

October 7, 1983

DIESEL GENERATOR STATUS REPORT

I. Diesel Generator 102

As anticipated in LILCO's status report dated September 21, 1983, diesel generator 102 was released for reassembly on September 23, 1983. The reassembly has commenced and is now in progress. It is expected to be completed on or about October 13, 1983.

Failure Analysis Associates (FaAA) completed the preliminary metallurgical report on the failed crankshaft on diesel generator 102. This report concludes that the fracture resulted from high cycle fatigue and that no anomalies in the composition of the materials or their physical properties were found. In order to confirm the accuracy of the metallurgical evaluation, LILCO has cut a piece of the failed 102 diesel generator crankshaft from the vicinity of the no. 5 connecting rod journal. Metallurgical analyses will be performed on this piece of the crankshaft to confirm the accuracy of the residual stresses measured in the vicinity of the failed surfaces.

Because the new 13" x 12" crankshafts have a larger (12") crankpin than the original crankshafts installed in the Shoreham engines, it was necessary to install new connecting rods and connecting rod bearings. These bearings and piston rods have been installed as part of the reassembly process. As noted in the previous status report, problems with the connecting rod

bearings found during the disassembly of the diesel generators are being investigated. See description of metallurgical examination of a connecting rod bearing from diesel generator 103 described in Section II.

As anticipated in the previous status report, the baseplate for diesel generator 102 has now been machined by Delaval to ensure a solid seating surface for the main bearings. The baseplate has been returned to Shoreham where it has been reinstalled in diesel generator 102.

In preparation for the reinstallation and operation of diesel generator 102, the portions of the lube oil system that remain in the diesel generator room are in the process of being flushed.

The cylinder heads installed on the number 7 and number 2 cylinders of diesel generator 102 at the time of the crankshaft failure were hydrostatically tested in accordance with TDI's factory procedure requirements. No leakage was noted.

Electrical testing of the 102 generator rotor disclosed a low megger reading that was isolated to a problem at the number 7 pole. The rotor has been returned to the manufacturer for analysis and repair. The manufacturer will also check the run-out of the rotor shaft and rebalance the assembly. In addition, the governor for diesel engine 102 has been removed and returned to the manufacturer for inspection and analysis. A report on this inspection and analysis will be provided by the manufacturer.

II. Diesel Generator 103

As anticipated in LILCO's previous status report, diesel generator 103 was released for reassembly on September 21, 1983. The reassembly of this engine required to be performed on the turbine deck was essentially completed on October 5, 1983. During the reassembly of this engine, some test instrumentation was installed on the crankshaft in preparation for the performance of a torsional stress test on diesel generator 103. The remainder of the instrumentation will be installed after initial operation of the engine. The instrumentation will be used to conduct a torsional stress test on diesel generator 103 with the new 13" x 12" crankshaft installed. This torsional stress test will be similar to that performed on diesel generator 101 with the original 13" x 11" crankshaft installed.

A flush of the lube oil system components remaining in the diesel generator room has been completed on four of the seven required flush paths for diesel generator 103.

As noted above, the installation of new 13" x 12" crankshafts in the shoreham diesels requires replacement of the original connecting rods with new connecting rods which can accommodate the larger crankpin diameter. The larger diameter crankpin also requires that new connecting rod bearings be installed. These new components are being used in the reassembly of diesel generator 103.

Destructive metallurgical examination of the number 3 cylinder aluminum 11" connecting rod bearing is in progress.

Preliminary results indicate tensile strength below specified values and voids in the grain structure. FaAA and TDI are independently performing stress analyses of the new, larger 12" connecting rod bearings to assess their adequacy. The results of the metallurgical analysis and the stress analysis of the connecting rod bearings will be included in FaAA's final report.

The generator for diesel generator 103 has been disassembled and inspected visually and electrically. It was found satisfactory and released for reassembly.

III. Diesel Generator 101

As reported in LILCO's previous status report, instrumentation was applied to diesel generator 101 to obtain stress levels in the crankshaft fillets and on the crankshaft web of the no. 5 and no. 7 cylinders. Torsional measurement devices were also placed on the engine to measure the overall torsional response of the engine generator set. As previously reported, initial efforts to conduct this test were unsuccessful because strain gauge instrumentation needed improvement. Following modification of this instrumentation, the torsional stress test was successfully performed on September 28, 1983. The engine was operated at various loads ranging from 0 to 3500 KW. The results of this test are currently under evaluation by LILCO, FaAA, and TDI. A preliminary review of the data obtained indicates that the data are valid. The data indicate that strain

levels in the fillet areas are excited by the firing sequence of the engine. The strains measured were oscillatory in nature and their effect on the crankshaft is being assessed by FaAA.

Following completion of the torsional stress test, diesel generator 101 was released for disconnection and removal from the diesel generator room. This process is underway. LILCO estimates that diesel generator 101 will be placed on the turbine deck for disassembly on or about October 9, 1983. Disassembly will be completed on or about October 12, 1983.

Diesel engine 101 is being inspected in the same manner as were diesel engines 102 and 103. The lube oil flush of the portion of the system remaining in the diesel generator room will be commenced when the engine is removed from the room. Preliminary electrical checks of the 101 generator rotor while in place in the diesel generator engine room disclosed a low megger reading. After removal of the 101 generator from its cubicle, it will be disassembled and inspected.

IV. New Crankshafts

As reported in LILCO's September 21 status report, two replacement crankshafts have been obtained from Krupp Co. in Germany. These crankshafts have been reinstalled in diesel generators 102 and 103. A third replacement crankshaft has also been obtained from Krupp Co. in Germany but has not yet arrived on site. This crankshaft is expected to arrive at

Shoreham on or about October 22, 1983. This third crankshaft will receive the benefits of the same improvements and inspections reported in the previous status report for the other two new crankshafts.

V. Schedule

As noted above, the preliminary report on the metallurgical findings has been completed and sent to the Board and parties. As previously reported, FaAA anticipates that its interim report setting forth FaAA's conclusions concerning the cause or causes of the diesel generator 102 crankshaft failure will now not be available until the latter part of October, 1983. The comprehensive report on the disassembly of the diesel generator, the crankshaft inspections on all three diesel generators, the detailed results of analyses, including the results relating to the connecting rod bearings, and a review of the design of the new crankshafts should be available in November.

As reported in the previous status report, LILCO has undertaken to purchase three new diesel generator sets from Colt Industries and has authorized engineering work on the interfacing of these engines with existing plant systems. Although work on these efforts is continuing, no decision has been made on whether these engines will ultimately be installed and used at Shoreham.