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HOLMES & NARVER, Inc.

ENGINEERS

405730

TO: Chief Project Engineer JOB: 884

FROM: Chief Production Engr. RE: Dehumidification of Rolled-Up Stations 70, 2201, 2301

DATE: May 17, 1954

With reference to your memo #2734 of April 21, 1954, and memo o/s #7869 regarding dehumidification of rolled-up stations 70, 2201 and 2301 we hereby submit the following comments and conclusions.

There are three basic methods of dehumidifying a space. The first is by heating the air in the space, maintaining a "hot locker" effect. This method will not remove any moisture from the air but by raising the temperature will reduce the relative humidity. Oil burning heaters could be used but they require a supply of air for combustion and an exhaust vent. On these stations any direct vent to the atmosphere would require punching holes through the concrete structure. Routing of vent pipe through the present devious air intakes would be unsatisfactory.

The second basic method is by chemical means such as silica gel. Moisture is removed and heat is added simultaneously to the air in this process. This is the most direct method for removing moisture but it required fans for circulating the air over the silica gel drying-and-reactivating beds, a source of heat to drive off the moisture in the reactivating process, and large intake and discharge air ducts to remove the moist air from the reactivated silica gel. Units of this type would require electric power for heat, fans, and controls.

The third basic method is to cool the heated air below the existing dew point temperature, causing moisture condensation; the cooled air is then reheated to obtain desired relative humidity. The air conditioning units made by Servel come under this heading. These units burn gas to operate their absorbtion refrigeration systems used to cool the treated air and also to supply reheat. Relatively large quantities of cooling water and also electric power for fans, pumps and controls are needed. These requirements rule out the "Servel Type" system.

The existing equipment in the stations dehumidify by cooling and reheating; however, they require cooling water and considerable electric power, especially in station 70 which has 25 H.P. compressors and high electric reheat.

The most practicable solution appears to be the use of small electric dehumidifiers identical to those proposed for the warehouses on Elmer. In these units air is passed over a cooling coil, precipitating moisture, and then is passed over a compressor and condenser leaving the unit slightly warmer than room temperature. These units use approximately 200 watts each and a 1/4" copper or rubber tube drain line is the only other connection required. Assuming that we wish to hold room conditions at 50% R.H. maximum, Station 70 would require nine units total, one in each room and one in the corridor. One unit would be set on the floor in the center of each room, the interior doors left open, and the drain lines routed down the corridor to the floor drain in Room 4. All exterior doors and openings would be sealed. Total power requirement 1800 watts.

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Station 2201 would require 4 units, one each in rooms A, B, Utility and entrance corridor. Total power 800 watts.

Station 2301 would require 3 units, one each in rooms 1, 2 and the equipment room. The units in rooms 1 & 2 could drain into the sump in room 1. The unit in the equipment room should drain to the outside. Total power 600 watts.

The referenced correspondence shows a requirement for periods of unattended operation of the dehumidification system for two weeks to one month. Gasoline or diesel powered units cannot be considered reliable for such prolonged operational periods without the use of an extensive control system.

Proposals have been made on occasion (Ref. Memo #2176 and o/s 6490, dated 20 July 1953) for the installation of wind driven generators; however, this source of power generation has not been utilized. Records of prevailing wind conditions and the demands of the proposed electrical loads are such to indicate the wind generator as applicable to this power requirement.

Available data concerning weather conditions in the Eniwetok area over a 15 year period show that during August and September winds are at a minimum and have a mean velocity of 9 mph with calm days occuring only 8% or 2.4 days total per month. Since it is not likely that the 2.4 calm days would be consecutive and further since expected infiltration of moisture through the building structure is very low, we do not feel that increase in humidity, with the dehumidifiers inoperative during this period, would be sufficient to cause damage to stored equipment.

Proposed wind generator installations for the three areas concerned are shown on the attached Sketch No. SK-385.

In the event this system is adopted it is recommended that a portable recording voltmeter and ammeter be connected to record the generator output to collect operational data for future reference.

R. W. Collins
Chief Production Engineer

RWC/EWH:vr
Attachment (1)

cc: Engr. File
W.F. Escher
P.F. Larson