



Environmental Science International - Principle Resume

Howard B. West, Ph.D.

Years Experience: 20

EDUCATION

- Ph.D. Geology & Geophysics, 1988, Rice University, Houston Texas. Thesis: "The Origin and Evolution of Lavas from Haleakala Crater, Hawaii"
- M.S. Geology/Geophysics, 1982, University of Hawaii at Manoa. Thesis: "The Chemical Evolution of Laupahoehoe Group Alkalic Lavas, South Rift, Mauna Kea, Hawaii"
- B.S. Geology/Geophysics, 1979, University of Hawaii at Manoa.
- B.A. Communication, 1979, University of Hawaii at Manoa.
- High School Diploma, Kamehameha High School, 1972.

PROFESSIONAL AFFILIATIONS AND CERTIFICATIONS

- American Geophysical Union, since 1981.
- Geochemical Society, since 1981.
- University of Hawaii, Department of Geology & Geophysics, Member of Graduate Faculty, Elected Fall 1993.
- American Red Cross Certification, First Aid & Safety and CPR, 2000.
- Certified Environmental Systems Manager, CESH 1566.
- Certified Radiation Safety Officer, 2003.
- NITON XRF Spectrum Analyzer Certification, 2001.
- Nuclear Gauge Certification, 2003.
- OSHA HAZWOPER and HAZCOM 40-Hour Certification with 8-hour annual refresher.
- Registered Professional Geologist, Tennessee, TN4453.
- U.S. Army Corps of Engineers, Construction Quality Control Management Certification, 1998.

SUMMARY OF QUALIFICATIONS

Dr. West is the Executive Vice President of ESI and is one of the two founding members of the corporation. He provides technical oversight and direction for all ESI projects and has over twenty years of professional experience. Prior to the formation of ESI, Dr. West was the Technical Director of a small, disadvantaged, environmental consulting firm in Hawaii.

Providing technical oversight or acting as Project Manager, Dr. West has been involved in numerous environmental projects, including Phase I and Phase II environmental site assessments, groundwater and soil investigations, petroleum hydrocarbon remediation, release response assessments, NPDES permits, underground and above-ground storage tank investigations, environmental plan preparation (hazardous waste management plans, exposure prevention management plans, health and safety plans, sampling and analysis plans, environmental protection plans, chemical data acquisition plans, release prevention control and countermeasure plans, storm water pollution control plans, spill prevention control and countermeasure plans, and spill response plans), emergency response coordination at petroleum release sites, environmental management system (including ISO 14001) consultation, lead-based paint and asbestos assessment and abatement projects, and environmental monitoring during construction.

A former faculty member at the University of Hawaii, Dr. West has extensive geologic field experience in Hawaii and has been the principal investigator and project manager on numerous projects involving



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the geochemistry, geology, and volcanology of the Hawaiian Islands. Specialties include designing and implementing field and laboratory strategies for studying geochemical and geologic problems. He has extensive experience in major element, trace element, and radiogenic isotope analyses of rock and geothermal fluid samples involving several analytical techniques, including x-ray fluorescence, inductively coupled plasma emission-mass spectrometry, instrumental neutron activation analysis, and thermal-ionization mass spectrometry.

PROFESSIONAL EXPERIENCE

Example Projects at Commercial Sites:

Phase I and Phase II Environmental Site Assessments at Commercial and Industrial Facilities in Hawaii. Project Manager for numerous Phase I and Phase II Environmental Site Assessments at commercial facilities throughout Hawaii. Tasks included background site research, site inspections, coordinating suspect asbestos-containing building material and suspect lead-based paint inspections, conducting subsurface soil and groundwater investigations, supervising soil gas surveys, and preparing technical reports.

Phase I and Phase II Environmental Site Assessment at a Commercial Facility in Honolulu, Hawaii. Project Manager for a hazardous materials assessment (Phase I) and preliminary site characterization assessment (Phase II) at a former paint warehouse facility. Tasks included conducting a soil gas survey using Strataprobe drilling techniques, performing a lead-based paint assessment, interpreting chemical data, performing the QA/QC evaluation of the chemical data, and writing the technical report.

Emergency Release Response Cleanup and Assessment, Schofield Barracks, Hawaii. Project Manager and Field Manager for a release response cleanup and assessment at Schofield Barracks, Hawaii, in response to a wide-scale petroleum release that occurred during a storm event. Personally directed the cleanup of free-phase petroleum floating on ponded water, the removal of 2,000 gallons of impacted water from the storm sewer system, and the excavation and disposal of impacted soil and contaminated construction materials. Performed an assessment of residual soil contamination and prepared technical reports, including the final assessment report, which was submitted to state and federal agencies. Following the cleanup and assessment, provided on-site guidance for the implementation of engineered controls necessary to prevent future occurrences.

Environmental Remediation and Assessment During Asphalt Plant Closures on Hawaii and Oahu, Hawaii. Project Manager and Field Manager for the remediation and environmental assessment of asphalt plants on Hawaii and Oahu. Responsibilities included site evaluation, site inspections, release reporting, remedial design and oversight, and post-remedial assessment.

Groundwater Monitoring Program Oversight and Management for Commercial Service Station Facilities on Oahu, Hawaii, and Maui, Hawaii. Program Director for overseeing and managing ongoing groundwater monitoring programs at fifteen service station facilities. Tasks include project oversight; the interpretation and QA/QC evaluation of chemical data; providing recommendations concerning regulatory actions; the preparation of quarterly, semiannual, and annual groundwater monitoring reports; and interaction with regulatory personnel.

Groundwater Investigations at Commercial Facilities on Oahu, Hawaii, Maui, Molokai, and Kauai, Hawaii. Project Manager for numerous groundwater investigations at facilities in Hawaii that operate underground storage tanks. Tasks included project oversight, interpretation and QA/QC evaluation of chemical data, providing recommendations concerning regulatory actions, the preparation of detailed technical reports, and interaction with regulatory personnel.



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Emergency Release Response at Underground Storage Tank Facilities in Hawaii. Project Manager for responding to releases at underground storage tank facilities. Responsibilities included planning, organization, and coordination of the release response and subsequent abatement. Performed field oversight, provided Department of Health notification, and prepared release response reports.

Due Diligence Site Assessments at Commercial Service Station Facilities on Oahu, Hawaii, and Maui, Hawaii. Project Director Manager for conducting due diligence site assessments at twenty commercial service stations on Oahu, Maui, and Hawaii. The assessments were conducted as part of a large-scale property transaction and they included the drilling of numerous soil borings and the collection of soil and groundwater samples. Tasks included project oversight, release reporting, interaction and coordination with regulatory personnel, and the preparation of detailed technical reports for all sites.

Initial Site Assessments at Commercial Facilities in Hawaii. Project Manager for conducting initial site assessments at commercial facilities on Oahu and Maui that operate underground storage tanks. The site assessments included the drilling of soil borings, the installation of groundwater monitoring wells, and the collection of soil and groundwater samples. Tasks included project oversight, providing recommendations, interpretation and QA/QC evaluation of chemical data, site history research, and the preparation of detailed technical reports.

Underground Storage Tank Closure and Closure Assessments at Facilities in Hawaii. Prepared underground storage tank closure and release response reports for numerous facilities on Oahu, Hawaii, Kauai, Maui, and Molokai. Responsibilities included project oversight, field oversight, personnel training, and release notification.

Environmental Assessments During Underground Storage Tank System Upgrades for EPA Compliance, Commercial Facilities in Hawaii. Project Manager for environmental assessments conducted as part of underground storage tank system upgrades at commercial facilities on Oahu, Hawaii, and Maui. The upgrades were performed to comply with the EPA requirements taking effect on December 22, 1998 (40 CFR 280.21). The assessments included release evaluation, sampling, and recommendations. Responsibilities included project oversight and the preparation of technical reports.

Free-Phase Petroleum Product Evaluation, Commercial Facilities in Hawaii. Directed and managed the sampling, analysis, and evaluation of free-phase petroleum product at petroleum release sites in Hawaii. The petroleum product was floating on the water table beneath the release sites, principally underground storage tank facilities and bulk petroleum fuel storage terminals. The purpose of the investigations was to assess the origin of the product. Tasks included project oversight, providing recommendations, interpretation and QA/QC evaluation of chemical data, site history research, and the preparation of detailed technical reports.

Solid Waste Permit for Concrete and Asphalt Recycling Plant on Oahu, Hawaii. Designed and prepared all procedural and environmental documents required for a newly constructed concrete and asphalt recycling plant on Oahu. The documents included general procedures for acceptance of materials, acceptance criteria for incoming materials, an incoming material profile form, a list of approved laboratories, a request for clearance form, a plant-specific uniform solid waste manifest, a sampling and analysis plan for processed material, and a processed material profile form. Provided specific requirements for the position of Qualified Environmental Scientist and provided training recommendations. Currently provides ongoing consultation for evaluating laboratory data and approving incoming materials.

Hazardous Materials and Spill Response Training, Industrial Facilities in Hawaii. Provided hazardous materials and spill response training to facility personnel at industrial facilities in Hawaii.



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Training classes included solid and hazardous waste management, hazardous materials management, emergency spill response procedures, and SPCC and DOT requirements. Designed and prepared all training materials.

Asbestos and Lead-Based Paint Projects, Commercial Facilities in Hawaii. QA/QC Manager for numerous asbestos and lead-based paint assessment and abatement projects at commercial facilities in Hawaii. Tasks included project oversight, interpretation and QA/QC evaluation of asbestos and lead data, providing recommendations concerning regulatory actions, reviewing lead and asbestos hazard management plans for compliance with regulatory requirements, and reviewing final technical reports.

Environmental Oversight and Monitoring at Construction Projects, Various Commercial Facilities in Hawaii. Project Manager for environmental oversight and monitoring for construction projects at facilities in Hawaii. The construction projects involved the excavation of petroleum-hydrocarbon impacted soil. The environmental oversight included soil sampling and disposal of impacted soil. Tasks included project oversight, interpretation and QA/QC evaluation of chemical data, providing recommendations concerning appropriate disposal, and coordinating the transportation and disposal of impacted soil.

Groundwater Sampling, Monitoring, and Site Characterization at Commercial Facilities on Oahu and Kauai, Hawaii. Field Geologist for groundwater sampling, monitoring, and site characterization at commercial facilities that contained leaking underground storage tanks.

Site Characterization and Remediation of Petroleum Fuel Releases at Commercial Bulk Fuel Storage Terminals in Hawaii. Geochemist and QA/QC Manager for characterizing the nature and extent of petroleum fuel impacts to soil and groundwater at bulk fuel storage terminals on Oahu, Maui, and Hawaii. Participated in product recovery operations. Responsibilities included the interpretation of chemical data and the writing and editing of technical reports.

Hazardous Waste Management Operations Procedures for Commercial Bulk Fuel Terminals on Oahu, Hawaii, Maui, and Kauai, Hawaii. Designed and prepared Hazardous Waste Management Operations Procedures for six bulk fuel terminals in Hawaii. The procedures outlined the waste management program, described waste management facilities, discussed and outlined the guidelines for sampling and analyzing wastes, described the methods for the identification and classification of hazardous and non-hazardous wastes, identified appropriate waste storage procedures and the preparation of wastes for transport to TSD facilities, prescribed how to prepare waste specification documentation, and described the procedures for establishing a central filing system for waste management.

Spill Prevention, Control and Countermeasures Plans and SPCC Consultation for Industrial Facilities in Hawaii. Project Manager for the development and preparation of Spill Prevention, Control and Countermeasures [SPCC] Plans for asphalt manufacturing plants and precast plants on Oahu and Kauai. The plans detail the actions to be taken in response to releases of petroleum products and the engineering controls required to prevent releases. Tasks included the design and writing of SPCC Plans, facility inspections, training, and consultation with the EPA.

Release Prevention, Control and Countermeasures Plans for Asphalt Plants on Oahu, Kauai, and Maui, Hawaii. Project Manager for the development and preparation of Release Prevention, Control and Countermeasures [RPCC] Plans for asphalt manufacturing plants on Oahu, Maui, and Kauai. The plans detail the actions to be taken in response to releases of hazardous substances and petroleum products. Tasks included the design and writing of RPCC Plans for four facilities.

Exposure Prevention Management Plans at Commercial Bulk Fuel Terminals in Hawaii. Prepared Exposure Prevention Management Plans for commercial bulk fuel terminals on Oahu. The



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plans included the identification and evaluation of contaminant exposure pathways to human and environmental receptors and the development of strategies for monitoring identified exposure pathways.

NPDES Permitting and Storm Water Pollution Control Plans for Industrial and Commercial Facilities on Oahu, Kauai, and Maui, Hawaii. Project Manager for the preparation of NPDES permit applications and notice of intents [NOIs] and for the development and preparation of Storm Water Pollution Control Plans for industrial facilities, asphalt manufacturing plants, and bulk petroleum fuel terminals on Oahu, Maui, and Kauai. The plans called for managing storm water and meeting State of Hawaii Department of Health NPDES general discharge permit requirements. Tasks included the design and writing of the plans and the preparation of NPDES permit applications, including NOIs, for storm water generated by industrial activities.

NPDES Permitting for Bulk Petroleum Fuel Terminals on Oahu, Kauai, Hawaii, and Maui. Project Manager for the preparation of NPDES permit applications and notice of intents for commercial facilities in Hawaii, including bulk petroleum fuel terminals on Oahu, Maui, Hawaii, and Kauai. Included were NPDES permits for discharges of treated effluent from petroleum product bulk terminal facilities, construction dewatering, and discharges of hydrotesting waters. Also prepared the appropriate permit applications and notifications to the Department of Public Works. Responsibilities included consultation and interaction with the Department of Health.

Waste Management Operations, Commercial Facilities, Oahu, Hawaii. Project Manager responsible for the characterization and disposal of investigation-derived waste materials from commercial gasoline service stations throughout Oahu. Designed, prepared, and implemented a management plan that included waste consolidation, sampling, chemical characterization, and remediation. Responsibilities included field oversight, sampling, determining the appropriate method of remediation, and the preparation of a detailed technical report.

Hydrological and Soil Survey, Kanaha Pond Wildlife Sanctuary, Maui, Hawaii. Project Manager for a hydrological survey to assess the quantity and quality of water sources to Kanaha Pond Wildlife Sanctuary. Objectives of the study included evaluating if surface runoff and groundwater entering the sanctuary presents an ecological risk and if effluent from the neighboring water treatment plant injection wells was entering the sanctuary. To accomplish this, monitoring wells were installed at strategic locations. As part of the project, a soil survey was conducted with the objective of generating a soils map of the sanctuary.

Solid Waste and Hazardous Waste Management, Commercial Facilities in Hawaii. Project Manager responsible for coordinating the inventorying, characterization, and disposal of solid and hazardous waste at commercial facilities in Hawaii. Responsibilities included field oversight, providing QA/QC and interpretation of the chemical data, determining the appropriate method of disposal, and the preparation of summary reports.

Department of Transportation [DOT] Regulatory Compliance Review of a Commercial Facility in Honolulu, Hawaii. Project Manager for evaluating the facility's compliance with DOT regulations concerning the handling, storage, and transportation of oil and hazardous materials. Included was a review of the facility's compliance with DOT spill response regulations.

Sediment Monitoring and Best Management Plan for Petroleum Hydrocarbon-Impacted Sediments at an Industrial Facility on Oahu, Hawaii. Assisted in the development of a Sediment Monitoring and Sediment Management Plan at an industrial facility. The plan was necessary for identifying, characterizing, and managing potential petroleum hydrocarbon-impacted sediment generated during industrial activities.



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Application of CERCLA Hazard Ranking System at a Former Commercial Facility Site in Honolulu, Hawaii. Evaluated and assigned a Hazard Ranking System score for a potential CERCLA site.

Evaluation of RCRA Hazardous Waste Site at a Former Commercial Facility Site in Honolulu, Hawaii. Provided an interpretation, evaluation, and assessment of RCRA hazardous waste regulations and their application to the site of a former commercial facility.

Expert Review of Environmental Risk Assessments at Commercial Facilities in Honolulu, Hawaii. Reviewed and evaluated risk assessments prepared by other consultants for compliance with EPA regulations under CERCLA .

Source Testing for EPA Title V Air Permitting for Power Generating Facilities on Oahu and Maui, Hawaii. Participated in the oversight of performance source testing for emissions from power plants on Oahu and Maui. Source testing included determining PM₁₀, SO_x, NO_x, CO, CO₂, and THC emission compliance.

Example Projects at Military Sites:

Environmental Management System, U.S. Naval Hospital, Camp Lester, Okinawa, Japan. Director and Project Manager for performing an evaluation of the Environmental Management System [EMS] at the U.S. Naval Hospital in Okinawa, Japan. The project goal was to consolidate the plans and procedures at each individual hospital facility into a single EMS that would be compliant with the ISO 14001 standard. Conducted an audit of all available plans, documents, and standard operating procedures related to solid and hazardous waste management, underground and above-ground storage tanks, medical waste management (including the medical waste incinerator), air emissions (including radon), chemical recycling, asbestos-containing building materials, lead-based paint, hazardous materials handling, pesticides, ozone-depleting substances, PCBs, radiation safety, SPCC requirements, cultural resources management, natural resources protection, backflow prevention and cross-connection control, pollution prevention, spill prevention, disaster preparedness, hazard communication, and personnel training. Performed an inspection of all facilities within the hospital for compliance with existing plans and procedures. As a final deliverable, prepared an ISO 14001-compliant EMS Manual for the Hospital. The Final EMS documentation also was submitted in a fully-linked, web-based, digital format.

Site Characterization of former U.S. Navy Quartermaster Station, Saipan, Commonwealth of the Northern Mariana Islands, U.S. Army Corps of Engineers Pacific Ocean Division. Geochemist and QA/QC Manager for the site characterization of an area where hundreds of storage drums of diesel fuel were buried in trenches. The investigation included a geophysical survey, the excavation of shallow pits, the installation of groundwater monitoring wells, and the collection of soil and groundwater samples. Responsibilities included the evaluation, interpretation, and quality assessment of chemical data and the technical review and editing of the summary report.

Underground Storage Tank Closure, Tripler Army Medical Center, Honolulu, Hawaii, U.S. Army Corps of Engineers Pacific Ocean Division. Geochemist and QA/QC Manager for the removal and permanent closure of a 1,000-gallon capacity underground storage tank used to store fuel oil. The closure was part of a general site modification in which the boiler system in one of the Medical Center buildings was converted from a fuel oil system to a natural gas system. Responsibilities included the evaluation, interpretation, and quality assessment of chemical data and the technical review and editing of the summary report.

Underground Storage Tank Closure in Underground Bunker, Battery George W. Ricker, Waialua, Hawaii, U.S. Army Corps of Engineers Pacific Ocean Division. Geochemist and QA/QC Manager for the removal and permanent closure of a diesel fuel underground storage tank system



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inside an underground battery. Responsibilities included the evaluation, interpretation, and quality assessment of chemical data and the writing of the technical summary report.

Environmental Investigation of PCB, Dioxin, and Dibenzofuran Contaminated Site in Honolulu, Hawaii, U.S. Army Corps of Engineers Pacific Ocean Division. Geochemist and QA/QC Manager for the environmental investigation of a site contaminated with chlorinated dibenzodioxins, chlorinated dibenzofurans, and PCBs. Responsibilities included the evaluation, interpretation, and quality assessment of chemical data and the writing of the technical summary report.

PCB Transformer Removal Assessment, U.S. Army Corps of Engineers Pacific Ocean Division, Hawaii. Geochemist and QA/QC Supervisor for the removal and testing of abandoned PCB-containing electrical transformers on the Island of Hawaii. The project included testing the transformer dielectric fluids, concrete pad, and surrounding soils for PCBs and disposing of the transformers. Responsibilities included writing the PCB Transformer Removal Assessment Report and evaluating, interpreting, and assessing the quality of the chemical data.

Permanent Closure and Removal of Above-Ground Storage Tank, Camp H. M. Smith, U.S. Marine Corps. Geochemist and QA/QC Manager for the removal and permanent closure of a 5,000-gallon capacity above-ground storage tank used to store diesel fuel. Responsibilities included the evaluation, interpretation, and quality assessment of chemical data and the editing of the technical summary report.

Removal and Permanent Closure of Hydraulic Hoists, U.S. Army National Guard, Keaukaha Military Reservation, Hilo, Hawaii. Geochemist and QA/QC Manager for the removal and permanent closure of four steel-constructed hydraulic hoists. The hoists were installed at an unknown date and had not been used for 20 years. Oil was supplied to the hoists by a small above-ground storage tank. The hoists, tank, and associated piping were removed during the closure. Responsibilities included the evaluation, interpretation, and quality assessment of chemical data and the editing of the technical summary report.

Asbestos and Lead-Based Paint Projects, Military Facilities in Hawaii. QA/QC Manager for numerous asbestos and lead-based paint assessment and abatement projects at facilities in Hawaii. Tasks included project oversight, interpretation and QA/QC evaluation of asbestos and lead data, providing recommendations concerning regulatory actions, reviewing lead and asbestos hazard management plans and other deliverables for compliance with contract specifications and regulatory requirements, and reviewing final technical reports.

PUBLICATIONS

Papers:

West, H. B. and Leeman, W. P., 1987, Petrology and Geochemistry of Lavas from Haleakala Crater, Hawaii: An Overview: in Field Trip Guide to Maui (J. S. Sinton, ed.), 83rd G.S.A. Cordilleran Section Meeting, 45-65.

West, H. B. and Leeman, W. P., 1987, Isotopic Evolution of Lavas from Haleakala Crater, Hawaii: Earth Planet. Sci. Lett. 84, 211- 225.

West, H. B., Gerlach, D. C., Leeman, W. P. and Garcia, M. O., 1987, Isotopic Constraints on the Origin of Hawaiian Lavas from the Maui Volcanic Complex, Hawaii: Nature 330, 216-220.



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West, H. B., Garcia, M. O., Frey, F. A. and Kennedy, A., 1988, Nature and Cause of Compositional Variations Among the Alkalic Cap Lavas of Mauna Kea Volcano, Hawaii: *Contrib. Mineral. Petrol.* 100, 383-397.

Frey, F. A., Wise, W. S., Garcia, M. O., West, H., Kwon, S.-T. and Kennedy, A., 1990, Evolution of Mauna Kea Volcano, Hawaii: Petrologic and Geochemical Constraints on Postshield Volcanism: *J. Geophys. Res.* 95, 1271-1300.

West, H. B., 1990, Haleakala, East Maui, Hawaii: in *Volcanoes of North America: The United States and Canada* (C. A. Wood and J. Kienle, eds.), Cambridge University Press, 345-346.

Kennedy, A. K., Kwon, S.-T., Frey, F. A. and West, H. B., 1991, The Isotopic Composition of Postshield Lavas from Mauna Kea Volcano, Hawaii: *Earth Planet. Sci. Lett.* 103, 339-353.

West, H. B., Garcia, M. O., Gerlach, D. C. and Romano, J., 1992, Geochemistry of Tholeiites from Lanai, Hawaii: *Contrib. Mineral. Petrol.* 112, 520-542.

West, H. B. and Leeman, W. P., 1994, The Open-System Geochemical Evolution of Alkalic Cap Lavas from Haleakala Crater, Hawaii, USA: *Geochim. Cosmochim. Acta.* 58, 773-796.

Leeman, W. P., Gerlach, D. C., Garcia, M. O., and West, H. B., 1994, Geochemical Variations in Lavas from Kahoolawe Volcano, Hawaii: Evidence for Open System Evolution of Plume-Derived Magmas: *Contrib. Mineral. Petrol.* 116, 62-77.

Garcia, M. O., Foss, D. J. P., West, H. B., and Mahoney, J. J. 1995, Geochemical and Isotopic Evolution of Loihi Volcano, Hawaii: *J. Petrol.* 36, 1647-1674.

West, H. B., Hulsebosch, T. P., Garcia, M. O. and Mahoney, J. J., 2001, The Geochemical Evolution of Kilauea: Results from a Two Kilometer Drill Hole: *J. Petrol.* (in prep.).

West, H. B., Gerlach, D. C., Thomas, D. M. and Delanoy, G. A., 2001, Trace Element and Isotope Geochemistry of Geothermal Fluids, East Rift Zone, Kilauea, Hawaii: *Geochim. Cosmochim. Acta.* (in prep.).

Reports:

West, H. B., Gerlach, D. C., Delanoy, G. A. and Thomas, D. M., 1992, Trace Element and Isotope Geochemistry of Geothermal Fluids, East Rift Zone, Kilauea, Hawaii: Final Report to the Department of Energy, 28 p.

Abstracts:

West, H. B. and Garcia, M. O., 1982, Composition and Evolution of Alkalic Cap Stage Lavas from Mauna Kea Volcano, Hawaii: *EOS* 63, 1137.

Frey, F. A., Kennedy, A., Garcia, M. O., West, H. B., Wise, W. S. and Kwon, S.-T., 1984, Mauna Kea Volcano, Hawaii: Lava Compositions and Their Evolution: *EOS* 65, 300.

West, H. B. and Leeman, W. P., 1984, Composition and Evolution of Lavas from Haleakala Crater, Hawaii: *EOS* 65, 1131-1132.



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Gerlach, D., Stormer, J. C. and West, H. B., 1985, Isotopic and Trace Element Geochemistry of Fernando de Noronha: EOS 66, 1137.

West, H. B., 1985, Pb Isotopic Variations in Lavas from Haleakala Crater, Hawaii: EOS 66, 1133.

Gerlach, D., Stormer, J. and West, H., 1986, Geochemistry of Fernando de Noronha: Terra Cognita 6, 324.

West, H. B., Gerlach, D. C., Leeman, W. P. and Garcia, M. O., 1986, Isotopic Evolution and Heterogeneity of Hawaiian Alkalic and Tholeiitic Lavas: Haleakala and Kahoolawe: Terra Cognita 6, 188.

Norman, M. D., Leeman, W. P., West, H. B. and Carlson, R. W., 1986, Isotopic Compositions and Evolution of Intermarginal Subduction- Related Andesites and Basalts, Northwestern USA: Terra Cognita 6, 198.

Frey, F. A., Kennedy, A., Garcia, M. O., Wise, W., Kwon, S.-T. and West, H., 1987, Evolution of Mauna Kea Volcano: in Abstract Volume, Hawaii Symposium on How Volcanoes Work, 81.

Gerlach, D. C., West, H. B., Leeman, W. P. and Garcia, M. O., 1987, The Maui Volcanic Complex: Constraints on the Origin of Hawaiian Lavas: in Abstract Volume, Hawaii Symposium on How Volcanoes Work, 88.

West, H. B. and Leeman, W. P., 1987, Open System Magma Chamber Processes: Trace Element Systematics of Alkalic Cap Lavas from Haleakala Crater, Hawaii: in Abstract Volume, Hawaii Symposium on How Volcanoes Work, 266.

Gerlach, D. C., West, H. B., Thomas, D. M., Delaney, G. A. and Ikemoto, B. N., 1989, Trace Element Geochemistry of Geothermal Fluids, East Rift Zone, Kilauea, Hawaii: EOS 70, 1397.

West, H. B., Gerlach, D. C., Garcia, M. O. and Romano, J., 1989, Geochemistry of Lavas from Lanai, Hawaii: Constraints on the Origin of Hawaiian Shield-Building Lavas: EOS 70, 1384.

Frey, F. A., Garcia, M. O., Chen, C.-Y., Wise, W. S., Roden, M., Kennedy, A. and West, H., 1990, Geochemical Constraints on the Evolution of Hawaiian Volcanoes: in Intraplate Volcanism: The Reunion Hot Spot, Abstract Volume, 77.

West, H. B., Hulsebosch, T. P., Garcia, M. O., Kawakami, C. L., Kay, S. F. and Resig, J. M., 1992, Preliminary Results on the Petrology and Geochemistry of Lavas from a Two Kilometer Deep Scientific Observation Hole, Kilauea East Rift Zone, Hawaii: EOS 73, 513.

West, H. B., Hulsebosch, T. P., Mahoney, J. J. and Garcia, M. O., 1994, Geochemical and Isotopic Evolution of Kilauea: Results from a Two Kilometer Deep Scientific Observation Hole: EOS 75.