PROPOSAL FOR DEVELOPMENT OF A GROUND WATER MONITORING PROGRAM

FOR KAWECKI BERYLCO INC.

ROGERS, GOLDEN & HALPERN
1427 Vine Street
Philadelphia, PA 19102

June 14, 1985

Rogers, Golden & Halpern
1127 Vine Street
Philadelphia, Pennsylvania 19102
215/563-4220

Boston Virginia

RGH

June 14, 1985

Mr. Francis Coyle
KBI
County Line Road
Boyertown, Pa. 19512

Re: Proposal for Installation of Ground Water Monitoring System

Dear Mr. Coyle,

We are please to present our proposal for design and installation of a ground water monitoring system to serve the mausoleum vault disposal area. We have made every effort to provide a quality package of services at a reasonable price.

As you can see from the enclosed resumes, our staff is highly qualified to conduct the studies you have requested. The scope of work and cost proposal have been organized by task so that you can better understand the organization of our technical program.

If you have any questions about specific elements of our proposal or would like to modify the content of specific tasks, please feel free to contact us. Thank you for the opportunity to place a bid on this work.

Sincerely,

Charles D. Miller

Charles D. Miller
Environmental Engineer

cc: Thomas Concannon, Ph.D.
Cabot Corporation
Box 1296
Reading, Pa. 19603

PROPOSAL FOR DEVELOPMENT OF GROUND WATER MONITORING PROGRAM FOR KAWECKI BERYLCO INC.

RGH is pleased to present this detailed scope of work and cost proposal for the design and installation of a ground water monitoring program at KBI. Our proposal involves the installation of five monitor wells with durable, easy-to-use dedicated sampling apparatus. A streamlined efficiency conscious approach has been adopted.

We intend to use wells drilled during the initial exploration phase of the project in the final monitoring layout wherever possible. In order to accomplish this, we will be relying on the considerable experience of our hydrogeologic staff in the design, installation and operation of ground water monitoring systems.

The scope of work calls for the completion of seven exploratory wells. These wells will be used to develop information about the direction and velocity of ground water movement in the vicinity of the mausoleum vaults. The selection of monitor locations will be based on the hydrologic data developed from measurements of these wells. We are presenting as an option the pump testing of the group of exploratory wells. We believe that information about the permeability of the formation as well as about the potential for transmissive fracture zones in the area will be very useful in optimizing the monitoring network.

As requested, we have prepared a cost estimate for 100 percent teflon monitoring installations, including casings, screens and sampling apparatus. For comparison purposes we have also provided costs for construction of monitoring points using PVC materials only. It is our feeling that given the conditions at the site and the objectives of the monitoring program, the performance of teflon materials will not be appreciably better than the PVC.

When concentrations of organic compounds in the low ppb range are being monitored, PVC may interfere with monitoring functions. However, for the analytical program currently being comtemplated, no interference resulting from bleed or adsorbtive activity of PVC is anticipated. Except when exposed to certain concentrated acids and pure organic phases, PVC is equally resistant to attack as teflon. If you would like to consider the use of PVC construction in the monitoring network, we will be glad to explore the relative advantages of PVC and teflon with you.

We do not anticipate problems with background water quality in this area. Potential sources of radioactive substances are too remote to be of concern. Several of the lithologies of the Precambrian complex known as the Reading Prong have a high radon signature. Although these rocks outcrop nearby, the short half life of radon (less than 4 days) effectively ensures that radon will not survive as a dissolved constituent in ground water long enough to migrate to the site.

We do anticipate potential problems created by the apparently long-standing practice of stockpiling uraniferious ores adjacent to the mausoleum vaults. Even though the concentrations of uranium, thorium, and their daughters may be very low in this material, a potential for creating an artificial radioactive signature in the downgradient wells may be a concern. The storage area is located in an apparent down gradient location from the vaults, an obvious site for location of monitoring points. In order to minimize the potential for interference, we intend to locate the monitoring points as close to the vaults as is practical. In so doing, the number of points needed to adequately monitor the vaults is increased over what would be required if the wells could be located further downgradient. Consequently, five carefully selected monitoring wells are considered the minimum for this application.

The RGH hydrogeologists who have been assigned to this project are experienced with ground water monitoring programs involving a wide variety of hazardous materials in many different geologic terrains. Roger Moose has

managed hydrogeologic investigations at over 50 waste disposal facilities in the northeastern United States. Many of these projects were in the Triassic geologic province in which the KBI facility is located. Charles Miller, who has also managed varied hydrogeologic projects, specializes in the hydraulic evaluation of aquifers including computer simulation studies. Ron Kaiserman has conducted extended ground water monitoring studies as part of his research in the mobility of radioactive isotopes in ground water. Resumes for the principle investigators committed to this project are enclosed with this proposal. Recent studies completed or underway at RGH include:

- An evaluation of a proposal for uranium mining, milling, and waste disposal project in Sheva, Virginia.
- The design and installation of a dedicated ground water monitoring system for the City of Bethlehem, Pennsylvania's municipal landfill.
- The analysis of the impact of acid waste disposal by a hazardous waste generator at the Price's Pit Superfund Site.
- The siting study for the New Jersy Hazardous Waste Siting Commission.

In all its projects, RGH emphasizes close coordination with the client in addressing environmental problems. Due to extensive experience in dealing with issues of environmental law and regulation, RGH scientists are also in the best position to advise their clients on the potential implications of the information obtained in the course of their investigations.

A detailed scope of work for the proposed project follows. For more details on the elements of the program, please feel free to contact Charles Miller or Roger Moose at (215) 563-4220.

SCOPE OF WORK

TASK 1: Project Start-up

This phase of the program will involve the selection of drilling locations, establishment of a project time table, and coordination with subcontractors. We will review all pertinent hydrologic data concerning the area before developing the investigation plan. Aerial photographs of the site will be examined to determine whether any significant geologic lineations should be considered in designing the monitoring program. The direction of ground water flow in the vicinity of the mausoleum vaults will be estimated on the basis of geologic inference for the purpose of selecting initial drilling locations. A total of seven drilling locations will be selected. We believe that if these locations are selected judiciously, the exploratory bores can be used in the final monitoring layout. Two of the initial locations will be potential background monitoring points.

We anticipate using two subcontractors for this project. Garber Drilling Company has been selected to provide drilling services. This firm has extensive experience with the installation of secure water quality monitoring wells in the Brunswick Formation of Pennsylvania. Furthermore, their cost for mobilization to the job is low since they are based in the region. Laboratory services will be provided by Teledyne Laboratory and by Spots, Stevens and McCoy, Inc. Teledyne, which specializes in radiological analyses, will provide gross alpha and beta assays of ground water. The laboratory at Spots, Stevens and McCoy will analyze ground water for fluoride content.

Task 2: Drilling

Seven air percussion exploratory borings will be drilled. Each will be completed to a finished inside diameter of 6 inches. Through the soil and weathered rock zone, a 6.5 inch steel surface casing will be installed in an

eight inch bore. The surface casing will prevent deterioration of the bore, isolate the bore from inflow of surface water, and provide a means of securing the wells. The surface casing will extend to the top of competent rock and will be grouted into place. The casing will be provided with a locking steel cap. Each well will be developed with air until it flows clear and steady.

Our field hydrogeologist will log the cuttings returned from the drilling operation to determine the depth to competent rock, the physical characteristics of the aquifer, and the depth to water bearing zones. This data will be used later to determine the appropriate depths for screen sections and sand pack in monitor well installation. In order to interpret the water level data it will be necessary to provide control in the form of surveyed elevations for each of the wells. We will utilize a local surveying firm for this purpose.

Our cost proposal assumes that an average depth of 100 feet will be sufficient in this area to intercept at least 30 feet of saturated thickness. In the event that well depths must be carried deeper to achieve an adequate amount of saturation, the cost of the additional drilling will be charged on a per foot basis.

Task 3: <u>Hydraulic Analysis</u>

Water level measurements will be made in each of the wells immediately after development and again one week later. This information will be used to determine the hydraulic gradients that control the direction of ground water flow in the vicinity of the mausoleum vaults.

Two of the seven wells will be selected for pump testing. The selection will be made on the basis of estimate well capacities and the geometry of the well group. Each well be pumped using a commercial submersible pump for 8 hours. Formation permeabilities will be determined from drawdown measurements in the other wells. Formation permeability together with

porosity controls the velocity with which ground water migrates. We anticipate that the permeability of the aquifer will be decidedly anistropic. In this case, actual flow directions may diverge somewhat from those predicted on the basis of hydraulic gradient alone. It is also possible that interpretation of the pump test data may indicate the presence of transmissive geological structures.

The hydraulic data will be evaluated to determine the appropriate locations for monitoring wells. We are hopeful that the monitoring points may be selected from among the seven initial well locations. In the event that the hydraulic data clearly establishes the need to add one or more new locations, unit cost estimates for the drilling of additional wells have been provided in the cost proposal.

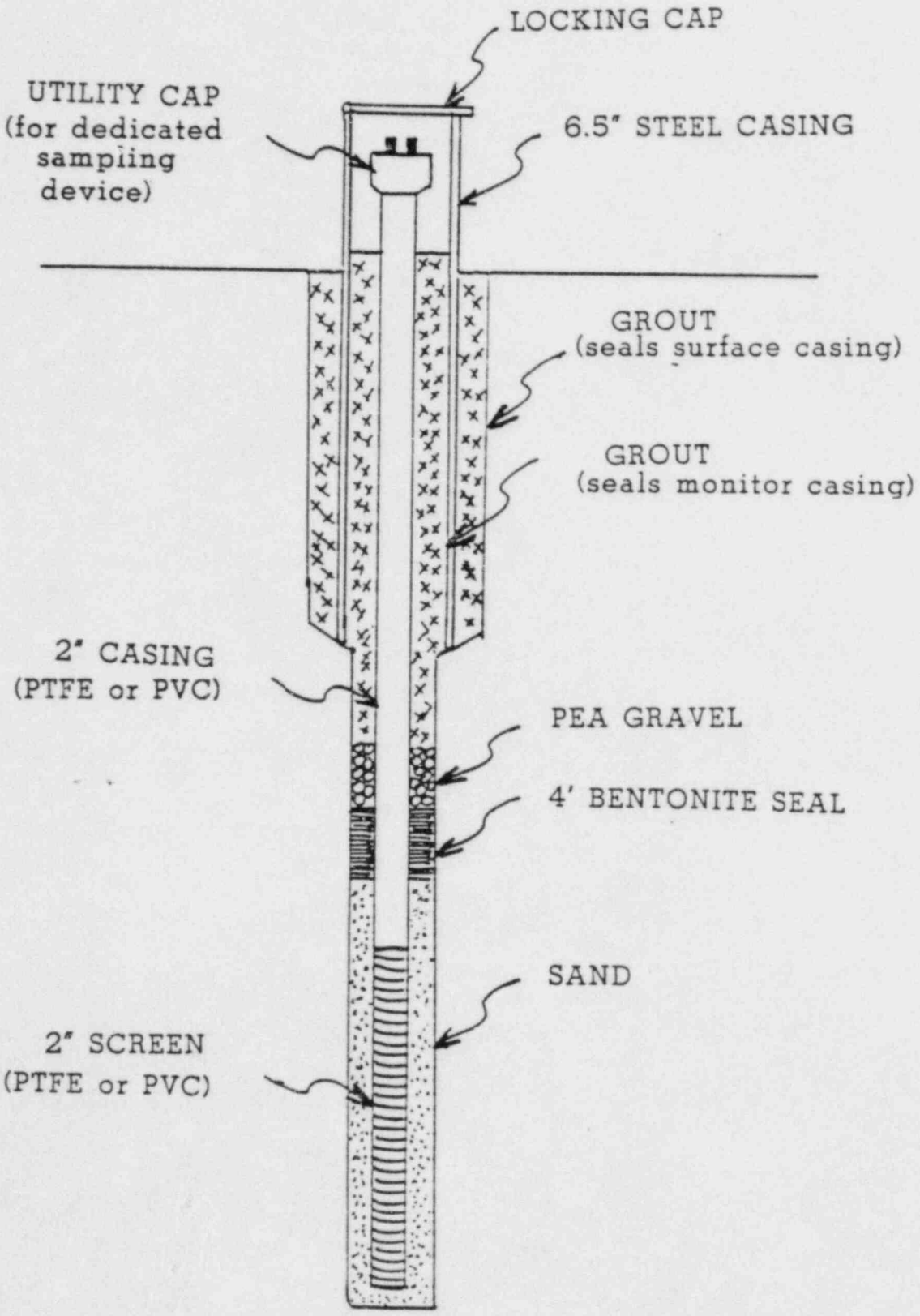
Task 4: Installation of Monitor Wells

RGH personnel will install five monitor wells. Each well will consist of two inch diameter casings and screen. The open portion of the well will be isolated with a 4 foot bentonite seal and grout. The bottom 30 feet of the well will be screened. If the saturated thickness exceeds 30 feet, the sand pack will be extended above the top of the screen to within 4 feet of the water table. A diagram of the proposed well construction is attached.

Each well will receive one dedicated pneumatic sampling pump. We are specifying the Q.E.D. Well Wizard sampling system. An alternative system may be employed at your request. However, we prefer the Q.E.D. system because the controller is totally pneumatic and does not require charging or battery hook-ups and because it has been shown to be reliable for high lift sampling applications. The construction of the well installation, including casings, screens, and pump may be either PVC or PTFE (teflon). Cost for both types of construction are provided.

MONITOR WELL

CONSTRUCTION DIAGRAM



Task 5: Initial Sampling Round

The initial sampling round will consist of a training session for KBI personnel in the operation of the monitoring network. We will measure water levels and collect a sample from each of the five monitor wells according to proper quality assurance procedures. The samples, together with a field blank, will be sent to the appropriate laboratories for analysis of gross alpha and beta emmissions and fluoride concentration.

Task 6: Data Interpretation and Report

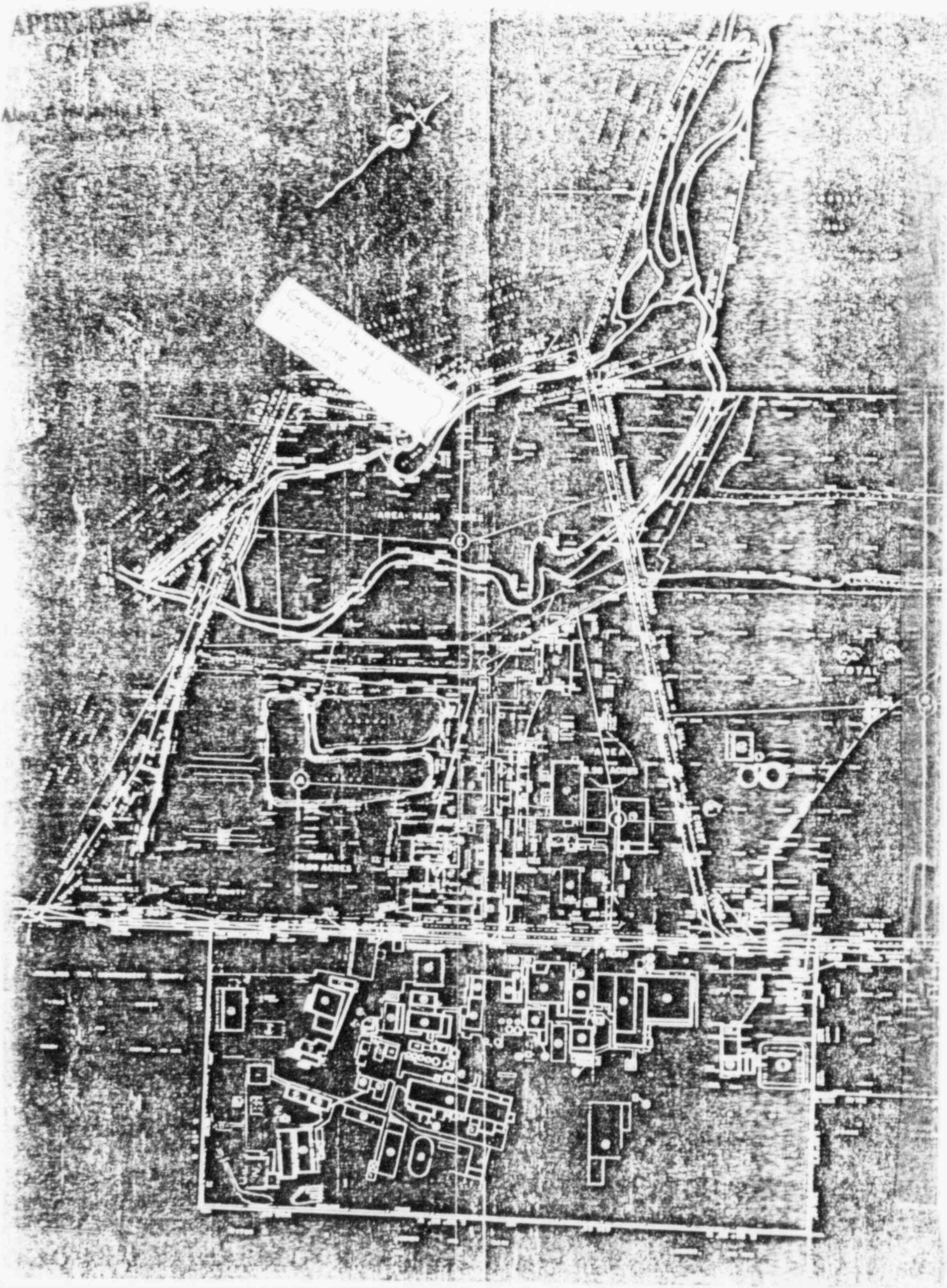
RGH will interpret the chemical analyses, paying special attention to background water quality and any anomallous results. We will at this time furnish a brief report to KBI documenting the results of our inve tigations. A plan of the monitor well layout showing pertinent elevations will also be provided. We will furnish a description of quality assurance procedures, including sample preservation methods and chain-of-custody documentation for use by KBI personnel.

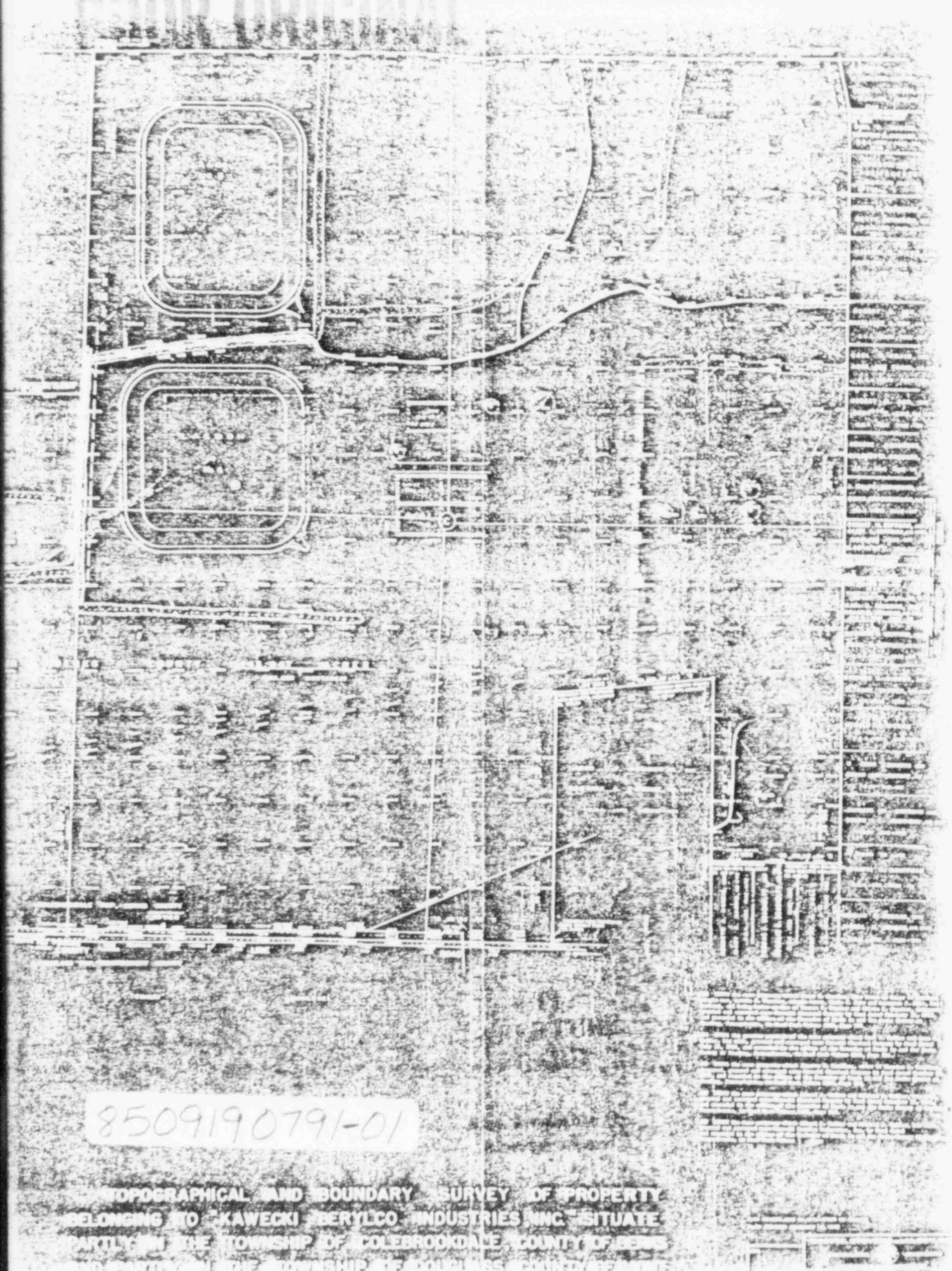
COST PROPOSAL

The following quotation is a not-to-exceed cost estimate for completion of the scope of work described in the preceding section. For your convenience, the total project cost has been broken down by task. Where insufficient information is available on which to base a firm price, such as in the case of total drilling footage, an add/deduct unit price has been provided. Two costs for installation of monitor wells are provided. One is for construction using PTFE (teflon) materials and the other is for construction using polyvinyl chloride (PVC) materials. Items that are recommended but optional parts of the project are starred.

ITEM	ESTIMATED COST	
TASK 1: PROJECT START-UP	$ 1,500	
TASK 2: DRILLING (700 feet)	10,000	
- add/deduct footage: $14.50/foot - footage rate for additional wells: $16/foot		
TASK 3: HYDRAULIC ANALYSIS		
- survey elevations	600	
- water level measurements	600	
- pump tests *	2,850	
TASK 4: MONITOR WELL INSTALLATION	PVC	PTFE
add/deduct footage PVC: $4.90/foot PTFE: $45.60/foot	8,100	30,000
TASK 5: INITAL SAMPLING ROUND	1,200	
TASK 6: INTERPRETATION AND REPORT *	2,300	
TOTAL:	$27,150 with PVC materials	$49,050 with PTFE materials

NOTE: Operation of the monitoring system will require that a pump actuation device (time sequence controller) and a water level probe be provided. We assume since KBI plans to operate the monitoring system with its own personnel, you will be purchasing these necessary items. The cost of these devices is, therefore, not included in our cost proposal. This equipment can be purchased from Q.E.D. for about $3,000.





TOPOGRAPHICAL AND BOUNDARY SURVEY OF PROPERTY
BELONGING TO KAWECKI BERYLCO INDUSTRIES INC. SITUATE
IN THE TOWNSHIP OF EDGEBROOK IN COUNTY OF