

**AEC DISTRIBUTION FOR PART 50 DOCKET MATERIAL  
(TEMPORARY FORM)**

CONTROL NO: 4866

FILE: *APR*

<b>FROM:</b> Tennessee Valley Authority Chattanooga, TN J. E. Gilleland			<b>DATE OF DOC</b> 5-30-74	<b>DATE REC'D</b> 5-31-74	<b>LTR</b> X	<b>TWX</b>	<b>RPT</b>	<b>OTHER</b>
<b>TO:</b> A. Giambusso			<b>ORIG</b> 1 signed	<b>CC</b> 9	<b>OTHER</b>	<b>SENT AEC PDR</b> XXX <b>SENT LOCAL PDR</b> XXX		
<b>CLASS</b>	<b>UNCLASS</b>	<b>PROP INFO</b>	<b>INPUT</b>	<b>NO CYS REC'D</b> 10		<b>DOCKET NO:</b> 50-438/439		

**DESCRIPTION:**  
Ltr trans the following.....  
DESCRIPTION AS PER SUPER J  
  
**PLANT NAME:** BELLEFONTE UNITS 1 & 2

**ENCLOSURES:**  
Info to be incorporated into amdt #12 re:  
1) Operational Accuracy  
2) Permanent Meteorological Facility  
3) Dew Point Measurement System  
  
**ACKNOWLEDGED  
DO NOT REMOVE**  
(19 cys encl rec'd)

FOR ACTION/INFORMATION 6-14-74 GMC

- |                        |                              |                            |                       |
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| OGC, ROOM P-506A          | SCHROEDER          | GAMMILL       | GEARIN (L)       | SALTZMAN        |
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| GIAMBUSO                  | PAWLICKI           | SPANGLER      | MAIGRET (L)      | MCDONALD        |
| BOYD                      | SHAO               |               | REED (E)         | DUBE w/input    |
| MOORE (L)(BWR)            | STELLO             | <u>ENVIRO</u> | SERVICE (L)      | CHAPMAN         |
| DEYOUNG(L)(PWR)           | HOUSTON            | MULLER        | SHEPPARD (L)     | <u>INFO</u>     |
| SKOVHOLT (L)              | NOVAK              | DICKER        | SLATER (E)       | C. MILES        |
| GOLLER(L)                 | ROSS               | KNIGHTON      | SMITH (L)        | KLECKER         |
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| DENISE                    | TEDESCO            | REGAN         | WADE (E)         |                 |
| REG OPR                   | LONG               | PROJECT LDR   | WILLIAMS (E)     | <u>AOR FILE</u> |
| FILE & REGION(3)          | LAINAS             |               | WILSON (L)       | D. THOMPSON (2) |
| MORRIS                    | BENAROYA           | HARLESS       |                  |                 |
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- |                                   |                                 |                        |
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| 1 - P. R. DAVIS (AEROJET NUCLEAR) | NEWMARK/BLUME/AGBABIAN          | RM-B-127, GT.          |
| 16 - CYS ACRS HOLDING             | 1-GERALD ULRIKSON...ORNL        | 1-RD..MULLER..F-309 GT |
|                                   | 1-B & M SWINEBROAD, Rm E-201 GT |                        |

TENNESSEE VALLEY AUTHORITY  
CHATTANOOGA, TENNESSEE  
37401



May 30, 1974

Mr. A. Giambusso  
Deputy Director for Reactor Projects  
Directorate of Licensing  
U.S. Atomic Energy Commission  
7920 Norfolk Avenue  
Bethesda, Maryland 20014

Dear Mr. Giambusso:

In the Matter of the Applications of ) Docket Nos. 50-4387  
Tennessee Valley Authority ) 50-489

Informal conversations with representatives of your staff have indicated a need for TVA to revise our response to Question 2.57 of the Bellefonte Nuclear Plant PSAR in regard to compliance with Regulatory Guide 1.23. In order to document our response to this item and thus to expedite the review, the enclosure contains information that will be incorporated into our response to Question 2.57. This material consists of three sections: (1) Operational Accuracy - Pulse-O-Matic Data Logging System, (2) Permanent Meteorological Facility, and (3) Dew Point Measurement System.

The enclosed information will be included in Amendment 12 to the PSAR, which is tentatively schedule to be submitted to the AEC in early July 1974.

Very truly yours,

J. E. Gilleland  
Assistant to the Manager of Power

Enclosure (10)  
CC: Mr. William E. Garner, Esquire  
Route 4  
Scottsboro, Alabama 35768

William D. Paton, Esq.  
Office of the General Counsel  
Office of Regulation  
U.S. Atomic Energy Commission  
Washington, DC 20545



REGULATORY DOCKET FILE COPY

4866

ENCLOSURE

Operational Accuracy - Pulse-O-Matic Data Logging System

Because of instrument system installation priorities at other TVA plant sites during the past six months, as well as a shortage of readily available instrument systems, TVA was not able to install the modified, or single-type delta-T, system as the Bellefonte offsite temporary meteorological facility until May 24, 1974. This modified system was installed, on the 130-foot tower, for direct measurement of temperature difference between the 33- (10-meter) and 130-foot levels. Evaluations will be made to determine the comparativeness of the two systems. The modified delta-T system is the more accurate and is assumed to be in (or near) compliance with the Regulatory Guide 1.23 specification of  $\pm 0.1^\circ \text{C}$ .

However, over the past four months, TVA has been conducting field tests in an attempt to determine the operational accuracy of the Pulse-O-Matic temperature difference system at the onsite temporary meteorological facility at the Hartsville site. This system is identical in design to the one at Bellefonte and the results of the accuracy evaluation should be equally applicable to the temperature measurement system at the Bellefonte facility. To provide an adequate data base upon which to compare the Pulse-O-Matic data, a high speed digital data logging system was installed on January 30, 1974, on the same tower at the Hartsville facility. Identical temperature sensors and shields were located at the same tower heights (33 feet (10 meters) and 150 feet). The digital data logging system is identical to the ones now operating at the permanent meteorological facilities at the Browns Ferry, Sequoyah, and Watts Bar plant sites. This type system is extremely reliable and provides temperature and delta-T measurements well within the accuracy specifications of the Regulatory Guide 1.23. A statistical evaluation of the comparativeness

between the two sets of data is now in progress; however, the preliminary analysis indicates that further data are needed in order to complete the definitive evaluation and to identify the accuracy of the system in terms of the regulatory guide specifications. The results of the evaluation should be available by mid June 1974.

Over the past six months TVA has been conducting field and laboratory studies in an attempt to determine the operational accuracy of the modified or single-type Pulse-O-Matic delta-T data logging system and to obtain results which would be applicable for the Bellefonte system. Two single delta-T systems were designed and fabricated by the TVA Division of Water Control Planning and installed in early 1974 at two other priority nuclear plant sites under environmental investigation. Determinations were made of the total delta-T errors that may occur with this type system. They fall into three types--(1) errors attributable to the signal conditioner component, which can be observed during calibration and, to a large degree, corrected; (2) errors caused by mismatch of the temperature sensor elements and wire leads which cannot be easily evaluated after installation on the tower; and (3) errors induced by the difference in temperature of the wire leads of the temperature sensor elements. The maximum total system error evaluated in the range of delta-T values from about  $-0.5^{\circ}$  F to  $+0.5^{\circ}$  F equalled  $\pm 0.46^{\circ}$  F; however, the standard deviation of the maximum total error was only  $\pm 0.11^{\circ}$  F. It should also be pointed out that the  $0.46^{\circ}$ F value is optimized as each of the three types of errors would seldom contribute to the maximum amount. Also, since they are positive and negative values they will tend to cancel. Therefore, the actual total error when averaged over a period of time will be considerably less than  $0.46^{\circ}$  F as evidenced by the standard deviation value of only  $+ 0.11^{\circ}$  F.

Therefore, this preliminary evaluation would indicate that the single delta-T system very likely meets the Regulatory Guide 1.23 specifications a good portion of the time.

## Permanent Meteorological Facility

Upon receipt of the AEC license for plant construction, the installation of the permanent meteorological facility at the Bellefonte site will begin. Tentatively, the collection of reliable data should begin in late 1974 or early 1975. The facility will be located on the plant site about 5,000 feet northeast of the reactor building complex. It will consist of a 110-meter steel tower with an instrument building (environmental data station) in the near vicinity of the tower. The data collection and processing by a high speed digital computer system will include (1) wind direction and wind speed at 10 and 110 meters, (2) atmospheric turbulence index ( $\sigma$ -y and  $\sigma$ -z) at 10 and 110 meters, (3) temperature at 1,\* 10, 60, and 110 meters, (4) dew point at 1,\* 10, and 110 meters, and molar radiation, total radiation, rainfall, and atmospheric pressure at 1 meter. Descriptive information on the instrumentation follows.

<u>Sensor</u>	<u>Height</u>	<u>Description</u>
Wind Direction	10 and 110 Meters	Climet Instruments, Inc., Model 012-11; calibration range, 0-540° continuous; accuracy, $\pm 3^\circ$ azimuth; dampening ratio, 0.4.
Wind Speed	10 and 110 Meters	Climet Instruments, Inc., Model 011-11; starting threshold, 0.6 mph; operating range, 0-90 mph; accuracy within $\pm 1$ percent of true value or 0.15 mph, whichever is greater from threshold to 90 mph.
Atmospheric Turbulence, Sigma-y and Sigma-z	10 and 110 Meters	Climet Instruments, Inc., Model 012-11; range 0-360° for $\sigma$ -y, 0-90° for $\sigma$ -z; resolution 1°.
Temperature	1,* 10, 60, and 110 Meters	Climet Instruments, Inc., Model 016-1; platinum resistance detector, aspirated temperature shield, Model 016-1A; calibration range, 0-100° F; accuracy $\pm 0.6^\circ$ F, includes radiational error up to 0.2° F.

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\*One meter temperature and dew point data are for support of TVA's botanical surveillance program.

<u>Sensor</u>	<u>Height</u>	<u>Description</u>
Dew Point	1,* 10, and 110 Meters	H. G. and G., Cambridge Dew Point Analyzer, Model 992; accuracy $\pm 0.5^\circ\text{F}$ .
Solar Radiation	1 Meter	Epply Laboratories, $180^\circ$ Pyrheliometer, Model 8-48; calibration range, $> 3.5 \mu$ sensitivity, 2 mv. (g-cal) $^{-1}$ min. $\text{cm}^2$ .
Total Radiation	1 Meter	Beckman-Whitley, Inc., Model 0-188-01; total hemispherical radiometer.
Rainfall	1 Meter	Belfort Instrument Co., Model 5915-12; weighing bucket; calibration range, 0-9.9 inches; accuracy within $\pm 0.06$ inches.
Atmospheric Pressure	1 Meter	H. E. Sostman and Co., Model 2014-28/32-HAL; pressure transducer; calibration range, 28 to 32 in. Hg.; accurate to about $\pm 0.01$ in. Hg.

#### Data Processing System

Interrogation (or scanning) impulses from the sensors will be processed by a data logger system consisting of three basic components-- (1) analog to digital converter, (2) scanner, and (3) mini-type digital computer, Nova Model by Data General, with 4-k memory.

All meteorological sensors will be interrogated and processed by data logger system for hourly readout. Interrogation rates will vary among meteorological parameters. Wind speed, wind direction, and wind direction persistence will be interrogated 240 times per hours or every 15 seconds. Temperature, dew point, solar radiation, and total radiation will be interrogated 30 times per hour or every 2 minutes. Standard deviation of horizontal wind direction fluctuation,  $\sigma_y$ , will be interrogated 720 times per hour or every five seconds. Fastest interrogation will be with the standard deviation of vertical direction fluctuation,  $\sigma_z$ , at

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\*One meter temperature and dew point data are for support of TVA's botanical surveillance program.

1,800 times per hour or every two seconds. Slowest interrogation, once per hour, will be with rainfall and atmospheric pressure.

Sigma-y and sigma-z values will be computed from the standard statistical formula,  $\sqrt{(\Sigma x^2 - (\Sigma x)^2/n)/(n-1)}$ , for each 5-minute interval, where x - the instantaneous wind direction and n - the number of valid interrogations during the 5-minute interval. The 12 5-minute values will then be used to compute the 1-hour average value,  $\sigma$  average (1 hour) =  $(\sigma_1 + \sigma_2 + \dots + \sigma_{12})/12$ . Prevailing wind direction will be computed as the average direction for 22-1/2 degree sector with the highest number of 15-second interrogations during the hour.

### Dew Point Measurement System

The TVA Division of Water Control Planning installed a prototype dew point measurement system in early April of this year at the permanent meteorological facility at the Watts Bar plant site. This system sequentially measures hourly dew point values at the 1-, 10-, and 110-meter tower levels. The air samples are drawn down the tower through temperature-controlled conduit into the sensing system located in the environmental data station near the base of the tower. The sensing system consists of an E. G. and G. Cambridge-type analyzer, Model 992, with the system accuracy estimated to be near  $\pm 0.5''$  F, or well within the Regulatory Guide 1.23 specification of  $\pm 0.5^{\circ}$ C.

The field testing of this new dew point system will continue for three to six months. When the system proves operationally acceptable, TVA will install similar systems at all nuclear plant (temporary and permanent) meteorological facilities, including the permanent facility at the Bellefonte site.