



Duane Arnold Energy Center
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*Operated by Nuclear Management
Company LLC*

NG-00-1596
October 3, 2000

Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station 0-P1-17
Washington, DC 2055-001

Subject: Duane Arnold Energy Center
Docket No: 50-331
Op. License No: DPR-49
Standby Gas Treatment and Standby Filter Unit Design Features
Reference: Response to Generic Letter 99-02, "Laboratory Testing of Nuclear-
Grade Activated Charcoal" and Technical Specification Change Request
(TSCR-027): "Revision to Ventilation Filter Testing Program", NG-99-
1338, dated November 10, 1999
File: A-117

Dear Sir or Madam:

The purpose of this memo is to document certain features of the Duane Arnold Energy Center (DAEC) Standby Filter Units (SFUs) and Standby Gas Treatment (SBGT) system as discussed with the Staff during a recent teleconference which discussed DAEC's response to Generic Letter 99-02 and the associated Technical Specification amendment request. Specifically, the Staff requested 1) references or other docketed information stating the current and proposed charcoal bed depths, the residence time per bed depth, and the actual system face velocities of the SFUs and SBGT and, 2) confirmation that the credited efficiencies of the SBGT system and SFUs are 99% and 90%, respectively, and that the amendment request submitted as part of the DAEC response to the Generic Letter is not proposing to change those values.

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Page 6.5-7 of the DAEC Updated Final Safety Analysis Report (UFSAR) states that the minimum bed depth of the SBT system is 6 inches, that the effective face area of the filter is approximately 100 ft², that the maximum design fan air flow is 4000 scfm, and that the maximum superficial gas velocity through the carbon bed will not exceed 40 fpm. Assuming a system test flow rate of 4400 cfm as stated in Section 5.5.7 of the DAEC Technical Specifications, the resulting "design basis" face velocity can be assumed to be 44 fpm. The residence time for the SBT system is not stated in the UFSAR but can be inferred as follows:

$$\begin{aligned}\text{SBT residence time, } \tau_{\text{sbgt}} &= \frac{(\text{volume of adsorbent, ft}^3)}{(\text{system flow rate, cfm})} \\ &= \frac{(100 \text{ ft}^2)(6 \text{ in.})(1 \text{ ft}/12 \text{ inches})}{(4000 \text{ ft}^3/\text{min.})(1 \text{ min.}/60 \text{ sec.})} \\ &= 0.75 \text{ seconds (or 0.68 seconds if a flow rate of 4400 fpm is assumed).}\end{aligned}$$

Page 9.4-6 of the UFSAR states that the minimum bed depth of the SFUs is 2 inches. Although the nominal flow rate through the SFUs is given as 1000 cfm, the maximum "design basis" flow rate for purposes of testing is given as 1100 cfm in Technical Specification 5.5.7. Neither the UFSAR or Technical Specifications explicitly state the residence time or nominal system face velocity. However each can be determined from the information provided. Given a Technical Specification maximum system flow rate of 1100 cfm (T.S. 5.5.7) which corresponds to a face velocity of 44 fpm (T.S. 5.5.7), the effective face area is (1100 ft³/minute)/(44 ft/min) or 25 ft². The SFU residence time, τ_{sfu} , is therefore nominally

$$\begin{aligned}\text{SFU residence time, } \tau_{\text{sfu}} &= \frac{(25 \text{ ft}^2)(2 \text{ in.})(\text{ft}/12 \text{ inches})}{(1000 \text{ ft}^3/\text{min.})(1 \text{ min.}/60 \text{ sec.})} \\ &= 0.25 \text{ seconds (or 0.22 seconds for a design basis flow rate of 1100 fpm)}\end{aligned}$$

The SFU nominal system face velocity is (1000 ft³/min.)/(25 ft²) or 40 fpm.

As a point of confirmation, the testing performed to meet the proposed Technical Specification change will use the parameter tolerances specified in ASTM D3803-1989.

Based on our review, the design basis charcoal bed efficiencies credited in the DAEC accident analysis are 99% and 90% for SBT and the SFUs respectively. DAEC does not propose to change these design basis assumption. By proposing Technical Specification penetration limits of 0.5% and 5% respectively, the DAEC will be effectively establishing a safety factor of 2 to account for potential efficiency losses over the course of an operating cycle.

Should you have any questions regarding this matter, please contact this office.

This letter is true and accurate to the best of my knowledge and belief.

Nuclear Management Company, LLC

By *Gary Van Middlesworth*
Gary Van Middlesworth
DAEC Site Manager

State of Iowa
(County) of Linn

Signed and sworn to before me on this 3rd day of October, 2000,
by Gary Van Middlesworth.



Nancy S. Franck
Notary Public in and for the State of Iowa

9-28-01
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