

NORTHERN CALIFORNIA GEOLOGICAL SOCIETY



MARCH MEETING ANNOUNCEMENT

- DATE:** Wednesday, March 27, 2002
- LOCATION:** Orinda Masonic Center, 9 Altarinda Rd., Orinda
- TIME:** 6:30 p.m. Social; 7:00 p.m. talk (no dinner)
Cost is \$5.00 per person
- RESERVATIONS:** Leave your name and phone number at 925-736-6039 or at danday94@pacbell.net before the meeting.
- SPEAKER:** Donald L. Gautier, USGS Menlo Park

The Ghost of Malthus, The Global Greenhouse, and The Perilous Geography of Petroleum

The rise of the United States of America as a cultural force in the 20th Century has been powered by petroleum. As late as 1951, the USA produced more than half the world's oil. Now America accounts for less than 9 percent of world production and for less than 50 percent of its own demand, making it the world's largest oil importer. Meanwhile, U.S. coal production is at an all-time high and on a per capita basis the United States emits almost three times as much carbon dioxide as do the countries of Western Europe.

To meet the requirements of the Kyoto Protocol would require Americans to reduce their gasoline consumption and to increasingly rely on natural gas rather than coal for electricity generation. It is widely believed that a natural gas economy will provide the bridge to a sustainable, low-carbon energy future. However, in spite of many new wells, U.S. natural gas production has not increased, suggesting that rising consumption may require greatly increased importation of liquefied natural gas. Increasing reliance on imports presumes the existence of resources to import.

The mature state of oil and gas development in the U.S. and Europe is sometimes used to argue that the world faces an imminent shortfall in petroleum, but the data do not support such a claim. Instead, slightly more than 20 percent of the world's foreseeable endowment of petroleum and about 7 percent of the world's recoverable gas have been produced so far. But while most fossil fuel consumption is in the highly developed countries, remaining oil and gas resources are concentrated far from the United States, Japan and Western Europe. More than 50 percent of the world's petroleum is in just six basins, five of them near the Persian Gulf. Natural gas is concentrated in the Middle East and in the Former Soviet Union. How the United States

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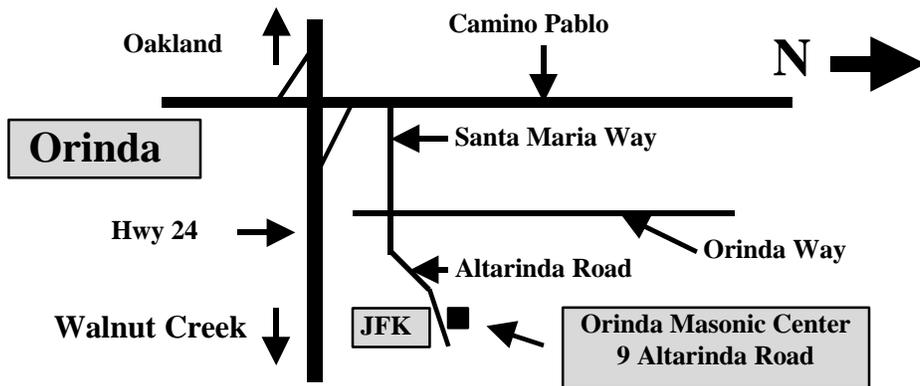
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faces the perilous environmental and political geography of fossil fuels could define the global political landscape in the 21st Century.

Don Gautier took his Ph.D. in Geology from the University of Colorado, Boulder, and worked for Mobil Exploration in Denver before joining the U.S. Geological Survey in 1977. His research at the Survey has focused on energy resource supply. Gautier was first author of the 1995 National Assessment of Oil and Gas Resources, and he is now a project scientist on the World Energy Project. His current research is focused on changes in reserves in existing fields and on interdisciplinary studies of resource geology, technology, and economics.

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Would you like to receive the NCGS newsletter by e-mail? If you are not already doing so, and would like to, please contact **Dan Day** at danday94@pacbell.net to sign up for this service.

NCGS 2002 Calendar

Wednesday, March 27, 2002

Donald L. Gautier, USGS Menlo Park

“The Ghost of Malthus, the Global Greenhouse, and the Perilous Geography of Petroleum”

Orinda Masonic Center

Saturday, April 6, 2002 Field Trip

Morgan Sullivan, Raymond Sullivan, John Waters, and Rick Yarborough

“Geology and Sequence Stratigraphy of Black Diamond Mine”

Black Diamond Mines Regional Preserve

Wednesday, April 24, 2002

John Gabelman, Consultant

“Hydrous Carbonatitic(?) Volcanism in Central Wyoming” (tentative title)

Orinda Masonic Center

Wednesday, May 15, 2002 AAPG Distinguished Lecture

James Harrell, The University of Toledo, Toledo, Ohio

“Archaeological Geology in Egypt: Ancient Oil Wells and Mummy Bitumen, Earliest Geological Map, First Paved Road, Pyramid Temple Pavements, and the Sphinx Age Controversy”

Orinda Masonic Center

Saturday, May 18, 2002 Field Trip

Ron Crane, Consultant, and *Craig Lyon*, retired Chevron

“Structure and Geology of Mount Diablo” (Tentative title)

Details to be announced.

Bay Area Geophysical Society

Oz Yilmaz of Anatolian Geophysics in Turkey will talk about *"A Unified 3-D Seismic Workflow."* The talk will be Monday March 25 or Tuesday March 26. Check back later for exact details.

John Etgen of BP in Houston will talk *about "High-end Imaging for Exploration and Development."* Exact title TBA. The talk will be sometime this Winter or Spring 2002.

Geoffrey Dorn of BP Center for Visualization, University of Colorado will present the SEG 2002 Spring Distinguished Lecture, titled: *"The Role of Visualization in Resource Exploration and Development."* The talk will be tentatively set for May 7, 2002

Jon Claerbout of Stanford University is tentatively scheduled to speak this Winter 2002. The talk will most likely be at the Chevron Visualization Center in San Ramon. Please check back later for more details.

The SEG will announce a Fall Distinguished Lecture for the Autumn of 2002

Please check the BAGS website at <http://sepwww.stanford.edu/bags/> for meeting updates.

February Speaker Chronicles the Early Exploration of the Highest Sierra

The February 27th NCGS meeting featured renowned USGS geologist **Dr. James G. Moore**, who presented a captivating historical account of the first westerners to venture into the highest summits of the Sierra Nevada Range. Dr. Moore's lecture followed the title of his recent book *Exploring the Highest Sierra*. It revealed the fascinating story of early surveyors and geologists whose determination and adventurous spirits compelled them to chart this unexplored wilderness.

The "highest Sierra" refers to the southern portion of the Sierra Nevada Range within, and east of, Sequoia and Kings Canyon National Parks. The southern Sierra Nevada has the highest peaks in the range, with 12 summits over 14,000 feet high. It was largely unexplored until the 1849 Gold Rush era, when the settling of California drove settlers to unravel its complex geology and conquer its towering peaks.

The story begins with John Charles Fremont, explorer and military officer, born to a Frenchman and a native Virginian in Savannah, Georgia, in January, 1813. After his father's death in 1818, the family moved to Charleston, South Carolina, where he entered Charleston College in 1828. Although Fremont excelled in mathematics, his inattentiveness and absenteeism resulted in his expulsion. He taught mathematics on the warship *Natchez* and upon its return from a two-year cruise, he was awarded a degree from his former alma mater, Charleston College. Fremont passed an exam for a professorship in the U.S. Navy, and subsequently became an assistant engineer in the U.S. Topographical Corps to survey a projected railroad route through the Appalachian Mountains from Charleston to Cincinnati. In 1837 he aided in a military reconnaissance of the mountainous Cherokee country in Georgia, North Carolina, and Tennessee in preparation for an anticipated Indian uprising.

Fremont participated in topographic surveys of lands north of Missouri, the Des Moines River, and the Rocky Mountains in Wyoming. With these expeditions under his belt, Fremont was determined to explore uncharted land between the Rockies and the Pacific Ocean. His travels took him to the Great Salt Lake, the Columbia River valley, and Fort Vancouver. On November 10, 1843, he and his 39 men set off from the lower Columbia River basin to the upper Colorado watershed, but inclement weather forced his party to take shelter in the Great Basin. Knowing that the party could not survive the winter in this cold, dry desert, Fremont used astronomical techniques to pinpoint their location and set out to cross the Sierra Nevada Range to the west without the help of native guides. His party, which included famous scout Kit Carson, accomplished this formidable task in 40 days, and reached Sutter's Fort on the Sacramento by way of Carson Pass in early March, 1844.

The grueling trek emaciated his men and cost them nearly half of their pack animals. The party mapped the west side of the Sierras and returned to Kansas by crossing the Sierras a second time, taking a route past Great Salt Lake. In the Spring of 1845, Fremont was commissioned to explore the Great Salt Lake again, and the coastal regions of Oregon and California. His party crossed the Sierras in the winter of 1845-46 after exploring the watersheds of the Pacific northwest. The group discovered Owens Lake, the Owens River, Walker Lake, and Tulare Lake. The group had split several months earlier, but rejoined in San Jose in early 1846. Fremont left his men and went to Monterey to obtain permission from Mexican authorities to explore more of California. Although he was initially permitted to continue his survey, strained relationships between the United States and Mexico resulted in his being ordered to leave California at once. Exhaustion and lack of supplies made it impossible for Fremont and his men to leave. The 62-man force took up position on Hawk's Peak about 30 miles from Monterey and built a crude fort to defend themselves. After a four-day standoff, the greatly outnumbered Americans withdrew in the quiet of night and headed northward through the Sacramento Valley to Oregon. An emissary of the U.S. government met him there and presented him with a message from Washington, D.C., ordering him to watch over American interests in California. He drove the Mexican forces out of northern California and was elected governor of California by the American settlers on July 4, 1846. Forces led by Commanders Stockton and Sloat eventually captured Monterey. Now that war had been declared between the United States and Mexico, the combined forces secured California as a permanent U.S. territory under articles of capitulation drawn up by Fremont and signed by the Mexican authorities.

Caught in a conflict between his commander, Stockton, whom he supported, and the recently arrived General Stephen Kearny, Fremont was subsequently charged with mutiny. Although not found guilty of mutiny, Fremont was dismissed from military service and voluntarily resigned his commission to set out in mid-October, 1848, to find a route to California by way of the Rio Grande. Crossing hostile Indian territory, Fremont again attempted to cross the Sierras in mid-winter, with disastrous results. The small party lost one-third of its men and all of its pack animals, forcing them to retreat to Santa Fe. Fremont regrouped and eventually discovered a safe route through the Sierras to Sacramento, which he reached in the Spring of 1849. Fremont was the first Senator of the State of California, made a close but unsuccessful bid for the Presidency in 1856, and subsequently served the Union cause in the Civil War. He withdrew his nomination for Republican candidate in the 1864 Presidential election, was active in land purchases for major railroad interests after the war, and served as Arizona Territory governor from 1878-1881. His cartographic contributions to the remote

high Sierra Nevada Range, considering the tremendous obstacles involved, are impressive.

Based in part on Fremont's surveys, the first geologic map of California was issued by Blake in 1855. It was, however, only a first approximation to reality. More work was needed, and an enthusiastic young geologist named Clarence King would supply this. King was born in 1842 in Rhode Island, and graduated from Yale University's Sheffield Scientific School in 1862, where he was inspired by the legendary mineralogist James Dwight Dana (remember *Dana's Manual of Mineralogy?*). Dana had participated in the 1838-1842 Wilkes Expedition and had characterized geologic features on Mount Shasta in California, then considered the tallest peak in America. After graduating from Yale, King and his close friend Jim Gardiner set out for California. On a steamer heading from Sacramento to San Francisco they met Professor William H. Brewer, who would later join them in their geological exploits. In California, King and Gardiner joined the California Geological Survey, headed by Josiah Whitney. In 1863, Whitney assigned King to study the mariposa gold mine. While there, he discovered a belemnite (squid-like creature) fossil in gold-bearing shale that helped establish a date for the Sierra Nevada granites. While in Mariposa, King observed the distant peaks of the high Sierra and pondered whether these pinnacles were not higher than Mount Shasta. In 1864, King was accompanied by Dr. Brewer, Gardiner, and Charles Hoffman, chief topographer, on a jaunt into the high country of the upper Kern River watershed. The group carried a mercury barometer to note elevation, which would be later compared to readings taken daily on a similar barometer kept in the Central Valley town of Visalia.

King and his entourage of Brewer, Hoffman, and Gardiner explored the highest Sierra in the summer of 1864. They scrambled up the moraines to Mount Brewer and explored the headlands of the Kern River, which flows southward out of the high Sierras. After days of arduous climbing, the group reached what they thought was the crest of the Sierras, only to find that their goal lay further to the east. King reached the summit of Mount Tyndall, named after the famous European Alpine mountaineer, and took a bearing on Mount Whitney. When Brewer returned to Visalia to get a tooth pulled, King twice attempted to scale Mount Whitney, but was turned away by inclement weather. Only a few hundred feet shy of the summit, he recorded an elevation of about 15,000 feet.

In 1871 King returned to the area and summited what he thought was Mount Whitney, taking his bearings from a survey made by Jim Gardiner from the Owens Valley. Proclaiming that he had scaled the tallest peak in America, King was horrified when Watson Goodyear scaled the same pinnacle, now known as Mount Langley, under clearer weather conditions than King had, and viewed the higher Mount Whitney several miles to the north. King was out of

state, and returned two years later to conquer the peak, but had been beaten by three local fishermen, Charley Begole, Johnny Lucas, and Al Johnson, who set foot on the summit at noon on August 18, 1873. Clarence King reached the top on September 19th, having made the fourth ascent. On October 21, 1873, John Muir scaled Whitney from the east, by way of the treacherous Mountaineers Route, after an unsuccessful attempt from the southwest. Owens Valley residents wanted the mountain renamed Fisherman's Peak. Following much debate, the Governor ended the dispute by vetoing a bill to name it Fisherman's Peak, and Mount Whitney became its official moniker.

Always the politician, King convinced the U.S. Congress to fund a 40th Parallel Survey (1867-1872) to characterize this essentially unknown part of America. The successful management of this project led to King becoming the first director of United States Geological Survey in 1879. King eventually supported John Muir's concept of the glacial origin of Yosemite Valley, and published the results of an 1870 expedition to Mount Shasta in the *American Journal of Science*. He revealed the Great Diamond Hoax of 1872 as a fraud and avoided a serious national financial catastrophe, conducted mineral resource and precious metal surveys to serve the mining industry, and published the acclaimed geologic text *Systematic Geology* in 1878. His resignation as USGS director in 1881 marked the end of his stellar scientific career and the beginning of a series of financial failures, including several ill-fated mining ventures. In 1888 he married Ada, a black woman, who bore him five children. The potentially scandalous nature of this union forced him to keep his marriage secret from his prestigious Rhode Island family. After boisterous outbursts accompanying his poor mental and physical health, he died in Arizona on December 24, 1901.

The exploits of John Fremont and Clarence King, both easterners, helped open up the more remote areas of the highest Sierra. Their efforts promoted settlement and mining operations, and boosted the California economy. And King himself has been recognized as one of the premier geologists of the Nineteenth Century. His scientific and organizational skills contributed to the accurate survey of the Oregon-California territories, and helped establish the U.S. Geological Survey as an important government agency.

This fascinating chapter of California's history was eloquently described by Dr. Moore, and richly illustrated by the old photographs and maps that he displayed during his presentation. These early pioneers also played a major role in our national history and were politically significant figures of their time. It is fitting that at this point in his career, Dr. Moore has focused on the historical background of a field area that he has studied for forty years. The NCGS sincerely thanks him for sharing this enlightening historical account of the exploration of the highest Sierra with its members.

NCGS Selects Recipient for 2002 Earth Science Teacher of the Year Award

Ms. Joan Carter, a full-time Earth Science teacher at Branham High School in San Jose, CA., has been selected to receive the annual \$500 award for excellence in Earth Science education from the Northern California Geological Society, at its March 27 meeting in Orinda, CA.

Ms. Carter has 12 years' teaching experience with the Campbell Union High School District. Her Earth Science course is based on California science content standards, presents concepts in the context of Problem Based Learning exercises, incorporates web-based technology and resources, and is fine-tuned by student feedback. The course integrates concepts of the formation and erosion of earth materials with the uses of mineral products, mining and reclamation activities, water resource supply issues, and the engineering geology of road construction. The unit includes field outings to the Almaden Quicksilver Park (a former mercury mine), and she is interested in incorporating additional fieldwork into the course. (Members with ideas for outings in the San Jose-Santa Cruz area are invited to submit suggestions).

Ms. Carter's approach to Earth Science teaching is proactive and creative. Her decision to focus on Earth Science led to an involvement with the Bay Area Earth Science Institute, and the development of teaching modules through San Jose State University. Her efforts at interdisciplinary curriculum design played an integral role in the recognition of Branham as a California Distinguished School, a U.S. Blue Ribbon School, and a participant in the California High School Network Project.

The NCGS award recognizes balanced incorporation of natural resource and environmental sustainability concepts in pre-college earth science curricula. The award is a component of a national award program sponsored by the AAPG Foundation. Ms. Carter's application will be submitted to a \$500 regional competition sponsored by the AAPG Pacific Section. The regional winner will be submitted to AAPG headquarters in Tulsa for participation in the \$5,000 national contest.

Biggs Award For Excellence In Earth Science Teaching For Beginning Professors

Purpose: To reward and encourage teaching excellence in beginning professors of earth science at the college level.

Eligibility: Earth science instructors and faculty from all academic institutions engaged in undergraduate education, who have been teaching full-time for 10 years or less. (Part-time teaching is not counted in the 10 years.)

Award Amount: An award of \$750 is made possible as a result of support from the **Donald and Carolyn Biggs Fund**, maintained by the GSA Foundation, the GSA Geoscience Education Division, and GSA's Science, Education & Outreach Programs. This award also includes up to \$500 in travel funds to attend the award ceremony at the GSA annual meeting.

Deadline and Nomination Information: Nomination forms for the 2002 Biggs Earth Science Teaching Award can be located at www.geosociety.org or by contacting **Leah Carter** at (303) 357-1037 or mailto: lcarter@geosociety.org.
Nominations must be received by May 1, 2002.

Mail Nomination Packets to:

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William E. Crain Receives The AGI William B. Heroy, Jr. Award For Distinguished Service

ALEXANDRIA, VA — The American Geological Institute (AGI) is pleased to announce that William E. Crain and Robert L. Heller (posthumous) will receive the William B. Heroy, Jr. Award for Distinguished Service. The award will be presented on Sunday, March 10, in Houston, during the AGI Past Presidents and Guests dinner held in conjunction with the annual meeting of the American Association of Petroleum Geologists, an affiliated member society. The Heroy Award is presented annually to a geoscientist in recognition of outstanding service to the Institute and to the geoscience profession.

Crain and Heller were instrumental in generating the vision and support for the development of AGI's new and innovative secondary-school Earth science curricula. "With the geosciences affecting so many aspects of our lives and our society," noted Marcus E. Milling, AGI Executive Director, "Bill and Bob both recognized early on the need for strong, new and creative educational programs in the Earth sciences so that the next generation has the scientific background to make well-informed decisions." Added Milling, "Bill's and Bob's personal commitment and joint leadership in pursuing this important investment in the future of our society and our profession qualifies them for this Distinguished Service Award."

Bill Crain, working with Bob Heller, initially secured financial support from Chevron Corporation to begin the development of Investigating Earth Systems™, a nine-unit program for middle-school students. In 1997, Crain continued this effort, together with Jan van Sant, Executive Director of the AGI Foundation, and Thomas Hamilton of EEX Corporation, in successfully raising \$2.5 million for AGI educational programs over the next three years. Crain also helped increase the effectiveness of the AGI Foundation by enlisting the senior geologists of major petroleum corporations and independent producers to actively support the goals and participate in the activities of AGI and the AGI Foundation.

Crain had a distinguished career as a geologist and senior executive with Chevron Corporation before retiring in 1994 as Vice President of Chevron's worldwide exploration and production activities and a member of Chevron's Board of Directors. He is a graduate of the University of Minnesota, Duluth and served in the U.S. Air Force. Crain is a long-time member of the AGI Foundation. He currently lives in Danville, CA, with his wife, Jean.

Heller, who passed away in 1993, established the geology department at the University of Minnesota – Duluth where he taught a variety of courses. Over the years, he advanced from professor to chancellor of the Duluth campus. Heller was passionate about educating young people and in the 1960s served as director of AGI's Earth Science Curriculum Project (ESCP) and editor of Investigating the Earth, AGI's flagship Earth science textbook. He was President of the National Association of Geology Teachers from 1976 to 1977 and was President of AGI in 1979. Heller received the Ian Campbell Award from AGI in 1985.

To date, the Investigating Earth Systems™ curriculum has been adopted in 26 states. This program, along with the 5-unit Earth System Science in the Community (EarthComm™) for grades 9-12, is being developed in accordance with the National Science Education Standards and the American Association for the Advancement of Science – Project 2061's Benchmarks for Science Literacy. Both curricula consist of inquiry-based modules that can be used as stand-alone units or as a full course presented in any order. They are commercially available from It's About Time Publishing (www.its-about-time.com).

The American Geological Institute's Distinguished Service Award is presented in honor of one of the outstanding geologists of the 20th century, William B. Heroy, Jr. Heroy advanced the use of geophysics in petroleum exploration and in geologic research worldwide. Recipients of this award are measured against his exemplary career.

The American Geological Institute is a nonprofit federation of 39 geoscientific and professional associations that represent more than 120,000 geologists, geophysicists, and other earth scientists. Founded in 1948, AGI provides information services to geoscientists, serves as a voice of shared interests in our profession, plays a major role in strengthening geoscience education, and strives to increase public awareness of the vital role the geosciences play in mankind's use of resources and interaction with the environment. More information about AGI can be found at <http://www.agiweb.org>. The Institute also provides a public-outreach web site, <http://www.earthscienceworld.org>.

"Drinking Water Source Assessment and Protection in Groundwater and Surface Water"

May 1 & 2, 2002 - Sacramento
May 16 & 17, 2002 - Newport Beach
June 5 & 6, 2002 - South San Francisco Bay Area

For Complete Announcement & Registration Options: <http://www.grac.org/dwsap.html>

Organized and Sponsored by:
University of California, Davis, Groundwater Resources Association of California, California Department of Health Services

In Cooperation With:
Association of California Water Agencies, California Rural Water Association
Natural Resources Section - California State Bar

Course Description

Drinking Water Source Assessment and Protection (DWSAP) is California's answer to federal mandates for wellhead protection and source water assessment. It is one of many pillars for sustainable development and protection of water resources in California. Today, through the implementation of programs such as DWSAP, professionals, executives, and employees of diverse backgrounds and in a wide variety of private, non-profit, and government responsibilities at the local, state, and federal level are directly or indirectly involved in the management and assessment of groundwater and surface water. Yet, many find themselves lacking the multidisciplinary background, expertise, or means to meet the technical and regulatory challenges related to water and drinking water resources management. The amount of technical information available is often overwhelming.

This Course will review the fundamental principles of groundwater and watershed hydrology, water quality, and water contamination. It will provide an overview of the most common tools for measuring, monitoring, and assessing groundwater and surface water resources, particularly with respect to California's DWSAP program. The Course is specifically geared towards an audience that is involved in the management and assessment of water resources. Course attendees, who may have some experience but no formal training in hydrology or related engineering or science fields, will benefit from the basic Course goal to provide a good understanding of the topics as listed below.

The Course will be taught by experienced instructors with a broad, in-depth knowledge of California groundwater and watershed hydrology and of California's Drinking Water Source Assessment and Protection Program. Participants will be given a set of booklets that address the Course topics and accompany the lectures.

Who Should Attend

The Course is geared to consultants, and technical and management personnel in private and public water supply companies, irrigation districts, water districts, local and state agencies, and in resource conservation districts. While focusing on drinking water source assessment and protection in the second half of the Course, it is also a good introduction to water resources assessment and monitoring for watershed advisors, watershed group participants, and members of environmental and stakeholder groups and citizens alliances.

Course Topics

- Overview of California's Drinking Water Source Assessment and Protection Program
- Surface Water Hydrology and Watersheds
- Groundwater Hydrology
- Water Rights and Water Law
- Surface Water Quality
- Groundwater Quality, Sampling and Monitoring
- Surface Water Contaminants
- Groundwater Contamination
- Delineation of Surface Water Sources
- Delineation of Groundwater Sources
- Potentially Contaminating Activities
- Vulnerability Assessments
- Protecting Water Resources
- Drinking Water Source Assessment and Protection: Case Studies
- Use of TurboSWAP to file a Drinking Water Source Assessment with CA DHS

Course Benefits At the end of the Course, participants will have a greater understanding of:

- Groundwater flow and groundwater quality
- Watershed hydrology, river water quality, and water contamination
- The professional vocabulary used in water resources reports
- Water resources investigation tools used to measure, assess, and monitor groundwater and surface water properties and processes
- Drinking water source assessment and protection
- The relationship between a Source Water Assessment and a Watershed Sanitary Survey
- The scope, limitations, and pitfalls of various options in DWSAP and where to take the initial DWSAP
- How to prepare an effective DWSAP

Continuing Education Credit

This Course is DHS-approved for 14 Continuing Education contact hours for California water system operators.

Additional Information

Please visit the GRA web site at <http://www.grac.org/dwsap.html> or contact Kathy Snelson, GRA Executive Director, at executive_director@grac.org or (916) 446-3626.