Table 3. Characteristics of the Stress State That Minimized the Weighted One-Norm Misfit of the Point Pedernales Borehole Breakout Data

	S_1	S_2	S_3
Azimuth	N148.5°E	N55.8°E	N318.7°E
Plunge	31.5°	4.4°	58.1°
Value	2	$1.821^{1}_{1.584}$	1

Optimized $\phi, 0.821^{1.000}_{0.584}$; minimum weighted one-norm misfit, 4.84°; 95% confidence level for weighted one-norm misfit, 5.96°.

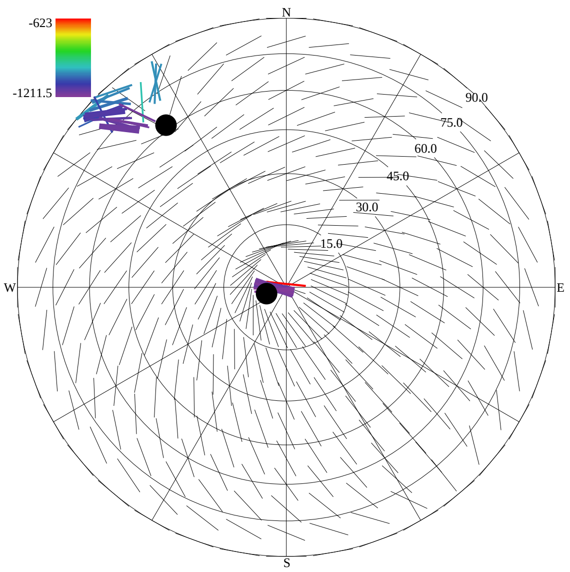

Figure 14. Lower hemisphere stereographic projection plot of the selected Point Pedernales breakouts plotted on top of the theoretical breakout pattern of the best fitting stress state. The graduated scale shows the depth of the selected breakouts in meters. The two solid circles are the location of the nodal points of the theoretical breakout pattern.

Pedersen [1991] inversion.

After "inverting" the Point Pedernales data we compare the theoretical breakout pattern with the observations of good quality breakouts (Figure 14). Both the nodal points of the pattern are along a strike of roughly N37°W, with the near-vertical one plunging 85° and the near-horizontal one plunging 28° from horizontal. One nodal point lies between the A-13 and A-16 clusters of breakouts, which have a distinctly different trend. Finally, it should be noted that the nodal points are not symmetric about the origin of the plot, unlike the simple stress state examples shown in Figure 2, because none of the principal stress directions are vertical (Table 3).

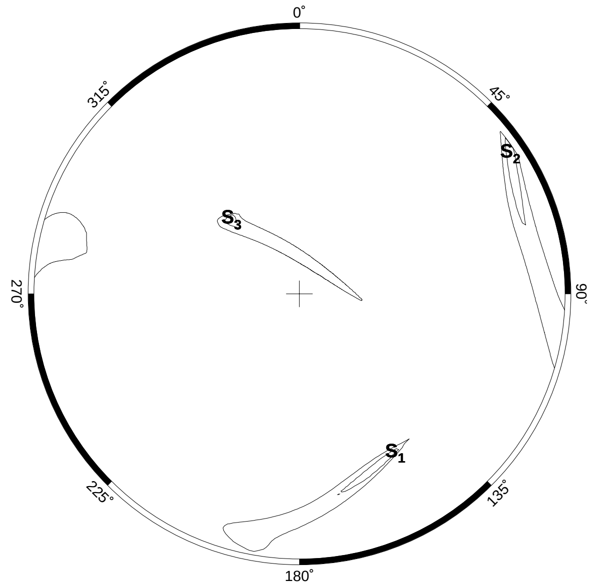

Figure 15. Lower hemisphere stereographic projection plot of orientations of the principal stress directions of the best fitting stress state. The inner and outer contours are the 75% and 95% confidence limits for the each principal stress direction. The stress state ϕ ratio was held constant at 0.821.

The best fit orientation of the greatest principal stress direction, S_1, is N148.5°E, surprisingly more east of south than is to be expected. However, the 95% confidence levels on the S_1 direction would permit it to lie in the azimuth range from N143.0°E to N198.1°E (Figure 15). Given the relative shallowness of the breakout data, the deepest breakout being 1.2 km deep, the stress state has no principal vertical stress direction. The minimum stress, S_3, is the closest principal stress direction to vertical, being 31.9° away from vertical.

This finding does not agree well with the regional breakout, focal mechanism, hydraulic, and geologic data presented by *Mount and Suppe* [1992], which show horizontal principal stress directions oriented NE-SW. It also does not agree well with the inferred NNW trends of young folds in the Southern Santa Maria Basin [e.g., *Clark et al.*, 1991], which might imply a more NE or ENE direction of S_H. However, it is possible that the stress state in the Point Pedernales field varies locally from place to place, so that our result may not be regionally representative of the stress field beyond the immediate area of the borehole system studied here.