A.6 FLOOD POTENTIAL - ELEVATION/DISCHARGE CURVE DES PLAINES AND KANKAKEE RIVERS

The following is a summary of an analysis of the Morris Operation (GE-MO) site, and its vicinity, for susceptibility to severe flooding at flow rates of up to 600,000 cf/s. This study was originally performed as a result of a question asked by USAEC during evaluation of NEDO-10178, **Safety Analysis Report - Midwest Fuel Recovery Plant,** dated December 1970.

The Harza Engineering Company of Chicago, Illinois was engaged to develop preliminary water level-discharge rating curves for discharges up to 600,000 cfs as specified in USAEC questions, even though the maximum flood of record at the site is less than 100,000 cfs. (See figure A.6-1) No studies were made to determine the discharge for the maximum probable flood at the site. However, as shown by the preliminary analysis, even at the discharge rating of 600,000 cfs, the maximum water level is still below the plant site elevation of 530 ft. (mean sea level). Thus, there will be no serious flood effects of safety significance at the GE-MO.

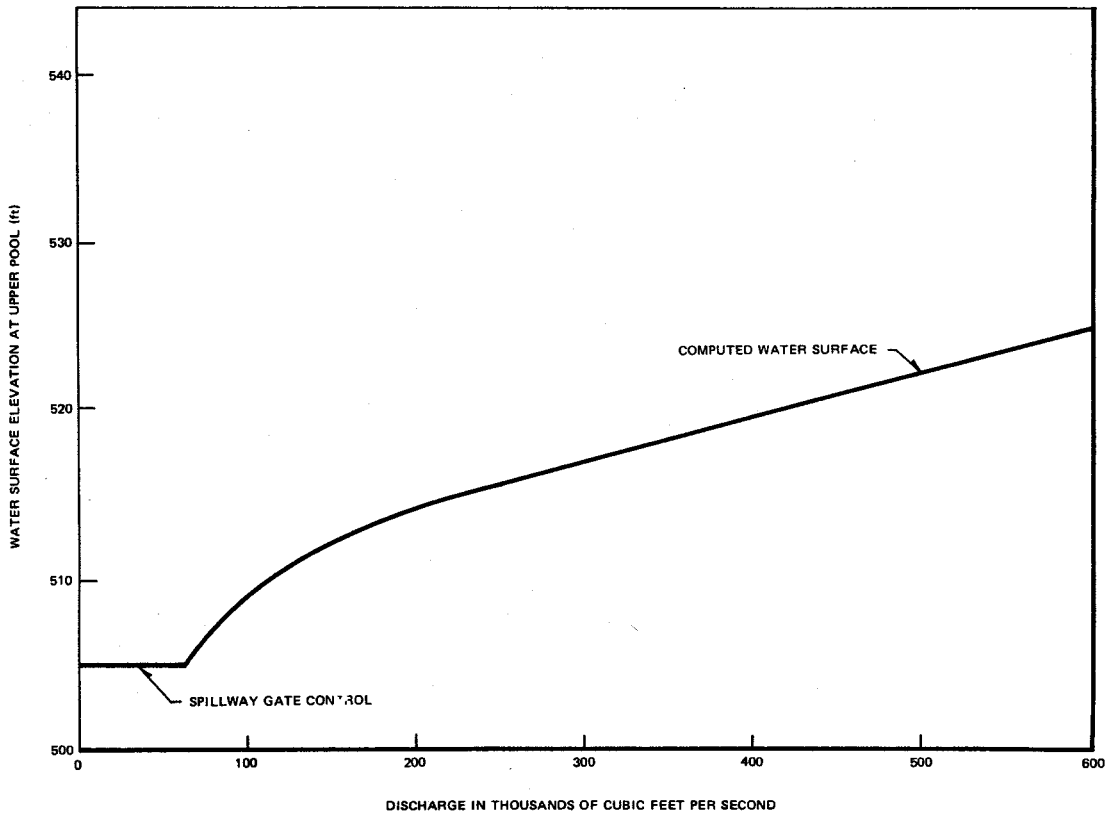

Figure A.6-1. Dresden Lock and Dam, Upper Pool – Preliminary Water Level Discharge Rating Curve.

The hydraulic analyses performed to determine the water levels for extreme and intermediate discharges were based on available topographic and hydraulic information. The analyses were limited to river and overbank cross sections in the vicinity of the plant site.

Method of Analysis. The direct step method was used for computing water surface profiles for selected discharges, floodway geometry and roughness coefficient. Computations were

executed on an IBM 1130 computer using a Corps of Engineers program for computing water surface profiles. This program, used for 6 to 8 years, has been used in evaluating other sites for nuclear facilities.

Cross Sections. A total of 13 cross sections was selected in an 8-mile reach between the Morris Highway Bridge (route 47) and the Dresden Lock and dam Pool as shown on Figure A.6-2 attached. A section just upstream of the lock and dam passes through the plant site. At each cross section, channel and overbank geometries were determined from Illinois Water Charts prepared by the U.S. Army Corps of Engineers. Overbanks were described using USGS 7.5 ft. quadrangles which have 5 ft. contour intervals except for one map which has 10 ft. contour intervals. More refined definition of the overbank sections was not believed warranted for this preliminary study. Points in the cross sections were described at each major break in the side slope so that subareas computed by assuming trapezoidal sections would not differ from the true areas by a significant amount.

Roughness Coefficients. Roughness coefficients were established from photo interpretations, a reconnaissance of the area, and calibration runs of a recorded flood profile. The July 1957 flood profile for the study obtained from gage readings at Morris just below the Route 47 Bridge and below the Dresden Dam was reproduced by estimating "n" values and determining the backwater curves for the observed discharge. The "n" values were adjusted until a good reproduction of the flood profile was obtained. Roughness coefficients of 0.070 for overbank and 0.032 for the channel were determined from approximately 95,000 cfs discharge during the 1957 flood.

Starting Evaluation. For each selected discharge, critical depth was determined at the Morris Bridge section. Water surface profiles were then determined up to the Dresden Pool section starting from critical depth at the lower section. Start elevations were then determined by extrapolation from the slope of the upstream water surface. Water surface profiles were again computed using these starting elevations. Since the elevation change at the upstream section was not great after recomputing the profiles (1.5 feet maximum) it was concluded that a new starting elevation based on a new extrapolation would not materially affect the results.

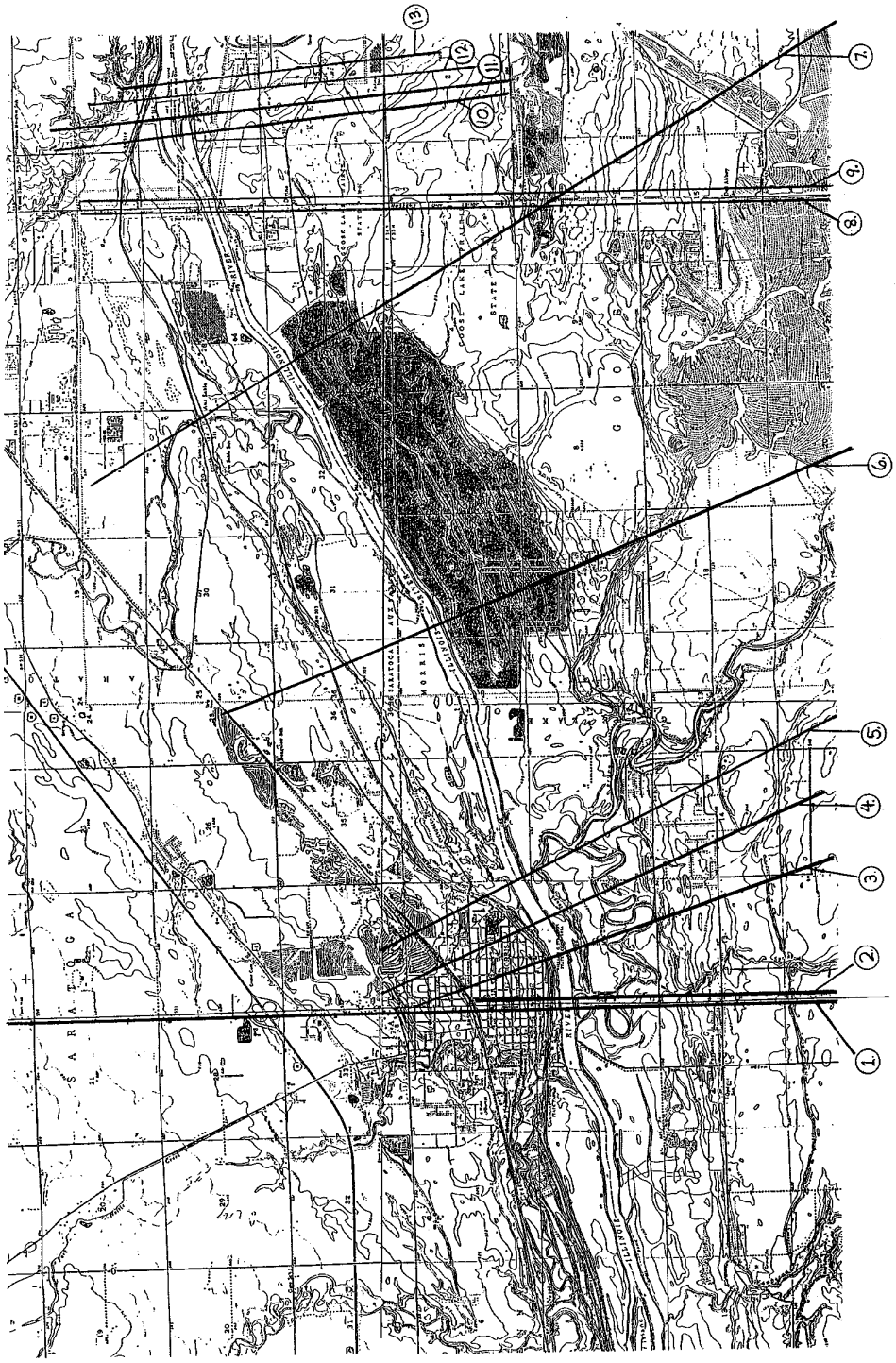

Figure A.6-2. GE-Morris Operation Site Study Reach.

Water Surface Profiles. Water surface profiles were determined for four discharges: 100,000 cfs, 200,000 cfs, 400,000 cfs and 600,000 cfs. Below about 100,000 cfs the water surface just above the dam is controlled by gate operations. Profiles for the four discharges are shown on Figure A.6-3. The profiles are shown for the two starting elevations.

Rating Curve. The water surface elevations computed at the Dresden Pool section for the four selected discharges were used to define the preliminary rating curve at the plant site. Elevations for other discharge were interpolated between the computed values.

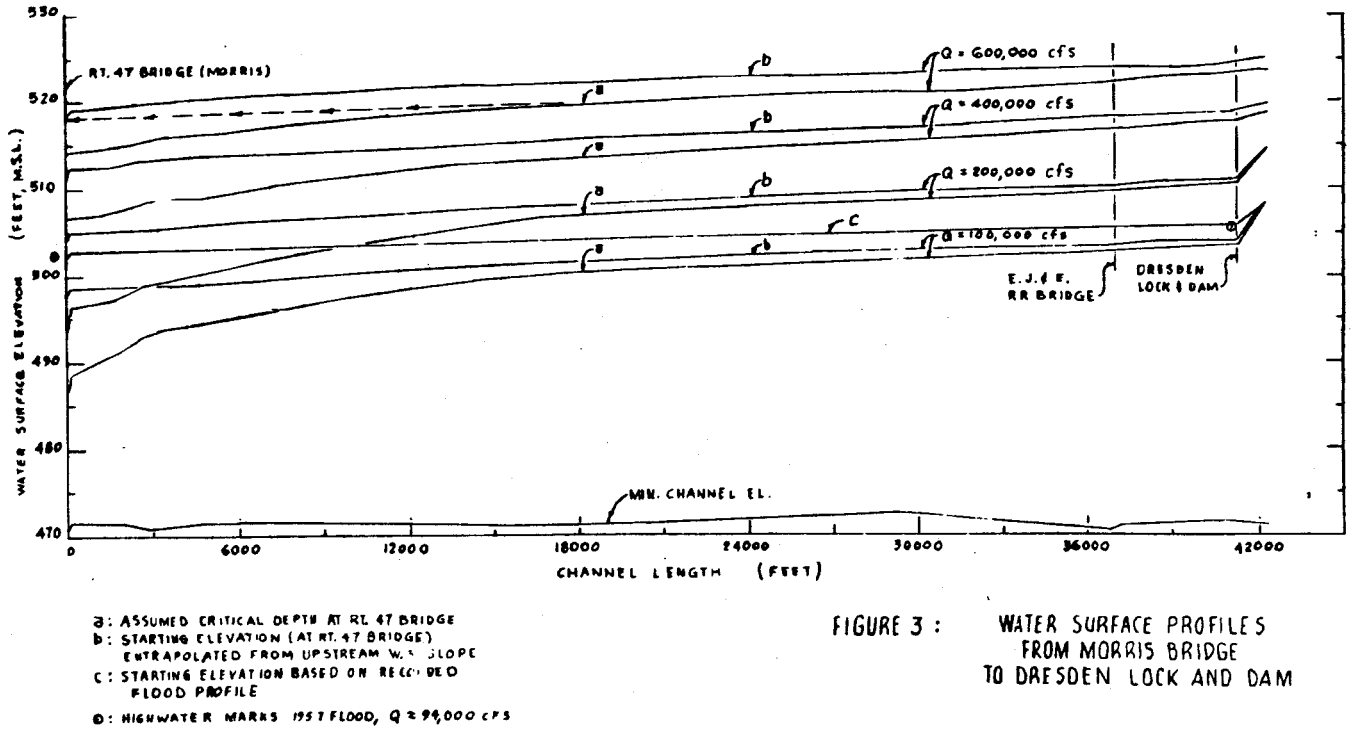

Figure A.6-3. Water Surface Profiles from Morris Beidge to Dresden Lock and Dam.