As a parting thought on the value of evidence, I am reminded of a story that might have a point:

An old Indian, named Joe Blow, received an appointment with the president of the local bank and requested a loan until he could fatten his hogs for market.

The banker agreed to the loan but informed the old Indian that he would have to put up his hogs as evidence of good faith.

The old Indian later sold his hogs and promptly repaid the banker.

Noticing that the old Indian had several hundred dollars left in his pocket after repaying the loan, the banker said, "Joe, why don't you leave all that money here and let me take care of it for you?"

Indian Joe replied, "How much evidence you got?"

Thank you.

ENGINEERING

REFERENCE MATERIAL AVAILABLE FOR HYDOLOGY, HYDRAULIC, AND STRUCTURAL DESIGN OF WATER CONTROL STRUCTURES

By DON HAYS, *Director, Division of Engineering Department of Fish & Wildlife Resources, Kentucky*

A number of good reference books are available to the hydraulic-design engineer; many more, in fact, than the ones listed. However, I recommend the following for the simple reason that the Soil Conservation Service has done as much or more research in the hydraulic-hydrology field as any one agency. Their manuals are constantly being revised as new methods are developed from research. The S.C.S. has been quite willing to help engineering personnel from other agencies in the use of their material. Frequent training classes are held in which new principles of design are advanced and are generally open to those requesting special permission to attend.

Publications by the U. S. Department of Agriculture, Soil Conservation Service.

1. Hydrology—Supplement A

   Contains five parts, starting with general requirements through to the development and analysis of design hydrographs. Engineering memorandums, from the Washington office of the S.C.S., outline the limiting criteria for the design of earth dams and are to be used in conjunction with this guide.
2. "Chute Spillways" Section 14.
3. "Hydraulics" Section 5.
4. "Structural Design" Section 6.
5. "Drainage" Section 16.
6. "Drop Spillways" Section 11.

(All these sections are designed to fit into the S.C.S. Engineers Handbook.)

Publications by the U. S. Department of Agriculture, Agricultural Research Service.

Written by Fred Blaisdell and Charles A. Donnelly at the St. Anthony Falls Hydraulic Laboratory, University of Minnesota Agricultural Experiment Station.

1. "Hydraulics of Closed Conduit Spillways Part I. Theory and Its Application" gives results of tests and formulae to determine flow in a conduit under any condition of head or length.

2. "Hydraulics of Closed Conduit Spillways Part X, The Hood Inlet" describes the development of the hood inlet as a simple, economical and easily installed spillway.
3. "Straight Drop Spillway Stilling Basin" used as an erosion control in drainage ditches, as an irrigation drop and check structure and as a spillway for earth dams.
4. "Hydraulic Design of The Box Inlet Drop Spillway" contains sufficient information necessary for the hydraulic design of this type of spillway.
5. "Design Chart For the SAF Stilling Basin". Sheets 1 and 2 give the graphic solution of equations used in the design of the SAF. The basin is proportioned to discharge water into the downstream channel in such a manner as to prevent damaging scour.

Publication by the U. S. Department of The Interior, Bureau of Reclamation. "Design of Small Dams."

This is a new publication (1960) and is a resumé of the more popular design manuals, including those published by the S.C.S. The authors, however, refer the engineer to the original design manual for more complete information.

In addition to these design manuals, Armco Drainage and Metal Products puts out three books that are good references.

1. "Armco Water Control Gates"—a catalogue of gates which includes a wide range of models and sizes for water works and flood control.
2. "Metal Pipe Spillways"—a catalogue of prefabricated metal spillways, specifically the hooded inlet and the riser-conduit spillway.
3. "Handbook of Culvert and Drainage Practice" which includes a catalogue of metal culvert sizes, shapes and coatings.

HYDRAULICS OF DROP INLET SPILLWAYS

By Huson A. Amsterburg

Hydraulic Engineer in the Engineering and Watershed Planning Unit, Soil Conservation Service, Spartanburg, South Carolina

The Soil Conservation Service is concerned with the storage of water in many phases of its work. This storage may be of a temporary nature (a period of approximately 10 days) to alleviate flood damages by manipulating peak runoff hydrographs or it may be permanent storage for wildlife purposes, recreation, or some other use.

Usually, the water is impounded behind an earth fill with a conduit through the fill which has a riser on the upstream side.

After the design hydrograph has been developed, the design of the structure is accomplished by some flood routing procedure which determines the dimensions of the structure and the amount of storage required.

In order to do the flood routing, it is generally necessary to develop a stage-discharge relationship for a spillway which consists of the conduit and riser. A considerable number of variations of this type of spillway have been used, such as CMP with concrete block riser, concrete pipe with concrete riser, etc., with various types of anti-vortex baffle walls.

In the southeastern section of the United States, the flat-top riser as illustrated in Figure 1 is often used in our work under the Small Watershed Act, Public Law 566. Among its advantages are safety and adaptation of a more efficient trash guard. The flat top prevents people from throwing stones and similar material in the riser. It also acts as an anti-vortex device.

In Figure 1 are shown the limiting dimensions of the riser. The cross-sectional area of the riser should be at least one and one-half times the cross-sectional area of the conduit. One of the reasons for this is to eliminate the control of the stage-discharge relationship by the condition known as "short tube flow" which can be difficult to define. Having the depth of the riser equal to or greater than four times the diameter of the conduit insures full pipe flow even though the conduit is put on a slope steeper than normal.