NOTICE

**CERTAIN DATA
CONTAINED IN THIS
DOCUMENT MAY BE
DIFFICULT TO READ
IN MICROFICHE
PRODUCTS.**

HDC-969

HDC 969

DECLASSIFIED

#1 VW Wood
 #2 CH Gross
 #3 RS Bell
 #4 JS McMahon/SF Schure
 #5 GR Church
 #6 RI Beaton/JB Work
 #7 D&C File

Classification Cancelled (Change to

DECLASSIFIED

By Authority of J. H. Kahn January 18, 1949

D. B. O. R. 3/1/57 L. S. #3

By A. H. Kahn 4/16/58

This document consists of

3

Pages

NOV 17 1989

To: V. W. Wood, Project Engineering

From: C. E. Lapple, Design Division

C E Lapple

200 AREA - DISSOLVER OFF-GASES

This will confirm and summarize our recent discussion on the problem of the dissolver off-gas contamination.

Problem

- Since the installation of the large sand filters in the 200 Areas, the problem of recontamination of the cleared air has come up. This can be due to -
- 1) recontamination due to previous accumulations on the stack,
 - 2) by-passing around the sand filter, or
 - 3) contamination from the dissolver off-gases which are now bled into the base of the stack.

Tests performed by Technical Division, while not fully conclusive, indicate that a great part of the recontamination originates from the dissolver off-gases.

The dissolver off-gases involve the handling of a maximum of 150 cu.ft./min. of gas at a time by means of a steam jet normally developing 20 to 28 in. water at the dissolving tanks. Initially this air may contain over 10% nitrogen oxides, and iodine as a vapor or salts. Also metallic salts are entrained to the extent of about 2 lb./day. Thus the dust or solids concentration in the air may average (24 hour basis) about 50 to 100 grains/1000 cu.ft. of air. At the present time, some 90% or more of these contaminants are removed in a water scrubber.

Method of Solution

While the methods of achieving a high degree of cleanup of these gases have not been fully evaluated or developed, it is felt that there is sufficient information available to proceed with full scale design in view of the urgency of the problem and the relatively small gas handling capacities involved for the full scale. Alternate methods are considered below:

DISTRIBUTION RESTRICTED TO U.S. ONLY

DECLASSIFIED MASTER

HDC-969
January 18, 1949

DECLASSIFIED

A. Use of Existing Large Sand Filters:

The dissolver off-gases could be discharged directly into the existing large sand filter. The main objection to this is the presence of large amounts of nitric oxide vapors, particularly if the present scrubbers are removed. This will constitute a potential hazard to the mechanical strength of the large sand filter. The writer feels that the risk is too great to consider this as a final solution. However, it is suggested that this alternative be considered as an immediate stop-gap expediency. If this is done it is suggested that the scrubber be left in place and that in subsequent operations the system be run with and without water flow in the scrubbers. It is also suggested that the off-gases be bled into the main ventilation gases at the nearest point which is upstream from the water seal and that either compressed air or a fan be used to exhaust the dissolver off-gases in place of steam. The drainage capacity of the large sand filter may not be sufficient to handle the large volumes of condensate resulting from the use of steam.

B. Use of Separate Filter Unit:

While results were not entirely conclusive, previous tests indicated that a sand filter removes over 95% of the iodine activity leaving the scrubber. Since the packing in that case was Ottawa sand, which would not be expected to have an adsorptive affinity for vapors, it is felt that the iodine must be present in particle form, either dissolved in water droplets or as iodates. Thus, since collection was obtained with Ottawa sand and since recent test data indicated marked advantages of fine Fiberglas over sand, it would seem logical to consider Fiberglas for the packing. Hanford sand may have additional advantages in the way of chemical adsorption but these have not been demonstrated.

While the Fiberglas sand filter could be designed for velocities as high as 16 ft./min. (corresponding to a 4-ft. diam. unit) without excessive pressure drop, the expected solids concentrations are 50 to 100 times as high as in the main ventilation gases. Thus to secure reasonable life, a considerably larger unit must be employed. Project Engineering has already prepared designs and placed orders for parts for use with available 8-ft. diameter tanks. These would have a velocity of 3 ft. per minute. This appears to be reasonable to me although even for this unit the life may not be more than a year or two if the expected concentrations are encountered. It should be mentioned that the high solids concentration referred to assume that the scrubbers will ultimately be removed.

In the design I would suggest that a 5-in. water pressure drop be allowed for even though initially the pressure drop through an 8-ft. diameter Fiberglas unit would be less than 1 in., in order to allow for large solid buildup. It is suggested that the gases be pulled through the filter by a fan located on the downstream side in order to realize a power savings of several thousand dollars per year, over a steam jet. There is, of course, no objection to a steam or air jet located on the downstream side other than that of economics.

DECLASSIFIED

Mr. V. W. Wood

-3-

January 18, 1949

It is also suggested that provision be made for permitting injection of a small amount of steam (on the order of 50 lb/hour) on the upstream side of the filter since we are not certain at this time but that successful removal of iodine in a sand filter may be related to humidification and water vapor condensation. Connections should also be provided to (1) permit sampling on both the upstream side, and (2) to permit future additions of other equipment if so indicated.

From the standpoint of filter life, it is recommended that a graded packing be used even with Fiberglas. It is suggested that 2 ft. of fine (#55) Fiberglas be used supported on various coarser grades, to be determined following the writer's visit to Owens-Corning Fiberglas Corp.

The current designs are contemplating mounting frames of C.W.S. filters in the top of the sand filter. To me this appears an unnecessary complication and possible maintenance problem. However, I can see no great objection since the filters are so designed that they can readily be removed.

It is also suggested that the scrubber be left in place, but turning off the water, until operation of the sand filter is assured.

C. Use of Reactive or Adsorptive Packings:

Recent tests have indicated that silver coated sand will have a high collection efficiency for iodine. Information on this type of packing is not yet complete and, since the need for this extreme has not been proven, and since procurement of large amounts of coated packing poses a problem, this type of unit can best be considered separately after the simpler type filter has been evaluated.

CEL:jk

**DATE
FILMED**

6/2/94

END