



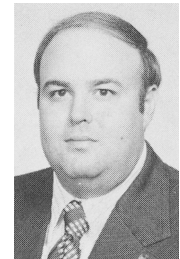
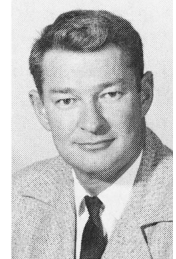
AUTHORS — DECEMBER 1975

NUCLEAR EXPLOSIVES

THE RIO BLANCO EXPERIMENT—ITS OBJECTIVES, DESIGN, AND EXECUTION

Gerald R. Luetkehans (top) (BS, mathematics and physics, University of New Mexico) has for the past six years been involved in the utilization of nuclear explosives and engineering applications. He is currently a vice president of CER Geonuclear and was their project director on Project Rio Blanco. John Toman (center) (BS, United States Military Academy, West Point, 1953; MS, engineering and physics, University of Illinois, 1959) has been actively engaged in the Plowshare and Energy Resource Programs at Lawrence Livermore Laboratory since 1964. He has served as the project scientist for numerous nuclear explosive experiments including Project Gasbuggy, Project Ketch, Project Rio Blanco, and the Interoceanic Canal Studies. In 1970 he assumed the duties as leader of the Plowshare I Group—Gas and Oil Stimulation, Storage, and Nuclear Excavation. In May 1975, he became leader of the Earth Sciences Test Support Programs. Bennie G. DiBona (bottom) (BA, physics, University of South Florida, 1964) is the Director of the Industrial Applications Division of the U.S. Energy Research and Development Administration's Nevada Operations Office. He has for the past several years been responsible for planning and field operations of peaceful nuclear explosive programs. He is also currently involved in other energy research programs such as massive hydraulic fracturing for stimulating natural gas production and development of low-temperature geothermal resources.

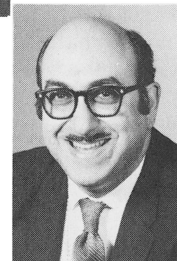
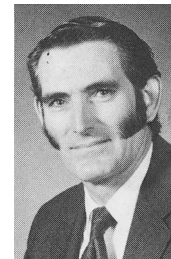
*Gerald R. Luetkehans
John Toman
Bennie G. DiBona*



RIO BLANCO: NUCLEAR OPERATIONS AND CHIMNEY RE-ENTRY

Wayne R. Woodruff (top) (BS, engineering physics, University of California, Berkeley, 1953) is a staff physicist working on nuclear explosive development at the University of California Radiation Laboratory in Livermore. He served as test group director for the laboratory's program at the Nevada Test Site from 1964 to 1966. He became the test director for the laboratory's Plowshare and Detection Program in 1966 and served in that capacity on the Sterling, Gasbuggy, and Rio Blanco Events. He is currently working in the underground engineering area of the Plowshare Program while doing graduate work in physics at California State University, Hayward. Raymond S. Guido (BS, chemical engineering, Syracuse University, 1958) heads up the Nuclear Explosive Systems Section, Nuclear Test Engineering Division at Lawrence Livermore Laboratory. He is responsible for design and analysis of nuclear explosive

*W. R. Woodruff
R. S. Guido*

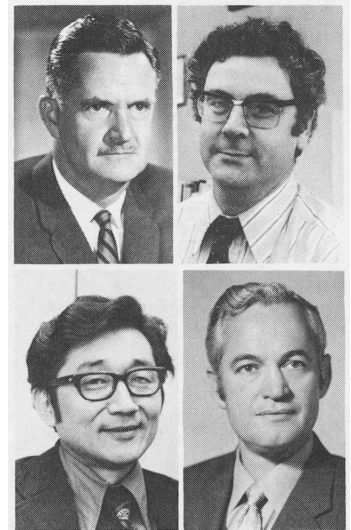


firing systems, environmental protection systems, and for the safe fielding and execution of the laboratory's nuclear explosive tests. He was responsible for fielding and detonating the nuclear explosives used in the Rio Blanco Project. His other responsibilities are in solar energy, *in situ* oil shale retorting, *in situ* coal gasification, and high explosive applications.

MODIFICATION OF THE COLONY TOWER FOR THE RIO BLANCO DETONATION

J. A. Blume (top left) (PhD, civil engineering, Stanford University, 1966) is president of URS/John A. Blume & Associates, Engineers, and a director of URS Corporation. Also affiliated with URS/Blume are structural engineer S. A. Freeman (top right) (MS, civil engineering, University of California, Berkeley, 1957), structural dynamics engineer K. K. Honda (bottom left) (MS, civil engineering, San Jose State College, 1967), and vice-president L. A. Lee (bottom right) (BS, civil engineering, University of California, Berkeley, 1951). All four authors are registered professional engineers with long-term experience in evaluating structural response to ground motion due to underground nuclear detonations and seismic disturbance.

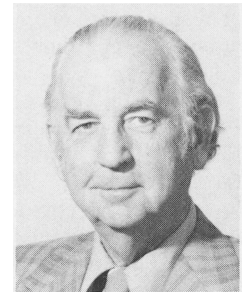
*John A. Blume
Sigmund A. Freeman
Kenneth K. Honda
Lloyd A. Lee*



PROJECT RIO BLANCO GROUND MOTION STUDIES

E. D. Alcock (PhD, physics, California Institute of Technology, 1935) was senior geophysicist for CER Geonuclear Corporation, sponsor of Project Rio Blanco. He designed and executed the primary seismic effects program for the project. Now retired, he is continuing investigations into the effect of site environment on seismic response.

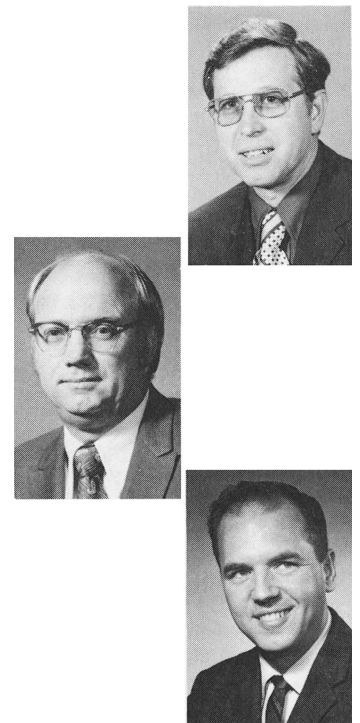
E. D. Alcock



THE RIO BLANCO EXPERIMENT: SUBSURFACE AND SURFACE EFFECTS AND MEASUREMENTS

John Toman (top) (BS, United States Military Academy, West Point, 1953; MS, engineering and physics, University of Illinois, 1959) has been actively engaged in the Plowshare and Energy Resource Programs at Lawrence Livermore Laboratory since 1964. He has served as the project scientist for numerous nuclear explosive experiments including Project Gasbuggy, Project Ketch, Project Rio Blanco, and the Interoceanic Canal Studies. In 1970 he assumed the duties as leader of the Plowshare I Group—Gas and Oil Stimulation, Storage, and Nuclear Excavation. In May 1975, he became leader of the Earth Sciences Test Support Programs. Clyde J. Sisemore (center) (MS, physics, University of California at Berkeley, 1963) is a staff scientist at Lawrence Livermore Laboratory investigating the phenomenology of nuclear explosions. Major research activities include field measurement of close-in hydrodynamic parameters and development of specialized transducer systems. Robert W. Terhune (bottom) (BS, physics, San Diego State College, 1961; MS, applied science, University of California, Davis at Livermore, 1967) is group leader of Applied Rock Mechanics at Lawrence Livermore Laboratory. His research activities include a developed surface motion measurement program for cratering experiments and stress wave propagation in earth media.

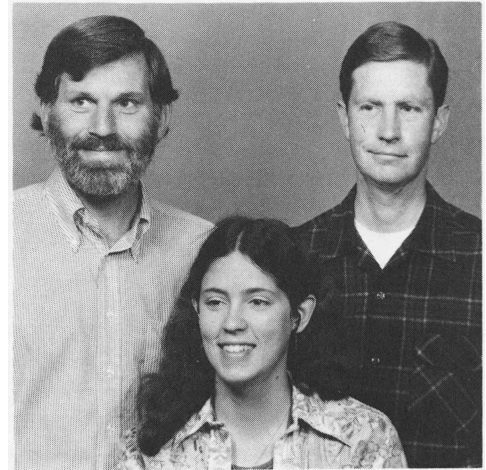
*J. Toman
C. Sisemore
R. Terhune*



HEATING EFFECTS IN RIO BLANCO ROCK

R. W. Taylor (left) (PhD, Pennsylvania State University, 1960) is a geochemist in the Chemistry and Materials Science Department at Lawrence Livermore Laboratory. He has worked on the thermal and chemical effects of nuclear explosives in mining. Presently he is studying *in situ* oil shale and coal processing. P. E. Rossler (center) (junior microbiology student, San Jose State University) spent the summers of 1974 and 1975 at Lawrence Livermore Laboratory as a trainee under a fellowship program of the Associated Western Universities. During the summer of 1975 she worked on the kinetics of the reaction of steam with coal char. D. W. Bowen (right) (technical associate, Research Engineering Division, Lawrence Livermore Laboratory) for the past three years has designed and conducted geochemical experiments directed to the use of nuclear explosives for natural gas and oil production. His current interests are *in situ* coal gasification and alternate fuels.

R. W. Taylor
D. W. Bowen
P. E. Rossler



PORE PRESSURE ENHANCEMENTS OBSERVED ON RIO BLANCO

J. R. Banister (top) (PhD, Iowa State University, 1953) is the department manager of the Test Effects Department of Sandia Laboratories. His current interests are weapon effects and fluid mechanics. D. M. Ellett (D. Eng., mechanical engineering, Yale University, 1952) is a staff member at Sandia Laboratories. He is currently working on structural dynamics and explosive effects.

John R. Banister
D. M. Ellett



VERIFYING THE COHERENCY TRANSFER FUNCTION GROUND MOTION PREDICTIONS FOR MULTIPLE UNDERGROUND EXPLOSIONS

Dean V. Power (BS, University of Utah, 1959; MS, San Jose State College, 1968) is a senior physicist in the Research Department, Energy Resource Development, El Paso Natural Gas Company. For the past seven years his interests have included ground motion prediction, seismic effects data acquisition, and effects assessment as part of nuclear explosive stimulation and hydraulic fracturing stimulation research.

Dean V. Power



PRODUCTION TEST DATA AND PRELIMINARY ANALYSIS OF TOP CHIMNEY/CAVITY

John Toman (BS, United States Military Academy, West Point, 1953; MS, engineering and physics, University of Illinois, 1959) has been actively engaged in the Plowshare and Energy Resource Programs at Lawrence Livermore Laboratory since 1964. He has served as the project scientist for numerous nuclear explosive experiments including Project Gasbuggy, Project Ketch, Project Rio Blanco, and the Interoceanic Canal Studies. In 1970 he assumed the duties as leader of the Plowshare I Group—Gas and Oil Stimulation, Storage, and Nuclear Excavation. In May 1975, he became leader of the Earth Sciences Test Support Programs.

John Toman

