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Att: CDM Executive Board

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Your ref.:	Our ref.:	Date:
CDM Ref 0445	MLEH/KCHA	21 February 2008

Response to request for review
Demand side energy conservation & reduction measures at IPCL – Gandhar Complex (0445)

Dear Members of the CDM Executive Board,

We refer to the issues raised in the requests for review by three Board members concerning DNV's request for issuance of emission reductions for the project activity "Demand side energy conservation & reduction measures at IPCL – Gandhar Complex" (0445) and would like to provide the following clarifications for your perusal and review.

The points raised and our response to the same are indicated below.

Comment 1:
Some monitored refrigeration values in June and July 2006 exceed the nameplate capacity of VARs. For example, the monitored refrigeration of 730 TR/hr by VAR unit 1 in Ethylene Oxide-Ethylene Glycol plant on 29 June 2006 was over than 700 TR/hr stated in the PDD. Further clarification is required.

DNV's Response:

DNV agrees with the query raised by the members of the Executive Board that the refrigeration values have been exceeding the nameplate capacities on certain days during the monitoring period.

However, it must be noted that equipments in the chemical process industry are generally designed assuming a worst case scenario of the input parameters, i.e. the design of the equipment is done considering the maximum temperatures. A stated capacity 5-10% over normal output is the normal practice of the manufacturers as a safety factor for meeting the guarantee clauses. Coupled with this, the operating parameters of the machines also contribute to the excess capacity of the machine. In the case of the vapour absorption refrigerators (VARs) the most critical parameters are the inlet temperatures of the coolant, cooling water and steam besides other various parameters. The amount of refrigeration delivered by a machine greatly depends on the inlet conditions. This is clearly specified in the extract provided from the operations and maintenance manual attached as a part of the PP response and reproduced below.

"The temperature, at which the refrigerant vapour in the condenser condenses, decreases in proportion to the reduction in the temperature of hot/cooling water. Hence the temperature differences available in the absorber and condenser increase enabling the machine to deliver a

higher than rated capacity. As the capacity increases for the same solution flow rate, the various inefficiencies of the heat exchange reduce, thereby increasing the efficiency of operation."

While most of the temperature parameters are in the control of the project proponent, the temperature of the cooling water inlet to the chillers is dependent on the season. As per the data sheet of the machines (attached as a part of the project proponents response) the maximum temperature of the cooling water for which the machines are designed is 33°C. As seen from the extract of the O&M manual, temperature differences available in the absorber and condenser enabling the machine to deliver a higher than rated capacity. Hence, a lower cooling water temperature is advantageous. At site, for most of the year, the cooling water temperature is below the design temperature, thereby making available additional refrigeration capacity in case it is needed. The same has been confirmed by the supplier of the machines, M/s Thermax, vide their mail to the project proponent and which has been attached by the project proponent in their response.

It may also be noted that an analysis of the deviation from the nameplate capacity indicates that 94% of the deviations were of less that 10% (mostly <5%) on the nameplate capacity and 5% of deviations less than 20% of the nameplate capacity. This is reasonable considering that a) there is always a safety factor considered during the designing of the equipment and b) the effect of the temperature parameter on the capacity of the refrigeration as explained above.

Comment 2:

The sectoral scope mentioned in the monitoring report (p.2) should be corrected to Manufacturing industries.

DNV's Response:

This has been corrected by the project proponent and the revised monitoring report is attached.

Yours faithfully
for DET NORSKE VERITAS CERTIFICATION AS

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