



**CALIFORNIA STATE SCIENCE FAIR
2007 PROJECT SUMMARY**

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Project Title Seismic and Petrographic Analyses of the Victoria Island Structure (Phase II)	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The analyst completed in 2005 a study of 3d seismic and well data in the Sacramento basin that revealed a subsurface, circular, ~5500-m-diameter feature, which is buried 1,490-1,600 m below sea level. The main purpose of the current phase of the study is to acquire the direct evidence of shock metamorphism needed to confirm an impact origin. Additional mapping of the seismic data was also done to confirm the rootless nature and timing of the Victoria Island structure.</p> <p>Methods/Materials Samples were taken from the two wells directly within the structure. Thin sections were made of samples with significant quartz grain populations. Using a petrographic microscope, quartz grains were examined for lineation patterns similar to planar deformation features or PDFs. Quartz grains with potential PDFs were further examined under a universal stage microscope to measure the angle of the possible PDF with respect to the minerals c-axis to confirm whether its Miller index was similar to known PDFs. Seismic horizons were mapped with GeoGraphix# software programs.</p> <p>Results Thousands of likely quartz grains were examined and a total of nineteen grains with potential PDFs were found all within 40 meters of the seismically identified impact surface. Thirty-one out thirty-three of planar microstructures that were found had indices similar to known PDFs. The Basal (0001) index, a typical orientation for PDFs, is the most common, with 11 microstructures or approximately 35% of the total. The total number of grains and measured planer features compare favorably to those found in well cuttings from sedimentary rocks of known impacts. The new seismic maps helped document that the structure is post Domengine (mid-Eocene) in age and is rootless at depth.</p> <p>Conclusions/Discussion The mapping done in this current study has further confirmed the similarity of the dimensions of the Victoria Island structure to known impacts. The petrographic analysis has shown enough evidence of likely PDFs in quartz grains to warrant calling the Victoria Island structure a probable impact. Abstracts of this work have been completed and are now being shared with the impact community. In addition to peer review of this study, further work including conformation of quartz mineralogy with a microprobe and study of additional samples from wells in the area may be required before the structure can be considered a proven impact crater.</p>	
Summary Statement The primary focus of this study was to find the physical evidence necessary to prove whether the Victoria Island Structure was formed by an impact event.	
Help Received Used lab equipment at San Diego State University, department of geological sciences under the supervision of Dr. Jared Morrow; Seismic data and seismic mapping software were provided by ABA Energy; Well samples were provided by ABA Energy and the California Well Sample Repository.	