RICHARD C. SLADE & ASSOCIATES

CONSULTING GROUNDWATER GEOLOGISTS

May 7, 1998

Mr. Michael Young, President
Integrated Environmental Services, Inc.
3990 Westerly Place, Suite 210
Newport Beach, California 92660

P17-98

Re: Proposal for Hydrogeologic and Contractor Services
Destruction of Water Wells
Boeing Facility Property
Torrance, California

Dear Mr. Young:

Per your request and that of Mr. Chris Stoker of your office, the firm of Richard C. Slade & Associates, Consulting Groundwater Geologists, is pleased to present its proposal for hydrogeologic and contractor services for destruction of two water wells at the Boeing Facility, Torrance, California. Specifically, these two wells are located in the north-central portion of the property which itself lies just south of 190th Street and between Western Avenue on the west and Normandie Avenue on the east.

For the proposed work, Richard C. Slade & Associates (RCS) will serve as the overall project director and will provide all required hydrogeologic office and field services to perform the required destruction of the two subject water wells. RCS will also prepare the Work Plan, respond to questions from the client(s) or Agency staff, prepare a Site Safety Plan for its field personnel, monitor the actual well destruction, and prepare a letter-report to document the destruction of each well.

For the contractor services, RCS will utilize Beylik Drilling Company (Beylik) to perform all required field construction work necessary to completely destroy the two wells. Beylik will perform the video logs, bailing of the wells, filling the entire well with Portland cement, rip as much as 200 ft of new perforations in each well and complete the destruction by creating a "mushroom cap" atop the existing casing. Beylik will also obtain any necessary permits for the work and will prepare a Site Safety Plan for its personnel and equipment.

For your information, we have worked on many occasions over the years with Beylik on both the construction of new water wells and the destruction of others. Both firms are well qualified to provide the design for the work and then to conduct the field work necessary to thoroughly and properly destroy both wells. Our Recommended Scope of Work and cost estimate are presented on the following pages.

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In our professional opinion you do not want to follow the minimum requirements for well destruction identified in Bulletin 74-90 (June 1991) – California Water Well Standards; that report supplements well destruction information originally provided in Bulletin 74-81 (December 1981). True, your well destruction costs will be less costly, but the long-term liability for your client will not be mitigated. A far better and more permanent solution and one which will tend to preclude questions in the future regarding the adequacy of the sealing method, is to conduct the work as we recommend hereunder. Our proposed work will provide the following:

- Documentation of the existing conditions in each well;
- Provide the original driller's log for each well;
- A record of the field work conducted to clean out the current well to its known total depth;
- A record of the additional perforations cut into the existing well casing in order to allow our cement seal to extend out beyond the well casing and at depths above the reported great depths to the uppermost perforations in each well;
- A record of the volume and type of cement used to completely fill the existing casing; and
- A letter-report for each well which provides the written documentation of the above items.

Thank you for the opportunity of submitting this proposal, and we look forward to continuing to work with you on groundwater issues relating to this property.

Very truly yours,
RICHARD C. SLADE & ASSOCIATES

Richard C. Slade

Attachments

RECOMMENDED SCOPE OF WORK

Background Information

During a field reconnaissance of the site early last year with Mr. Rus Purcell of Kennedy Jenks Consultants, I observed the two subject wells and suggested that it may be important to destroy those wells properly so that possible onsite contamination would not migrate vertically downward to deep aquifers. Following that, we went to the County of Los Angeles and obtained their re-written copies of the original driller's logs of those two wells. Copies of those re-written logs were provided to Mr. Purcell and others involved in the project at that time.

Recently, we were asked to prepare this proposal for destruction of the two wells. To accomplish this properly, I decided to obtain copies of the driller's logs of the wells from the contractor who originally constructed the wells in the early 1940s. That contractor, Roscoe Moss Company, is still in business but now only manufactures water well casing; they have not drilled wells since the mid-1970's. We routinely utilize their well casing in the construction of municipal-supply water wells, a phase of our consulting work with which we are frequently involved.

With the help of Mr. Ted Caldwell of Beylik Drilling Co., our sole subconsultant for this well destruction project, we acquired a copy of the original driller's logs for both subject wells. As stated above, both wells were drilled in 1942 for the Aluminum Company of America. Both wells are 600 ft deep and contain interspersed zones of perforations that begin at 477 ft in one well and 427 ft in the other. Based on hydrogeologic conditions in the area, these wells likely produced groundwater from the Silverado aquifer system.

Due to their probable cable tool method of construction, neither well has a sanitary seal or a gravel pack outside of the well casing. All casing is reported to be 14 inches in diameter. Although no electric logs were performed at the time of construction of these wells, the driller's logs do indicate the subsurface sediments as logged by the driller.

For proper and thorough well destruction, it is vital to have an accurate driller's log and record of casing perforation intervals, and hopefully an electric log also. As stated, only the former two items are available.

We have carefully reviewed the driller's logs of these two wells plus the log for the following: the third onsite well (also drilled in 1942, but reportedly abandoned or destroyed many years ago by others); and for a nearby but offsite well located just to the south, drilled in 1943 for Stauffer Chemical Company, and reportedly abandoned(?) in

1967. Review of these four drillers' logs helps us identify potential zones that may require sealing during the well destruction program.

Our limited comparison to date of the well drillers' logs to geologic logs of recently-drilled, deep, onsite groundwater monitoring wells (WCC-3D) reveals:

a) The driller's logs are very generalized and tend to show relatively large thicknesses of clays and/or sandy clays to depths of 150 ft or so.

b) The geologic log shows the upper sediments are not clays/sandy clays but rather predominantly fine grained sands from ground surface to 110 ft and then silty clay from 110 to 118 ft, then fine-grained sands to 123 ft, and finally claystone to the 140-foot total depth of this borehole.

c) Hence, the driller's log can only be used as a rough guideline for the sediments present at depth in each well; as stated above, no electric log exists for the old water wells.

Summarized Scope of Work

Hydrogeologic services for RCS will include:

Task A – Data Collection and Review

Collect and review the drillers' logs for three onsite wells and the nearby offsite well and then compare those drillers' logs to the geologic logs of selected onsite groundwater monitoring wells.

Much of this task has already been accomplished.

Task B – Prepare Site Safety Plan and Work Plan

Write and prepare a Site Safety Plan for the RCS field personnel and incorporate it into our detailed Work Plan that must be prepared for the work.

These two plans will be submitted to the Regional Water Quality Control Board for approval before conducting the field work.

Task C – Field Monitoring of Well Destruction Activities

RCS is in the process of developing a definitive step-by-step program for the proposed well destruction. Individual work items to be included in the well destruction will very likely include the following items and in the order so indicated for each well:

1. Obtain appropriate permits to perform the destruction work.

2. Mobilize and demobilize all equipment and supplies (pump rig, bailers, tremie pipe, and tractor). Remove the pump motor and pump column from the well; these will be left onsite for disposal by Boeing because the equipment is old and outdated and has no salvage value. At present, it is not known at what depth the pump is set, in what length is each section of pump column, and whether or not the joints of the pump column will unscrew readily or if they need to be torch-cut to take them apart as they are removed from the well.

3. Use a large diameter bailer to bail possible lubricating oil from the top of the static level in the well; any bailed oil will be placed in appropriate drums and left onsite for proper disposal by Boeing.

4. Conduct a video log survey of the well casing to the total well depth to assess the condition of the casing and the exact locations of the casing perforations, to determine the amount of sediment fill in the bottom of the casing, and to determine if any portion of the casing has collapsed or is ruptured. We assume that the casing has not collapsed.

5. Utilize a large bailer to bail sediment fill from the bottom of the casing; we assume there is 50 ft of such fill to remove.

6. Utilize a down-hole casing perforation tool and cut new perforations into the casing; we estimate we will cut as many as 200 feet of new perforations in the well in the depth zone between ground surface and 400 ft (there are no existing perforations in either well above a depth of 427 ft.

7. Utilize tremie pipe set to various depths in the well and grout the entire casing with a 10-sack mix; an estimated 25 cubic yards of cement may be needed for each 14-inch diameter steel casing to the full depth of the casing.

8. Demolish the large cement well pad and utilize a backhoe to excavate down to 5 ft abound the top of the existing casing; remove the upper 5 ft of casing; rip apart the upper few feet of the new exposed casing and "mushroom" it out, and filling it will cement to create a "mushroom cap" atop the casing; backfill the upper 5 ft of the excavation with native soils up to original ground surface.

For our RCS work during Task C - Field Monitoring Services, we propose to:

1. Maintain liaison and communicate between our contractor and ourselves, and between your office, the client, and our field personnel.

2. Provide limited monitoring of the removal of the motor, pump and pump column.

3. Observe the bailing of possible lubricating oil from the water surface in the well.

4. Be present when the video log is performed, and to review and provide assessment of this video log; provide possible changes to the field destruction program, as presently planned, due to unforeseen conditions now detected downhole in the well by the video log.

5. Assuming no changes to the originally planned program, we would now monitor the bailing of the estimated maximum 50 ft of accumulated sediment fill in the bottom of the well.

6. Monitor the down-hole ripping of the well casing (estimated 200 ft maximum), at intervals that are finalized after reviewing the video log survey, but are recommended to all be above a depth of 400 ft.

7. Monitor the complete filling of the well casing by cement to a depth of 600 ft.

8. Provide part-time monitoring of the development and construction of the "mushroom cap" atop the well casing.

Task D – Prepare Documentation Report

Write and prepare a report to document the methods used and results from the destruction of the well.

Task E – Meetings

We envision there may be as many as two meeting to prepare for and attend during the duration of this project.

COST ESTIMATE and SCHEDULE

For the preceding scope of work, we estimate the costs for our hydrogeologic services and our well destruction contractor for the first well to be as follows:

A.	**Hydrogeologic Services**	$12,900 to $13,400
B.	**Contractor Services**	$18,000 to $18,800
	Estimated Project Total	**$30,900 to $32,200**

Subsequent to the work on the first well, and prior to initiating destruction work on the second, we can issue you a revised cost estimate for this subsequent work based on results at the first well

Key Assumptions for Cost Estimates

Our key assumptions for the cost estimates for the hydrogeologic office and field services by RCS and for the field construction services by Beylik include:

a. A permit from the Watermaster and/or Environmental Health Department will be required.

b. The wells will be destroyed, separately, perhaps weeks apart, and hence not concurrently. We will begin at the northernmost of the two wells.

c. Pumps and motors will be removed from each well; we do not know the depth of the pump setting or if the pump column is in 10- or 20-foot lengths. Existing pumps, motors, and pump columns are old and outdated and, hence, have no salvage value. They will be left onsite for disposal by Boeing.

d. We assume there will be limited bailing of oil from the water surface in each well; this oil, which is excess pump lubricating oil, must be removed before conducting a video log of the well. Any such bailed oil will be stored in drums for proper disposal by Boeing. Flocculant will be added to the water prior to the video log.

e. A video log survey will be performed in each well to document the location of existing perforations, to identify possible casing ruptures/collapses at depth (which would then create severe problems in

subsequent cementing operations(, and to determine the depth of sediment fill in the bottom of each well.

f. After the video logging, we shall bail as much as 50 ft of sediments from the bottom of each well, prior to ripping the casing.

g. Provide casing ripping tools to cut as much as 200 vertical ft of new perforations in each well; this is essential to maximize the benefit of the cementing operations in precluding further vertical movement of potential contaminant down the existing casings. These new perforations will be placed at selected intervals in each well between the depths of ground surface and 400 feet.

h. Utilize a tremie pipe to completely fill the 14-inch diameter steel casings to their total depths of 600 ft each.

I. Demolish the well pad and excavate down around the top of the casing, cut off the upper 5 feet of casing, swedge the casing out, and open and create a "mushroom, cap" with cement at a depth of 5 ft below ground surface. Concrete from pad demolition will be left onsite for removal by Boeing.

j. Costs for hydrogeologic services accrue on a time and expense basis in accordance with the attached Schedule of Charges.

Schedule

We estimate we can provide our Site Safety Plan and Work Plan within three weeks of receiving written notice to proceed. Time for permitting and Work Plan acceptance by the regulatory agencies are not known.

Actual field time for performing all required destruction operations is estimated at eight (8) full working days. Following all destruction work, I estimate we can provide three copies of our "destruction report" within an additional three weeks.

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SCHEDULE OF CHARGES AND CONDITIONS

PROFESSIONAL HOURLY RATES

Principal Groundwater Geologist	$135.00 per hour
Project Manager – Groundwater Geologist	$100.00 per hour
Staff Geologist	$70.00 per hour
Graphics	$45.00 per hour
Clerical	$45.00 per hour
Depositions and Court Testimony (4-hour minimum per day)	$225.00 per hour

SPECIAL EQUIPMENT AND SERVICES

Hermit Data Logger & Transducer (for aquifer tests)	$350.00 per day
Groundwater Monitoring Syringe (for volatile organics)	$125.00 per day
Submersible Pump (4-in diameter) and Generator	$150.00 per day
Field Water Quality Probe (T, pH, EC)	$75.00 per day
Electric Tape Water Level Probe	$25.00 per day
Check-valve Bailers (hydrocarbons or other contaminants)	$20.00 per day
Subsurface Exploration, Water Quality Laboratory	Cost + 15%
Job Supplies, Reproduction, etc.	Cost + 15%
Automobile Mileage	$0.40 per mile

CONDITIONS

Findings, conclusions, and recommendations will be prepared, within the limits prepared by the client, in accordance with generally accepted professional hydrogeologic practice. No other warranty, either express or implied, is made by any verbal or written reports or services furnished for this project.

Invoices will be issued, at my option, on a monthly basis or when the work is completed. A service charge of 1-1/2% per month will be payable on any amount not paid within 30 days. Any attorney fees or other costs incurred in collecting delinquent charges shall be paid by the client.

Client will furnish rights-of-way to land proposed for field operations. Reasonable precautions will be taken to minimize damage to land or underground facilities (such as pipelines), but the proposed fees do not include costs for restoration of any damage resulting from field activities.

January 1998

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