

**MINERA DE SANTA MARTA POWER PLANT
VALVE SAVINGS HISTORICAL DATA**

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Following our report released after 25,000-26,000 working hours, on the occasion of reaching 28,000-29,000 hours in operation, this report presents the historical data on exhaust valves conserved in the three Deutz engines: four-stroke cycle, with 6.3 MWh output each, running on heavy fuel oil, installed in the power plant at Belorado, Spain (Burgos province), brought into service in March 1995. The source data have been taken from our historical archives, and cover the period from when they were brought into service until the most recent overhaul on the engines.

During the months of May and June of 1998, the general overhaul of the three engines was undertaken, at the following total hours in operation:

Engine No. 1 : 28,713 hours

Engine No. 2 : 28,052 hours

Engine No. 3 : 28,902 hours

Saving statistics are detailed in the following table. The cumulative results at the overhaul corresponding to 29,000 hours give figures on savings only very slightly lower than those detected at the overhaul at 26,000 hours (see the Report on this overhaul). Both figures are very similar. Thus, the tendency of maintenance savings achieved by the additive treatment is confirmed.

DATA FOR ALL THREE ENGINES TOGETHER:

	<u>At 26,000 hours</u>	<u>at 29,000 hours</u>
Replacements of valve cones (theoretical)	153	171
Replaced valve cones (actual)	38	53
Saving	115	118
Failed valve baskets (theoretical)	153	171
(Rectifiable)	(145)	(162)
(Not rectifiable)	(8)	(9)
Valve baskets to be rectified (theoretical)	145	162
Valve baskets rectified (actual)	14	23
Saving	131	139
Valve baskets to be replaced (theoretical)	8	9
Valve baskets replaced (actual)	1	1
Saving	7	8
Saving (percentage) on valve cones	75.2%	69.0 %
Saving (percentage) on reinforcing valve baskets	90.3%	85.8 %
Saving (percentage) on new valve baskets	87.5%	88.9 %