California Environmental Protection Agency AIR RESOURCES BOARD	LIEBHERR MACHINES BULLE SA	EXECUTIVE ORDER U-R-018-0060 New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engine and emission control system produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2005	5LHAL17.2ARA	12.88 and 17.18	Diesel	8000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Direct Diesel Injection, Turbocharger, Charge Air Cooler, Smoke Puff Limiter	Crane, Loader, Dozer, Compressor

The engine models and codes are attached.

The following are the exhaust certification standards (STD) and certification levels (CERT) for hydrocarbon (HC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kW-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kW-hr)					OPACITY (%)		
			HC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
225 ≤ kW < 450	Tier 2	STD	N/A	N/A	6.4	3.5	0.20	20	15	50
		CERT	--	--	5.9	0.7	0.15	12	9	33

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 28TH day of December 2004.

Allen Lyons, Chief
Mobile Source Operations Division

Engine Model Summary Form

ATTACHMENT

U-R-018-0060

Manufacturer: **LIEBHERR MACHINES BULLE SA**

Engine category: **Nonroad CI**

EPA Engine Family: **5LHAL17.2ARA**

Mfr Family Name: **NA**

Process Code: **New Submission**

1.Engine Code	2.Engine Model	3.BHP@RPM (SAE Gross)	4.Fuel Rate: mm/stroke @ peak HP (for diesel only)	5.Fuel Rate: (lbs/hr) @ peak HP (for diesels only)	6.Torque @ RPM (SEA Gross)	7.Fuel Rate: mm/stroke@peak torque	8.Fuel Rate: (lbs/hr)@peak torque	9.Emission Control Device Per SAE J1930
NA	D9408TI-E	571@2100	238@571	NA	1741@1200-15	254@1741	NA	SPL, TC, CAC,
NA	D9408TI	542@2100	227@542	NA	1668@1575	241@1668	NA	SPL, TC, CAC,
NA	D9406TI	408@2100	214@408	NA	1254@1500	236@1254	NA	SPL, TC, CAC,
NA	D9406TI-E	408@1900	234@408	NA	1276@1400	241@1276	NA	SPL, TC, CAC,
NA	D9408TI-E	496@2100	207@496	NA	1539@1500	222@1539	NA	SPL, TC, CAC,
NA	D9406TI-E	349@2100	192@349	NA	1155@1100	228@1155	NA	SPL, TC, CAC,
NA	D9406TI-E	378@2100	209@378	NA	1134@1600	225@1134	NA	SPL, TC, CAC,
NA	D9408TI-E	571@2100	238@571	NA	1741@1200-15	254@1741	NA	SPL, TC, CAC,
NA	D9408TI	542@2100	227@542	NA	1668@1575	241@1668	NA	SPL, TC, CAC,
NA	D9406TI	408@2100	214@408	NA	1254@1500	236@1254	NA	SPL, TC, CAC,
NA	D9406TI-E	408@1900	234@408	NA	1276@1400	241@1276	NA	SPL, TC, CAC,
NA	D9408TI-E	496@2100	207@496	NA	1539@1500	222@1539	NA	SPL, TC, CAC,
NA	D9406TI-E	349@2100	192@349	NA	1155@1100	228@1155	NA	SPL, TC, CAC,
NA	D9406TI-E	378@2100	209@378	NA	1134@1600	225@1134	NA	SPL, TC, CAC,
NA	D9408TI-E	571@2100	238@571	NA	1741@1200-15	254@1741	NA	SPL, TC, CAC,
NA	D9408TI	542@2100	227@542	NA	1668@1575	241@1668	NA	SPL, TC, CAC,
NA	D9406TI	408@2100	214@408	NA	1254@1500	236@1254	NA	SPL, TC, CAC,
NA	D9406TI-E	408@1900	234@408	NA	1276@1400	241@1276	NA	SPL, TC, CAC,
NA	D9408TI-E	496@2100	207@496	NA	1539@1500	222@1539	NA	SPL, TC, CAC,
NA	D9406TI-E	349@2100	192@349	NA	1155@1100	228@1155	NA	SPL, TC, CAC,
NA	D9406TI-E	378@2100	209@378	NA	1134@1600	225@1134	NA	SPL, TC, CAC,
NA	D9406TI-E	349@2100	197@349	NA	1232@1260	238@1232	NA	SPL, TC, CAC,