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June 27, 1979

1978 Annual Environmental Program
Non-radiological - Terrestrial Monitoring
Infra-red Photographs

Mr. D. L. Wigginton
Project Manager - Branch No. 1
Division of Operating Reactors
Nuclear Regulatory Commission
Washington, DC 20555

Reference: Beaver Valley Power Station
Docket No. 50-334

Dear Mr. Wigginton:

Duquesne Light Company is forwarding under separate cover a set of infra-red aerial photographs taken during 1978 as part of Terrestrial Ecological Survey requirements noted in the Beaver Valley Power Station Technical Specifications, Appendix "B", Section 3.1.3.9. Also enclosed with the photographs is a copy of Section VII, pages 134 - 139 of the Beaver Valley 1978 Annual Environmental Report, Non-radiological Volume No. 1, which addresses the aerial infrared photography performed in 1978 in the vicinity of the Beaver Valley Power Station.

Very truly yours,

F. J. Bissert
Technical Assistant-Nuclear

FJB/sm
Attachment
CC: Mr. Germain LaRoche (NRC)

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DUQUESNE LIGHT COMPANY
BEAVER VALLEY POWER STATION

Docket No. 50-334

INFRA-RED AERIAL PHOTOGRAPHY

SUMMARY - 1978

(Attached pages taken from the
Beaver Valley, 1978 Annual Environmental
Report, Non-radiological Volume No. 1)

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VII. MONITORING PROGRAMS (TERRESTRIAL)

In accordance with the Beaver Valley Power Station Unit 1 Environmental Technical Specifications (ETS), the following terrestrial monitoring program elements were conducted in the 1978 study year:

ETS Reference

3.1.3.9 Aerial Infrared Photography

3.1.3.10 Soil Chemistry

3.1.3.11 Migratory Birds

Program elements 3.1.3.9 and 3.1.3.10 are elements concerned with cooling tower drift and the effects on vegetation and soil. Program element 3.1.3.11 is concerned with the collision of migratory birds with the cooling tower.

AERIAL INFRARED PHOTOGRAPHY (ETS Reference 3.1.3.9)

Objective

The objective of this study was to evaluate changes in vegetation that might have occurred from drift from BVPS cooling towers during the recent 2-year interval (1976-1978). Therefore, a comparison study of color infrared aerial photography flown during August, 1976 and in August, 1978 was made in the area of Beaver County, Pennsylvania, and, specifically, in the vicinity of the Beaver Valley Power Station near Midland on the Ohio River. The use of color infrared emulsion film enhances differences in the images of plants that are considered to have normal growth and vigor as contrasted to those stressed by some unusual or abnormal condition such as disease, the intervention of man, directly or indirectly, and climatic variations.

Methods

Field Sampling

During the growing season (June 23, 1978), color infrared photographic coverage of the BVPS site and vicinity was taken at a negative scale of 1 inch = 400 feet. The photography was taken utilizing a Zeiss 15/32 A-4 camera with a current calibration report from the U. S. Geological Survey. The lens used was a No. 112653 (shutter speed 1/250, F stop 5.6, magazine No. 116063).

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VII. MONITORING PROGRAMS (TERRESTRIAL)

Field Sampling (continued)

The photography was flown with a 60 percent overlap in the line of flight and 30 percent sidelap between flight lines using Kodak 2443 color infrared film (Aerochrome) with a Wratten 12 camera filter. From the color infrared positive and a line index to the photography provided by the photogrammetric services crew, any impact to the terrestrial vegetation was assessed by comparing 1978 photographs with 1976 photographs.

Black-and-white stereo coverage of approximately 4 square miles at 1 inch = 1,000 feet negative scale was also provided.

Photos were taken between 11 am and 2 pm EDT, and the flight direction was north-south. All photographs were free of cloud shadows. Processing methods and conditions remained constant.

A flight log was kept for time and processing of photographs. Information recorded in the flight log included the model and serial number of the camera and lens (Zeiss 15/32 A4), which remained the same for each flight as defined in the technical specifications; film and lot number; filter number (Wratten 12); altitude at the end of each flight line; time at the end of each flight line; date of flight; and flight map showing flight lines. The original photographs are 9-by-9-inch positive stereo transparencies. A map of the study area is shown in Figure 7-1.

Laboratory Analysis

In the laboratory, photographs were scanned for quality of the transparencies such as color, resolution, scale and cloud cover, obvious changes in color tone and pattern, and areas where tone, pattern, or textural characteristics may require specific ground reconnaissance.

Areas with the greatest and least potential for being affected by cooling tower drift were selected and compared. The location, extent, and severity of any stressed area was documented and related to meteorological data for the area. The possible role of cooling tower drift in the development of stressed areas was then assessed.

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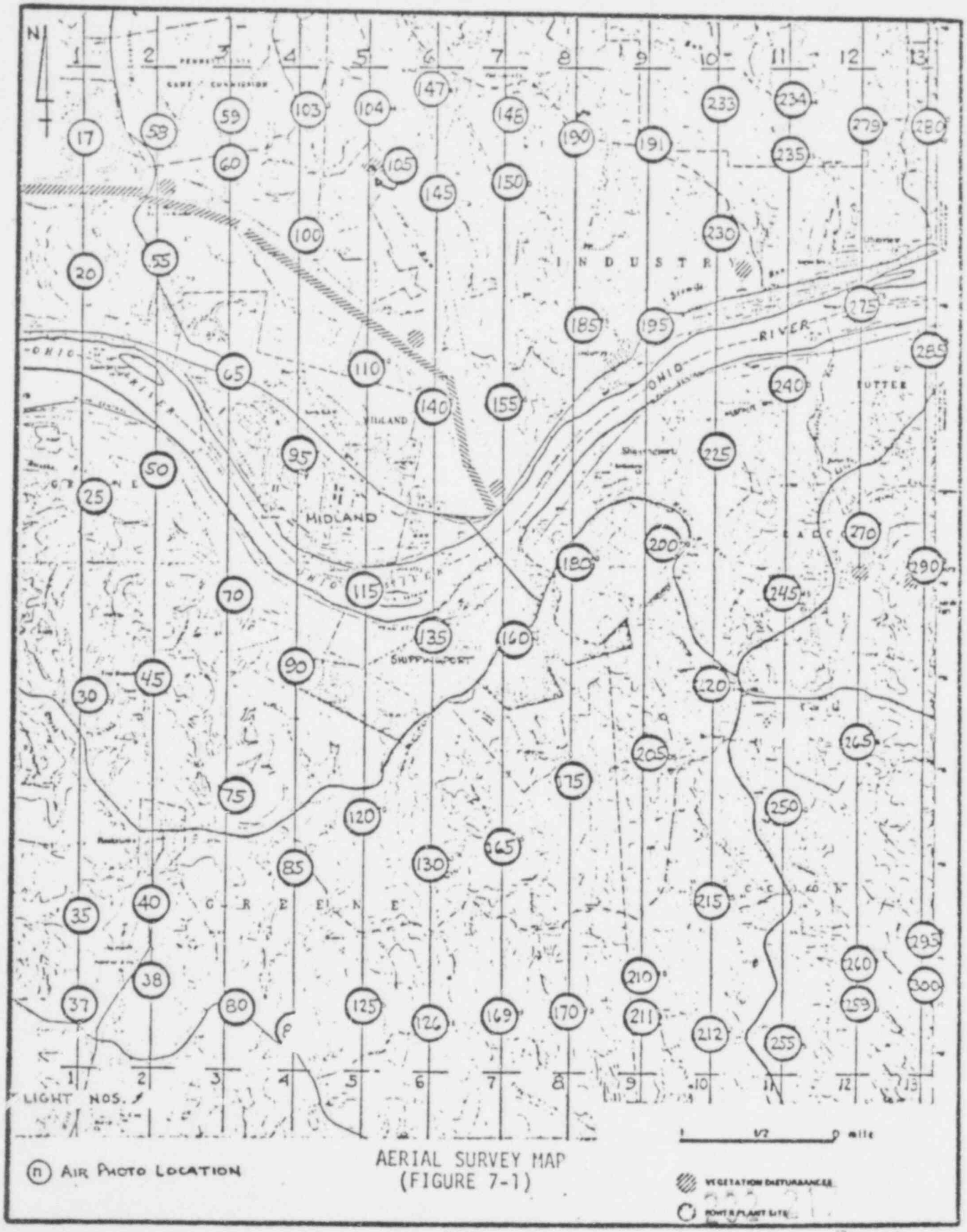

AERIAL SURVEY MAP
(FIGURE 7-1)

VII. MONITORING PROGRAMS (TERRESTRIAL) (continued)

Evaluation of Photographs

To study the possible influence of exposure on the contrast differences in the photographs, various plots were established in many parts of the project area. Essentially, this method selected identical areas of plant cover that included: (a) vegetation on well-drained hilltops and the upper portions of steep slopes, (b) low topographic areas, and (c) slopes found between (a) and (b).

Results

The 1978 photography was more nearly normal in terms of exposure although a slight degree of underexposure was noted. This condition may have affected the excessive blue in the corresponding prints. It was noted that the reflectance contrast between the identical stands of vegetation was much less than that found in the 1976 coverage. The results show that the major differences in contrast were related to the hilltops and adjacent portions of steep slopes.

These differences could be due to either the distinct vegetative type found on these areas or moisture deficiency. Because the vegetative type in question consistently appeared stressed in the 1976 aerial photographs and consistently showed improved vigor in the 1978 photographs in all segments of the area and since it seemed unlikely that drift from the cooling tower would improve the hilltop vegetation of the entire area, these results tentatively pointed to a climatic influence.

Data obtained from NOVA for the months preceding August, 1976 and August, 1978 were reviewed. The results indicated that 5 months prior to August, 1976 there was a 136-millimeter deficiency in moisture and 5 months prior to August, 1978 there was a 2-millimeter excess in moisture. These data were based on the growing period including April and later months. Interpolation between stations was necessary to minimize local variations and to estimate August, 1978 rainfall.

On the assumption that the precipitation from the cooling tower would fall in a downwind direction from the tower, as indicated by the general wind rose for the area, particular attention was paid to selected plots falling within eight segments of the wind rose. Comparisons were then made, not only between identical areas in the 1976-1978 series, but between identifiably similar groups of trees within the 1976 coverage and within the 1978 coverage. No detectable differences attributable to cooling tower drift were found.

VII. MONITORING PROGRAMS (TERRESTRIAL) (continued)

Results (continued)

Effects of spraying were evident within some rights-of-way, but no edge effects were noted on mature vegetation. There was some thickening of vegetation (brush) at the margin of rights-of-way. Significant areas of change are shown in Figure 7-1 and summarized in Table VII-1.

The conclusion of no adverse effects of cooling tower drift on vegetation includes the following considerations:

1. the quality of the color infrared photography

2. experience in photographic processing

3. the effects of soil depth, surface, and internal drainage on forest growth

4. principles of plant ecology, ecological succession, and forestry

5. weather conditions, especially rainfall.

Since the analysis of weather conditions shows a significant rainfall deficiency in 1976 of a duration that would affect those vegetative plant sites most susceptible to drought conditions, it is concluded that major differences found in vegetation were caused by drought.

Summary

A widespread improvement in the vigor of the natural forest cover has taken place from August, 1976 to August, 1978. In 1976, there were several areas of vegetation damage reported that were due to a variety of causes not related to the Beaver Valley Power Station (BVPS) cooling tower. The basic reason for the improvement in 1978 lies in the climatic stress induced by a 5-inch rainfall deficiency in the 5-month period preceding the August, 1976 photography, as contrasted with the normal rainfall that preceded the 1978 photography. No observed stress on the vegetation could be related to cooling tower drift.

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TABLE VII-1

Summary of Observed Vegetation Disturbances in the vicinity of the BVPS Site, June 1978

Changes in Vegetation	Aerial Photo No.
200-foot powerline right-of-way, lower left quad	7-156
Continuation Center	6-14-1
Continuation Center	5-105
Powerline, lower left and lower right quads	2-56
Minor enlargement of strip mine	5-105
New housing, lower left quad	2-56
New housing	13-290
Extended strip mining	10-229

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