OP13-026	ground power	ground power	electric	2021	155	--	798			in-use	no
LGB-OP13-027	ground power unit	ground power unit	electric	2016	155	--	798			in-use	no
LGB-OP13-028	ground power unit	ground power unit	electric	2018	155	--	798			in-use	no
LGB-OP13-029	air conditioner	air conditioner	electric	2018	131	--	391			in-use	no
LGB-OP13-030	air conditioner	air conditioner	electric	2011	131	--	391			in-use	no
LGB-OP13-031	air conditioner	air conditioner	electric	2011	131	--	391			in-use	no
LGB-OP18-010	aircraft tractor	a/c tug narrow body	diesel	2019	83.5	tier 4	385	eagle ttr-12	other	in-use	no
LGB-OP18-009	aircraft tractor	a/c tug narrow body	diesel	2019	75	tier 4	385	gt35	tug technologies,	in-use	no
LGB-OP18-011	belt loader	belt loader	diesel	2014	49	tier 4	706	tc-88	other	in-use	no
LGB-OP18-001	baggage tractor	baggage tug	gasoline	2019	61	--	846	av50pk25	other	in-use	no

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-OP11-011	FORK LIFT	Forklift	LPG	2005	103	--	345	In-Use	Off-Road	Transferred out of air basin (07/2021)
LGB-OP11-016	Ground Power Unit	Ground Power Unit	Diesel	2011	155	Tier 3	466	In-Use	Off-Road	Transferred to VNY (07/2021)
LGB-OP07-001	FUEL TRUCK	Fuel Truck	Diesel	2002	216	Tier 1	150	Low-Use	Off-Road	Scrapped (09/2021)
LGB-OP08-001	REFUELER	Fuel Truck	Diesel	2000	174	≤ Tier 1	83	In-Use	Off-Road	Transferred to VNY (09/2021)
LGB-OP08-014	REFUELER	Fuel Truck	Diesel	2001	290	--	62	In-Use	On-Road	Transferred out of air basin (09/2021)
LGB-OP08-016	GPU	Ground Power Unit	Diesel	2010	130	Tier 3	599	In-Use	Off-Road	Transferred out of air basin (09/2021)

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.

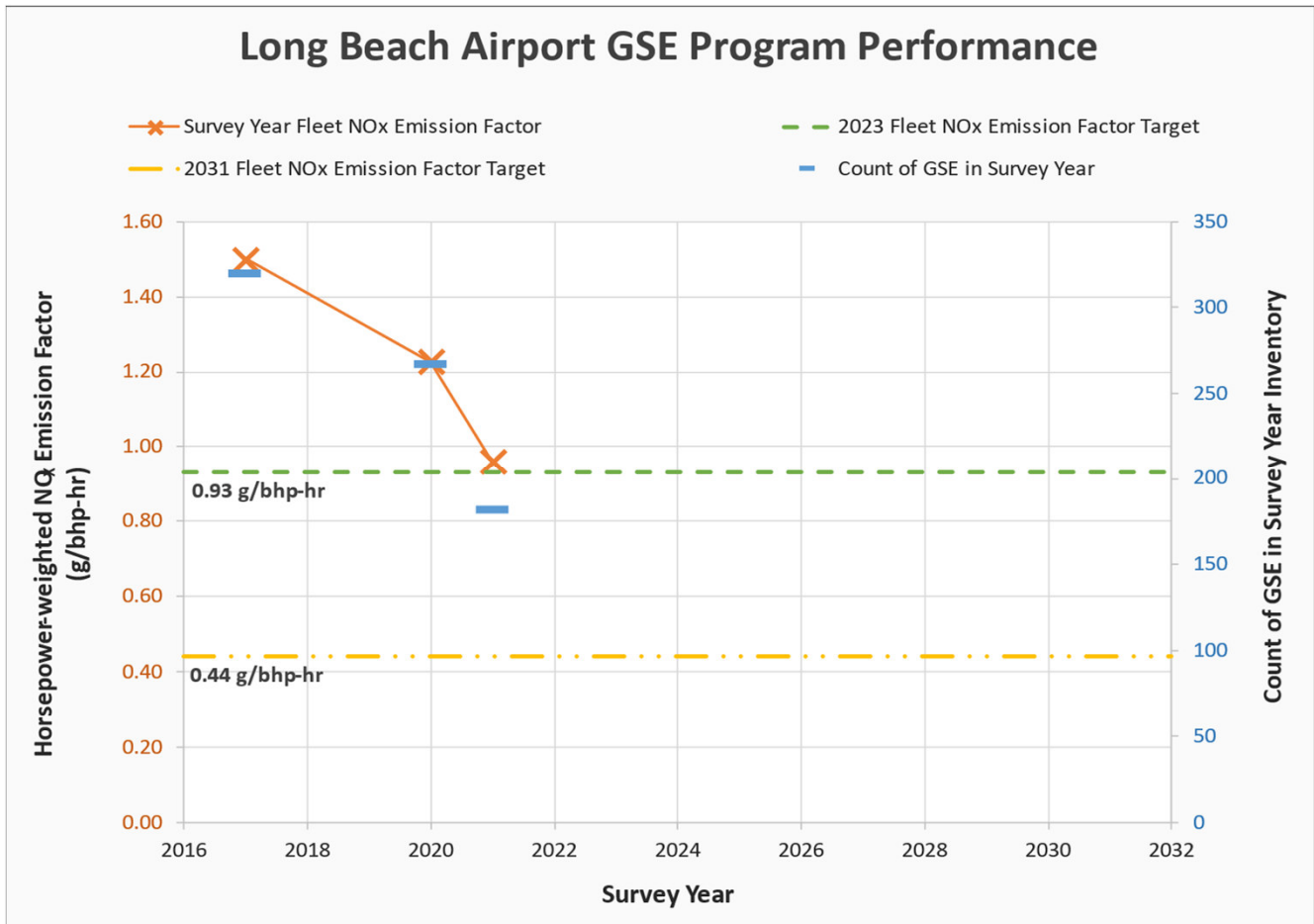
Fleet Mix					Emissions (tons per year; metric tons for CO ₂ e)							
Total	Electric	Diesel	Gas	Other	CO	ROG	NO _x	PM ₁₀	PM _{2.5}	SO _x	CO ₂ e	
182	88	53	27	14	19.7	1.7	7.7	0.26	0.24	0.00	1,461	

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:

0.96 grams per brake horsepower-hour



Methodology - Collection of Data

In February 2022, reporting forms were distributed to all operators of GSE at the airport. Operators were supplied with the final reporting forms for the previous MOU reporting year and were instructed to update and verify these reporting forms, which detail the model years, horsepower, equipment categories, fuel types, and other identifying characteristics of the equipment 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. Operators were instructed to provide specific dates for equipment which was indicated as no longer in operation at the airport (i.e., scrapped, relegated to emergency use, or moved off-airport), and for equipment moved off-airport, to indicate where the equipment was moved. Operators were also instructed to report any newly operating equipment at the airport during the reporting year.

All operators had completed and submitted the reporting forms by beginning of May. Additional follow-up with operators was completed throughout 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 were removed from the inventory. Low-use equipment (defined as operating fewer than 200 hours per year), were retained in the inventory for the purposes of determining fleet-total emissions but were not included in the calculation of the fleet-wide grams of NOX per brake horsepower-hour performance factor. 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. Such adjustments were most commonly: corrections to on-road/off-road vehicle designations; adjustments to engine model year, horsepower, or fuel type data based on discussions with operators and prior inventory reports; 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.

Methodology - Emission 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 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 calendar year 2021, 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, and fuel type of the equipment. 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.

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.

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, especially for newer equipment.

SCAQMD 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 were updated on July 23, 2021 with final load factors and deterioration caps provided on August 13, 2021. These finalized LSI factors were used with CARB's ORDAS factors for diesel (which also incorporated the most recent engine standard requirements) were used 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, and equipment category of a given unit. In the calendar year 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. Activity factors were derived from the OFFROAD2017 default activity levels for diesel GSE pairings, except where gasoline & natural gas pairings provided a more specific factor (i.e. for air start GSE units, the activity for gasoline & natural gas "air start units" was used in lieu of the diesel "other GSE" activity). For low-use equipment, the activity level was assumed to be 200 hours per year regardless of the equipment type. Per unit emissions were calculated using the following formula and summed across all equipment listed at the airport to determine the fleet-total emissions:

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)