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WORK PLAN FOR BIOLOGICAL REMEDIATION LIGHTER AMPHIBIOUS RESUPPLY
CARGO (LARC) 60 MAINTENANCE AREA FORT STORY VA
3/10/1993
SOLUTIONS ENVIRONMENTAL ASSOCIATES INC

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**WORK PLAN
FOR
BIOLOGICAL REMEDIATION
LARC MAINTENANCE AREA
FORT STORY
VIRGINIA BEACH, VIRGINIA**

Prepared For:

**INTERNATIONAL TECHNOLOGY CORPORATION
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May 10, 1993

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1.0 INTRODUCTION

1.1 Background

The soil and possibly the groundwater at the LARC parking area at Fort Story has been impacted by hydrocarbon materials resulting from maintenance activities conducted in the area. The site was characterized in the Preliminary Site Characterization of Fort Story by JMM. The remedial approach that has been proposed for this site is based upon the results of the Site Characterization and the soil type.

From the site information and the site visit, the site has been contaminated with diesel fuel, motor oil and some other petroleum products that primarily has a residual of semivolatile compounds. This is based on the analytical results presented. The Total Petroleum Hydrocarbon concentration ranges from 11,200 ppm at MW-115 at depth of 1.5 feet, to 28 ppm at SB-112 at 8 feet. The analytical results indicate 0.02 ppm of Ethylbenzene, 0.01 ppm of tetrachloroethane, 0.07 ppm of m&p xylene and 0.05 ppm of o xylene at MW-115 at 1.5 feet. All other samples do not contain any volatiles in the treatment area. Analysis of the soils also included pesticides/PCBs with a result of 0.011 ppm of p',p'DDD at MW-115 at 1.5 feet and ranges of similar concentrations of p',p'DDD, p',p'DDE and p',p'DDT at surface at SB-113. BNAs were performed, with non-detectable results in the treatment area. Metals analysis was also performed as total metals. There were results at SB-116 and SB-117 at surface of lead and zinc that are indicative of the site use. It is understood that the TCLP lead results are below the action level.

Approximately 250 yds³ will be removed from the Fire Fighting Area and located at the west end of the remediation area at the LARC Parking Area. The soil will be staged on plastic until remediation activities begin.

1.2 Site Description

The site is rectangular in shape, approximately 140' wide by 500' long, containing approximately 15,000 yd³ of contaminated materials. The soil type is characterized as medium grained sand. The depth to groundwater varies from 5 to 7.5 feet below the ground surface.

In review of the Site Assessment Plan done by JMM, several groundwater monitoring wells were found to be located in the immediate vicinity of the LARC parking site. The locations of the prior soil boring locations and monitoring wells described above are shown on Enclosure 2.

2.0 INVESTIGATIVE METHODS

A limited subsurface investigation will be performed to evaluate the horizontal and vertical extent of the contaminated soil. Our investigation will include a review of the Site Assessment, site work which will include excavating pits or trenches to view the soil profile, drilling/installing groundwater monitoring wells, drilling and installing at least one product recovery well, and collecting soil and groundwater samples for chemical analysis. Aquifer characterization tests (i.e., drawdown and recovery) will also be performed to evaluate site hydrogeologic conditions. The following sections describe the investigative methods to be employed.

2.1 Utility/Piping Clearance

Prior to subsurface investigation activities, a utility check must be performed to identify nearby underground utility lines and/or pipelines. Solutions will supply maps indicating proposed excavation and drilling locations. Coordination of the utility check for these locations will be the responsibility of the Fort Story point of contact.

2.2 Permitting

A permit may need to be obtained from the Virginia Water Control Board prior to inoculation of the soil at the site with active biological materials. Solutions can assist with the initial permitting activities, however, it is the responsibility of the land owner to obtain these permits. (X)

2.3 Drilling Procedures

Soil borings will be advanced in the LARC parking area on a random grid sampling plan. These proposed soil boring locations will be determined based on the inferred groundwater flow direction being north. The final locations may change due to additional information obtained from field sampling. The soil borings will be advanced by a hand auger or by a truck-mounted drill rig using 6 1/4 inch inside diameter hollow-stem augers. If warranted, a hand auger may be initially advanced to check for subsurface utilities or piping. Soil cuttings obtained during drilling activities will be staged on site for remediation.

The split-spoon samples will be collected at continuous intervals until the final depth of the boring. Two - foot length split-spoon samplers will be used to increase the likelihood that a sufficient quantity of each sample is retained for laboratory analysis.

The soil samples will be visually classified by Solution's on-site geologist and properly recorded. The description will include, but not limited to, the following:

- Principal constituent type
- Color
- Minor constituent, if present, and approximate proportion
- Plasticity for cohesive soils
- Relative density of noncohesive and cohesive soils: loose, dense, very dense; very soft, soft, medium stiff
- Moisture content: dry, damp, moist, wet

It is anticipated that drilling operations will be performed using Level D personal protective clothing. Continuous air monitoring will be conducted with a photoionization detector (PID) or a flame ionization detector (FID) during drilling activities. If, however, volatile organic vapor concentrations exceed 2.5 parts per million (ppm), in the breathing zone around the borehole being drilled, Level C personal protective equipment may be required.

2.4 Monitoring Well Installation

Several of the soil borings will be converted into, two-inch diameter PVC shallow groundwater monitor wells. The monitoring wells will be used to provide data to evaluate the entry conditions of the groundwater before remediation activities begin. The recovery well system will be installed in the treatment area. More than one recovery well may be required. If more than one well is necessary, the associated costs are included in the bid pricing.

2.5 Fluid Level Measurements

Fluid level measurements will be obtained from all newly installed monitoring wells and selected existing groundwater monitoring wells presently located in the vicinity of the LARC parking area. The depth to water or free-phase product will be measured using an oil/water interface probe capable of detecting product layers as thin as 0.01 feet. Depths will be measured to the nearest 0.01 foot. The interface probe will be decontaminated between readings with an Alconox solution and distilled water.

2.6 Well Development Procedures

Following well construction and curing of the grout seal, each newly-installed well will be developed to remove fine-grained materials that may have entered the well during construction. Well development groundwater will be staged on site.

2.7 Sample Collection

Soil and groundwater samples will be collected for chemical analysis. The following sections describe soil and groundwater sampling activities.

2.7.1 Soil Sampling

In order to establish the concentration of TPH and type of contamination in the soils, soil random samples will be collected before, and at the end of the remediation. Each sample will be collected and submitted for TPH analysis. The soil samples will be collected from a random grid in accordance with Chapter 9 of SW-846. Collection of these samples will be performed as directed by Solutions project manager. The samples will be collected via hand auger as discussed in Section 2.3.

Each soil sample will be placed into a laboratory prepared container, stored on ice in a cooler, and delivered to the contract laboratory for analysis. Appropriate Chain-of-Custody (COC) documentation will accompany the samples to the laboratory.

2.7.2 Random Sampling Grid

The site has been surveyed (Drawing # 915-02-02), and a grid of 25 ft. x 25 ft. x 1 ft. has been placed on the site area (Drawing # 915-02-03). The grid size approximates 100 yd³. The grid points are numbered and 60 samples with 3 duplicates will be collected from the random sample numbers that have been selected from the random number chart. See Attachment 1. The selection of the chart heading number will be made by a Corp of Engineers' Representative.

2.7.2 Groundwater Sampling

Groundwater samples will be collected from the groundwater monitoring wells, to evaluate the horizontal and vertical extent of potentially contaminated groundwater. The groundwater samples will be analyzed for TPH by 418.1, BTEX, Ph, phosphate, ammonia, nitrate and total lead. Monitoring wells will be allowed to stabilize for at least a 24-hour period prior to sampling. The following paragraphs discuss the methods to be employed for sampling activities.

Prior to performing groundwater sampling, static fluid level measurements will be obtained using a water level probe. The depth to groundwater and the thickness of floating product, if present, will be determined in the well at the time of measurement. The water level will be measured to the nearest 0.01 foot from the top of the PVC well casing. The total depth of each well will also be measured to the nearest 0.01 foot using a weighted measuring tape. The water levels and well depth measurements will be used to calculate the volume of water in each well and the minimum volume of water that must be purged prior to sampling. All downhole equipment will be decontaminated withalconox detergent and distilled water.

A minimum of three well volumes will be purged from the wells prior to sampling. If the well is pumped or bailed dry, purging will be considered to be complete and an appropriate note will be recorded in the field log. Purged water will be stored on site for later reuse. The decontaminated water and the groundwater will also be stored for later reuse. The decon water and the groundwater will be tested and released or bioremediated, tested and released.

Groundwater samples will be collected from the wells using dedicated disposable polyethylene bailers or clean bailers and immediately placed into appropriate, laboratory-prepared sample containers. Samples that are to be analyzed for volatile organic compounds (VOC's) will be collected by slowly pouring water from the bailer into a 40 ml vial. Each vial will be completely filled to prevent volatilization, and preserved with HCL and put on ice.

2.8 Sample Handling and Transportation

The subcontracted laboratory will deliver new, clean, contaminant-free polyethylene and glass sample containers with preservatives, labels, and COC documents.

2.9 Sample Documentation in the Field

Three kinds of documentation will be used in tracking and shipping analytical samples:

- Field log book
- Sample labels
- Chain-of-Custody records

At a minimum, the label for each sample bottle will contain the following information:

- Site name
- Sample number
- Date and time of collection
- Sampler's initials
- Sample preservation and preservative used, and
- General types of analysis to be conducted.

The sample information, as well as the analysis to be performed on the sample, will be entered in the field log book for each sampling point. Any errors in the field log will not be erased; instead a single line will be drawn through the error and initialed by the person completing the log.

Additionally, the following items will be entered:

- Dates and times of entry
- Sample depth and number
- Names of field personnel on site
- Names of visitors on site
- Field conditions
- Description of activities
- Sampling remarks and observations
- QA/QC samples collected
- List of photographs taken, and
- Sketch of site conditions

Sample numbers will be designated by site code name ("LARC"), matrix ("S" for soil and "W" for groundwater), borehole number, and sample number taken from a particular borehole (Example: LARC-S-1-01 would represent the first soil sample collected from soil boring number 1). For duplicate samples an arbitrary sample number will be chosen.

Custody of the samples will be maintained by Solutions personnel from the time of sampling until the time they are forwarded to the analytical laboratory. A sample is considered to be in an individual's possession if:

- It is the sampler's possession or it is in the sampler's view after being in his/her possession;
- It was in the sampler's possession and then locked or sealed to prevent tampering; or,
- It is in a secure area.

The sample COC is documented using COC records. The COC record will be used to record the custody of samples at all times. The following information shall be entered on the COC record:

- Project name;
- Signature of sampler;
- Solutions sample number, date, and time of collection, grab or composite sample designation, and a brief description of the type of sample location;
- Signatures of individuals involved in sample transfer;
- Sample matrix; and,
- The tracking number or laboratory number

Solutions field personnel will complete a COC record, in ink, to accompany each cooler forwarded from the site to the laboratory. Any errors on the COC records will not be erased; instead, a line will be drawn through the error and initialed by the person completing the form. The original copy will be placed in a sealable bag and put inside the appropriate cooler, secured to the cooler's lid.

If the sample cooler is to be shipped by commercial air carrier, the cooler must be secured with custody seals so that the seals would be broken if the cooler is opened. The commercial carrier is not required to sign the COC record as long as the custody seals remain intact and the COC records stays in the cooler. The only other documentation required is the completed airbill.

If the sample shipment is hand delivered to the laboratory by Solutions or retrieved by laboratory personnel at the site, then the custody seals are not necessary. The laboratory sample custodian, or his/her designer accepting the sample shipment, whether it is from the air carrier to Solutions, signs and dates the COC record upon sample receipt. The original COC record will be returned with the final data report. The laboratory will be responsible for maintaining internal log books and records that provide a custody record during sample preparation and analysis.

2.10 Decontamination Procedures

Drilling and well development equipment (i.e., augers, drill rods, pump, hoses) will be decontaminated before initial use and after each boring by steam cleaning to reduce the possibility of cross-contamination occurring between borings. For the split-spoon samplers, the spoons will be decontaminated between samples either by steam cleaning or by washing with a non-phosphate soap (Alconox) and rinsing with distilled water. A temporary decontamination area/pad will be provided by the drilling subcontractor and will be designated by Solutions site geologist or project manager on the property near a potable water source.

2.11 Aquifer Characteristics

Aquifer characterization tests will be performed to evaluate the hydrologic characteristics of the shallow water-bearing zone. The following sections discuss the various test methods to be employed.

2.11.1 Groundwater Elevation Data

At the completion of well drilling, installation, and well development, the depths to water (or floating product if detected) will be measured in site wells using a water level probe. Groundwater elevations will be calculated from data by subtracting the groundwater measurements from surveyed, top-of-casing reference elevations. Survey elevation data for the wells will be obtained using standard survey procedures. All vertical elevations will be surveyed from the nearest permanent benchmark by a registered surveyor. Data generated from the measurements will be contoured to assist in determining groundwater flow direction.

Monitoring wells that are detected to have free product will be individually evaluated whether they will be used to determine groundwater flow direction. This evaluation will be dependent upon conditions such as product thickness, geology, etc.

2.11.2 Well-Head Tests

The well-head tests will be a standard variation of the falling-head or rising-head slug test. In these tests, a solid slug of known dimensions is introduced below the water table or withdrawn quickly to induce a disturbance in the water column. It is anticipated that tests will be performed at two different well locations. Monitoring wells with measurable free product will not be considered for the well-head tests. Water level data will be collected using Data Loggers and pressure transducers. Additionally, water level measurements will also be recorded using an electric measuring tape in order to compare test results. All downhole equipment will be decontaminated using the same procedures as described in Section 2.12.

Data from the well-head tests will be analyzed according to standard methods, as appropriate to the test conditions and probably including: Hvorslev (1951); Bouwer and Rice (1967); Cooper, et al. (1967); or similar studies. The aquifer parameters calculated from the well-head tests will include hydraulic conductivity and transmissivity. Estimated values for hydraulic conductivity will be associated with the probable thickness of the shallow saturated layer to approximate a value of transmissivity for the shallow zone. This data will be submitted prior to initiation of the remediation process.

2.11.3 Aquifer Drawdown and Recovery Tests

2.11.3.1 Recovery Well Installation

To assist with the biological remediation and provide hydraulic isolation, several well points will be installed at the site to serve as a recovery system. The location of the well points will be determined upon field observations. The well will be installed within the suspected area of the contaminated soil. Construction methods and materials will be similar to those used for the two-inch monitoring wells. After installation, the recovery well will be thoroughly developed to remove sediments from the well and to improve the hydraulic connection of the well with the surrounding aquifer.

2.11.3.2 Pump Installation

A pump suction line will be temporarily installed in the recovery well by the geologist or drilling subcontractor. Depending upon the depths of the recovery well and the size of the pump used, the pump suction will be suspended within the recovery well. Upon installation, the pump suction will be suspended six-inches to one-foot above the bottom of the recovery well.

Either a solid PVC pipe or a flexible hose may be used as the suction line with a footer valve to hold prime. Upon reaching the top of the well, the discharge line will be attached to a manifold line that will connect the well points, below grade, with a totalizing meter at the pump. The pump discharge will return all water to the site after it passes through an oil/water separator. The discharge from this system will be returned to the site as the "carrying" media for the biological inoculate.

2.11.3.3 Step-Drawdown Test

After the pump and associated equipment is installed, fluid level measurements will be obtained from the recovery well and the two-inch monitoring wells located at the site.

Fluid levels for each step of the test will be recorded by the hydrologic monitor from the pressure transducer.

If a significant amount of free product is present (0.05 ft. or greater) the fluid level measurements will be obtained using an interface probe. These manually obtained measurements will also be obtained on a logarithmic scale.

Decisions as to when the flow rates should be increased to the next step will be based on the drawdown observed in the recovery well. Efforts will be made to over pump the recovery well so the maximum discharge rate may be determined.

After each step is completed, fluid level measurements from the nearest two-inch monitoring wells will be recorded. If drawdown influences are observed in these monitoring wells, additional measurements will be obtained from monitoring wells further away from the recovery well. This procedure is intended to determine what influences, if any, may be observed in the monitoring wells during the 8-hour aquifer test.

Once the various steps have been completed for the step-drawdown test, the flow rate of the pump will be adjusted with the gate valve to the discharge rate which will be used for the 8-hour aquifer test. The pump will then be shut down by terminating the power supplied to the pump. The recovery of the water levels inside the recovery well will be measured on a logarithmic scale, similar to the scale used for the drawdown phase of the test. Fluid levels within the recovery well and the monitoring wells will be allowed to return to static before starting the 8-hour aquifer test.

2.11.3.4 8-Hour Aquifer Test

The 8-hour aquifer test will be an aquifer test in which a constant discharge rate will be maintained for an 8-hour interval. Fluid level measurements in the recovery well and all of the two-inch monitoring wells at the facility will be observed.

Prior to starting the test, fluid level measurements will be obtained from all wells. Selection of the two-inch monitoring wells will be based on site specific conditions. Such conditions may be the presence of free product, distance to the recovery well, and traffic patterns in the area.

In addition to the fluid level data recorded from the four wells, fluid level data will also be obtained from the remaining monitoring wells using an interface probe. These measurements will be recorded every 30 minutes. If no influence is observed within these monitoring wells, the frequency may be reduced to an hourly interval.

Flow rates will be recorded periodically. Site personnel will record flow rates frequently during the initial portion of the test. If flow rates are remaining fairly stable, they will not require as frequent checks. Data obtained from the flowmeter will be used to determine the total volume of fluids discharged and the average flow rate for the test.

If a pressure transducer is being used in the recovery well, an interface probe will be used to periodically measure the product thickness that may be present. These measurements will be obtained on an hourly schedule.

2.11.3.5 Recovery Test

At the conclusion of the drawdown phase of the aquifer test, the pump will be shut down and the fluid levels permitted to recover. Of the two-inch monitoring wells, only those monitoring wells that had a measurable drawdown need to be monitored during the recovery test. The recovery test will be terminated after the fluid levels in the recovery well have returned to 90% of the original level. The pump and other downhole equipment will not be removed from the recovery well until the recovery test is concluded.

2.11.3.6 Data Elevation

Fluid levels obtained prior to the initiation and the termination of the 8-hour aquifer test will be used to develop potentiometric surface maps to illustrate the influence of the recovery well. Information obtained from the aquifer test will be used to determine the specific capacity and efficiency of the recovery well. In addition, aquifer conditions permitting, the following properties of the aquifer that may be determined.

- Hydraulic conductivity
- Storage coefficient
- Transmissivity
- Rate of groundwater migration

3.0 ANALYSIS OF SOIL AND GROUNDWATER

All samples will be analyzed for required parameters using seven-day laboratory turnaround. The following sections discuss the methodology to be employed for laboratory analysis.

3.1 Laboratory Analysis

3.1.1 Soils

The soil samples will be analyzed for the total petroleum hydrocarbons by 8015. Specific method numbers for the required analysis described in the reference material listed below:

-Total Petroleum Hydrocarbons (TPH) Method Modified 8015- Test Methods for Evaluating Solid Waste SW-846, 3rd Edition, November 1986.

3.1.2 Groundwater

The groundwater samples will be analyzed for the following parameters: purgeable aromatics. Specific method numbers for the required analysis are listed in Table 3 and the analytical methods are described in the references listed below:

-Volatile Organics - Test Methods for Evaluating Solid Waste SW-846, 3rd Edition, November 1986.

-Total Petroleum Hydrocarbons - SW-846 Method Modified 8015.

-Metal Analysis - EPA Method 200 Series.

3.2 Laboratory Quality Assurance/Quality Control (QA/QC)

The laboratory QA/QC Plan is attached with the Work Plan. All sampling containers, preservation, holding times, and analytical methods are according to the strictest EPA guidelines. The laboratory contracted for the initial work and the process work will be Solutions Laboratories, Inc. The laboratory has extensive

experience in this type of work. The laboratory is approved by the Virginia State Water Control Board, for reporting to their agency for VPDES permit work as well as other analytical work commonly reported to the UST department of the State Water Control Board. The Certificate number is VA000017.

4.0 CONTAMINATED MATERIALS HANDLING

Quantities of solids and liquids may be generated as a result of drilling operations and decontamination procedures. This section defines the procedures to be used to control the handling, packaging, and transporting of contaminated materials. The following paragraphs address the potential sources and protocols for containerization and handling of contaminated waste.

There are five sources that may potentially generate contaminated materials, including: drilling, decontamination, well development, purging activities, and aquifer pump testing.

Initial containment of the materials will be accomplished using a plastic sheeting. During drilling, cuttings will be placed on plastic for temporary storage. For decontamination fluids, a temporary decontamination area will be constructed. The decontamination area will be constructed so that fluids will be collected for re-use at the site. All cuttings and decontamination fluids will be remediated at the site. The water and soil will be tested and released or bioremediated, tested and released.

5.0 BIOREMEDIATION

5.1 General Information

Our remediation program starts with hydraulic isolation of the groundwater under the site by pumping sufficient water to produce a cone of depression. Remediation liquids applied to the site will migrate to the depressed groundwater and be pumped out and returned to the site after treatment, if necessary. The oil will be removed for disposal. The water will be used as a vehicle to put micro-organisms and inoculant into the contaminated soil. Water will be put into holding tanks for pH adjustment, aeration, nutrient enrichment and micro-organism enrichment by EPA approved micro-organisms. From the holding tanks, the water will be placed back into the site for another cycle of capturing, consuming and moving contaminants toward the cone of depression. This cycle of moving enriched water through the site is a continuous process of consuming and moving soil contaminants.

An equally important part of the program is physically moving the contaminated soils to "break up" pockets of contamination and to search for areas of heavy contamination. These areas of soil contamination will be analyzed and given specialized treatment. Such treatment will be a combination of physical movement and specifically developed inoculant. Each individual area of contamination receives its special recipe for "clean up".

The site has a noted area of contamination that consists of a mixture of diesel, motor oil and grease that quantifies at levels of 18,000 to 21,000 ppm by Method 3550/8015. This soil will be fertilized, removed, screened in a wet screening process, and pumped into a 150,000 gallon above-ground pool. The pool will be inoculated with 40,000 gallons of inoculant. The pool will then be loaded with the heavily contaminated soil. The pool will be equipped with an aeration and pumping system, that will move the sand and aerate the richly inoculated slurry. The process will continue until the soil has reached the 50 ppm endpoint. The sand will be pumped out onto a dewatering area, with the water being recycled to the pool. The sand will then be returned to the site. This process will be repeated until all of the heavily contaminated sand is remediated.

5.2 Site Work

The site work will begin by "cutting" and leveling the area where the pool will be installed. The area that has been selected, has been determined as being below 50 ppm by Method 3550/8015. Debris and oversize objects will be removed from this area. During this same timeframe, the firefighting soil will be screened and placed in a poly lined area on the site that is also identified as being below 50 ppm. The segregation of this material will be maintained until the remediation process is complete and returned to the owner. The remediation of this material will be done using a "modified" soil farming method. The soil will be fertilized, spread on poly, and a inoculant specifically selected for the nature of the contamination will be added. The soil has been contaminated with jet fuel, gasoline, and solvents. The runoff from this material will be recycled after the pH adjusted is adjusted and nutrients are added. The soil will periodically have the surface disturbed and remediation will continue until the TPH is below 50 ppm, quantified by Method 5030/8015.

Prior to any remediation activities, the site will have well points placed slightly North from the midline of the site. The pumping rate of the manifolded well points will be in the range of 20 GPM/ well. The well points will be connected by a 1 1/2 line with footer valves in each well, and all connected to a discharge pump. The system discharge will be pumped back to onto the site.

The heavily contaminated sand will be excavated, wet screened, and pumped into the pool. The rinseate from the wet screen will be pumped into the pool. The excavation of the heavily contaminated sand will be wet screened, stockpiled, sprayed with inoculant, and covered until the pool is ready to reload. The pool is designed to load 750 yds of sand per loading. The cycle will require weekly loading and unloading.

The remediation of the remainder of the site will be accomplished by pumping, trenching, and spraying with inoculation that is recycled. The site will be excavated in trenches accessing the highest concentrations of contamination that can be identified during the preliminary site preparation. The approach will be to expose those areas by trenching, and then inoculate the trenched areas with an EPA approved inoculation. The trenches will possibly be open during the entire period of remediation. The exact inoculant that will be used will be determined during the initial TPH characterization during the preliminary site work. The inoculation for the LARC parking area may consist of a different inoculation than that used for the firefighting soil. If the inoculant is determined to be different, the soil will be brought into the treatment area, but segregated, such that the soil can be physically applied separately.

5.2.2 Sequence of Operations

Initial evaluation of the soil and groundwater conditions by pit exploration will be performed during the initial monitoring well installation. The purpose of this activity is to better define the site profile and any site specific subsurface conditions that need to be considered.

A random "grid" will be sampled before the bioremediation process is initiated, and "selected" sampling in areas that will be occupied by the above ground pond.

Once the sampling has been performed under the area of the pool, the above ground pond will be installed, approximately 150,000 gallons, using commercial grade pre-fabricated sections and a 30 ml (minimum) liner that is compatible with the fluids to be contained (HPDE or equal).

During this period, we will also begin installation of the equipment area, decon area and chemical storage areas with appropriate barriers and controlled entry points.

The transfer of nutrients and inoculant solutions from the staging area in Chesapeake, Virginia to the above ground pond ("pond") will begin the week of May 10, 1993. We will begin installation of the wet screen system adjacent to pond to remove debris from the sand prior to transfer to the pond.

During the week of May 17, 1993 the site will begin the mechanical disturbance of the top layer (approx. 12") of the entire site with a gang plow or other device and remove debris that may consist of tools, concrete, steel grating and piping. The first application of the inoculant will be performed to the entire site. We will then excavate to a depth of approximately 2' and stockpile the heavily contaminated soils on the southeast corner of the site. We will begin screening of the excavated heavily contaminated soil and transfer the first batch to the pond for treatment. As the batch is completed the clean soil will be pumped to a temporary storage area lined with two layers of 6 ml poly where it will de-water. The removed liquid will be returned to the pond for re-use.

In parallel with the pond operations, the remainder of the site will be excavated to groundwater levels and inoculated. Inoculant will be recycled by various pumping systems and the "cone of depression" system.

As sections of the area are remediated to below 50 ppm TPH, the areas will be random "grid" sampled and released.

At completion of all remediation, the pond inoculant will be applied to the site. The site will receive a final grading to restore it to the approximate pre-treatment conditions with respect to topography.

All removed debris will be stored on 6 ml poly for disposal by Ft. Story personnel.

5.3 Inoculation

The biological inoculation consists of a liquid solution, that contains a high cell count of EPA approved bacteria, that have been given ideal conditions in order to deliver a "activated" biological solution that is prepared to consume the TPH of concern.

5.4 Selection of Inoculation

The selection of the micro-organisms is based on the chromatographic characteristics of the contamination. In many cases, the inoculation is a combination of several EPA approved bacterial groups. The mixture is based on formulated on the historical experience of our work with a wide variety of contaminants, the TPH characteristics, and the abilities of different types of bacteria that consume certain type of TPH compounds. It has been known for years that certain types of micro-organisms consume certain compounds that are contained in different products, for example diesel fuel. See Enclosures 3 and 4.

6.0 COMPLETION OF REMEDIATION

During the initial analysis, the area of soil contamination and groundwater interface will be outlined. At completion the level of contamination in the soil will be below the 50 ppm as specified by Method 3550/8015 . This will be verified by a random grid selection of samples that will include samples that encompass soil to the groundwater level. Since the groundwater in the area may be contaminated, the depth of our remediation responsibility will be to the top of the saturated zone. In the remediation process outlined in Section 5 above, the groundwater and other wastes on site will be used as a transportation vehicle for soil remediation and not for groundwater remediation.

At completion, all surface will be returned to original contour and our remediation equipment removed. Installed underground piping will be left for future use.

List of Enclosures

1. General Location Map
2. Detailed Site Plan
3. Bioremediation Schematic
4. Bioremediation System Cross Section

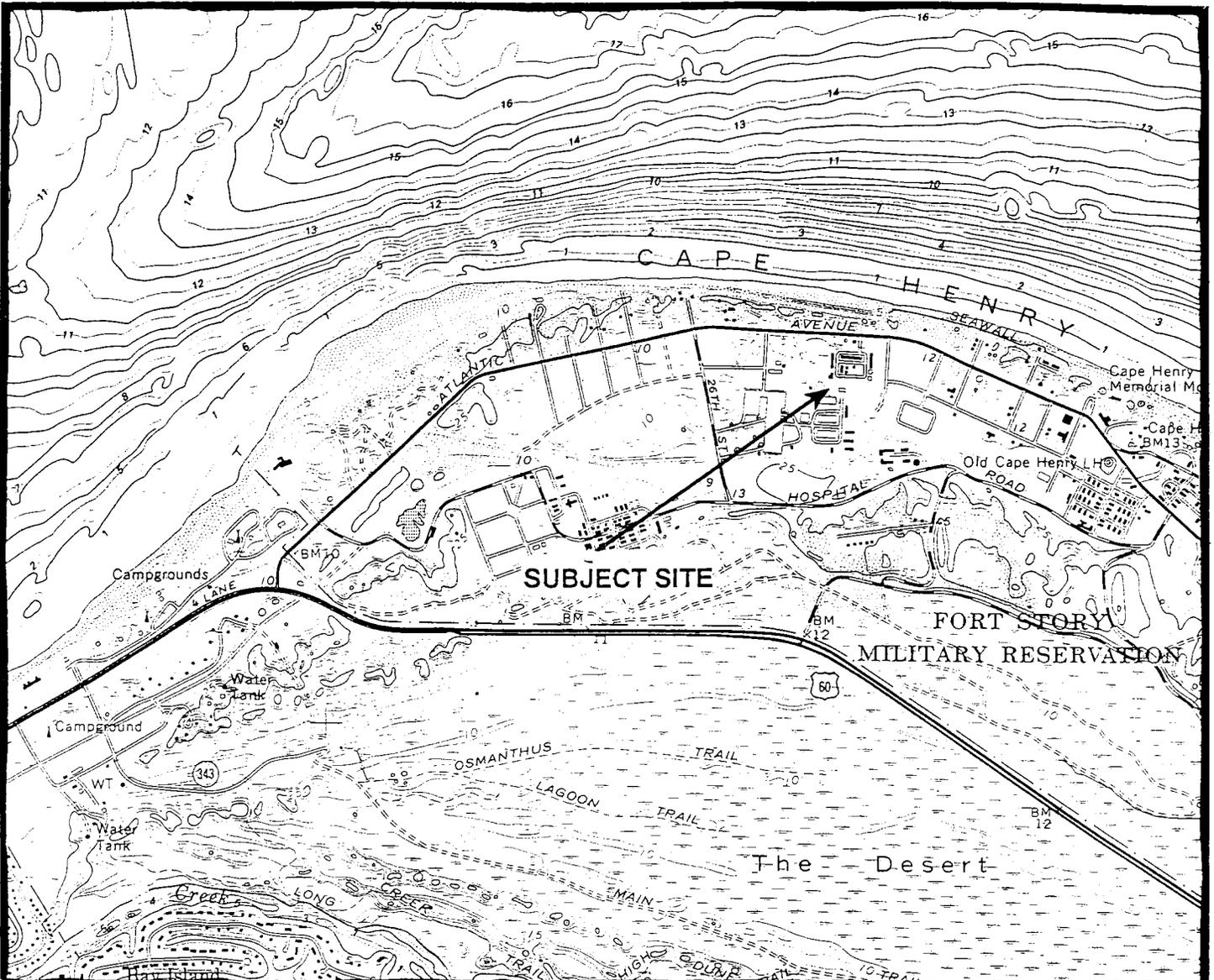
List of Attachments

1. Random Grid Chart
2. Time Table of Activities

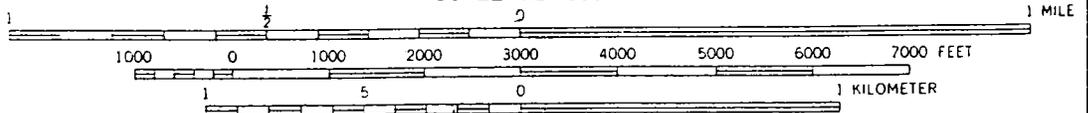
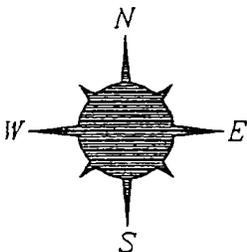
Drawings

1. 915-02-02 Surveyed Site Plan
2. 915-02-03 Random Grid

ENCLOSURES



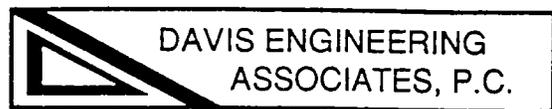
SCALE 1:24 000



CONTOUR INTERVAL 5 FEET
 NATIONAL GEODETIC VERTICAL DATUM OF 1929
 DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS MEAN LOW WATER
 THE RELATIONSHIP BETWEEN THE TWO DATUMS IS VARIABLE
 SHORELINE SHOWN REPRESENTS THE APPROXIMATE LINE OF MEAN HIGH WATER
 THE MEAN RANGE OF TIDE IS APPROXIMATELY 2.7 FEET
 THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

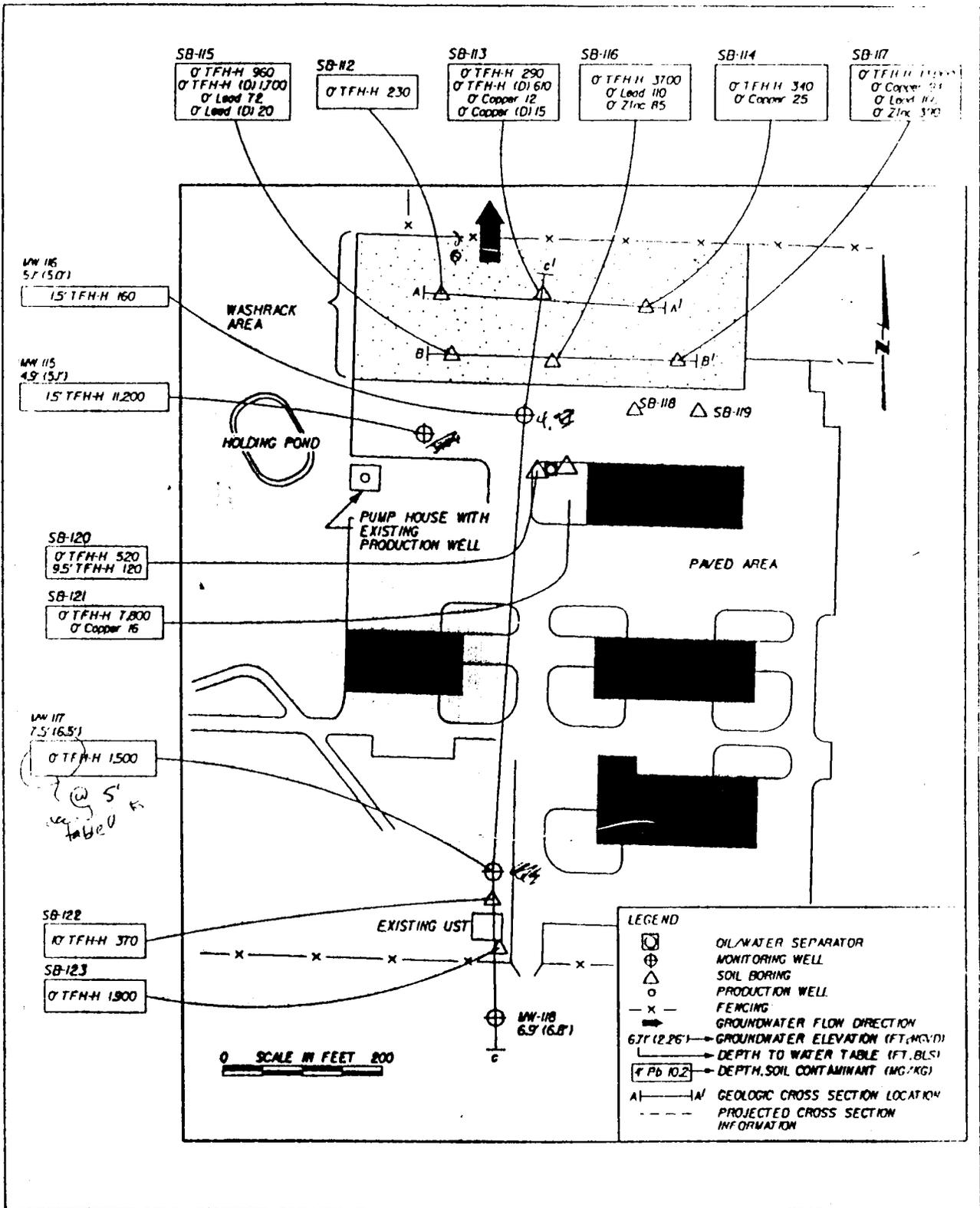
SOURCE:

U.S.G.S. 7.5 Minute Series
 Cape Henry, VA
 1964
 Photorevised 1986
 Bathymetry Added 1986

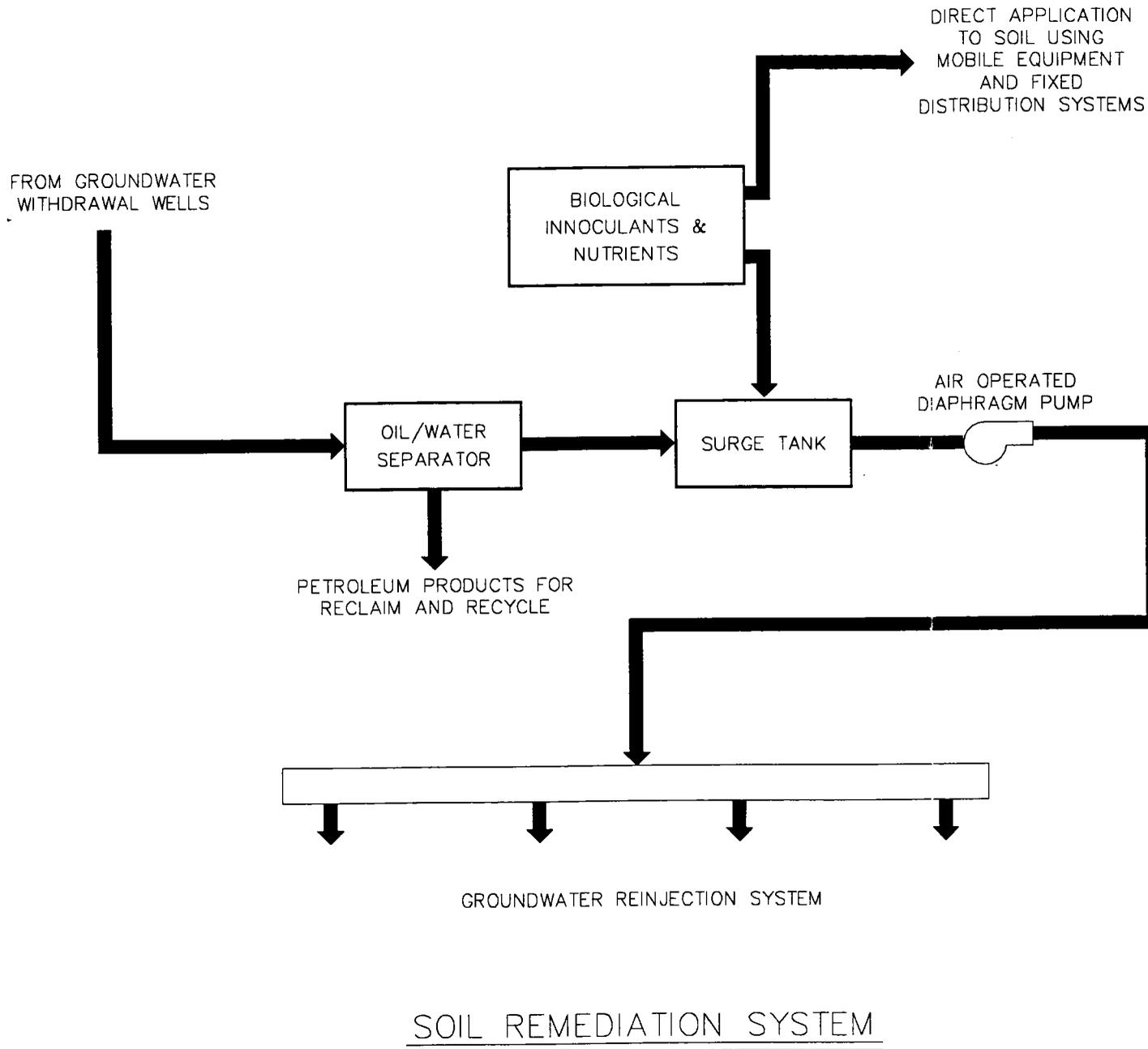


**DAVIS ENGINEERING
 ASSOCIATES, P.C.**

ENCLOSURE 1
 General Location Map



Soil Chemistry Concentration and Geologic Cross Section Locations,
LARC Maintenance Area
Ft. Story, VA



DAVIS ENGINEERING ASSOCIATES, P.C.
 569 CENTRAL DRIVE VIRGINIA BEACH, VIRGINIA

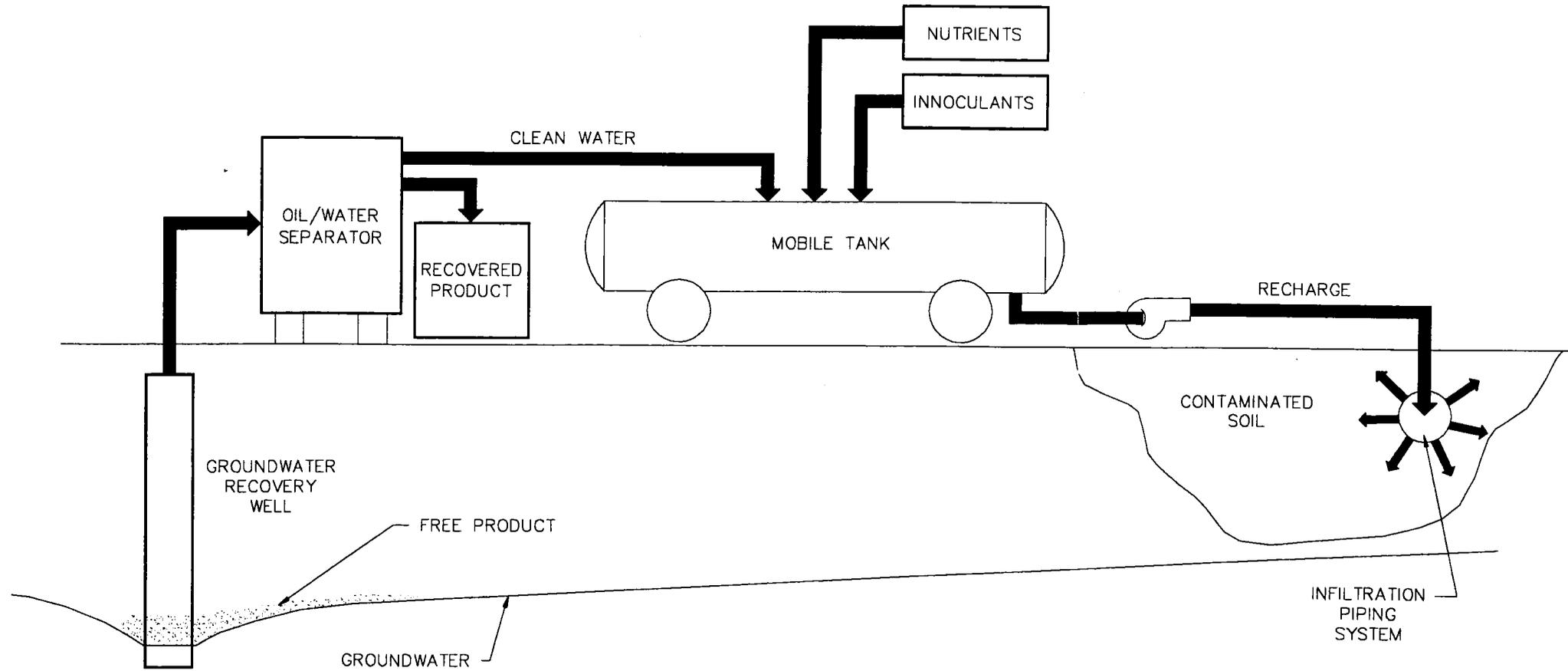
SOLUTIONS ENVIRONMENTAL ASSOCIATES
 FT. STORY VA. BEACH, VA
 BIOREMEDIATION SCHEMATIC

BY: BLA DATE: 01-29-93 NO. 914-01-01
 CHK'D: ACD APP'D: ACD

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REVISIONS

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BIOREMEDIATION SYSTEM CROSS-SECTION

THIS DOCUMENT PREPARED USING AUTOCAD RELEASE 12.



DAVIS ENGINEERING ASSOCIATES, P.C.
500 CENTRAL DRIVE VIRGINIA BEACH, VIRGINIA

SOLUTIONS ENVIRONMENTAL ASSOCIATES
FORT STORY
VA. BEACH, VIRGINIA
BIOREMEDIATION SYSTEM CROSS-SECTION

BY: BLA DATE: 2-9-93
CHK'D: ACD APP'D: ACD NO. 914-01-02

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REVISIONS

No.	DESCRIPTION	DATE	BY

ATTACHMENTS

Attachment 1
Miscellaneous Statistical Tables

A TABLE OF 14,000 RANDOM UNITS

Line/Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
1	10480	15011	01536	02011	81647	91646	69179	14194	62590	36207	20969	99570	91291	90700
2	22368	46573	25595	85393	30995	89198	27982	53402	93965	34095	52666	19174	39615	99505
3	24130	48360	22527	97265	76393	64809	15179	24830	49340	32081	30680	19655	63348	58629
4	42167	93093	06243	61680	07856	16376	39440	53537	71341	57004	00849	74917	97758	16379
5	37570	39975	81837	16656	06121	91782	60468	81305	49684	60672	14110	06927	01263	54613
6	77921	06907	11008	42751	27756	53498	18602	70659	90655	15053	21916	81825	44394	42880
7	99562	72905	56420	69994	98872	31016	71194	18738	44013	48840	63213	21069	10634	12952
8	96301	91977	05463	07972	18876	20922	94595	56869	69014	60045	18425	84903	42508	32307
9	89579	14342	63661	10281	17453	18103	57740	84378	25331	12566	58678	44947	05585	56941
10	85475	36857	43342	53988	53060	59533	38867	62300	08158	17983	16439	11458	18593	64952
11	28918	69578	88231	33276	70997	79936	56865	05859	90106	31595	01547	85590	91610	78188
12	63553	40961	48235	03427	49626	69445	18663	72695	52180	20847	12234	90511	33703	90322
13	09429	93969	52636	92737	88974	33488	36320	17617	30015	08272	84115	27156	30613	74952
14	10365	61129	87529	85689	48237	52267	67689	93394	01511	26358	85104	20285	29975	89868
15	07119	97336	71048	08178	77233	13916	47364	81056	97735	85977	29372	74461	28551	90707
16	51085	12765	51821	51259	77452	16308	60756	92144	49442	53900	70960	63990	75601	40719
17	02368	21382	52404	60268	89368	19885	55322	44819	01188	65255	64835	44919	05944	55157
18	01011	54092	33362	94904	31273	04146	18594	29852	71585	85030	51132	01915	92747	64951
19	52162	53916	46369	58586	23216	14513	83149	98736	23495	64350	94738	17752	35156	35749
20	07056	97628	33787	09998	42698	06691	76988	13602	51851	46104	88916	19509	25625	58104
21	48663	91245	85828	14346	09172	30168	90229	04734	59193	22178	30421	61666	99904	32812
22	54164	58492	22421	74103	47070	25306	76468	26384	58151	06646	21524	15227	96909	44592
23	32639	32363	05597	24200	13363	38005	94342	28728	35806	06912	17012	64161	18296	22851
24	29334	27001	87637	87308	58731	00256	45834	15398	46557	41135	10367	07684	36188	18510
25	02488	33062	28834	07351	19731	92420	60952	61280	50001	67658	32586	86679	50720	94953
26	81525	72295	04839	96423	24878	82651	66566	14778	76797	14780	13300	87074	79666	95725
27	29676	20591	68086	26432	46901	20849	89768	81536	86645	12659	92259	57102	80428	25280
28	00742	57392	39064	66432	84673	40027	32832	61362	98947	96067	64760	64584	96096	98253
29	05366	04213	25669	26422	44407	44048	37937	63904	45766	66134	75470	66520	34693	90449
30	91921	26418	64117	94305	26766	25940	39972	22209	71500	64568	91402	42416	07844	69618
31	00582	04711	87917	77341	42206	35126	74087	99547	81817	42607	43808	76655	62028	76630
32	00725	69884	62797	56170	86324	88072	76222	36086	84637	93161	76038	65855	77919	88006
33	69011	65797	95876	55293	18988	27354	26575	08625	40801	59920	29841	80150	12777	48501
34	25976	57948	29888	88604	67917	48708	18912	82271	65424	69774	33611	54262	85963	03547
35	09763	83473	73577	12908	30883	18317	28290	35797	05998	41688	34952	37888	38917	88050
36	91567	42595	27958	30134	04024	86385	29880	99730	55536	84855	29080	09250	79656	73211
37	17955	56349	90999	49127	20044	59931	06115	20542	18059	02008	73708	83517	36103	42791
38	46503	18584	18845	49618	02304	51038	20655	58727	28168	15475	56942	53389	20562	87338
39	92157	89634	94824	78171	84610	82834	09922	25417	44137	48413	25555	21246	35509	20468
40	14577	62765	35605	81263	39667	47358	56873	56307	61607	49518	89656	20103	77490	18062
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42	34914	63976	88720	82765	34476	17032	87589	40836	32427	70002	70663	88863	77775	69348
43	70060	28277	39475	46473	23219	53416	94970	25832	69975	94884	19661	72828	00102	66794
44	53976	54914	06990	67245	68350	82948	11398	42878	80287	88267	47363	46634	06541	97809
45	76072	29515	40980	07391	58745	25774	22987	80059	39911	96189	41151	14222	60697	59583
46	90725	52210	83974	29992	65831	38857	50490	83765	55657	14361	31720	57375	56228	41546
47	64364	67412	33339	31926	14883	24413	59744	92351	97473	89286	35931	04110	23726	51900
48	08962	00358	31662	25388	61642	34072	81249	35648	56891	69352	48373	45578	78547	81788
49	95012	68379	93526	70765	10593	04542	76463	54328	02349	17247	28865	14777	62730	92277
50	15664	10493	20492	38391	91132	21999	59516	81652	27195	48223	46751	22923	32261	85653

Attachment 1 Cont.
Miscellaneous Statistical Tables

481

A TABLE OF 14,000 RANDOM UNITS

Line/Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
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53	73115	35101	47498	87637	99016	71060	88824	71013	18735	20286	23153	72924	35165	43040
54	57491	16703	23167	49323	45021	33132	12544	41035	80780	45393	44812	12515	98931	91202
55	30405	83946	23792	14422	15059	45799	22716	19792	09983	74353	68668	30429	70735	25499
56	16631	35006	85900	98275	32388	52390	16815	69298	82732	38480	73817	32523	41961	44437
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58	38935	64202	14349	82674	66523	44133	00697	35552	35970	19124	63318	29686	03387	59846
59	31624	76384	17403	53363	44167	64486	64758	75366	76554	31601	12614	33072	60332	92325
60	78919	19474	23632	27889	47914	02584	37680	20801	72152	39339	34806	08930	85001	87820
61	03931	33309	57047	74211	63445	17361	62825	39908	05607	91284	68833	25570	38818	46920
62	74426	33278	43972	10119	89917	15665	52872	73823	73144	88662	88970	74492	51805	99378
63	09066	00903	20795	95452	92648	45454	09552	88815	16553	51125	79375	97596	16296	66092
64	42238	12426	87025	14267	20979	04508	64535	31355	86064	29472	47689	05974	52468	16834
65	16153	08002	26504	41744	81959	65642	74240	56302	00033	67107	77510	70625	28725	34191
66	21457	40742	29820	96783	29400	21840	15035	34537	33310	06116	95240	15957	16572	06004
67	21581	57802	02050	89728	17937	37621	47075	42080	97403	48626	68995	43805	33386	21597
68	55612	78095	83197	33732	05810	24813	86902	60397	16489	03264	88525	42786	05269	92532
69	44657	66999	99324	51281	84463	60563	79312	93454	68876	25471	93911	25650	12682	73572
70	91340	84979	46949	81973	37949	61023	43997	15263	80644	43942	89203	71795	99533	50501
71	91227	21199	31935	27022	84067	05462	35216	14486	29891	68607	41867	14951	91696	85065
72	50001	38140	66321	19924	72163	09538	12151	06878	91903	18749	34405	56087	82790	70925
73	65390	05224	72958	28609	81406	39147	25549	48542	42627	45233	57202	94617	23772	07896
74	27504	96131	83944	41575	10573	08619	64482	73923	36152	05184	94142	25299	84387	34925
75	37169	94851	39117	89632	00959	16487	65536	49071	39782	17095	02330	74301	00275	48280
76	11508	70225	51111	38351	19444	66499	71945	05422	13442	78675	84081	66938	93654	59894
77	37449	30362	06694	54690	04052	53115	62757	95348	78662	11163	81651	50245	34971	52924
78	46515	70331	85922	38329	57015	15765	97161	17869	45349	61796	66345	81073	49106	79860
79	30986	81223	42416	58353	21532	30502	32305	86482	05174	07901	54339	58861	74818	46942
80	63798	64995	46583	09765	44160	78128	83991	42865	92520	83531	80377	35909	81250	54238
81	82486	84846	99254	67632	43218	50076	21361	64816	51202	88124	41870	52689	51275	83556
82	21885	32906	92431	09060	64297	51674	64126	62570	26123	05155	59194	52799	28225	85762
83	60336	98782	07408	53458	13564	59089	26445	29789	85205	41001	12535	12133	14645	23541
84	43937	46891	24010	25560	86355	33941	25786	54990	71899	15475	95434	98227	21824	19585
85	97656	63175	89303	16275	07100	92063	21942	18611	47348	20203	18534	03862	78095	50136
86	03299	01221	05418	38982	55758	92237	26759	86367	21216	98442	08303	56613	91511	75928
87	79626	06486	03574	17668	07785	76020	79924	25651	83325	88428	85076	72811	22717	50585
88	85636	68335	47539	03129	65651	11977	02510	26113	99447	68645	34327	15152	55230	93448
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90	08362	15656	60627	36478	65648	16764	53412	09013	07832	41574	17639	82163	60859	75567
91	79556	29068	04142	16268	15387	12856	66227	38358	22478	73373	88732	09443	82558	05250
92	92608	82674	27072	32534	17075	27698	98204	63863	11951	34648	88022	56148	34925	57031
93	23982	25835	40055	67006	12293	02753	14827	22235	35071	99704	37543	11601	35503	85171
94	09915	96306	05908	97901	28395	14186	00821	80703	70426	75647	76310	88717	37890	40129
95	50937	33300	26695	62247	69927	76123	50842	43834	86654	70959	79725	93872	28117	19233
96	42488	78077	69882	61657	34136	79180	97526	43092	04098	73571	80799	76536	71255	64239
97	46764	86273	63003	93017	31204	36692	40202	35275	57306	55543	53203	18098	47625	88684
98	03237	45430	55417	63282	90816	17349	88298	90183	36600	78406	06216	95787	42579	90730
99	86591	81482	52667	61583	14972	90053	89534	76036	49199	43716	97548	04379	46370	28672
100	38534	01715	94964	87288	65680	43772	39560	12918	86537	62738	19636	51132	25739	56947

Attachment 1 Cont.
Miscellaneous Statistical Tables

A TABLE OF 14,000 RANDOM UNITS

Line/Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
101	13284	16834	74151	92027	24670	36665	00770	22878	02179	51602	07270	76517	97275	45960
102	21224	00370	30420	03883	96648	89428	41583	17564	27395	63904	41548	49197	82277	24120
103	99052	47887	81085	64933	66279	80432	65793	83287	34142	13241	30590	97760	35848	91983
104	00199	50993	98603	38452	87890	94624	69721	57484	67501	77638	44331	11257	71131	11059
105	60578	06483	28733	37867	07936	98710	98539	27186	31237	80612	44488	97819	70401	95419
106	91240	18312	17441	01929	18163	69201	31211	54288	39296	37318	65724	90401	79017	62077
107	97458	14229	12063	59611	32249	90466	33216	19358	02591	54263	88449	01912	07436	50813
108	35249	38646	34475	72417	60514	69257	12489	51924	86871	92446	36607	11458	30440	52639
109	38980	46600	11759	11900	46743	27860	77940	39298	97838	95145	32378	68038	89351	37005
110	10750	52745	38749	87365	58959	53731	89295	59062	39404	13198	59960	70408	29812	83126
111	36247	27850	73958	20673	37800	63835	71051	84724	52492	22342	78071	17456	96104	18327
112	70994	66986	99744	72438	01174	42159	11392	20724	54322	36923	70009	23233	65438	59685
113	99638	94702	11463	18148	81386	80431	90628	52506	02016	85151	88598	47821	00265	82525
114	72055	15774	43857	99805	10419	76939	25993	03544	21560	83471	43989	90770	22965	44247
115	24038	65541	85788	55835	38835	59399	13790	35112	01324	39520	76210	22467	83275	32286
116	74976	14631	35908	28221	39470	91548	12854	30166	09073	75887	36782	00268	97121	57676
117	35553	71628	70189	26436	63407	91178	90348	55359	80392	41012	36270	77786	89578	21059
118	35676	12797	51434	82976	42010	26344	92920	92155	58807	54644	58581	95331	78629	73344
119	74815	67523	72985	23183	02446	63594	98924	20633	58842	85961	07648	70164	34994	67662
120	45246	88048	65173	50989	91060	89894	36063	32819	68559	99221	49475	50558	34698	71800
121	76509	47069	86378	41797	11910	49672	88575	97966	32466	10083	54728	81972	58975	30761
122	19689	90332	04315	21358	97248	11188	39062	63312	52496	07349	79178	33692	57352	72862
123	42751	35318	97513	61537	54955	08159	00337	80778	27507	95478	21252	12746	37554	97775
124	11946	22681	45045	13964	57517	59419	58045	44067	58716	58840	45557	96345	33271	53464
125	96518	48688	20996	11090	48396	57177	83867	86464	14342	21545	46717	72364	86954	55580
126	35726	58643	76869	84622	39098	36083	72505	92265	23107	60278	05822	46760	44294	07672
127	39737	42750	48968	70536	84864	64952	38404	94317	65402	13589	01055	79044	19308	83623
128	97025	66492	56177	04049	80312	48028	26408	43591	75528	65341	49044	95495	81256	53214
129	62814	08075	09788	56350	76787	51591	54509	49295	85830	59860	30883	89660	96142	18354
130	25578	22950	15227	83291	41737	79599	96191	71845	86899	70694	24290	01551	80092	82118
131	68763	69576	88991	49662	46704	63362	56625	00481	73323	91427	15264	06969	57048	54149
132	17900	00813	64361	60725	88974	61005	99709	30666	26451	11528	44323	34778	60342	60388
133	71944	60227	63551	71109	05624	43836	58254	26160	32116	63403	35404	57146	10909	07346
134	54684	93691	85132	64399	29182	44324	14491	55226	78793	34107	30374	48429	51376	09559
135	25946	27623	11258	65204	52832	50880	22273	05554	99521	73791	85744	29276	70326	60251
136	01353	39318	44961	44972	91766	90262	56073	06606	51826	18893	83448	31915	97764	75091
137	99083	88191	27662	99113	57174	35571	99884	13951	71057	53961	61448	74909	07322	80960
138	52021	45406	37945	75234	24327	86978	22644	87779	23753	99926	63898	54886	18051	96314
139	78755	47744	43776	83098	03225	14281	83637	55984	13300	52212	58781	14905	46502	04472
140	25282	69106	59180	16257	22810	43609	12224	25643	89884	31149	85423	32581	34374	70873
141	1 359	94202	02743	86847	79725	51811	12998	76844	05320	54236	53891	70226	38632	84776
142	11 44	13792	98190	01424	30078	28197	55583	05197	47714	68440	22016	79204	06862	94451
143	063 7	97912	68110	59812	95448	43244	31262	88880	13040	16458	43813	89416	42482	33939
144	7628 5	75714	89585	99296	52640	46518	55486	90754	88932	19937	57119	23251	55619	23679
145	55322	07589	39600	60866	63007	20007	66819	84164	61131	81429	60676	42807	78286	29015
146	78017	90928	90220	92503	83375	26986	74399	30885	88567	29169	72816	53357	15428	86932
147	44768	43342	20696	26331	43140	69744	82928	24988	94237	46138	77426	39039	55596	12655
148	25100	19336	14605	86603	51680	97678	24261	02464	86563	74812	60069	71674	15478	47642
149	83612	46623	62876	85197	07824	91392	58317	37726	84628	42221	10268	20692	15699	29167
150	41347	81666	82961	60413	71020	83658	02415	33322	66036	98712	46795	16308	28413	05417

Attachment 1 Cont.
Miscellaneous Statistical Tables

A TABLE OF 14,000 RANDOM UNITS

Line/Col.	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
151	38128	51178	75096	13609	16110	73533	42564	59870	29399	67834	91055	89917	51096	89011
152	60950	00455	73254	96067	50717	13878	03216	78274	65863	37011	91283	33914	91303	49326
153	90524	17320	29832	96118	75792	25326	22940	24904	80523	38928	91374	55597	97567	38914
154	49897	18278	67160	39408	97056	43517	84426	59650	20247	19293	02019	14790	02852	05819
155	18494	99209	81060	19488	65596	59787	47939	91225	98768	43688	00438	05548	09443	82897
156	65373	72984	30171	37741	70203	94094	87261	30056	58124	70133	18936	02138	59372	09075
157	40653	12843	04213	70925	95360	55774	76439	61768	52817	81151	52188	31940	54273	49032
158	51638	22238	56344	44587	83231	50317	74541	07719	25472	41602	77318	15145	57515	07633
159	69742	99303	62578	83575	30337	07488	51941	84316	42067	49692	28616	29101	03013	73449
160	58012	74072	67488	74580	47992	69482	58624	17106	47538	13452	22620	24260	40155	74716
161	18348	19855	42887	08279	43206	47077	42637	45606	00011	20662	14642	49984	94509	56380
162	59614	09193	58064	29086	44385	45740	70752	05663	49081	26960	57454	99264	24142	74648
163	75688	28630	39210	52897	62748	72658	98059	67202	72789	01869	13496	14663	87645	89713
164	13941	77802	69101	70061	35460	34576	15412	81304	58757	35498	94830	75521	00603	97701
165	96656	86420	96475	86458	54463	96419	55417	41375	76886	19008	66877	35934	59801	00497
166	03363	82042	15942	14549	38324	87094	19069	67590	11087	68570	22591	65232	85915	91499
167	70366	08390	69155	25496	13240	57407	91407	49160	07379	34444	94567	66035	38918	65708
168	47870	36605	12927	16043	53257	93796	52721	73120	48025	76074	95605	67422	41646	14557
169	79504	77606	22761	30518	28373	73898	30550	76684	77366	32276	04690	61667	64798	66276
170	46967	74841	50923	15339	37755	98995	40162	89561	69199	42257	11647	47603	48779	97907
171	14558	50769	35444	59030	87516	48193	02945	00922	48189	04724	21263	20892	92955	90251
172	12440	25057	01132	38611	28135	68089	10954	10097	54243	06460	50856	65435	79377	53890
173	32293	29938	68653	10497	98919	46587	77701	99119	93165	67788	17638	23097	21468	36992
174	10640	21875	72462	77981	56550	55999	87310	69643	45124	00349	25748	00844	96831	30651
175	47615	23169	39571	56972	20628	21788	51736	33133	72696	32605	41569	76148	91544	21121
176	16948	11128	71624	72754	49084	96303	27830	45817	67867	18062	87453	17226	72904	71474
177	21258	61092	66634	70335	92448	17354	83432	49608	66520	06442	59664	20420	39201	69549
178	15072	48853	15178	30730	47481	48490	41436	25015	49932	20474	53821	51015	79841	32405
179	99154	57412	09858	65671	70655	71479	63520	31357	56968	06729	34465	70685	04184	25250
180	08759	61089	23706	32994	35426	36666	63988	98844	37533	08269	27021	45886	22835	78451
181	67323	57839	61114	62192	47547	58023	64630	34886	98777	75442	95592	06141	45096	73117
182	09255	13986	84834	20764	72206	89393	34548	93438	88730	61805	78955	18952	46436	58740
183	36304	74712	00374	10107	85061	69228	81969	92216	03568	39630	81869	52824	50937	27954
184	15884	67429	86612	47367	10242	44880	12060	44309	46629	55105	66793	93173	00480	13311
185	18745	32031	35303	08134	33925	03044	59929	95418	04917	57596	24878	61733	92834	64454
186	72934	40086	88292	65728	38300	42323	64068	98373	48971	09049	59943	36538	05976	82118
187	17626	02944	20910	57662	80181	38579	24580	90529	52303	50436	29401	57824	86039	81062
188	27117	61399	50967	41399	81636	16663	15634	79717	94696	59240	25543	97989	63306	90946
189	93995	18678	90012	63645	85701	85269	62263	68331	00389	72571	15210	20769	44686	96176
190	67392	89421	09623	80725	62620	84162	87368	29560	00519	84545	08004	24526	41252	14521
191	04910	12261	37566	80016	21245	69377	50420	85658	55263	68667	78770	04533	14513	18099
192	81453	20283	79929	59839	23875	13245	46808	74124	74703	35769	95588	21014	37078	39170
193	19480	75790	48539	23703	15537	48885	02861	86587	74539	65227	90799	58789	96257	02708
194	21456	13162	74608	81011	55512	07481	93551	72189	76261	91206	89941	15132	37738	59284
195	89406	20912	46189	76376	25538	87212	20748	12831	57166	35026	16817	79121	18929	40628
196	09866	07414	55977	16419	01101	69343	13305	94302	80703	57910	36933	57771	42546	03003
197	86541	24681	23421	13521	28000	94917	07423	57523	97234	63951	42876	46829	09781	58160
198	10414	96941	06205	72222	57167	83902	07460	69507	10600	08858	07685	44472	64220	27040
199	49942	06683	41479	58982	56288	42853	92196	20632	62045	78812	35895	51851	83534	10689
200	23995	68882	42291	23374	24299	27024	67460	94783	40937	16961	26053	78749	46704	21983

