99632

DUNN
GEOSCIENCE CORP.

12 METRO PARK RD. •
ALBANY, NEW YORK 12205
518/458-1313
FAX 518/458-2472

December 11, 1987

Ms. Nancy Camp
DNREC
Division of Air and
Waste Management
715 Grantham Lane
New Castle, DE 19720

Dear Nancy:

Enclosed are three signed copies of the sixth amendment to contract CERCLA 85-1. We are pleased to submit this document to your agency and anticipate finalization of the scope of work for the Delaware Sand and Gravel Landfill in a timely manner.

Dunn's agreement with this amendment is qualified such that time and expenses will require shifting between labor categories within tasks and between tasks. This need has been identified for the existing amendment since in a few tasks time for certain labor categories and computer expenses invoiced to date (last invoicing was June 1987) already exceed the amounts described in the amended contract. This shifting of funds would not exceed the total cost of the contract. In recent telephone conversations, you have concurred and have agreed that shifting hours will not present any difficulty. Also, note the few hand-written changes which we made in the contract.

With this amendment, the RI/FS for the Delaware Sand and Gravel Landfill will move rapidly to a culmination. Specific schedules and delivery dates will require further discussion and agreement between all concerned. If you have any questions, please contact Dunn Geoscience Corporation immediately.

Sincerely,

William J. Miller
Senior Hydrogeologist

WJM:jl
Enc.

AR303696

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF AIR & WASTE MANAGEMENT
89 KINGS HIGHWAY
P.O. BOX 1401
DOVER, DELAWARE 19903

WASTE MANAGEMENT
SECTION

TELEPHONE: (302) 736 - 4781

MEMORANDUM

TO: John E. Wilson, III

THRU: Phillip G. Retallick
June D. MacArtor
Gary A. Molchan
Kevin P. Maloney - Legal Office
Dee Donovan - Fiscal Office
Joseph J. Hardman 12/16/87

FROM: Nancy Camp 12-16-87

SUBJECT: Approval of Dunn GeoScience Contract Amendment #6 for RI/FS at Delaware Sand and Gravel

DATE: December 16, 1987

Attached for signature, please find three copies of Amendment #6 to contract for personal services for Delaware Sand and Gravel Landfill Remedial Investigation/Feasibility Study. Dunn GeoScience has signed the three copies and your signature is now required to activate the amendment.

The contract amendment represents changes in the scope of services and corresponding changes in the cost estimates. All scope changes are necessary to complete a quality RI/FS. All cost increases have been determined by a thorough cost analysis of cost estimates presented by Dunn GeoScience. Also in this amendment, the contract length is extended to February 29, 1988.

You will note handwritten date changes on first page of contract and cover page of the cost estimate. This was a last minute change requested by Dunn and approved by DNREC. To avoid a delay in signature by Dunn, the change was hand corrected.

12/17/87
Three copies signed & ret'd to Dunn.

The following is a summary of the changes which this amendment represents.

Task	Scope Increase	Cost Increase	Fee Increase
23	Groundwater modeling efforts have increased due to the difficulty in calibrating a 5 layer model. Also the number of scenarios to be modeled has increased from 10 to 20.	$13,816	$1,363
24	Due to the extension in time ten additional meetings and thirteen additional monthly reports have been and will be required.	$52,316	$4,618
27	Work effort for completion of the RI has increased due to the use of ACAD plots and posting of MDL's on all charts.	$47,133	$3,849
29	Work effort for the complete evaluation of alternatives has increased due to SARA requirements.	$51,321	$4,824
30	Scope of task was change from Development of Conceptual Design to Assistance with Development of Record Decision.	$ 6,767	$ 377
	Cost Increases	$171,353	15,031
	Total Cost & Fee Increase		$186,384

NC/mff
NC2072.2

Attachments

AMENDMENT NUMBER 6
TO
CONTRACT FOR PERSONAL SERVICES
CONTRACT NUMBER CERCLA 85-1
DATED OCTOBER 25, 1984

The above-referenced contract between the Delaware Department of Natural Resources and Environmental Control and Dunn GeoScience, Inc. is amended as follows:

By deleting in paragraph 3 Scope of Services, "as revised on March 31, 1986" and inserting in lieu thereof "as revised on August 31, 1987.

By deleting in paragraph 5c Personnel " as revised on March 31, 1986 and inserting in lieu thereof "as revised on August 31, 1987."

By deleting in paragraph 6 Effective Date and Time of Performance," services required hereunder shall be completed no later than November 30, 1986" and inserting in lieu thereof "services required hereunder shall be completed no later than February 29, 1988."

By deleting paragraph 7 a. Compensation and inserting in lieu thereof the following:

"7. Compensation

a. The Department shall pay the contractor for services rendered in performance of the work called for in Attachment A on a cost-plus-fixed fee basis with a maximum cost not to exceed seven hundred and eighty-two thousand, nine hundred and sixty-two dollars ($782,962), consisting of estimated costs in the amount of seven hundred and thirty four thousand, five hundred seventy nine dollars ($734,579) and a fixed fee of forty eight thousand, three hundred and eighty three dollars ($48,383). Such sums shall be paid to the contractor in accordance with paragraph 8, Method of Payment of this contract

By deleting in paragraph 8a Method of Payment "$563,226" and inserting "$734,597".

By deleting in paragraph 8b Method of Payment "$33,352" and inserting "$48,383".

By deleting Amended Attachments A and B dated March 31, 1986 in their entirety and substituting in lieu thereof Amended Attachments A and B dated ~~October 1~~ Dec 11 Jec, 1987, which are attached hereto.

In witness whereof, the Department and the Contractor have executed this Amendment to be effective as of ~~October 1~~, 1987.

Dec 11 fec

Department of Natural Resources
and Environmental Control

By: _____

Attest: _____

Dunn GeoScience, Inc.

By: _____ Pres.

Attest: _____

NCAMEND

Revised: August 31, 1987
Revised: March 31, 1986

Amended

Attachment A

Scope of Services

Remedial Investigation - Stage 1

Task 1. Obtain Access to the Property

Site access shall be obtained by the Department before the contractor begins field work.

Task 2. Prepare Health and Safety Plan

The contractor shall adopt a health and safety plan for activities performed pursuant to this contract which is at least as strict as the plan prepared by the Department. Said plan shall be consistent with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act section 104(f), the Environmental Protection Agency's (EPA) Occupational Health and Safety Manual, and other applicable EPA and Department safety guidance provided by the Department's project officer. As a condition to this contract the Department shall require the contractor and subcontractors, if any, to comply with the health and safety plan and all relevant federal and state health and safety standards. No field work at the site shall occur until the plan has been approved by the Department.

Task 3. Prepare Quality Assurance Plan

A quality assurance plan shall be prepared by the contractor for the site based on the Department's general quality assurance plan. The plan shall include procedures for sampling; field testing; chain-of-custody of

samples; sample handling, packaging, preservation, and shipping; recordkeeping and documentation; and any other procedures needed for the remedial investigation and feasibility study on or related to the site. Sample analysis requirements shall be specified. The plan shall be reviewed and approved by the Department and EPA before the investigation begins.

Task 4. Collect and Evaluate Existing Data

A complete data compilation and assessment of site specific information from all sources shall be made. The effort shall concentrate on information pertaining to the Delaware Sand and Gravel landfill, but shall include information generated in other studies, especially those involving the Army Creek landfill. This information shall include, but not be limited to the following:

Geology - boring logs from all wells drilled in the vicinity of the Delaware Sand and Gravel site.

Groundwater - sampling dates, water level readings, groundwater quality, recharge rates, and pump test data specific to wells at the site.

Surface water - Army Creek flow rates and water quality in the vicinity of the site;

Soils - analytical results of all cutting (soil) samples obtained during well drilling or site investigations;

Air - results of air quality monitoring conducted in the vicinity of the site;

Waste composition - landfill operating records or analytical data with regards to waste types, concentrations, locations in the landfill, and quantity disposed; and

Topography - maps and aerial photographs prepared or obtained during previous remedial efforts.

To the extent the Department has such information in its files the Department shall provide it. This does not relieve the contractor from searching other sources of information including, but not limited to EPA; New Castle County Department of Public Works; the Water Resources Agency for New Castle County; Delaware Geological Survey; University of Delaware; Delaware Division of Public Health; and parties possibly responsible for using the site as identified by EPA.

The contractor shall evaluate the adequacy of this information for determining on site and area hydrogeology and the degree and extent of contamination. Reinterpretation of existing data shall be made if necessary. Additional data requirements shall be identified by the contractor.

Task 5. Perform Preliminary Site Survey

A preliminary site survey shall be conducted by the contractor to evaluate site conditions for location of the initial groundwater, surface water, stream sediment, and soil sampling points and to define the depth and areal extent of buried containers according to accepted geophysical methods.

Task 6. Prepare Sampling Plan

A sampling plan shall be prepared by the contractor. Sampling locations shall be established by the contractor for the soil, surface water, groundwater, and stream sediment samples. These locations shall be based on site data obtained during the preliminary survey and from detailed review of existing information. The plan shall be reviewed and approved by the Department and EPA before the remedial investigation begins. The plan shall also specify procedures for storage and disposal of any wastes generated during the investigation.

Task 7. Procure Permits and Other Authorizations

Access to the work areas shall be obtained by the Department before work at the site begins. State environmental permits for the remedial investigation shall be obtained by the Department. The contractor shall notify the Department of all utility easements and other authorizations required to carry out this contract. The Department shall be responsible for obtaining the required access. The contractor shall supply the names, addresses, and, where possible, the telephone numbers of those from whom such access authorization is required.

Task 8. Prepare Topographic Map

The contractor shall prepare a topographic map of the site with a two foot contour interval using aerial photogrammetric methods. The contractor or approved subcontractor shall establish horizontal and vertical ground control as required by the photogrammetrist. The product of Task 8 shall be a single, scribed, double matte, three mil. washoff mylar with reversed image. The product shall have a horizontal scale of 1 inch = 50 feet and a contour interval of two feet. A grid coordinate system shall be established based on the most accurate control points available in the vicinity of the site. Control points to be considered include, but are not limited to, state plane coordinate system, U. S. Geological Survey (USGS) monuments, Army map service monuments, or county highway monuments. Mapping and ground surveys shall be completed to the National Map Accuracy Standards for the scale indicated. Copies of the map shall be given to EPA and the Department upon completion.

Task 9. Mobilize Field Equipment

The equipment needed during the investigation shall be provided by the contractor or by subcontractors. Equipment scheduled for use includes:

- o Field office;
- o Surveying equipment;
- o Drill rig;
- o Sampling tools and equipment;
- o Health and safety equipment; and
- o Decontamination equipment.

Small equipment shall be stored in a secure field office trailer. The placement of the trailer shall be specified in the health and safety plan. The drill rig shall remain on site in a secure location.

Task 10. Perform Subsurface Investigation

To more clearly define the extent of wastes and contaminated soil in the liquid waste disposal pit, several additional monitor wells shall be drilled in this area to supplement data provided from the drilling of borehole B-2.

A driller licensed and registered in Delaware shall be used. A minimum of six borings shall be drilled into or adjacent to the waste disposal pit. If additional wells are necessary, the Department shall amend the contract accordingly. All borings shall be drilled in a manner to prevent the spread of contaminants during drilling. The specific locations of the proposed borings shall be determined by the contractor and approved by the Department. The proposed boreholes shall be drilled by a qualified drilling contractor trained in health and safety procedures for work at hazardous waste sites. A geologist provided by the contractor shall be on the site at all times during this task to supervise drilling and logging and to collect samples. Monitor wells shall be installed in each boring.

To prevent induced migration of contaminants all wells shall be constructed and grouted to comply with Department regulations. All protective casings shall have well identification numbers marked on them. Upon completion of monitor well installations, the wells shall be surveyed to determine their exact locations and elevations.

All monitor wells shall be equipped with a bailer or a pump to permit groundwater to flow naturally into the well and provide fresh groundwater samples. Static water levels shall be recorded monthly. All drilling equipment shall be decontaminated after completion of each well.

A minimum of three samples per boring shall be collected. The samples shall be analyzed by the Department for the same constituents specified in Task 13. Quality assurance and quality control shall be the responsibility of the contractor.

Task 11. Perform Ground Survey

Baseline and Grid Survey

A baseline shall be established on the site by the contractor for the purpose of providing horizontal control of soil, stream sediment, and surface water sampling locations. Stakes shall be set at fifty-foot intervals and marked with stations and elevations. A grid system shall be surveyed and staked for sampling. Other physical features and improvements shall be located as required.

All soil, surface water, and stream sediment sampling points shall be located and described horizontally in accordance with the staked grid system. This will allow for the repeat sampling of any monitoring point at a later date, should this be necessary. Each sampling location shall be included on a copy of the topographic map prepared in Task 8.

Monitor Well Survey

Following the installation of all wells, each shall be located horizontaly and vertically with respect to the site grid and datum.

The existing monitor wells installed by E & E, Inc. and New Castle County shall be located to determine their horizontal and vertical locations. All well locations shall be included on the topographic map prepared in Task 8.

Task 12. Perform Surface Water and Stream Sediment Sampling

At least one sediment and one surface water sample shall be collected by the Department from each of the following locations:

- Army Creek upstream of Army Creek Landfill;
- Army Pond;
- Army Creek in the area adjacent to the Delaware Sand & Gravel landfill (2 samples); and
- Army Creek downstream from the Delaware Sand & Gravel landfill.

Based on these and other data an assessment of surface water and sediment contaminaton shall be made by the Department. Each water and stream sediment sample shall be taken at the same sampling location. The samples shall be analyzed by the Department for the following parameters:

- Acid extractable priority pollutants;
- Volatile organic priority pollutants;
- Base/neutral extractable priority pollutants;
- Pesticide/PCB priority pollutants;
- Heavy metal priority pollutants;
- Total organic halogens (TOH);
- pH (in field); and
- Temperature.

Task 13. Perform Soil Sampling

The soil sampling by the Department shall be limited to the former waste disposal pit and a reasonable area surrounding the pit's suspected boundaries. Soils shall be analyzed to determine the extent and nature of

surface soil contamination. The actual number and location of samples will depend on information obtained from the existing data review and the preliminary field survey. The samples shall be analyzed by the Department for the following:

- o Acid extractable priority pollutants;
- o Volatile organic priority pollutants;
- o Base/neutral extractable priority pollutants;
- o Pesticide/PCB priority pollutants;
- o Heavy metal priority pollutants; and
- o Total organic halogens (TOH).

Task 14. Perform Groundwater Sampling

Existing monitor wells, as well as those installed by the contractor, shall be sampled by the Department. The samples shall be analyzed by the Department for the following:

- o Acid extractable priority pollutants;
- o Volatile organic priority pollutants;
- o Base/neutral extractable priority pollutants;
- o Pesticide/PCB priority pollutants;
- o Heavy metal priority pollutants;
- o Total organic halogens (TOH);
- o pH (in field); and
- o Specific conductance.

Task 15. Perform Data Evaluation

Following the applicable remedial investigation tasks, data generated during the study shall be evaluated by the contractor. The evaluation shall be used in the production of the remedial investigation report to be submitted following the completion of the remedial investigation.

Remedial Investigation - Stage 2

Tasks 16 through 22 are a continuation and expansion of the work described in tasks 1 through 15.

Task 16. Obtain Access to Drilling Sites

Access to all of the monitor well drilling sites shall be obtained by the department before the contractor begins field work. All environmental permits required by this contract shall be obtained by the department.

Task 17. Prepare Sampling Plan

The contractor shall prepare a sampling plan as described in task 6 for the additional work described herein.

Task 18. Mobilize Field Equipment

The equipment needed during the investigation shall be provided by the contractor or by subcontractors. Equipment scheduled for use includes:

- Field office;
- Surveying equipment;
- Drill rig;
- Sampling tools and equipment;
- Health and safety equipment; and
- Decontamination equipment.

Small equipment shall be stored in a secure field office trailer. The drill rig shall remain on site in a secure location. In addition, access roadways to the monitoring well drilling sites shall be constructed.

Task 19. Surface Geophysical Surveys

Additional surface geophysical surveys shall be undertaken by the contractor. These surveys shall be performed in the area south of Grantham Lane previously identified by the contractor as a possible waste disposal area, in the area immediately south of the open sand pit, and in the vicinity of the drum disposal area. The surveys in the Grantham Lane area shall be used to determine the areal extent of landfilling and for the detection of buried metal drums. The surveys in the area south of the open sand pit shall

be used to determine the extent of landfilling in the western portion of the inert waste disposal area. The surveys in the drum disposal area shall be used to determine the presence of clay or the lack of clay separating the Columbia formation from the upper Potomac hydrologic zone.

Task 20. Monitor Well Installation

Additional monitoring wells shall be drilled to describe the extent, nature, and transport pathways of leachate contamination in the vicinity of Army Creek; to determine presence or absence of a clay aquiclude separating the Columbia and upper Potomac formations in the area between Delaware Sand and Gravel landfill and Army Creek landfill; and to determine the areal extent of contamination in the upper upper Potomac hydrologic zone and the lower upper Potomac hydrologic zone. Thus, three more wells in the drum disposal area shall be drilled; one immediately west and one immediately east of the drum disposal area, both screened in the upper upper Potomac hydrologic zone and one next to monitor well B-5 also screened in the upper upper Potomac hydrologic zone.

Additional subsurface information is also necessary to define the effect of the clay aquiclude on groundwater movement in the inert disposal area and to provide more information on the groundwater quality in the Columbia formation and the stratified groundwater quality in the upper Potomac hydrologic zone. Therefore, fifteen monitoring wells surrounding the inert disposal area shall be drilled. Nine of these wells shall be four inches in diameter and located in three, three-well clusters. Each well cluster shall have one four inch diameter well screened in the upper upper Potomac hydrologic zone, one four inch diameter well in the lower upper Potomac hydrologic zone, and one in the Columbia formation immediately above the upper

Potomac confining clay where saturated conditions are probable. A tenth four inch diameter well shall be drilled in the Columbia formation at well DGC-1; thus, creating a three-well cluster at that location. The other five (5) wells shall be 2 inch diameter wells screened in the Columbia formation. These wells shall be located around the inert landfill in order to determine groundwater movement in the water table aquifer.

In order to evaluate the groundwater flow patterns and possible effects of saltwater intrusion between the landfill and Llangollen Estates, the contractor shall install three well pairs south of Grantham Lane (DGC 10, DGC 11, and DGC 12 as shown on the attached map). Each well shall be four inches in diameter. One well of each pair shall be screened in the upper upper Potomac formation and the others shall be screened in the lower upper Potomac formation.

A driller licensed and registered in Delaware shall be used. All borings shall be drilled in a manner to prevent the spread of contaminants during drilling. The specific locations of the proposed borings shall be determined by the contractor and approved by the department. The approximate locations are shown on the attached map. The proposed boreholes shall be drilled by a qualified drilling contractor trained in health and safety procedures for work at hazardous waste sites. A geologist provided by the contractor shall be on the site at all times during this task to supervise drilling and logging and to collect samples. Monitor wells shall be installed in each boring.

To prevent induced migration of contaminants all wells shall be constructed and grouted to comply with department regulations. All protective casings shall have well identification numbers marked on them.

All monitor wells shall be developed with a bailer or a pump to permit groundwater to flow naturally into the well and provide fresh groundwater samples. All drilling equipment shall be decontaminated after completion of each well cluster.

Task 21. Sampling and Analysis

Groundwater

The contractor shall collect the groundwater samples described herein. The contractor shall analyze samples from the wells listed below in the field for specific conductance, Eh, and pH. The department shall analyze samples from the following wells for DOC, chloride, ammonia-N, TDS, TKN, hardness, sulfate, alkalinity, and TSS.

Columbia	Formation	Upper Upper	Potomac	Lower Upper	Potomac	Upper & Lower Upper Potomac
DGC-1C	DGC-14	DGC-1s	DGC-4	DGC-1d	25	28
DGC-7C	DGC-15	DGC-2s	DGC-5	DGC-2d	26	29
DGC-8C	DGC-16	DGC-3s	DGC-6	DGC-3d	32	31
DGC-9C	DGC-17	RW-6	DGC-7s	B-5	34	AWC 7
DGC-13	B-1	RW-12	DGC-8s	AWC G-3	38	61
	37	RW-13	DGC-9s	RW-1	40	

Columbia	Formation	Upper Upper	Potomac	Lower Upper	Potomac	Upper & Lower Upper Potomac
		RW-14	DGC-10s	DGC-7d	3A	
		B-4	DGC-11s	DGC-8d	56	
		33	DGC-12s	DGC-9d	57	
				DGC-10d	58	
				DGC-11d	62	
				DGC-12d	45	

In addition, eight blank and nine duplicate samples shall be prepared in the field by the sampling team and analyzed for the same non-priority pollutant parameters. Thus, a grand total of seventy-five samples shall be analyzed by the department for the above parameter list.

The contractor shall sample the following wells and submit the samples to the CLP for organic and heavy metal priority pollutant analysis:

Columbia	Formation	Upper	Upper	Potomac	Lower	Upper	Potomac	Upper & Lower Upper	Potomac
DGC-1c*	DGC-14	DGC-1s		DGC-4	DGC-1d		DGC-11d		29
DGC-7c	DGC-15	DGC-2s*		DGC-5	DGC-2d		DGC-12d		31*
DGC-8c	DGC-16	DGC-3s		DGC-6*	DGC-3d		58		AWC 7
DGC-9c	DGC-17	RW-6		DGC-7s	B-5		62		61
DGC-13	B-1	RW-12		DGC-8s	AWC G-3*		45		
		RW-13		DGC-9s	DGC-7d		32		
		RW-14		DGC-10s	DGC-8d				
		B-4		DGC-11s	DGC-9d				
		33		DGC-12s	DGC-10d				

* Split samples shall be taken at these wells.

The CLP shall analyze these samples for the following:

- o acid extractable priority pollutants;
- o base/neutral extractable priority pollutants;
- o volatile organic priority pollutants;
- o pcbs and pesticides for samples only from wells B-1, DGC-4, DGC-5, DGC-6, and B-5; and,
- o antimony, arsenic, beryllium, cadmium, chromium, copper, lead, iron, manganese, mercury, nickel, selenium, silver, thallium, zinc, magnesium, vanadium, tin, aluminum, cobalt.

The sampling team shall prepare seven blank and seven duplicate samples. Of the seven duplicate samples five shall be split and one set shall be sent to a contract laboratory for analysis. The remaining samples shall be analyzed by the CLP. The CLP, therefore, shall analyze a total of sixty-one samples for organic and heavy metal priority pollutants. When obtaining the split samples,

the sampling team shall obtain two from wells screened in the upper upper Potomac formation, one from a well screened in the lower upper Potomac formation, one from a well screened in both the upper and lower upper Potomac formation, and one from a well screened in the Columbia formation as indicted above by asterisks.

Surface Water and Stream Sediments

Surface water and stream sediment samples shall be collected by the department from the eight (8) locations listed below:

1. Army Creek -- on the west side of Route 13 between the abandoned Dairy Queen and the Texaco gas station. This is upstream of the waste oil pit located behind the Dairy Queen.
2. Army Creek -- upstream of the concrete weir just east of Route 13.
3. Army Creek Pond -- at the pond entrance (westernmost end of Army Creek Pond).
4. Army Creek -- at the pond effluent (easternmost end of Army Creek Pond).
5. Army Creek -- under railroad bridge at eastern end of Army Creek landfill.
6. Army Creek -- at tidal gate east of Route 9.
7. Gravel Pit Pond -- south of Army Creek Pond.
8. The intermittent stream east of the Delaware Sand and Gravel inert disposal area.

Sampling shall be performed by the department.

The surface water samples shall be analyzed by the department for the following parameters: DOC, chloride, ammonia-N, TDS, hardness, TSS, sulfate and alkalinity.

The surface water samples shall be analyzed by the department for the following metals:

Antimony	Mercury
Arsenic	Nickel
Beryllium	Selenium
Cadmium	Silver
Chromium	Thallium
Copper	Zinc
Lead	Iron
Magnesium	Manganese
Vanadium	Aluminum
Cobalt	Tin

The stream sediment samples shall be analyzed by the department for the following four (4) metals;

Antimony
Beryllium
Copper
Thallium

Formation Soil Sampling

Two hundred and ninety-eight (298) formation samples (split spoons) shall be collected by the contractor while drilling boreholes for monitoring well construction. Table 1 details the sampling locations and depth intervals. The proposed well locations are shown in Figure 1. Of these samples a total of thirty-eight shall be sent to a contract laboratory for analysis. These samples shall be collected as follows:

Well Designatio	Columbia Samples	Upper Potomac	Upper Samples	Quality Control Duplicates	Total
DGC-4	5	2		1	8
DGC-5	3	1		1	5
DGC-6	5	2			7
DGC-7d	3	1		1	5
DGC-8d	3	1		1	5
DGC-9d	3	1			4
DGC-14	2	-			2
DGC-17	2	-			2
					38

The contract laboratory shall analyze for the following:

- o acid extractable priority pollutants;
- o base/neutral extractable priority pollutants;

- o volatile organic priority pollutants;
- o antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc, vanadium, cobalt, aluminum, tin; and,
- o pcbs and pesticides for samples only from the following wells: DGC-4 and DGC-7d.

Approximately one hundred and eighty formation samples from on-site wells shall be analyzed by the contract laboratory for volatile organic priority pollutants.

Forty-five samples shall also be analyzed by the contractor or his subcontractor for Atterberg limits, soil moisture, particle size (with hydrometer), cation exchange capacity, and organic carbon content. The samples not analyzed shall be retained by the department.

Surficial Soil Samples

A total of forty-four (44) surficial soil samples shall be collected by the contractor for laboratory analysis. Twenty-six (26) samples (which include three quality control samples) shall be collected from sixteen locations within the Ridge area. Thirteen (13) samples (which include one quality control sample) shall be collected from six locations in the Grantham Lane south area. Five additional samples are included as a contingency dependent on field observations made by the sampling team.

The forty-four surficial soil samples shall be analyzed by the department for the following:

- o acid extractable priority pollutants;
- o base/neutral priority pollutants;
- o volatile organic priority pollutants;
- o antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc, vanadium, cobalt, aluminum, tin; and,
- o pcbs and pesticides for 5 samples chosen at the discretion of the sampling team.

Fifteen surficial soil samples shall be analyzed by the contractor or his subcontractor for Atterberg limits, soil moisture, particle size (with hydrometer), cation exchange capacity, and organic carbon content.

Special Note for Task 21: Sample numbers and locations are specified in the contract for the purpose of task scope and cost. Actual number and location of samples will be governed by the approved sampling plan referenced in Task 17 and by any Department approved alterations to the sampling plan. Therefore, variations in sample collection will not necessarily constitute a breach of contract.

Task 22. Surveying

The contractor shall survey the elevations of the twenty-four new monitoring wells described herein. The measurements shall include the elevations of the top of the outside pipe, the top of the inside pipe, and the ground surface. The monitoring well locations and elevations shall be plotted (where possible) on the topographic map prepared under contract number CERCLA 85-1.

The ten geophysical lines staked by the contractor in task 3 shall be located horizontally. This information shall be plotted on the topographic map prepared under contract number CERCLA 85-1.

The contractor shall survey the surficial soil sampling points in the ridge and Grantham Lane area and shall locate them horizontally on the topographic map.

The contractor shall also conduct the necessary topographic surveys to add the approximate one acre area south of Grantham Lane to the topographic map prepared under contract number CERCLA 85-1.

Task 23. Hydrologic Model Preparation

The hydrogeologic data collected during both investigations of the Delaware Sand and Gravel and Army Creek landfills shall be evaluated using a digital computer model of the water table and uppermost confined aquifers in the area. This model shall simulate groundwater flow and head in response to pumpage by water supply and contaminant recovery wells and shall be used to predict contaminant transport through the aquifer and possible effects on the water quality of supply wells. Predictions assuming both conservation and attenuation of contaminants during transport shall be made. Twenty scenarios jointly agreed on by the department of pumpage from water supply and contaminant recovery wells (including no contaminant recovery pumpage) shall be tested. These predictions shall be used to assess the most feasible means to eliminate unacceptable risks to human health, water supplies, and the environment.

Task 24. Reports and Meetings

Twenty four (12 prior to 11/30/86 and 12 between 11/30/86 and 2/29/88) times during this contract for services, meetings shall be held to review technical progress and to make decisions on future work tasks. These meetings shall also serve as an information exchange among the contractor, department, and New Castle County for coordinating remedial alternatives at both the adjacent Army Creek landfill and the Delaware Sand and Gravel landfill. Those attending these meetings shall include, but may not be limited to representatives of:

EPA, Region III;
EPA, Headquarters;
The Department;
New Castle County; and
The Contractor.

The contractor shall also submit two types of monthly progress reports to the Department.

1. Technical Progress Reports

These progress reports shall consist of the following elements:

- o Status of work at the site and progress to date;
- o Percent of completion (% of work hours expended);
- o Difficulties encountered during the reporting period;
- o Actions being taken to rectify problems;
- o Changes in personnel;
- o Target and actual completion dates for each element of activity including project completion.

The contractor shall use the Program Evaluation and Review Technique/Critical Path Method of project management and reporting.

2. Financial Progress Reports

These progress reports shall consist of, but may not be limited to the following elements:

- o Comparison of cost estimates and money expended for each task;
- o Comparison of percent completion per task with percent budgeted;
- o Requests for shifts of funds from task to task or new expenditure levels.

Task 25. Establish Objectives and Criteria for Remedial Actions

The department with assistance of the contractor shall establish the goals and objectives of site remediation. These goals and objectives shall include the determination of the degree of remediation required to mitigate adverse effects to human health and the environment.

Task 26. Identify Remedial Alternatives

Appropriate remedial techniques shall be identified by the contractor which satisfy the site objectives. These techniques shall be evaluated singly and in combinations to determine how well they meet the established project criteria.

The identification process for remedial methods shall consider public health and safety concerns and existing EPA and department hazardous waste and related regulations.

Task 27. Final Remedial Investigation Report and Feasibility Study Work Plan

After completion of the field investigations during Phase I, all pertinent field and laboratory data shall be assembled into a detailed report entitled "Draft RI Phase I." This report shall include detailed discussion of the following items:

- Objectivess of RI.
- Description of site-specific field investigations of Phase I including drilling and sampling.
- Description of the Geology and Hydrogeology of the site and surrounding area.
- A discussion of the nature and extent of contamination of maps, figures and tables in support of the text.
- Conclusions and recommendations for Phase II of investigation.

After completion of the field investigation during Phase II all pertinent field and laboratory data shall be assembled into a detailed report entitled "Draft Remedial Investigation for the Delaware Sand & Gravel Site." This report shall include the detailed discussion of the following items:

- Points 1 - 5 from the "Draft RI PHASE I" with appropriate additions included from the Phase II investigation.
- A full discussion of the nature and extent of contamination as determined from Phase I & II field investigations.
- Groundwater Modeling Results from Two-Dimensional of Groundwater Flow and Three-Dimensional of Groundwater Flow and Solute Transport.
- Maps, figures and tables shall be prepared to support the text. Groundwater isocon maps shall be prepared to illustrate the extent of groundwater contamination. The regional location map and all historical and recent data should be plotted using ACAD (Automatic Computer Aided Drafting) software for personal computer.

This report shall be submitted in Draft form to DNREC for review and comment. Upon incorporation of modifications requested by the reviewers the document will be approved and renamed Final Remedial Investigation.

A work plan for the Feasibility Study will also be prepared as part of this task. The work plan shall outline the steps to be taken in order to comprehensively evaluate the possible remedial alternatives.

Task 28. Treatability Studies

The contractor shall determine the feasibility of treating recovery well water for discharge to Army Creek, the aquifer, and/or the land surface. The contractor shall compare the known pollutant concentrations to established EPA water quality criteria for protecting aquatic life and human health. Where such criteria exist, the most conservative ones shall become the treatment goal. Where such criteria do not exist then the contractor shall derive this information from toxicological data. The acute and chronic effects of metals shall be established based on existing information from EPA.

The contractor shall determine if it is technically feasible to treat recovery well water so that it meets the water quality criteria. To do this the contractor shall conduct a literature search using the Dialog on-line information system. The contractor shall analyze this information to determine whether the known contaminants can be treated to meet water quality criteria.

The contractor shall prepare a report setting forth the applicable water quality criteria. The report shall discuss the various treatment methods that are available for the known pollutants. The report shall include references and descriptions of other studies to substantiate acceptable treatment methods. The report shall include a list of treatment alternatives that are technically practical.

Task 29. Evaluate Remedial Alternatives and Prepare Draft Feasibility Study Report

Alternatives identified in Task 26 shall be evaluated based on section 300.68 of the National Oil and Hazardous Substance Contingency Plan proposed for adoption by EPA on February 12, 1985 or as it may be adopted by EPA during the course of this contract. The contractor shall evaluate and rank the remedial measures for each disposal area based on the degree to which each satisfies the project's overall objectives. This evaluation shall include the steps set forth by the contractor in the Feasibility Study Work Plan dated May, 1985.

All information specific to the remedial measure evaluation shall be summarized and presented in a draft feasibility study report. This report shall include:

- Supporting references on the feasibility of the remedial measures chosen for evaluation;
- Acceptable engineering practices related to the design and implementation of the remedial measures chosen for evaluation;
- Expected environmental effects on each remedial measure;
- Preliminary conceptual drawings and sketches used to evaluate each remedial measure; and
- The cost estimates for each remedial measure with appropriate references provided.

This report shall be prepared according to the Guidance for Feasibility Studies Under CERCLA dated May 1985. All documents collected during the remedial measure evaluation will be organized in a project file and shall be available for later reference.

All data developed during the feasibility study needed to support the recommendation of specific remedial measures shall be presented in the draft report. Remedial action alternatives shall be evaluated and risk assessments

shall be performed. The risk assessments shall be prepared for the no action alternative and for four other remedial action alternatives for each of the four disposal areas. The EPA carcinogenic risk assessment methodology shall be used. Emphasis shall be placed on the risks associated with drinking groundwater from the Llangollen Estates water supply well field. Observed water quality data and results from groundwater modelling will be used as input in the risk assessment. The risk assessments will be prepared according to the Guidance for Superfund Public Health Evaluation Manual dated October 1986.

In addition, an assessment to determine bioaccumulation risks shall be performed. Water quality under the recovery wells shall be used in conjunction with partition coefficients to evaluate bioaccumulation due to the recovery well pumpage into Army Creek. All information specific to the remedial measure evaluation shall be summarized in the draft feasibility study report.

The draft report shall be used by the EPA, the department, and the public to select the remedial measure(s) to be implemented. The contractor shall assist the department in presenting the results of the feasibility study to the EPA Region III office, the public, and EPA Headquarters. As a result of the comments received, the EPA and the department shall choose the remedial measure(s) to be implemented at the Delaware Sand and Gravel landfill site.

Task 30. Assistance and Documentation for Preparation of the Record of Decision

The contractor shall provide the necessary assistance and documentation for the preparation of the Record of Decision. The department will be responsible for final selection of remedy and the actual writing of the Record of Decision; however, the contractor will be expected to provide technical assistance and documentation.

The contractor shall assist the department in presenting the conclusions of the remedial investigation/feasibility study and the Draft Record of Decision.

(Note: Costs for participation of the contractor in the public meeting has been incorporated into Task 24.)

Upon conclusion of the Public Meeting and 30 day comment period the contractor shall assist the department in developing the Responsiveness Summary for inclusion in the Record of Decision. Again the department will be responsible for actual writing of the Responsiveness Summary; however, the contractor will be expected to provide technical assistance and documentation.

Task 31. Prepare Feasibility Study Report

Upon review of the draft Feasibility Study as presented in Task 29, the contractor shall make changes recommended by DNREC. The contractor shall then provide the necessary technical assistance in selection of the Preferred Alternative.

Deliverable Products

The contractor shall deliver the following final products to the department upon the completion of each.

1. Six copies of Health and Safety Plan
2. Six copies of the Quality Assurance Plan
3. Six copies of the sampling plan (3 for Phase I)
   (3 for Phase II)
4. The revised topographic map original
5. Twenty copies of Draft RI Phase I
6. Six copies of the Feasibility Study Work Plan
7. Four copies of Draft RI Phase I & II
8. Ten copies of Final RI Phase I & II
9. Twelve copies of Draft Feasibility Study
10. Ten copies of Final Feasibility Study
11. Upon conclusion of the contract technical site files accumulated by the contractor shall become a part of the department site file.

NCATTACH