# CORRELATION TRENDS IN THIN-BEDDED TURBIDITES, JACKFORK GROUP, DEGRAY LAKE, ARKANSAS

## ABSTRACT

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The methods of data collection for modern and ancient turbidite systems are necessarily different. Therefor, the integration of data sets from modern and ancient turbidite systems is desirable if lithofacies and surface morphological models are to be linked. To achieve this, two activities have to be dealt with: 1) Modern and subsurface turbidite systems must be extensively cored and described, and 2) outcrops in ancient turbidite systems must be correlated laterally in sufficient detail to establish a framework to facilitate the interpretation of subenvironments which build the turbidite system. The latter approach can be accomplished only in a few turbidite systems that are relatively well exposed, with outcrops exposing thick sections of turbidites which have an equally thick correlative.

One ancient turbidite system meeting the above criteria is the Pennsylvanian Jackfork Group exposed around DeGray Lake, Arkansas. Two correlatable outcrops form the east and west wall of the Spillway, 214 feet (65 m) apart, while the third outcrop is 5500 feet (1675 m) to the west near the intake for the power-generating dam.

Each outcrop was divided into lithofacies-based units and each unit was described in general terms and individual beds in each unit were measured. The lithofacies-based units established a rough correlation between large segments of each outcrop using changes in character. A more detailed assessment and quantification of these changes is then produced when dividing the units into smaller subunits. Stratigraphically thick sections of individual beds can often be correlated between Spillway walls. It is difficult to accomplish this using lithologic logs derived from measured sections. It is easier to plot the sandstone bed thickness values on a graph such as shown in Figure 1. Each successive bed is weighted the same on the vertical scale with the horizontal scale representing bed thickness. The thinner beds, represented by the left-deflecting spikes, show no characteristic pattern and do not necessarily follow the same trend as the thicker beds, represented by the right-deflecting spikes. The thicker beds can be divided into thickening-upward, thinning-upward and symmetrical successions of beds which may be called cycles. These cycles form distinctive patterns for each outcrop and unit. Pattern recognition can be used to correlate cycles from each outcrop similar to the correlation of subsurface well-logs. Individual beds which make up each cycle can then be correlated across the Spillway. This method allows for important lithofacies changes and thinning trends to be recognized.

The lower one-third (approx. 140 feet [42 m] thick) of the Spillway section overlies massive channel deposits. The thinning- and fining-upward nature of these beds and their position over channel deposits make these interpretable as a channel-levee-overbank succession. Paleocurrent direction for the channels in this part of the Jackfork Group is westerly. Detailed correlation of individual beds, using a plot similar to Figure 1, reveals an increasing degree of correlatability upward, from 40% in the lower part to over 80% in the upper part of the section. This increase may reflect more laterally extensive, sheet-type flow deposition.

The second section is relatively thick-bedded and is sandwiched between very thin-bedded distal overbank deposits. This section is interpreted as a depositional lobe deposit. Mostly thickening-upward cycles can be recognized and used for correlation between Spillway walls. Individual bed and cycle thicknesses for each cycle show thinning trends across the Spillway which switch back and forth in direction, compatible to compensation cycles. A correlative section of turbidites, which were measured at the Intake, also shows thickening-upward trends. The overall thickness of this section is about 51 feet (16 m) thick while the Spillway sections are much thicker at about 80 feet (42 m) thick. Paleocurrent directions measured from sole markings show that this section is slightly oblique to directly down-current of the Spillway. Figure 1 shows good overall correlation between Spillway sections and the Intake section, but relatively poor bed-to-bed correlatability.

The third section is 14 feet (4 m) thick and comprises thicker-bedded turbidites which are thinning-upward and are sandwiched between very thin-bedded basin plain or distal overbank deposits. This section is interpreted as a small channel deposit. The thicker beds typically split into several low angle amalgamations. A correlative section at the Intake is slightly thicker, but is thinner-bedded and shalier. As in all sections, the original correlation was based upon lithofacies. The thickness plot for this section shows that the beds included in the overbank deposits at the Spillway can be correlated with

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thicker beds in the upper portion of the Intake section. This may be evidence that the parent channel axis lies nearer the Intake. Paleocurrent measurements derived from sole markings indicate a westerly direction of flow, but those from cross-lamination are more southerly. This divergence may be characteristic for levee-overbank deposits.

The last section is generally fining-upward and is extremely difficult to correlate. Thicker beds at the base of this section can be seen to amalgamate and split within each outcrop. The thicker beds are massive and slurry and debris flow deposits are common. These channel-fill beds are extremely difficult to correlate using the thickness plot, although this section shows the same vertical thinning-upward trend in both sides.

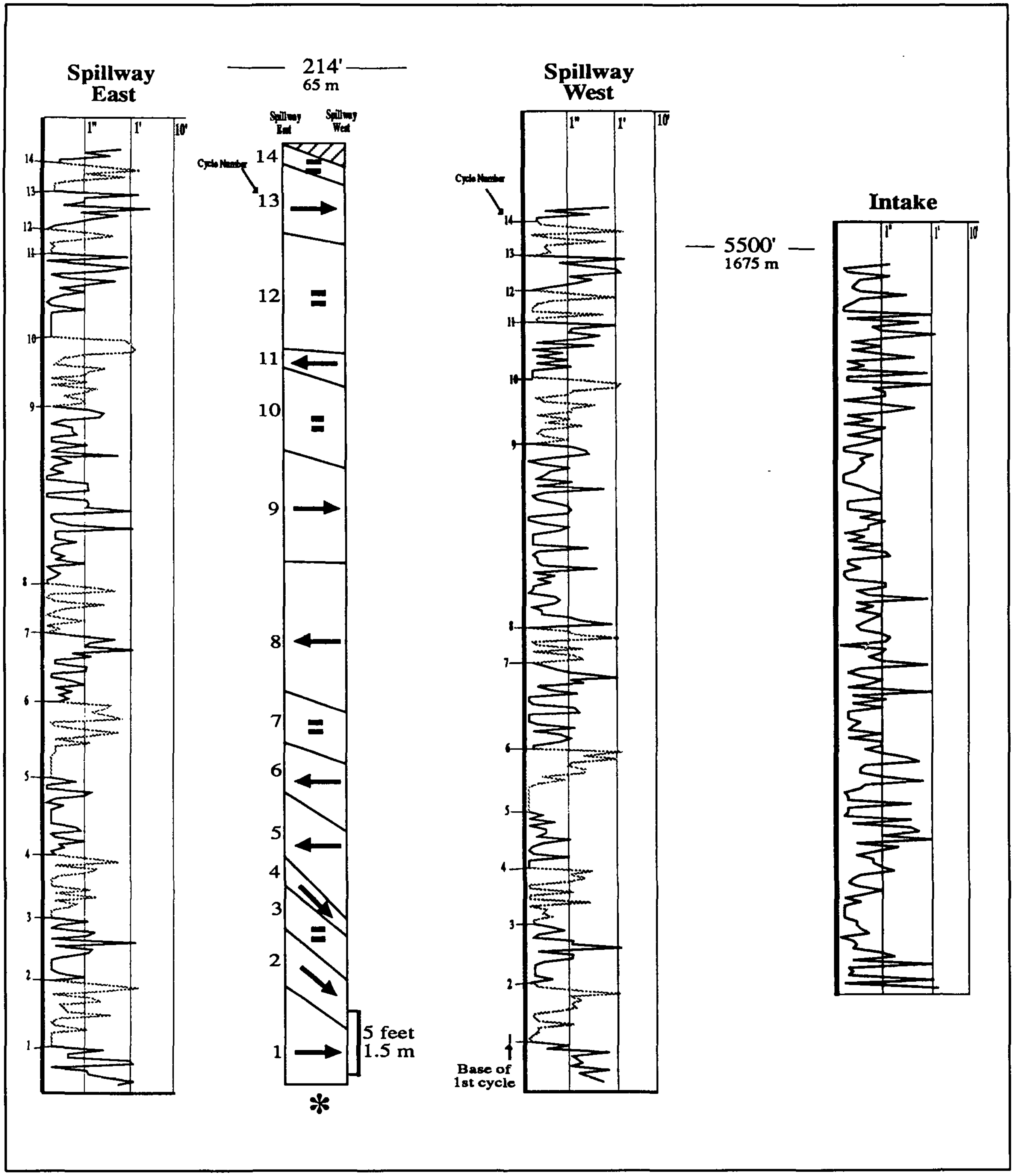


**Figure 1. Sandstone bed thickness plot for section 2 which can be divided into cycles. Solid and dashed lines are used for successive cycles to ease correlation between east and west sides of the Spillway. Individual bed correlation is good between the east and west Spillway sections, but poor between the Spillway and Intake sections except in overall thickness trend. Individual beds are weighted the same on the vertical scale with the horizontal scale representing bed thickness. Notice that this scale is not linear, but is close to logarithmic. Cycle thicknesses are plotted on the vertical scale in the graphic which is between the East and West Spillway bed thickness plot (asterisk*). Arrows show direction of thinning which switches back and forth; equal signs are assigned to cycles which show negligible lateral thinning.**