



KERR-MCGEE CHEMICAL CORPORATION

POST OFFICE BOX 55 • HENDERSON, NEVADA 89009

March 5, 1991

RECEIVED

MAR 11 1991

ENVIRONMENTAL PROTECTION

Ms. Adele Alderson
State of Nevada
Division of Environmental Protection
123 W. Nye Lane
Carson City, Nevada 89710

Dear Ms. Alderson:

Subject: Kerr-McGee Chemical Corporation
Phase 1 Consultant

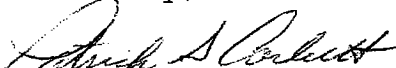
Kerr-McGee Chemical Corporation's (KMCC) Henderson, Nevada facility is proposing to utilize the Kleinfelder organization in fulfillment of the Phase 1 Study of the BMI Complex.

Attached are two (2) copies of the Statement of Qualifications of the project team for your review. KMCC has reviewed and accepted as satisfactory, the team organization as proposed. Kleinfelder has done a great deal of work for KMCC in the past, including P.E. approval of the cap installation at closure of the on-site Hazardous Waste Landfill.

KMCC recommends acceptance of Kleinfelder project team and requests a prompt response upon your review of the attached Statements of Qualifications.

Should you have any questions concerning this submittal, please contact me or Alan J. Gaddy at (702) 565-8901.

Sincerely,


Patrick S. Corbett
Plant Manager

PSC:j
ALDERSON

5 PROJECT TEAM QUALIFICATIONS

Introduction

Kleinfelder has assembled a project team of experienced environmental staff who are qualified to conduct the review, data analysis, and summary for this project. We have a wide variety of experience and disciplines in the environmental services.

Table 5.1
Staff Experience

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ENVIRONMENTAL PROTECTION

	RCRA/HSWA/CERCLA	RCRA POST CLOSURE	HYDROGEOLOGIC ASSESSMENT	HAZARDOUS WASTE MANAGEMENT	SOLID WASTE MANAGEMENT	POND/LANDFILL DESIGN-CLOSURE	PROJECT MANAGEMENT	REMEDATION	QA/QC	AIR PHOTO INTERPRETATION
Richard J. Allinger, P.G.	X	X	X	X	X	X	X	X	X	X
Kent E. Zenobia, P.E., REA	X	X	X	X	X	X	X	X	X	
Randolph C. Harris, R.G.	X	X	X	X	X	X	X	X	X	
Todd J. Croft	X		X	X	X		X	X	X	X
R. Scott Wallace	X		X	X	X		X	X	X	X
William C.B. Gates, CPG, REA	X	X	X	X	X	X	X	X	X	X

Project Team

Richard J. Allinger, P.G. - Project Manager

Mr. Allinger will be the overall project manager. He is the Environmental manager and Senior Geologist of Kleinfelder's Las Vegas Office and has extensive experience in the fields of environmental assessments, RCRA, CERCLA, SARA and other regulatory studies, hydrogeology, and engineering geology. Mr. Allinger has completed numerous RCRA corrective action studies and consulted with Department of the Army installations on environmental compliance issues at locations throughout the United States.

Mr. Allinger is a Registered Professional Geologist in Delaware. He has a Master of Science degree in Geology from San Diego State University.

Kent E. Zenobia, PE, REA, Senior Environmental Engineer

Mr. Zenobia will be the environmental and civil engineering senior review manager for this project. He is Kleinfelder's Senior Environmental Engineering Consultant. Although he works out to the Sacramento, California office, Mr. Zenobia is available to work on this project without the cost of per diem or travel, normally associated with inter-office support. Mr. Zenobia has over 15 years of experience in environmental engineering and hazardous waste mitigation. He has managed and directed many major industrial and governmental projects including a National Priority List site; a dioxin project alternative proposal for Times Beach, Missouri; and an on-site remediation and RCRA closure of a massive hazardous waste site. He is an expert in program development, planning and management, as well as remedial action design, implementation and operations.

Mr. Zenobia is a Licensed Professional Engineer in 10 states, including Nevada, as well as a Registered Environmental Assessor, and a Licensed Surveyor. He has a Master of Science degree in Environmental Engineering from Drexel University.

Randolph C. Harris, R.G., Senior Hydrogeologist/Consultant

Mr. Harris is a Registered Geologist with over 19 years of professional experience completing geological and environmental projects. He has completed numerous detailed hydrogeologic studies, geotechnical studies, and environmental analyses. He currently acts as the Senior Hydrogeologist and Consulting Associate for Kleinfelder, Inc.. In this capacity Mr. Harris reviews the Quality Assurance/Quality Control and Loss Prevention programs for the environmental/geology departments at all Kleinfelder offices. His experience in the review of environmental and hydrogeologic projects is a valuable asset to Kleinfelder, Inc. and its clients.

Mr. Harris is a Registered Geologist. He received his BS degree in Geology from California State University at Northridge.

Todd J. Croft, Project Geologist, Remote Sensing Specialist

Mr. Croft is experienced in the planning and implementation of hazardous and industrial waste site investigations, characterization, and monitoring. He has extensive experience in remote sensing techniques, with special emphasis on aerial photography interpretation. He is trained in QA/QC protocols, chain-of-custody procedures, and applicable techniques for sampling soil and water for contamination studies. His formal training also includes hazardous materials safety courses.

Mr. Croft received his Bachelor of Science degree in Geology with an extended major in Remote Sensing at Northern Arizona University.

R. Scott Wallace, Project Geologist, Regulations/Remediation Specialist

Mr. Wallace has over three years of experience in remedial studies, environmental compliance, and regulatory agency review. He has completed numerous environmental site assessments, contamination studies, and documentation of regulatory compliance issues. Mr. Wallace is well trained in regulations including

40 CFR 262 through 280. He contributes to all types of environmental projects completed by Kleinfelder.

Mr. Wallace received his Master of Science degree in Geology from Western Washington State University.

William C.B. Gates, CPG, REA, Senior Hydrogeologist/ Engineering Geologist

Mr. Gates is the Senior Hydrogeologist and Engineering Geologist in the Reno office. Mr. Gates will be available for senior level review of hydrogeological and regulatory projects as needed. Mr. Gates is a retired Army officer with more than 20 years of experience with various environmental projects. Mr. Gates completed more than 50 projects pertaining to ground water, solid waste, and hazardous waste issues at Army installations, depots, ammunition plants, and defense fuel supply points throughout the world.

Mr. Gates is a licensed professional geologist and a member of the American Institute of Professional Geologists and Registered Environmental Assessor (REA). He has a master of science degree in Geological Engineering from the School of Mines and Technology, Rapid City, South Dakota.

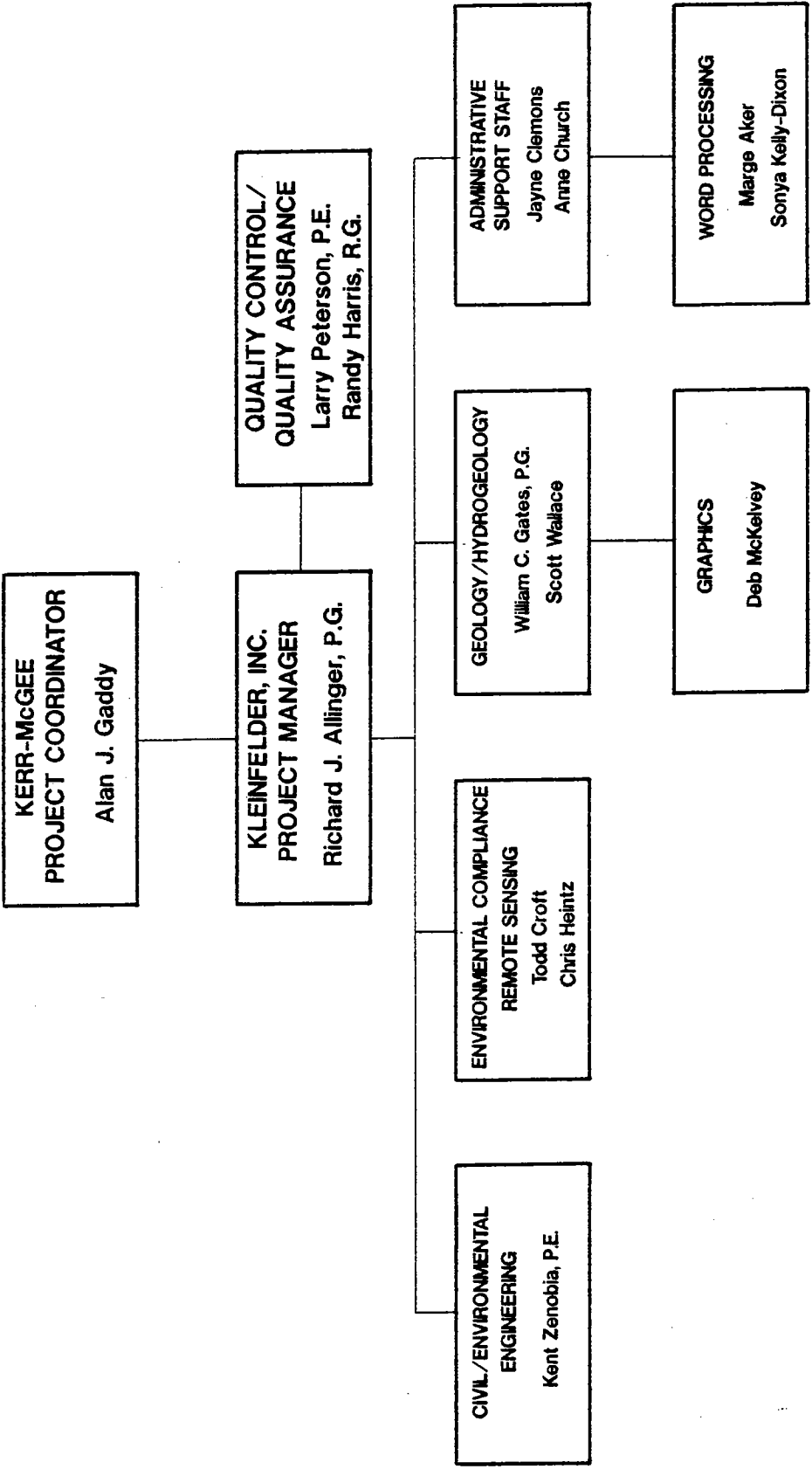


FIGURE 1: PROJECT TEAM ORGANIZATION CHART

6 KLEINFELDER, INC. QUALIFICATIONS

THE FIRM

Kleinfelder is an engineering consulting firm specializing in the earth, water, and air sciences. Since 1961, we have been a leader in solving large scale and complex environmental problems for clients in the industrial, commercial, residential, and governmental sectors. With more than 600 employees and 23 offices and laboratories in California, Nevada, Utah, Arizona, and Washington, we are well positioned to provide comprehensive and timely services.

Our approach to project management is to combine the skills of our professional and technical staff with innovative technology to cost effectively meet both environmental and engineering goals. We take care to assign qualified personnel to each project and then provide the necessary tools to complete the project. Kleinfelder is distinguished by the number and diversity of professionals it has available to address each clients needs. Kleinfelder's staff consists of chemical, civil, environmental, and soils engineers; chemists; geologists; hydrogeologists; industrial hygienists; computer specialists; data management analysts; and construction, laboratory, and materials testing technicians.

ORGANIZATION

As an ENR top 200 firm, Kleinfelder is large enough to service major projects, yet small enough to give personal attention to projects of all sizes. A regional manager with full responsibilities for a region is assigned to each office. The firm's senior principles serve as technical advisors an major projects and provide counsel to managers in their respective regions. For KMCC, this efficient means of corporate organization eliminates the cumbersome layer of bureaucracy with many large consulting firms.

LAS VEGAS OFFICE

Kleinfelder's Las Vegas office provides environmental consulting services to regions of Nevada, California, Utah, and Arizona. We have a highly qualified staff of over 45 professionals with expertise in environmental sciences, geology, materials testing, and environmental, geologic and geotechnical engineering.

Kleinfelder has had a presence in Nevada for over 20 years and has developed a strong working relationship with regulatory agencies, including the Nevada Division of Environmental Protection and the Clark County Health District. Kleinfelder's established working relationships with regulatory agencies will facilitate KMCC project approvals. Our close proximity, within 10 miles, to the KMCC Henderson facility will also facilitate the project and will decrease travel costs.

Kleinfelder has assigned a qualified, experienced project manager for the KMCC Henderson Facility Project. Richard J. Allinger, P.G., has over 12 years of experience as a professional geologist and has completed more than 10 detailed Resource Conservation and Recovery Act studies of the Department of the Army and the Department of Defense.

SITE REMEDIATION

Kleinfelder brings an in-depth, multidisciplinary approach to contaminated site cleanup and offers turnkey solutions ranging from site evaluation and characterization through design, construction and implementation of remedial systems, and postconstruction monitoring. Our engineers and scientists represent all disciplines necessary to complete the task. With multiple offices in the west and southwest, we are staffed to provide responsible and comprehensive services.

KLEINFELDER EXPERTISE

Remedial Investigations/Feasibility Studies

We understand the requirements of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and related laws that require completion of remedial investigation/feasibility studies, which identify cost-effective mitigation measures for uncontrolled hazardous waste sites. Our staff is experienced to:

- Investigate and assess site characteristics
- Identify and assess contaminant migration pathways
- Evaluate public health risks
- Identify and evaluate alternative techniques for remediation
- Select the most suitable remedial action

Contaminant Transport Modeling

Kleinfelder has extensive technical expertise in the numerical evaluation of ground water and the use of computer applications for characterizing ground water flow, solute transport, and migration of chemicals in various media.

Offsite Remediation

Kleinfelder's solutions to contaminated sites and facilities are diverse. The innovative approaches discussed herein are:

- Bioremediation
- Vapor Extraction Systems
- Product Recovery

Generally, the most cost-effective solutions are those that remove the contaminants without excavating and redisposing of soil. **Bioremediation**, the process of utilizing indigenous microorganisms present in the soil, has multiple applications and is a technology with which Kleinfelder has extensive knowledge and has used with effective results. Soil flushing and bioremediation alternatives to cleanup are consistent with state and federal disposal policies and recommendations. A prime advantage of in-place cleanup, in addition to cost effectiveness, is that bioremediation can take place without affecting scheduled plant/facility operations.

Soil-gas vapor extraction systems are a relatively recent technological development. The objective of this technology is to induce a flow of air through a soil mass containing volatile compounds. Vapor extraction, as a form of remedial action for subsurface hydrocarbon or gasoline contamination, relies on in-situ volatilization as the primary means of decontaminating soil in place. Optimal conditions for using vapor extraction technology are a uniform, coarse soil texture with a low moisture content, highly volatile compounds, and where ground water is at least 10 feet below the ground.

Product recovery technology has been used by Kleinfelder for a wide range of organic and inorganic contaminants including petroleum fuels, petrochemicals, solvents, pesticides, solvents, metals, and other toxic substances. Our approach has been to use a patented reclaimer system that recovers and separates contaminants from surface and ground water. The key features of this system are that it is easy to operate, has self-cleaning probes and filters, is programmable to meet specific site conditions, and easily interfaces with other in-situ treatment technology.

REPRESENTATIVE PROJECTS

Hydrogeologic Investigation and Remediation Study of Surface Impoundment, Lodi, California

Lodi/Overhead Door Company manufacturers galvanized steel doors at a facility located on Victor Road in Lodi, CA. In June 1985, our client received from the California Department of Health Services a notice of violation and order for compliance of its onsite surface impoundment. The impoundment had been used to store process waste water and permit solar evaporation and precipitation. Regulatory agencies were concerned with potential soil and ground water contamination since the impoundment was not lined with a synthetic material.

Kleinfelder provided environmental consulting services including a hydrogeologic investigation, soil and ground water analyses, and regulatory liaison. A Final Closure Plan was developed from this information and submitted to the regulatory agencies. The Closure Plan addresses the lateral and vertical extent of soil contamination, documents ground water quality, and presents a method to achieve clean closure of the surface impoundment. Upon regulatory agency reviews and comments, closure may be conducted in accordance with this plan. Excavation grades, removal volumes, and "cleanup" levels provided in the Closure Plan will enable a cost-effective and efficient remediation of this site. Continued ground water monitoring will facilitate water quality impact assessments.

Site Remediation, U. S. Army Corps of Engineers, Sacramento Army Depot , California

The Sacramento Army Depot encompasses approximately 395 acres in Sacramento, CA. This facility is an electronics supply depot responsible for the receipt, storage, issue, maintenance, and disposal of assigned commodities. Established at its present

site in 1945, the Army Depot has been involved in a variety of missions and operations over the past 40 years. Byproducts and wastes generated by the various operations were often disposed at onsite disposal pits, lagoons, and burn pits.

As part of the Department of Defense Installation Restoration Program, Kleinfelder was hired in 1985 to assess the impacts of past operations on soil and ground water quality.

Kleinfelder geologists reviewed and analyzed existing information from prior studies of the site including historical aerial photographs, existing reports on past operations and practices, and several small-scale environmental studies of the site. Based on this information, several areas of concern were pinpointed for further investigation.

Monitoring wells were installed and soil and water samples were analyzed to confirm past investigations and to assess the extent of soil and ground water contamination.

Kleinfelder personnel managed this large-scale study in an efficient and organized manner, facilitating rapid verification of the sources of contamination, evaluating the degree of hazard associated with each site, and recommending alternatives for immediate mitigation where necessary to protect the environment and the public health.

The Army Corps of Engineers continues to retain Kleinfelder's services as they progress toward meeting EPA requirements for the site. Kleinfelder is presently serving as a regulatory liaison and agency coordinator, and is evaluating feasible alternatives for remediating soil and ground water contamination at the depot.

Soil Remediation, KTI Chemical, Division of Union Carbide, California

This project site experienced a leak from a storage tank containing an odorless petroleum product. The contaminated soil and water extended beneath the main manufacturing building; therefore, remediation by soil excavation would have been costly. The soil and hydrology were studied, the plume was modeled and defined, and a laboratory investigation of biodegradation options and nutrient combination was conducted. Based on study results Kleinfelder designed an in-situ biodegradation system. The regulatory agencies approved the proposed system. The system has been installed and is in operation.

Nutrient rich, oxygenated water was injected into the original tank cavity to enhance the natural biodegradation of the residual product in the vadose zone. Water was withdrawn and recycled to the cavity for further soil treatment. Excess water is discharged to the sewer under permit.

Contaminated Site Assessment and Remediation, City of Modesto, California

A leak of stoddard solvent over an extended time contaminated the vadose zone. Since the contaminated area is approximately 50 feet in diameter and 60 feet deep soil excavation was an expensive remediation option. Therefore, a well system for water injection and withdrawal was designed and is in place. Nine wells withdraw water from preselected depths and 12 wells inject water with surfactant added to assist product solubility. Withdrawn water circulates through the bioreactor where

nutrients are added and the entrained solvent is chemically altered by a biological process. The treated water is recycled to the contaminated soil. In-situ biodegradation of the solvent in the vadose zone is taking place as well as biological cleanup of the circulated water in the bioreactor. Progress is monitored with lysimeters in 12 nests of 3 lysimeters per nest.

The reactor, pump, and controls are located in a fenced, shielded area and will remain in place after construction of the proposed new redevelopment at the site. All assessment modeling, conceptual design of remedial system, and permitting were conducted under Kleinfelder's direction. The system configuration and field installation of the process equipment and controls were completed by KAMTEC Corporation, a Kleinfelder subsidiary.

Hazardous Waste Site Cleanup, T. H. Agriculture & Nutrition Company, California
Kleinfelder was hired to conduct extensive geohydrological studies at a site on which various pesticides had been buried and to serve as liaison between the client and the associated regulatory agencies. We also provided subsurface exploration expertise and developed a soil mitigation plan for the site, which was approved by the regulatory agencies.

Kleinfelder managed the removal and disposal of more than 14,000 cubic yards of contaminated soil in this program and supervised field activities to ensure the health and safety of project personnel. Efforts are continuing to fully characterize the extent of contamination and threat to the local aquifer.

Site Remediation Plan, The Clorox Company, California

Kleinfelder evaluated the presence and movement of mercury under existing buildings at a major manufacturing facility in the Bay Area. The project included the design and implementation of an exploration program to define the existence and concentration of mercury in the soil, as well as proper sampling procedures for this substance. We used our B24 explorer rig to obtain the required samples under low clearance conditions.

Our personnel interacted with various regulatory agencies on behalf of the client and provided a plan for remedial action based on the evaluation of several remediation alternatives.

Soil Vapor Mitigation, Medical Office Building, Reno, Nevada

Kleinfelder responded to a contamination problem encountered on the project site during initial site grading operation. An investigation of the soil and ground water underlying the site indicated a potential for soil vapor originating from past leakage of buried storage tanks on the site, which could affect the proposed high-rise medical office project. Kleinfelder designed and provided materials testing services for a vapor recovery system using a concrete cap and vent configuration. The high-rise is currently in the final stages of completion.

Site Remediation Investigation, Confidential Electronic Industry Firm

Kleinfelder has conducted, to date, two phases of a three-phase project to assess and mitigate organic solvent contamination of the ground water beneath the site. Our

work on the project included the installation of multiple monitoring wells, low-flow aquifer pump testing, offsite contamination plume detection using passive vapor receptors, and preparation of a work plan for final contamination mitigation. A separate investigation was also conducted to provide a closure plan for a former onsite zirconium treatment and disposal area.

Site Assessment and Remediation, Unocal, Santa Clara, California

Approximately 2,100 gallons of diesel fuel were released to the subsurface environment when a 10,000-gallon underground tank was punctured during vapor monitoring well installation in the tank backfill. Kleinfelder characterized the site, which required eight soil borings, four of the borings were completed as water monitoring wells and one as a vapor monitoring well. Free product within the wells has been identified as predominantly diesel fuel with up to 25 percent gasoline content. Remediation of the site includes a large-diameter extraction well and an above-ground dual carbon filtration system controlled by a computerized cycling panel. The dual pump system will extract both free-floating product and groundwater for processing.

A preliminary assessment was performed to evaluate potential risks to public health and the environment from the released hydrocarbons. Kleinfelder identified the exposure pathway of concern as the potential for contaminant plume migration and contamination of groundwater used for the municipal drinking water supply. Existing geologic, hydrologic, and well construction data were compiled and evaluated. A conceptual model, based on an interpretation of available data, was developed and used to evaluate potential migration paths and risk to public health posed by the presence of diesel fuel within the shallow aquifer.

SITE CHARACTERIZATION

Kleinfelder has completed many investigative projects that assessed the presence of soil and ground water contaminants, assessed the extent of contamination, or ascertained that no contamination existed.

Our experience ranges from characterizing the conditions at a proposed site for residential development to exploring the site conditions of a 300-acre landfill or underground storage tank farm.

KLEINFELDER EXPERTISE

Review Site Conditions

Our soil scientists examine soils to assess whether chemicals and hazardous materials are present. This preliminary review helps to establish the parameters of the investigation.

Soil Sampling

Kleinfelder has logged and collected soil samples from many thousands of borings. Utilizing the full range of drilling equipment, we are capable of operating in almost all types of environmental conditions.

At sites where hydrocarbons are suspected, the soils samples are frequently screened on location for volatile organics using a Photovac "TIP" photoionization detector or organic vapor analyzer. The readings from this instrument assist the field geologist in assessing the depth of soil boring required.

Geologic Examination

Our geologists study the lithology of a site to evaluate the nature of the soil and rock formations, both of which play a role in understanding the potential migration of contaminants in the soil and ground water.

Geophysical Techniques

Geophysical investigations are cost-effective means to assess the location and boundaries of buried wastes, delineate plumes of contaminants in ground water, and to rapidly characterize geologic/environmental site conditions resulting from past operations.

Kleinfelder has successfully used seismic refraction, resistivity, ground penetrating radar, magnetometry, and metal detection to delineate site conditions at numerous locations in the western United States. Geophysical analyses can indicate changes in the subsurface conductivity of water and soil when metallic substances, certain organics, chlorides, and salts are present. This information is invaluable in siting the location of monitoring wells.

Monitoring Wells

Monitoring wells are installed to evaluate the background and "worst case" ground water quality in areas where vadose zone soil sampling indicates that water quality may have been affected by past operations. Water level surveys are used to evaluate the direction of ground water flow in the aquifer. Ground water samples are collected and analyzed by a certified laboratory. All samples are preserved and stored in accordance with EPA and State procedures and submitted to the lab under chain-of-custody control.

INDUSTRIES SERVED

- Construction contractors
- Electronics manufacturers
- Chemical processors
- Wood treatment plants
- Metal plating operations
- Class I disposal sites
- Class III landfills
- Refineries and petrochemical facilities
- Food processors
- Land developers
- Landfill owners/operators

SELECT CLIENTS

- Clorox Corporation
- North American Philips
- Guild Wineries
- U. S. Army Corps of Engineers
- U. S. Navy
- KTI, Division of Union Carbide Corporation
- Mobil Oil Corporation
- Chevron Corporation
- UNOCAL
- Shell Oil Company
- Santa Fe Pacific Realty Corporation
- Varian Associates
- Ashland Chemical Corporation
- Electro Coatings Corporation
- Southland Corporation
- Lockheed Corporation
- Robertson Homes

REPRESENTATIVE PROJECTS

Remedial Investigation of Manufacturing Facility, Confidential Client, Salt Lake City, Utah

Kleinfelder's work on the project consisted of an evaluation of contamination in the soils and ground water surrounding a large electronic manufacturing firm in Salt Lake City, Utah. The hydrogeologic investigation focused on the presence of volatile organic solvents and zirconium. Kleinfelder designed and implemented a ground water monitoring system which included a soil vapor survey to evaluate the contaminant plumes. The zirconium hydride burn pit area was investigated and a formal closure statement was submitted to the Utah Solid and Hazardous Wastes Committee. The zirconium treatment facility was formally closed in 1986. Ongoing services include ground water sampling, RI/FS evaluations, and assisting the client with negotiations with the State of Utah and Region VII of the EPA. Other coincidental activities have included aquifer characterization testing, abandoned tank removal and RCRA Part B closure of three storage facilities onsite.

Hazardous Waste Study, Confidential Industrial Client, California

On the east side of San Francisco Bay, a large manufacturing firm requested that an exploration program be designed to detect the presence of potentially hazardous wastes in the subsurface. In conjunction with other engineering contractors, a subsurface exploration program was designed that required nearly 100 soil borings, 36 ground water sampling and observation wells, and 86 seismic refraction lines. Interpreting the seismic refraction lines in conjunction with soil borings and samples of ground water helped identify the extent of waste materials in the underlying soil and ground water.

Chemical Waste Disposal Investigations, Lathrop, California

At the request of a major Central Valley petrochemical manufacturing firm, a program to monitor chemical waste in subsurface materials was undertaken. In association with other contractors and state and federal agencies, a monitoring program was designed, test borings drilled, and select samples of soil and ground water were taken for laboratory testing. Additional subsurface exploration in adjacent areas for the same owner is pending.

Site Evaluation of Waste Disposal Facility, Montezuma Hills, IT Corporation, California

Kleinfelder evaluated whether or not the Montezuma Hills Waste Disposal facility, located in Solano County, complied with State of California requirements.

To complete this evaluation we explored the subsurface stratigraphy, classified soils, tested soil permeability, described ground water level fluctuations, and conducted a broad range of tests to ensure that the facility complied with environmental conditions stipulated by the State.

Site Investigation, Confidential Client, San Jose, California

Due to faulty piping this site experienced a leak of several thousand gallons of a petroleum distillate. The site investigation was complicated by the presence of large structures which extended 20 feet below the surface. Backfill around the structures acted as a conduit for the contaminant.

Kleinfelder conducted a complete investigation and characterization of the area and the contamination. Since the location is adjacent to the plant boundary and a

residential area, a key aspect of the study was a risk assessment that supported a No-Action Alternative rather than free product recovery and continued monitoring.

Soil Contamination Assessment, KTI Chemical, Division of Union Carbide

This project site experienced a leak from a storage tank containing an odorless petroleum product. The contaminated soil and water extended beneath the main manufacturing building; therefore, remediation by soil excavation would have been costly. The soil and hydrology were studied, the plume was modeled and defined, and a laboratory investigation of biodegradation options and nutrient combination was conducted. Based on study results Kleinfelder designed an in-situ biodegradation system. The regulatory agencies approved the proposed system. The system has been installed and is in operation.

Nutrient rich, oxygenated water was injected into the original tank cavity to enhance the natural biodegradation of the residual product in the vadose zone. Water was withdrawn and recycled to the cavity for further soil treatment. Excess water is discharged to the sewer under permit.

Contaminated Site Assessment and Remediation, City of Modesto, California

A leak of stoddard solvent over an extended time contaminated the vadose zone. Since the contaminated area is approximately 50 feet in diameter and 60 feet deep soil excavation was an expensive remediation option. Therefore, a well system for water injection and withdrawal was designed and constructed. Nine wells withdraw water from preselected depths and 12 wells inject water with surfactant added to enhance product solubility. Withdrawn water circulates through the bioreactor where nutrients are added and the entrained solvent is chemically altered by a biological process. The treated water is recycled to the contaminated soil. In-situ biodegradation of the solvent in the vadose zone takes place while biological cleanup of the circulated water occurs in the bioreactor. Progress is monitored with lysimeters in 12 nests of 3 lysimeters per nest.

All assessment modeling, conceptual design of remedial system, and permitting were conducted under Kleinfelder's direction. The system configuration and field installation of the process equipment and controls were completed by KAMTEC Corporation, a Kleinfelder subsidiary.

Evaluation of Landfill Disposal Facility, Class I Site, Fresno, California

Kleinfelder was retained as a prime consultant to evaluate existing conditions at the Big Blue Hills waste disposal facility and to develop operating and/or closure plans to meet regulatory requirements.

We assessed the ground water hydrology by installing an extensive monitoring network including vacuum-pressure lysimeters for sampling the subsurface water. Our geologists and hydrogeologists conducted extensive subsurface investigations, explored geophysical conditions, and evaluated potential remediation alternatives.

Our study included a complete evaluation of contaminant migration from the site, specific recommendations for procedures to intercept the contaminants migrating

from the site, and provisions for a permanent closure plan. We also assisted the County with the required RCRA, Part B Application.

Hazardous Waste Site Characterization, T. H. Agriculture & Nutrition Company

Kleinfelder was hired to conduct extensive geohydrological studies at a site on which various pesticides had been manufactured and to serve as liaison between the client and the associated regulatory agencies. We also provided subsurface exploration expertise and developed a soil mitigation plan for the site, which was approved by the regulatory agencies.

Kleinfelder managed the removal and disposal of more than 14,000 cubic yards of contaminated soil in this program and supervised field activities to ensure the health and safety of project personnel. Currently, ground water mitigation measures are being analyzed and laboratory bench-scale studies are underway to determine biodegradation levels of pesticides in the soil. Efforts are continuing to fully characterize the extent of contamination and threat to the local ground water supply.

Site Characterization Study, The Clorox Company, California

Kleinfelder evaluated the presence and movement of mercury under existing buildings at a major manufacturing facility in the Bay Area. The project included the design and implementation of an exploration program to define the existence and concentration of mercury in the soil, as well as proper sampling procedures for this substance.

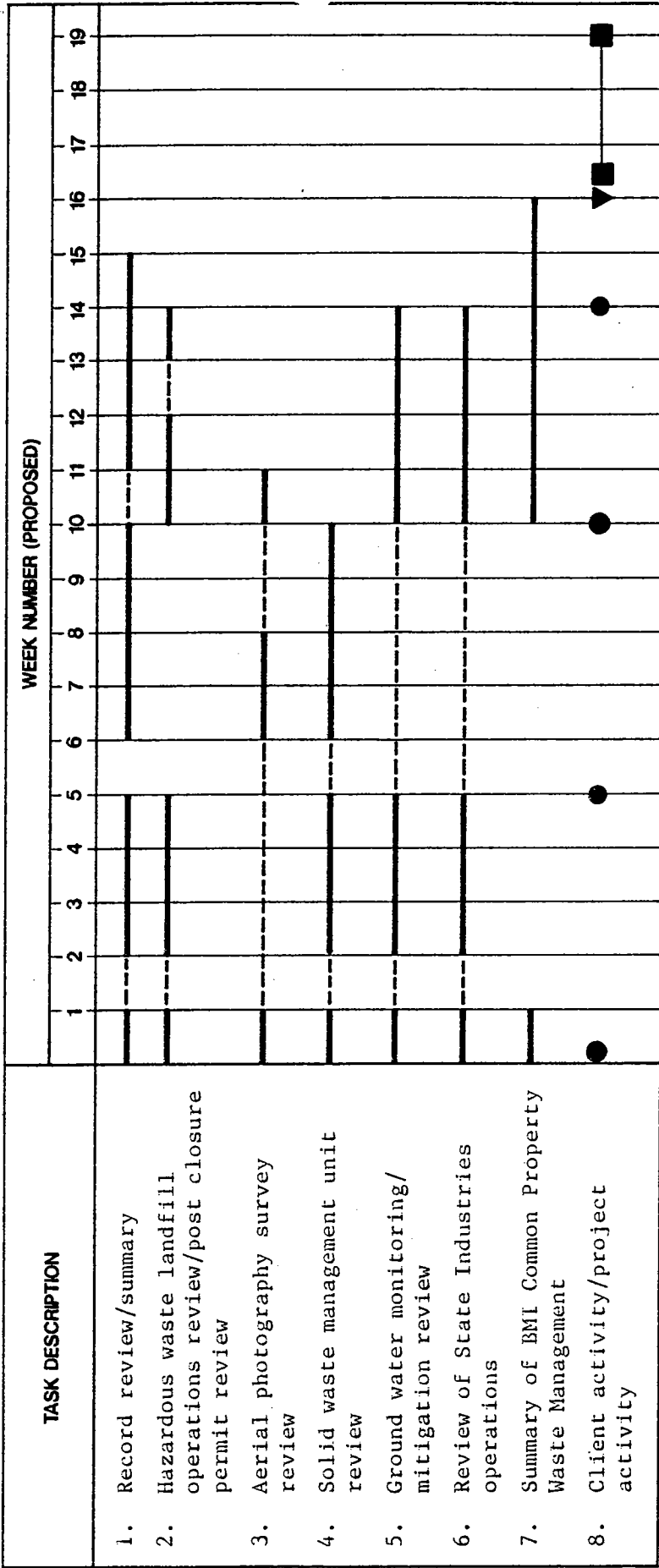
Our personnel interacted with various regulatory agencies on behalf of the client and provided a plan for remedial action based on the evaluation of several remediation alternatives.

Site Characterization Study, The Resort at Squaw Creek, California

Kleinfelder provided a comprehensive evaluation of the preproject condition of both the soils and ground water underlying the proposed \$75 million hotel and golf course complex. Our work on the project included the installation, development and sampling of over 35 ground water monitoring wells. A prototype of the project was constructed after 48 pressure vacuum lysimeters were installed to evaluate future impacts to the ground water underlying the site. Our work also included column testing to evaluate the mobility of pesticides through the native soils as well as a toxicological risk assessment of the chemicals targeted for use.

7 PROJECT SCHEDULE

The following illustration shows Kleinfelder's proposed schedule for completion of the KMCC Henderson Facility Study - Phase I. Kleinfelder will complete the project in approximately 13 weeks from KMCC's order to proceed. The 13 weeks of work include partial hours for the varying staff levels presented in Figure 2.



(TOTAL PROJECT TIME FOR KLEINFELDER = 13 WEEKS)

SYMBOLS :

- ▼ KEY DELIVERABLES
- CLIENT REVIEW
- STATUS AND PROGRESS MEETINGS
- INTERMITTENT ACTIVITY

FIGURE 2: PROPOSED TASK COMPLETION SCHEDULE

Henderson Industrial Study - Phase I

RICHARD J. ALLINGER, P.G.
SENIOR GEOLOGIST/ENVIRONMENTAL MANAGER

Education

BS Sonoma State University, Rohnert Park, CA
Geology, 1976

MS San Diego State University, San Diego, CA
Geology, 1979

Registration

Registered Professional Geologist, Delaware

Summary of Experience

Mr. Allinger has more than 8 years experience in assessing, designing, and implementing remedial investigations for private industry and the Department of the Army. Currently, he manages regional environmental operations and provides management and technical support on technical projects. Mr. Allinger has completed over 10 detailed and comprehensive RCRA studies at US Army installations throughout the United States. He has extensive experience in regulatory agency correspondence, negotiations, and was a key contributor to one of the first Federal Facilities Compliance Agreements completed at a Superfund site in Sacramento, California.

1989 - Present Senior Geologist with Kleinfelder, Inc.

Mr. Allinger is responsible for all geological and environmental studies, including the supervision of field and laboratory testing programs. His responsibilities also include monitoring schedules and budgets and reviewing reports. Mr. Allinger has extensive geological experience in southern Nevada, southern California and environmental experience covering many of the 50 states as well as Europe and Panama. He has completed over 15 environmental site evaluations at Kleinfelder.

1985 to 1989 Captain, Environmental Science Officer

United States Army Environmental Hygiene Agency (USAEHA). As an active duty commissioned officer Mr. Allinger completed over 40 detailed site assessments, RCRA Part B Permit corrective action studies, RCRA Subpart X studies for Open Burning/Open Detonation permits at Federal Facilities in Alabama, Indiana and Kansas, and Remedial Action studies at US Army bases throughout the United States.

Mr. Allinger completed his active duty tour as the Chief, Engineering Services, responsible for all well drilling, sampling and analytical projects completed by the USAEHA Waste Disposal Engineering Division. Mr. Allinger has extensive experience interfacing with regulatory agencies, laboratories and other government agencies.

1983 - 1985 Consulting Geologist

Mr. Allinger worked for two years as a consulting geologist, and inspector on a number of public works and private development projects. He worked as the chief inspector and materials coordinator for a large pump station project at Prudhoe Bay, Alaska. Mr. Allinger was responsible for all materials and site preparation at numerous pond completions and closures for a major oil company in Alaska during the expansion of north slope oil fields.

1980 - 1983 Senior Geologist Sohio Petroleum Company.

Mr. Allinger was responsible for the development geology and detailed subsurface stratigraphy of the Prudhoe Bay oil field, Alaska. His primary responsibility was the long range planning for future oil well drilling at the field and supervising several technicians in the planning phases. He completed detailed subsurface analysis of the oil bearing rocks for equity determination between the numerous oil field owners and for future secondary recovery methods at the oil field.

1978 - 1980 Development Geologist Exxon USA and Union Geothermal.

During these years Mr. Allinger was responsible for detailed subsurface analysis and site characterization of shallow oil fields and geothermal fields in southern California and northern California. Mr. Allinger utilized detailed subsurface and surface logging techniques and mapping methods to project long term development planning at numerous oil fields and geothermal sites. He supervised several geologic technicians and completed numerous independent studies on subsurface flow of steam and oil.

Professional Affiliations

Geological Society of America
National Water Well Association

Selected Project Experience

- o Superfund site characterization and remedial action report on contaminated ground water site in N. California. Mr. Allinger was instrumental in preparing the final report for submittal to the EPA Region IX and the California Department of Health Services for inclusion in a complex and comprehensive Federal Facilities Agreement.

- o Site characterization of over 50 solid waste management units at Army installation, coastal California. The study is an integral portion of the installations application for a RCRA Part B permit for a hazardous waste conforming storage facility.
- o Review and participation in development of RCRA Subpart X OB/OD permit applications at U.S. Army installations in Alabama, Kansas, and Indiana. Completed solid waste studies, coordinated inspections with EPA regulatory staff and completed final reports for inclusion in permit process.
- o Site characterization and ground water contamination survey for U.S. Troops in the Republic of Panama. The study and conclusions developed were used to provide health and safety information to U.S. troops and dependents concerning the safety of surface water and ground water effecting the installation properties.
- o Groundwater contamination survey at National Guard motor pool headquarters, Michigan. The study developed remediation alternatives for a contaminated shallow aquifer in an environmentally sensitive area of northern Michigan.
- o Site characterization and corrective action reports for RCRA Part B permit applications at U.S. Army installations in Alabama, Indiana, California, Arizona and Kansas. Mr. Allinger completed numerous corrective action reports following the HSWA guidelines for Solid Waste Management Units. Each study was completed prior to deadlines and was instrumental in the completion of the RCRA permitting process.
- o Solid waste studies and landfill site selection studies in Alabama, Kansas and California.
- o Detailed environmental audits at Defense installations in Texas, California, Arizona, Indiana, Kansas, and Maryland. The audits included a multi-media approach to all environmental programs including, hazardous waste management, solid waste and ground water management, air quality, medical waste, water quality, and sanitation.

Education:

MS Environmental Engineering, Drexel University
BS Civil Engineering, New Jersey Institute of Technology

Registrations:

Professional Engineer - California, Oregon, Nevada, Kentucky, New Jersey, Pennsylvania, Idaho, Washington, Arizona, and Utah.
Registered Environmental Assessor, 1988, California
Licensed Surveyor - Pennsylvania

Summary of Experience:

Mr. Zenobia has 15 years of experience in civil and environmental engineering and hazardous waste mitigation. He has managed and directed many major industrial and governmental projects, including a National Priority List site; a dioxin project alternative proposal for Times Beach, Missouri; and an onsite remediation and RCRA closure of 250,000+ tons of hazardous waste residuals. His specific areas of expertise include: program development, planning, and management; hazardous and residual waste management; environmental rehabilitation and restoration; and remedial action design, implementation, and operations.

1986 - Present Senior Project Manager and Operations Manager, Kleinfelder, Sacramento, California.

Oversees environmental operations and serves on the Kleinfelder Senior Technical Advisory Committee. Has overall project responsibility and technical supervision for all Northern Central Valley projects. Directs the division's technical operations through eight project managers. Oversees remedial action design and implementation plans. Provides expert witness testimony in areas of environmental contamination remediation and hazardous waste management.

1985 - 1986 Project Manager; Roy F. Weston; West Chester, Pennsylvania.

Managed a Remedial Investigation Feasibility Study for a National Priority List site under a US EPA-REM II contract. Developed the work plan, including all the elements required by the National Contingency Plan and CERCLA. This two-volume plan also included data analysis, innovative field scanning techniques, manpower resource estimates, computerized schedules, and cost estimates for a 20-acre site.

Senior engineer responsible for developing and conducting a feasibility study for a major aerospace/Department of Defense contractor in California with an 8,500 acre site having over 250 contaminant source locations. Prepared ground water contour and three-dimensional contaminant distribution maps to define the extent of the plume. Evaluated applicable remedial technologies and developed treatment systems for remedial action.

Project Manager for a remedial investigation and site clean-up of organic chemical and heavy metal contamination for a major electronics firm in New York State.

1982 - 1985 National Project Manager, Rollins Environmental Services, Inc., Wilmington, Delaware.

Project manager for major hazardous/industrial waste treatment, storage, disposal, and management projects. Provided project concept development, detailed planning, design, and construction management for the corporate facilities.

Project Manager on a \$6 million remedial action/basin closure involving over 250,000 tons of hazardous waste; project manager for design of a 600-acre hazardous waste management facility; and international project manager for a joint venture hazardous waste commercialization project in West Germany.

1979 - 1982 Senior Environmental Engineer, Conversion Systems, Inc. (Envirosafe Services, Inc.), Horsham, Pennsylvania.

Responsible for all client and government regulatory interfacing for a chemical stabilization disposal facility, including operational review and environmental audits, and closure of the facility.

Designed and provided construction management for entrance/unloading facilities, waste containment areas, foundations, sumps, and reinforced concrete for several secure landfill treatment storage disposal facilities.

1974 - 1979 Project Engineer, Philadelphia Water Department, Research and Development Division, Philadelphia, Pennsylvania.

Developed and implemented long-term research program for Delaware estuary water quality program. Management of technical teams and marine sampling vessels for New Jersey, Delaware, Pennsylvania State Environmental Agencies, and U.S. EPA and Geological Survey.

Project engineer responsible for design and process development in state-of-the-art research project for the investigation of trace organic chemicals removed from Philadelphia drinking water.

Professional Affiliations:

American Society of Civil Engineers
Committee on Hazardous Waste Management
National Society of Professional Engineers
National Council of Engineering Examiners
Certification and Registration
National Water Works Association

Select Project Experience:

- o Leaking Underground Storage Tank Remedial Investigation - Confidential Client, Winery and Distillery - Lodi, California.

Project manager for a remedial investigation at the site of a leaking underground storage tank. Performed a feasibility study to determine the most cost-effective, feasible alternative for cleanup. Designed and installed a Vapor Extraction System, which was demonstrated to remove 0.6 lbs/hr of hydrocarbons from the vadose zone. Remediation complete and site was restored.
- o Unocal - Leaking Underground Storage Tanks - Two Sites Northern California.
Project manager for remedial investigations and the design of Vapor Extraction Systems for leaking underground fuel tank site.
- o Dioxin Project Alternative Proposal - Times Beach, Missouri.
Project manager for technical planning and operating design of an advanced secure hazardous waste vault storage facility. Promoted commercial acceptance and national regulatory approval for vault concept via presentations to US EPA.
- o Hydrogeological Assessment Report (HAR) at Folsom Prison - Represa, California.
Project manager for a California Priority List Site involving a hazardous waste surface impoundment. Work included incorporating the remedial investigation into the HAR for cost effectiveness; performing the feasibility study in accordance with Department of Health Services guidelines; and performing a closure plan and remedial action plan.
- o HAR, Dallas Corporation, Overhead/ Lodi Door, Lodi, California.
Project manager for closure of a hazardous waste surface impoundment. Work involved preparing the Hydrogeological Assessment Report (HAR), closure plan, and remedial action plan and integrating these plans for cost effectiveness. The project has also involved the performance of monthly ground water monitoring and reporting.
- o Solid Waste Assessment Test (Swat) - University of California, Davis.
Project manager for the preparation of a SWAT proposal for the U.C. Davis and landfill.

Publications/Presentations:

Multiple Tap Column Design for Adsorbents

American Society of Civil Engineers, Journal of the Environmental Engineering Division, August, 1980.

Evaluation of Basic Landfill Concepts

Presented at American Institute of Chemical Engineers National Meeting, Cleveland, OH, August-September, 1982.

Pozzolanic Microencapsulation for Environmental Quality Assurance

Presented at 37th Annual Purdue Industrial Waste Conference, May, 1982.

An Alternative Solution to the Times Beach, Missouri Problem--The Environmental Vault

A presentation to U.S. Environmental Protection Agency, Washington, DC, Lee Thomas and the Technical Staff, May, 1983.

A State-of-the-Art Above Ground Hazardous Waste Containment System--The Environmental Vault

A presentation to Parliamentary Chambers, Wiesbaden, West Germany, April, 1984.

A Case Study--Lime--A Hazardous Waste Stabilization Agent

Co-author with Mike A. Turco.
ASTM Committee on C-7, Symposium on Lime for Environmental Uses, Los Angeles, California, June 23-28, 1985.

Vapor Extraction of Organic Contamination from the Vadose Zone--A Case Study

Co-author with Donald K. Rothenbaum, Shekhar B. Charjee, and Eric S. Findlay.
A paper presented to the National Water Well Association's Focus on Northwestern Ground Water Issues Conference, May 5-7, 1987.

RANDOLPH C. HARRIS
Senior Hydrogeologist/Associate

Education :

B.S. Geology, California State University, Northridge, California.

Registration :

Registered Geologist, California, #3708 (1982)

Summary of Experience :

Mr. Harris is a Registered Geologist with over 19 years of professional experience completing geological and environmental projects. He has completed numerous detailed hydrogeologic studies, geotechnical studies, and environmental analyses. He currently acts as the Senior Hydrogeologist and Consulting Associate for Kleinfelder, Inc.. In this capacity, Mr. Harris reviews the Quality Assurance/Quality Control and Loss Prevention programs at all Kleinfelder offices. His experience in the review of environmental and hydrogeologic projects is a valuable asset to Kleinfelder, Inc. and its clients.

1984-Present Senior Hydrogeologist and Associate, Kleinfelder, Inc. Responsible for senior technical review of environmental assessment and hazardous waste studies. Plans, coordinates and directs hydrogeologic studies. Specific duties include: performance of complex geologic field investigations, supervision of studies done by geologic staff, preparation of work plans, budgets, and proposals for both hazardous waste and water supply investigations; and provide technical expertise for litigative processes.

1982-1983 Senior Hydrogeologist, Morrison-Knudsen International, Colombia, South America. Responsible for directing water supply investigations on the Cerrejon Coal Project. Reporting to the Manager of Geotechnical Engineering. Responsibilities included directing and designing groundwater exploration programs, directing and conducting aquifer testing and evaluation, design and construction supervision of a production well field of 22 wells, and directing surface water supply investigations.

RANDOLPH C. HARRIS
Senior Hydrogeologist/Associate

- 1979-1981 Senior Hydrogeologist, Arctic Geohydrology, Anchorage, Alaska. Responsibilities included design of groundwater exploration programs, preparation of groundwater reports based on site reconnaissance and literature investigation, preparation of well specifications, troubleshooting, redevelopment programs, and remedial designs for existing water wells, and conducting pumping tests; and performing aquifer analysis.
- 1975-1979 Project Engineering Geologist (1977-79), Alyeska Pipeline Service Company, Anchorage, Alaska. Reported to the Manager of Civil Engineering of the operating company for the TransAlaska Pipeline. Responsibilities included design and construction of water wells in permafrost regions, design of infiltration galleries in both the arctic and subarctic, air photo surveillance of glacial surge and glacier dammed lakes, design and installation of porous medium piezometers in rock cuts for determining effectiveness of dewatering programs, and supervision of cathodic protection drilling program at both terminal and pump stations.
- Staff Geotechnical Engineer (1975-77), Alyeska Pipeline Service Company, Anchorage, Alaska. Reported to the Supervisor of Field Engineering during the construction phase of TAPS. Responsibilities included geologic exploration for construction mode confirmation, aggregate source studies, field design of both drilled and drilled-in-place piles, load testing of piles, engineering review and supervision of above-ground pipe placement and hardware modification, and remedial design of water wells.
- 1973-1975 Staff Geologist, Fugro, Inc., Consulting Engineers and Geologists, Long Beach, California - an international geologic and engineering consultant firm. Reported to the Project Manager. Responsible for geologic and hydrogeologic studies conducted on both a regional and site specific basis. Directed field mapping teams, coordinated geologic and hydrogeologist drilling programs, and mapped recent fault traces by trenching and air photo analysis.
- 1972-1973 Assistant Production Geologist, Signal Oil and Gas Company, Huntington Beach, California. Reported to Division Production Geologist for large waterflood recovery project in the largest and oldest directionally drilled oil field in California. Responsibilities included interpretation and correlation of down-hole geophysical

RANDOLPH C. HARRIS
Senior Hydrogeologist/Associate

logs (electric and radiation), prepared and presented geologic structure and stratigraphy in proposals for new injection and production wells, prepared structure maps from deep (10,000 - 20,000 feet)

1971-1972

Assistant Engineering Geologist, Earthquake Laboratory, U.C.L.A. School of Engineering, Los Angeles, California. Worked on various Earthquake Engineering research projects for the development of seismic zonation of the Los Angeles area. Responsibilities included interpretation and preparation of geologic maps and cross-sections, involved in both shallow (100 feet) and deep (1,000 feet) refraction surveys, and logged and interpreted shot holes.

Professional Affiliations:

National Water Well Association
Association of Engineering Geologists

TODD J. CROFT
Project Geologist

Education:

BS Geology Extended Major and Remote Sensing Minor, Northern Arizona University, Flagstaff, 1983.

Other Course Work:

Community College of the Air Force, USAF, 1975-1978, 41 semester hours of basic and advanced electronics course work.

Government Sponsored Courses (EPA):

Hazardous Materials Incident Response Operations Training Course, July 1984.

Air Transportation of Dangerous Goods/Restricted Articles Workshop, October 1984.

Radiation Safety and Use of Nuclear Devices, January 1985.

Geophysics for Hazardous Waste Site Investigations, May 1985.

Summary of Experience:

Mr. Croft is experienced in the planning and implementation of hazardous and industrial waste site investigation, characterization and monitoring. He is trained in QA/QC protocols, chain-of-custody procedures, and applicable techniques for sampling soil and water for contaminant presence. His formal training also includes hazardous materials safety procedures.

1986-Present Project Geologist, Kleinfelder, Environmental Services Division.

Plans and implements soil and ground water quality investigations of industrial and hazardous waste sites. Supervises drilling operations, performs geologic logging, installs monitoring and extraction wells, and conducts air, soil, and ground water sampling.

TODD J. CROFT
Project Geologist

Utilizes aerial photography and remotely sensed data to conduct environmental assessments, aid in site characterization efforts, and delineate target areas for field investigations.

1983-1986

Geologic/Geophysical Associate, Image Analysis Laboratory and Subsurface Monitoring Section, Lockheed Engineering and Management Services Company, Inc., Las Vegas, Nevada.

Assisted in planning and conducting site characterization field surveys of hazardous waste sites in support of the U.S. EPA's Environmental Monitoring Systems Laboratory. Conducted field surveys using electromagnetic conductivity, surface magnetics, borehole camera and aerial photography. Performed analysis and interpretation of aerial photographic, geologic, geophysical, and geochemical data. Supervised the field aspect of subcontracts for exploratory drilling, installation of ground water monitoring wells, conducting geochemical soil-gas surveys, and acquisition of site specific aerial photography. Assisted in the use of electrical resistivity, seismic refraction, and soil-gas monitoring techniques.

Summer 1982

Geological Assistant, Exploration Office, Barite Mining Inc., Elko, Nevada.

Conducted geochemical sampling, field mapping, and claims assessment work. Geochemical targets included high grade bedded barite and epithermal disseminated "Carlin-Type" gold deposits.

1975-1979

Avionic Sensor System Specialist, U.S. Air Force.

Responsible for the operation, maintenance, and repair of state-of-the-art infrared, laser, and T.V. sensor systems. Involved in research and development and production facets of sensor testing and use.

Selected Project Experience:

- o Sand Creek Industrial Site, Commerce City, Colorado.

Geophysical, aerial photographic and geochemical investigation of a closed municipal landfill, abandoned oil refining site, abandoned and covered acid waste disposal pond, and an active pesticide manufacturing facility.

TODD J. CROFT
Project Geologist

- o IWC Landfill Site, Fort Smith, Arkansas.
Aerial photographic and geophysical investigation to delineate the location, size, and structure of a closed landfill.
- o Colbert Landfill, Spokane, Washington.
Aerial photographic, geophysical, and geochemical investigations of an active landfill.
- o Marion Landfill, Marion, Indiana.
Aerial photographic and geophysical investigation of a closed landfill.
- o Stovepipe Wells, Death Valley, California.
Geophysical, aerial photographic and geochemical investigation of a leaking underground storage tank.
- o Holloman AFB, Holloman, New Mexico.
Geophysical and geochemical investigation of a leaking underground storage tank and a fireman training area.

R. SCOTT WALLACE
Project Geologist

Education

- BS Southern Utah State College, Geology, 1985
MS Western Washington University, Geology, 1987

Registration

- CAI-EPA Registered Asbestos Inspector and Management Planner
State of Utah Certified Soil and Ground Water Sampler.

Summary of Experience

Mr. Wallace has three years experience in geotechnical and environmental engineering, and has played a key role on projects in Utah, Arizona, California and Nevada. He has managed projects in the areas of environmental assessments for property transfers, underground storage tanks, asbestos surveys, geologic hazards and surface/ground water hydrology.

1987 - Present Project Geologist with Kleinfelder, Inc.

As environmental project geologist, Mr. Wallace is responsible for initial client contact and project planning, supervision and implementation of field activities, and serves as a regulatory liason to Local, State, and Federal agencies. He also authors and reviews technical reports and letters regarding environmental investigations. Field experience includes supervision of drilling operations, borehole logging and interpretation, installation and development of ground water monitoring wells, aquifer characterization, underground storage tank management, hazardous materials site investigations and geologic hazard investigations.

Jun - Dec 1986 Field Geologist, Coastal Consultants, Inc.

Mr. Wallace was responsible for carrying out all aspects of government research project (Coastal Sedimentation Study) under contract with the Washington State Department of Ecology.

May - Sep 1984 Geotechnical Field Technician, Pittsburg Testing Laboratory

Responsibilities included supervision of drilling operations, preparation of detailed lithologic records, caisson boring and concrete parameters, soil laboratory testing, and report preparation. Project experience includes an eight million dollar special events arena report preparation.

R. SCOTT WALLACE
Project Geologist

Professional Affiliations

Geological Society of America - Associate Member
National Water Well Association - Member
American Geophysical Union

Selected Project Experience

- o Soil and Ground Water Contamination Investigation East Flamingo Refueling Station, Las Vegas, Nevada.
- o Hydrocarbon Release Assessment and Remediation, Westside Metropolitan Police Substation, Las Vegas, Nevada.
- o Site Characterizations (15 locations) Retail Gasoline Service Stations, Las Vegas, Nevada.
- o Comprehensive Underground Storage Tank Assessments at 50 sites, Clark County School District, Clark County, Nevada.
- o Hazardous Chemical Site Assessment, Kidd Marshmallow Company, Henderson, Nevada.
- o Hazardous Chemical Site Assessment, AMPAC Development Company, Henderson, Nevada.
- o Level I Environmental Investigations of 75 sites in southern Nevada, Banks and Private Developers; Clark County, Nevada.
- o Geologic Hazard Investigation, Sunbrook residential Golf Course, St. George, Utah.
- o Ground Water Monitor Well Design and Installation, Nevada Power Company, Moapa, Nevada.
- o Cursory Asbestos Surveys of five residential developments, Private Developers and Owners, Clark County, Nevada.
- o Evaporation Pond Ground Water Monitoring Network, Molycorp; Mountain Pass, California.
- o Geologic Hazard Investigation, Proposed Virgin River Bridge, River Road, St. George, Utah.
- o Hydrocarbon Release Assessments for Texaco and Rebel Oil, Las Vegas, Nevada.

WILLIAM C. B. GATES

Senior Hydrogeologist/Engineering Geologist

Education:

MS Geological Engineering, South Dakota School of Mines and
 Technology, Rapid City, South Dakota.
BS Geology, Campbell University, Buies Creek, North Carolina.

Registration:

Registered Geologist, #139, North Carolina 1986
Certified Professional Geologist, CPG #4967
American Institute of Professional Geologists 1981
Environmental Assessor, REA-01320, California 1989

Summary of Experience:

Mr. Gates is a retired Army officer with over 20 years of experience dealing with various environmental problems worldwide. These problems have covered a wide range of interrelated disciplines attendant to ground water, solid waste and hazardous waste, including hydrogeology, engineering geology, geotechnical engineering, soils engineering, environmental science and instrumentation/exploration. He has completed over 50 of these projects with the U.S. Army Environmental Hygiene Agency at various Army installations, Army depots, Army ammunition plants and Defense fuel supply points. Because of the worldwide distribution of these facilities, he has had exposure to diverse geological, engineering, and regulatory problems.

1989-Present Senior Hydrogeologist, Kleinfelder, Reno, Nevada.

Responsible for senior technical review of environmental assessments, hazardous and solid waste studies and open burning/open detonation (OB/OD) programs for Propellents, Explosives and Pyrotechniques (PEP). Plans, coordinates and directs hydrogeologic studies of RCRA, CERCLA, SARA and LUST sites and ground water resources programs. Specific duties include: performance of complex geologic field investigations, supervision of studies done by geologic staff, preparation of work plans, budgets and proposals for both hazardous and solid waste and water supply investigations; and provides technical expertise for litigative processes.

WILLIAM C. B. GATES

Senior Hydrogeologist/Engineering Geologist

1987-1989 Chief, Engineering Services Branch, Waste Disposal Engineering Division (WDED), U.S. Army Environmental Hygiene Agency (USAEHA), Aberdeen Proving Ground (APG), Maryland.

Responsible for supervising, planning, controlling and coordinating the personnel and the equipment assets needed to support three major environmental programs: Ground Water, Solid Waste, and Hazardous Waste. Specific responsibilities included: overall supervision of project officers and technicians representing diverse disciplines such as geotechnical engineering, hydrogeology, soil science, and environmental science; report and design review, management of a complete in-house soils engineering laboratory and drilling equipment; management of a consumable and training budget. Special Project Officer in charge of developing a permit for OB/OD operations at Hawthorne Army Ammunition Plant, NV. Also senior reviewer for OB/OD permit applications at Tooele Army Depot, UT, and Pueblo Army Depot Activity, CO.

1985-1987 Chief, Soils Laboratory and Project Hydrogeologist and Geological Engineer, WDED, USAEHA, APG, Maryland.

Responsible for supervising, planning, controlling and coordinating the personnel and equipment assets to support a soils engineering laboratory and geotechnical drilling and ground water and soil sampling program. Specific responsibilities included: overall supervision of engineering geologists and technicians. Responsibilities included report writing and design development and review, supervision of a complete in-house soils engineering lab, maintenance supervision of technical equipment. Special project hydrogeologist stateside and overseas (Germany and Central America). Designed and developed specifications to environmentally protect ground water wells from frost heave. Conducted research on new landfill cover techniques using weathered rock in tropical terrains.

1979-1983 Project Geologist, WDED, USAEHA, APG, Maryland.

Responsible for managing personnel, equipment, and resources providing environmental consultations on surface and subsurface

WILLIAM C. B. GATES

Senior Hydrogeologist/Engineering Geologist

geology, hydrogeology and geotechnical engineering problems attendant to treatment, storage and disposal facilities for solid and hazardous waste. Ensured all geological data leaving the Soils Lab was accurate, timely, of good quality and in compliance with federal regulations under RCRA. Responsible for input on developing a remote control operated drilling rig for sampling OB/OD grounds at various ammunition plants.

1975-1979 Terrain Intelligence Analyst (Geologist) and Special Forces Medical Specialist, US Army Special Forces, Panama and Ft. Devens, Maine.

Detailed intelligence evaluations of the geomorphology, engineering geology and soils, hydrogeology, climate, vegetation, terrain trafficability of various strategic geographical areas in Central America and Europe, facilitated by areal photographic interpretation, field mapping and reconnaissance and hydrographical surveys.

1966-1979 Various Special Forces assignments to include demolition engineer.

Professional Affiliations:

Association of Engineering Geologists (AEG) Member, Hazardous Waste Management Committee
Geological Society of America (GSA)
National Water Well Association (NWWA)
Society of American Military Engineers (SAME), Sustaining Member

Publications:

Mr. Gates has over 50 professional publications and reports.

Hazardous Waste (HW) Project Experience includes:

- o HW Treatment Storage and Disposal (TSD) Facility Site Investigations. Evaluations and Remediations.
- o RCRA Part B Permit Assistance for HW TSD Facilities and Explosives/Propellant Open Burning/Open Detonation (OB/OD) Grounds

WILLIAM C. B. GATES

Senior Hydrogeologist/Engineering Geologist

- o Geotechnical Investigation of OB/OD Grounds
- o Development of Site Safety and Sampling Plans

OB/OD Site Locations

- o Pueblo Army Depot, CO, 1980
- o Pine Bluff Arsenal, AR, 1980
- o Rock Island Arsenal, IL, 1985
- o Yuma Proving Ground (PG), AZ, 1981
- o Aberdeen PG, MD (1979-1989)
- o Holston Army Ammunition Plant (AAP), TN, 1980, 1981
- o Lake City AAP, MO, 1980
- o Sunflower AAP, KS, 1980
- o Louisiana AAP, LA, 1981
- o Radford AAP, VA, 1982, 1982
- o Hawthorne AAP, NV, 1987, 1988
- o Fort Devens, MA, 1985
- o Fort Carson, CO, 1986

Selected Project Experience:

- o Evaluation of Solid Waste Management Units (SWMUs), Hawthorne Army Ammunition Plant, Hawthorne, Nevada.

Required evaluation of all SWMUs with respect to 40 CFR 264 and 270 and identification of SWMUs requiring RCRA Facility Assessments, RCRA Facility Investigations and/or Corrective Actions. The SWMUs included hazardous

WILLIAM C. B. GATES

Senior Hydrogeologist/Engineering Geologist

waste lagoons, underground tanks, open burning/open detonation grounds and storage facilities. Also, Hydrogeologic and Engineering Geology support of OB/OD RCRA Part B Permit Support for "New Bomb".

- o Hazardous and Solid Waste Management Survey, Palmerola Air Base, Honduras.

Provided in-depth hydrogeological consultation on management of Solid, Hazardous and Infectious waste and methods to prevent ground water contamination.

- o Hydrogeological Consultation of Army Maintenance Facility at Mannheim, West Germany.

Provided in-depth hydrogeologic consultations to both US Army Europe and Federal Republic of West Germany on treatment of ground water contaminated with Chlorinated Hydrocarbons (CHCs). This included detailed hydrogeologic analysis of flow regime, review of German flow models and implementing design for pumping raw water, treating CHCs and reinjection of clean treated water to form an artificial barrier between contaminated water and primary pumping source.

- o Hydrogeological Consultation of Class III Petroleum, Oil and Lubricant (POL) Storage Site, Augsburg, West Germany.

Provided in-depth hydrogeological consultation on leaking underground POL storage tanks. This included installation of a monitoring well net, analysis of plume and installation of relief wells to treat contaminated water.

- o General Hydrogeological Consultations.

Designed monitoring well networks based on unique hydrogeology, installed monitoring wells and implemented ground water programs at Army facilities in Nevada, Washington, Colorado, Tennessee, Virginia, Indiana, etc.

- o General Geotechnical/Environmental.

Designed and implemented protective grout modifications for ground water monitoring wells in northern tier states to prevent frost heave damage. Designed and implemented a method to use weathered rock in tropical terrains for landfill cover (Panama).

WILLIAM C. B. GATES

Senior Hydrogeologist/Engineering Geologist

o Ground Water Resources.

Provided in-depth hydrogeological assistance to US Forces and Republic of Honduras on location, installation and development of drinking water wells in Honduras.

Supervised installation of irrigation wells and production wells at Squaw Valley and Tahoe City, California.

1990 ENVIRONMENTAL FEE SCHEDULE

Professional Staff Rates

Field Engineer or Geologist.....	\$ 65.00/hr
Staff Engineer or Geologist.....	\$ 70.00/hr
Project Engineer or Geologist.....	\$ 75.00/hr
Senior Engineer or Geologist.....	\$ 85.00/hr
Principal Engineer or Geologists.....	\$105.00/hr

Technical Staff Rates (2)

Technician	\$ 44.00/hr
Senior Technician.....	\$ 50.00/hr
Welding Technician.....	\$ 50.00/hr
Supervisory Technician.....	\$ 65.00/hr
Materials Manager	\$ 75.00/hr
Special Laboratory Testing.....	\$ 50.00/hr
Technical Typist with Word Processing.....	\$ 42.00/hr
Technical Typist/Clerical.....	\$ 38.00/hr
Drafting.....	\$ 50.00/hr
Mileage (Outside 20-Mile Radius).....	\$ 00.45/mi
Overtime Surcharge.....	1.25 times above hourly rate
Hazardous Conditions (Level C or above).....	1.5 times above hourly rate

Field Exploration

Travel/Stand-By	\$ 95.00/hr
Drilling and Sampling.....	\$ 8.00/ft
Drilling (Monitoring Wells).....	\$120.00/hr
Photoionization Detector (PID)	\$ 50.00/day
Dozers, Backhoes, Tow Trucks.....	cost plus 20%
Monitor Well Development	\$100/well
Resistivity Meter.....	\$100.00/day
Seismograph.....	\$100.00/day
Per Diem (Per Man-Day)	\$ 65.00/man-day

Laboratory

Laboratory Analyses cost plus 20%

- Notes:
- (1) Minimum fee for any Professional and Technical Services rendered will be \$200.00.
 - (2) 2-hour minimum charge for all Field Services.
 - (3) 20% mark-up on all third party costs.