

Book F

Interpretation Cross Sections

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The cross sections in this book appear to be interpretation sketches. They may have been prepared by Sidney Prah1 who was an early user of the Wold-Crosby 1970 reflection seismic data. Prah1 is referenced by [Wold](#) (1982), and Prah1's early interpretation efforts are mentioned in the [Line P Notes](#) page (Book G). Prah1 was also a co-author of the Silverman et al. (1971) bathymetry and [line locations map](#) (Book B).

Most of the sketches in this book show only the water bottom profile. The sketches for Lines F and P, however, show more details.

Two of the files in this set are scans of computer-drawn cross sections, i.e., LineO_CrsSec2.jpg and LineP_CrsSec2.jpg¹. The computer-drawn plots show two interpreted horizons, i.e., the water bottom and what is probably the top of the Precambrian bedrock under the glacio-lacustrine sediments. The vertical axis appears to be depth below the surface in feet. The two rows of numbers at the base of the computer-drawn cross sections appear to be depths below the surface to the two horizons. The numbers are depth and not thickness because the tabulated values for both horizons are equal where the difference in travel time between the two horizons goes to zero.

As part of this evaluation, 40 sets of two-way time from the Line P field recording and depth from the corresponding computer-drawn cross section were input to a spreadsheet. Two way reflection times for both the marked water bottom and the top of the Precambrian were input.

The velocities for the water column and the sediments that were used in generating the depth section ([LineP_CrsSec2.jpg](#)) can be estimated by cross plotting the travel time values that were hand posted on the field recordings (divided by 2 for one way travel time) against the depths that were posted on the computer-drawn cross section. Cross plotting the values for the water bottom event and fitting a straight line through the points yields a velocity of about 5250 ft/s (1600 m/s). The trend line did not pass through the origin of the graph, i.e., zero time for zero thickness of the water later. Forcing the trend line to pass through the origin yielded a velocity of 4870 ft/s (1484 m/s) but with a slightly lower regression coefficient. Wold (1982) reported using a value of 4760 ft/s (1451 m/s) for time to depth conversion of the water column.

How the depths to the sedimentary horizon were calculated is a little harder to estimate. Wold (1982) reported using a velocity of 5600 ft/s (1707 m/s) for the velocity of the unconsolidated sediments. Lankston and Hofmann (2017) suggested sediment velocities increasing as a result of compaction from 4850 ft/s (1480 m/s) at the water bottom to 5900 ft/s (1800 m/s) at a two-

¹ These filenames do not show up in the pick list for files in Book F. These files are labeled as "computer-drawn" in the pick list. However, these file names will head the download dialog box after you press the Download button.

way travel time of 0.4 s in a deep water portion of the lake. Wold's (1982) value is in this range. Cross plotting one way travel times within the sediments, i.e., from the water bottom event to the Precambrian bedrock, against the differences in the depths posted on the computer-drawn cross sections suggests that a sediment velocity of 6490 ft/s (1978 m/s) was used for the two computer generated cross sections, i.e., somewhat faster than Wold's (1982) value and the Lankston and Hofmann (2017) value range.

References Cited

Lankston, R. W., and Hofmann, M. H., 2017, Sediment collapse indicators in the 1970 Flathead Lake seismic dataset, in 1970 Flathead Lake Seismic Survey, <http://scholarworks.umt.edu/flathead/16/> .

Silverman, A. J., Pevear, D. R., and Prah, S. R., 1971, Bathymetry of Flathead Lake, Montana: unpublished. (URL: <http://scholarworks.umt.edu/cgi/viewcontent.cgi?filename=2&article=1015&context=flathead&type=additional>)

Wold, R. J., 1982, Reflection seismic study of Flathead Lake, Montana, USGS Miscellaneous Field Studies Map MF-1433: US Geological Survey. (URL: <https://pubs.usgs.gov/mf/1433/plate-1.pdf>)

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