1050

PREDESIGN REPORT
OIL AND SOLVENT DUMP SITE
REMEDIAL ACTION PLAN

5/86

Presented to:

DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
Naval Air Station
Jacksonville, Florida

Presented by:

JONES, EDMUNDS & ASSOCIATES, INC.
730 North Waldo Road
Gainesville, Florida 32601

May 1986

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1.0 INTRODUCTION

In April 1979, Geraghty & Miller, Inc. (G&M) was retained by the Department of the Navy, Southern Division, Naval Facilities Engineering Command, to perform an evaluation of oil and solvent contamination of groundwater at the Naval Air Station (NAS) in Jacksonville, Florida. The results of the study were published in a report titled "Contamination of Soil and Groundwater From the Disposal of Oil and Volatile Products into Pits at the NAS, Jacksonville, Florida." This report, prepared by G&M dated May 27, 1980, recommended the construction of a ditch system around the contaminated site to intercept the groundwater flow. Also recommended were provisions for oil collection, separation, and removal within the ditch system.

Fred Wilson & Associates, a consulting engineering firm in Jacksonville, Florida, was retained to prepare the plans and specifications for the recommended ditch system. Plans and specifications were completed, a contractor hired, and the project completed and placed into operation in September 1983.

The United States Environmental Protection Agency (EPA) issued a National Pollution Discharge Elimination System (NPDES) permit effective September 25, 1983, and the Florida Department of Environmental Regulation (DER) issued a permit effective January 16, 1984 for the facility. Both of these permits contained effluent limitations and monitoring requirements which were extremely strict. Although the facility appeared to be successful in containment and collection of the pollutants in the groundwater, the system was unable to meet all of the effluent limitations in the EPA and DER permits. Therefore, the facility was taken out of service in April 1984.

Jones, Edmunds & Associates (JEA) prepared a report in October 1984 which; 1) reviewed previously collected data on system performance, 2) identified alternative processes for modifying the system to meet

EPA and DER requirements, and 3) recommended the processes which should be considered in more detail.

Subsequent to the submission of the 1984 report, two workshop meetings, one with Navy personnel (November 1, 1984) and one with DER (February 5, 1985) were held to review the identified alternatives. Five alternative systems were reviewed for applicability and comparative cost estimates were prepared to aid in evaluating the cost effectiveness of each alternative.

Figures 1.1 through 1.4 and Tables 1.1 through 1.4 present schematic process diagrams for various combinations of the process alternatives discussed and the approximate comparative cost estimates, respectively, for the alternatives which were not selected for further evaluation at this time. Note that in these cost estimates, since the surge basin and oil removal were common elements, that a detailed development of these costs was not performed.

1.1 ALTERNATIVES

Alternatives 1 and 2 are primarily biological treatment methods. Alternative 1 uses spray irrigation and overland flow as a biological basis. Alternative 2 uses a package wastewater plant for biological treatment. Carbon adsorption may be required following Alternative 1 for both discharge to the sewer system or to the ditch. Carbon adsorption probably would not be required following biological treatment with a package plant. Prior to disposal, a study of the produced sludge would be necessary to provide for compliance with appropriate regulations.

Alternative 3 consists of air stripping following surge and sedimentation with activated carbon contactors, polishing the liquid stream from the strippers.

Alternative 4 presents steam stripping as the only treatment process following surge and sedimentation.

Jones Edmunds & Associates, Inc. JEA
730 North Waldo Road/Gainesville, Florida 32601/(904) 377-5821 CONSULTING ENGINEERS AND SCIENTISTS

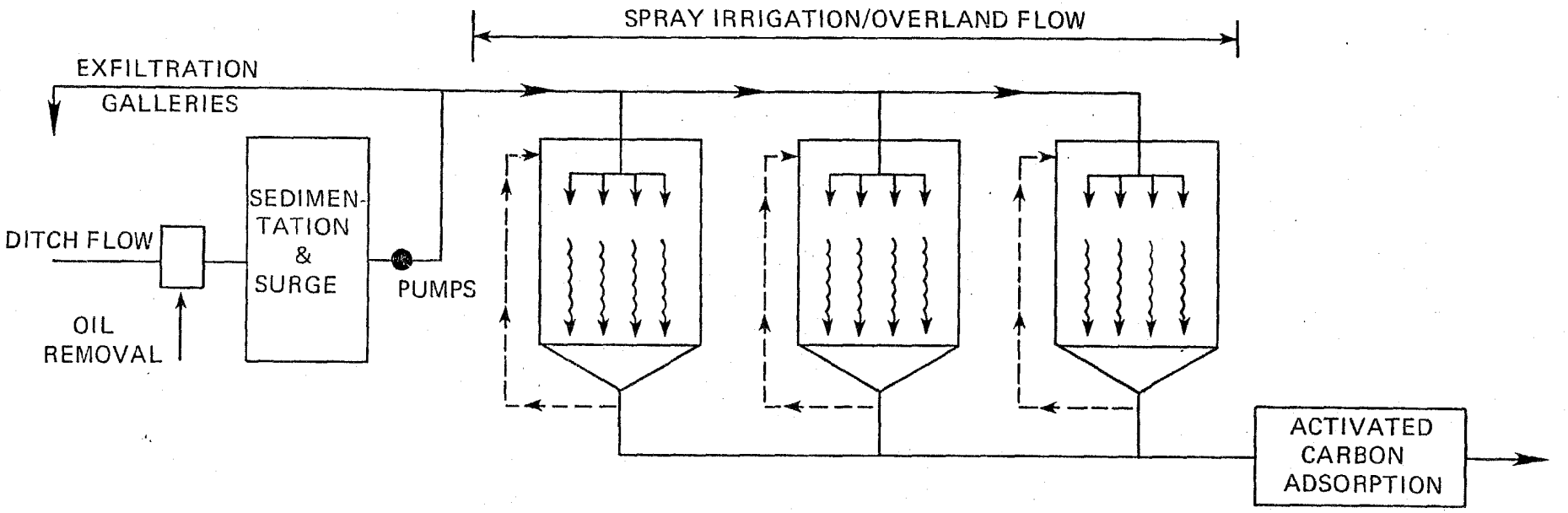

Figure 1.1 Alternative 1

Jones Edmunds & Associates, Inc. JEA
730 North Waldo Road/Gainesville, Florida 32601/(904) 377-5821 CONSULTING ENGINEERS AND SCIENTISTS

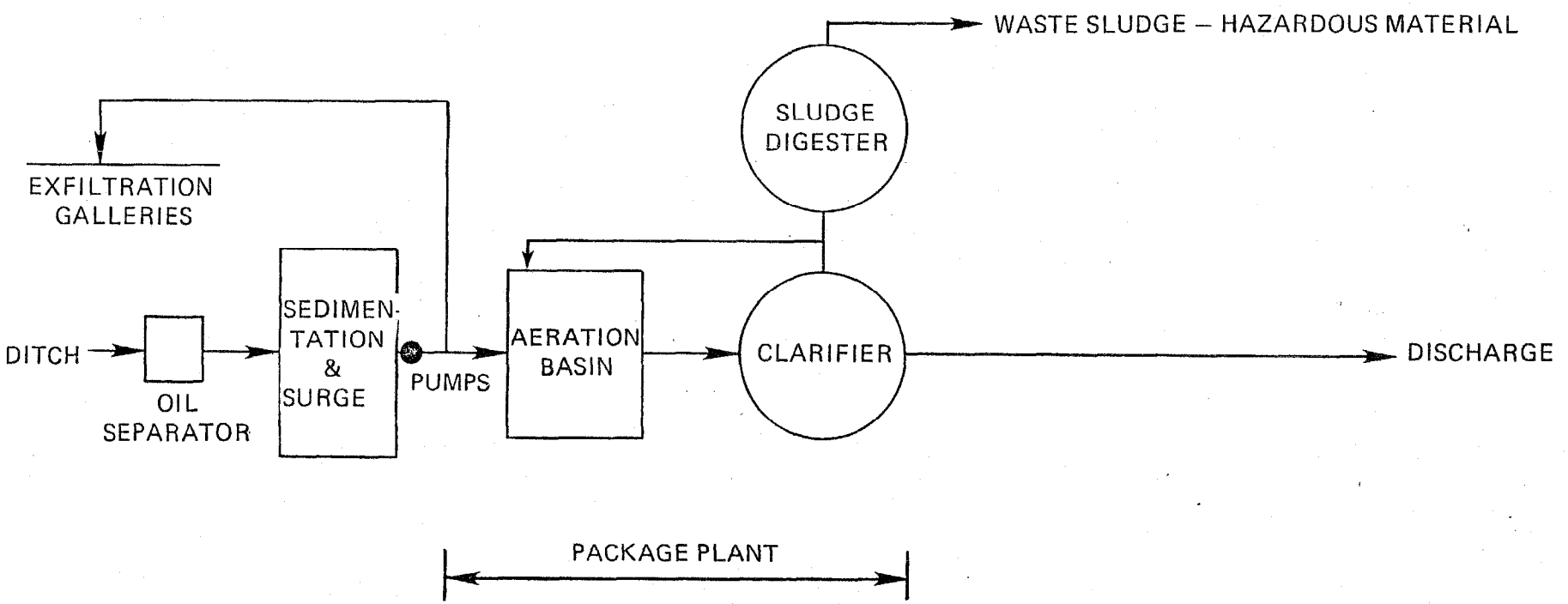

Figure 1.2 Alternative 2

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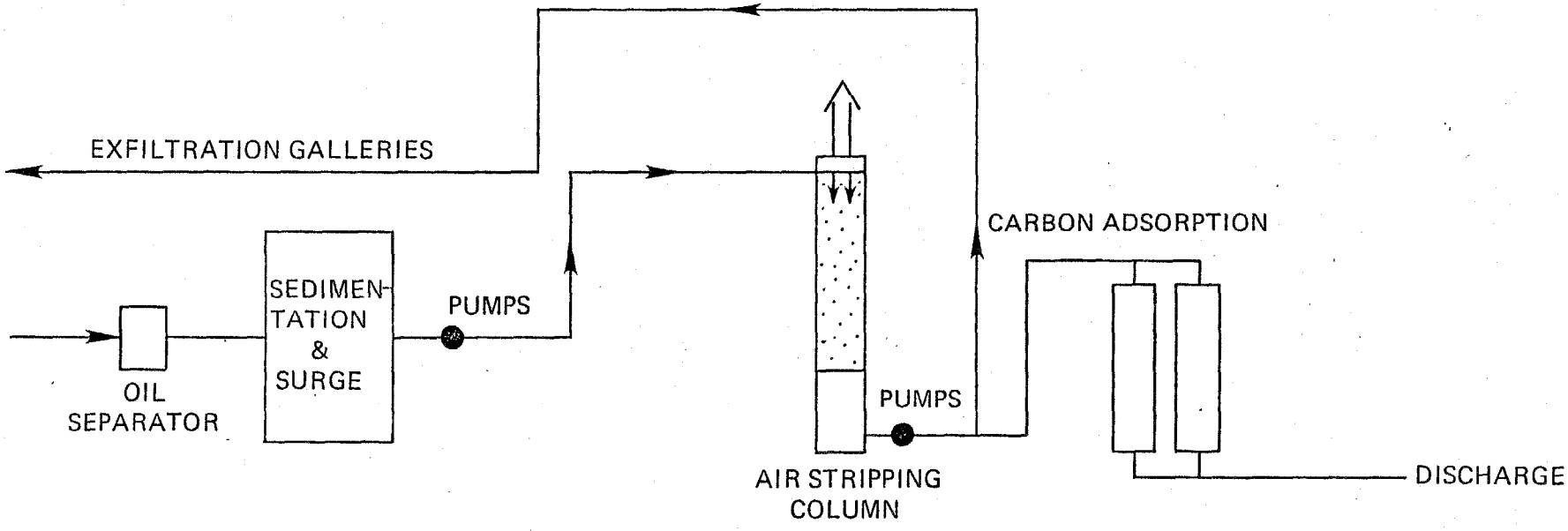

Figure 1.3 Alternative 3

Jones Edmunds & Associates, Inc. JEA
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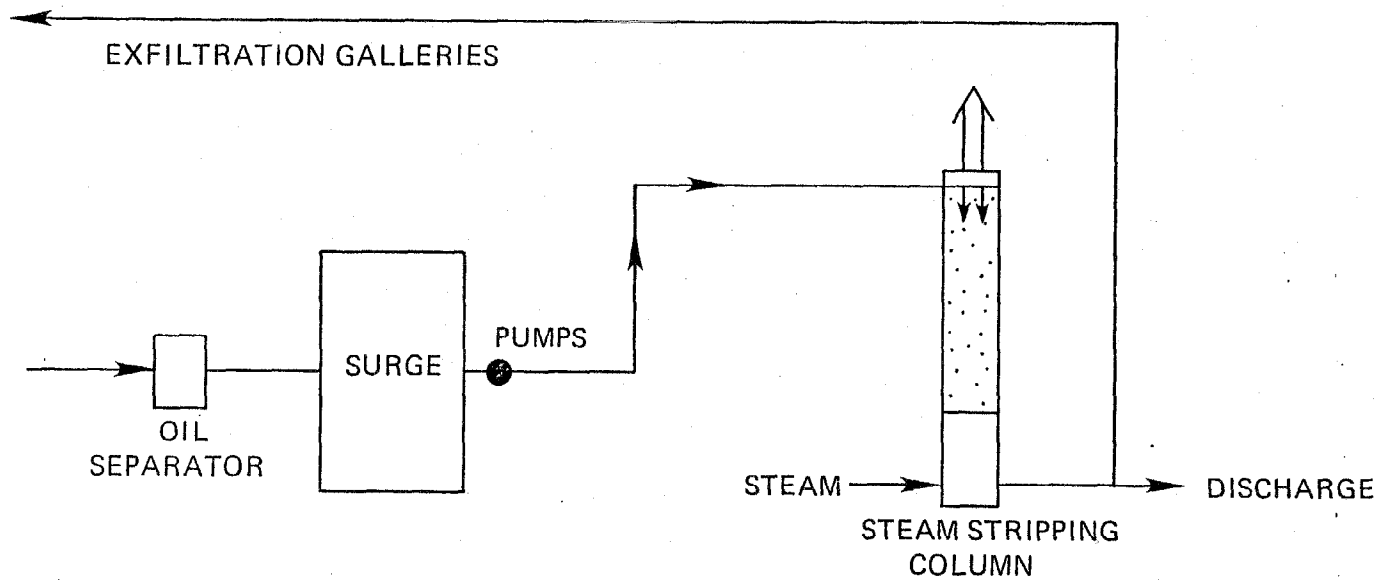

Figure 1.4 Alternative 4

Table 1.1. Conceptual Comparative Cost Projection -- Alternative 1

	Unit	Cost Per Unit	Total Cost
Surge Basin	30,000 cy	3.50/cy	$ 105,000
Oil Separation	---	---	25,000
Spray Site Improvements	400,000 sf	2.00/sf	800,000
Piping and Pumps	---	---	35,000
Carbon Adsorbers	---	---	160,000
	Alternative 1 Total		$1,125,000

Source: JEA, 1984.

Table 1.2. Conceptual Comparative Cost Projection -- Alternative 2

	Unit	Cost Per Unit	Total Cost
Surge Basin	30,000 cy	3.50/cy	$ 105,000
Oil Separation	---	---	25,000
Conventional Package Extended Aeration or Activated Sludge Plant	---	1.50/gpd	108,000
Piping and Pumps	---	---	12,500
	Alternative 2	Total	$ 250,500

Source: JEA, 1984.

Table 1.3. Conceptual Comparative Cost Projection -- Alternative 3

	Unit	Cost Per Unit	Total Cost
Surge Basin	30,000 cy	3.50/cy	$ 105,000
Oil Separation	---	---	25,000
Air Stripping	---	---	35,000
Carbon Contactors	---	---	160,000
Piping and Pumps	---	---	15,500
	Alternative 3	Total	$ 340,500

Source: JEA, 1984.

Table 1.4. Conceptual Comparative Cost Projection -- Alternative 4

	Unit	Cost Per Unit	Total Cost
Surge Basin	30,000 cy	3.50/cy	$ 105,000
Oil Separation	---	---	25,000
Stripping Tower	---	---	37,500
Steam Supply (onsite boiler)	---	---	50,000
Piping and Pumps	---	---	15,500
	Alternative 4	Total	$ 233,500

Source: JEA, 1984.

All cost estimates assume that lining of the surge basin will not be required, since the pond would be located within the confines of the site.

Onsite redistribution of the material excavated from the surge basin to reduce runoff and erosion is also assumed.

1.2 COST PROJECTION

The comparative cost projections indicate that Alternatives 2 and 4 have the lowest capital costs. Comparative operation costs have not been quantified, but would be lowest for Alternative 2. Operating cost for Alternative 4 would be significantly greater than Alternative 2, due to boiler fuel requirements.

1.3 SELECTED ALTERNATIVE

The fifth alternative includes construction of the surge basin to attenuate flow rates with the pumped discharge routed to the base wastewater treatment plant (WWTP) for biological treatment and disposal. The most cost effective treatment following the surge basin would be no additional onsite treatment, with disposal of surge basin effluent directly to surface water or the domestic WWTP. Surface discharge directly following the surge basin is not feasible since the same problems which forced the original system to be shut down would likely recur.

This alternative is a surge basin with enhanced high efficiency oil separation/collection, site improvements to contain stormwater runoff within the site and prevent offsite run on, with discharge from the surge basin to the base domestic WWTP. This report more fully develops the conceptual design criteria for this system and presents a more detailed projection of capital costs and annual operations and maintenance costs.

2.0 DOMESTIC WASTEWATER TREATMENT PLANT

The domestic WWTP is a 3.0 million gallons per day (MGD) biological treatment plant which currently operates at between 2.2 and 2.5 MGD. The hydraulic impact of 50,000 gallons per day (gpd) of site effluent on the plant will be minimal (flow rate developed in previous report). Likewise, a base flow of 50 gallons per minute (gpm) to the gravity sanitary sewer collection system should not cause a problem. Currently, the lift station serving the area has a firm capacity of 280 gpm. In order to handle the new flow, the pumps will need to run an additional 3 hours per day over current conditions. This is not expected to be a problem.

The major concern with the selected alternative is the ability of the WWTP to effectively treat and remove the organic components of the seepage water. Table 2.1 presents a summary of the quality data collected in the ditch effluent when the system was operating. Appendices A and B present analyses of influent and effluent, respectively, at the domestic WWTP (December 5, 1984). The plant influent showed substantial concentrations of VOCs and extractable compounds, while the effluent showed only a trace of VOCs and no other organic compounds.

The primary treatment mechanism within the WWTP for VOC removal is aeration. Biological treatment and organic carbon also contributed to overall removal. The additional flow may impact the quantity of organic compounds in the waste sludge; therefore, routine monitoring of sludge quality may be necessary.

Table 2.1 Summary of Chemical Data at NPDES Point (Ditch System)

Parameter	Limits*	Range	% Violations
pH	6.0 - 8.5 (units)	6.8 - 7.3	0
COD	125	18 - 120	0
Oil and Grease	5/15	1 - 11	30% (DER)
TSS	30	10 - 52	6%
PCB	0.001/0.065 (ppb)	0.035 - 0.361	75% (EPA), 100% (DER)
Arsenic	0.05 (ppb)	<0.005 - 0.011	0
Cadmium	0.8	<0.005 - <0.008	0
Chromium	0.5/1.0	<0.01 - <0.1	0
Mercury	0.2	<0.0001 - 0.001	0
Lead	0.03	<0.03 - <0.08	25%
Ethyl acetate	0.1	1.0 - 87.4	0
Methyl isobutyl-ketone	0.1	1.0 - 16.6	0
Methylene chloride	0.005	5.0 - 460	87.5%
Methylethyl ketone	0.1	20.8 - 311	50%
N-butyl acetate	0.1	4.9 - 171	25%
Trichloro-ethylene	0.005	1.7 - 134	50%
Total xylenes	0.005	<1.0 - 24	25%

* All analyses in mg/l unless otherwise noted.

3.0 REMEDIAL ACTION PLAN

The recommended remedial action plan for the solvent and oil dump site includes:

- Construction of an excavated surge basin with a working storage volume of 2.5 million gallons with 2 feet minimum free board and 2 feet of dead storage. The surge basin will be equipped with emergency overflow. A potential location and conceptual layout of the basin is shown in Figure 3.1. Final design may result in modification to the geometry as shown. The final basin may need to be deeper depending on the results of a soils and geohydrologic study of the proposed basin construction.

- Re-route drain pipes from the ditches upstream of the surge basin to a high efficiency oil-water separator. The design flow for this unit would be determined during final design and will be a function of stormwater runoff characteristics of the final system. Flow from the separators to the surge basin will be by gravity. The cost estimate is based on a peak flow approximation of 300 gpm.

- Install a duplex submersible pump station to pump the surge basin effluent at a rate of 50 gpm to the nearest gravity sanitary sewer manhole. Pump motors would necessarily be explosion proof. The pumps would operate off of level controls in the surge basin coupled with level devices located in the pump station sump. The controller would have an alarm light to alert the operator of an abnormal condition.

- Regrade the dump site inside the existing ditches to retain all runoff from a 10-year storm, prevent erosion damage, and mitigate existing erosion damage. Outside the ditches, regrading to prevent offsite run on will be required. In order

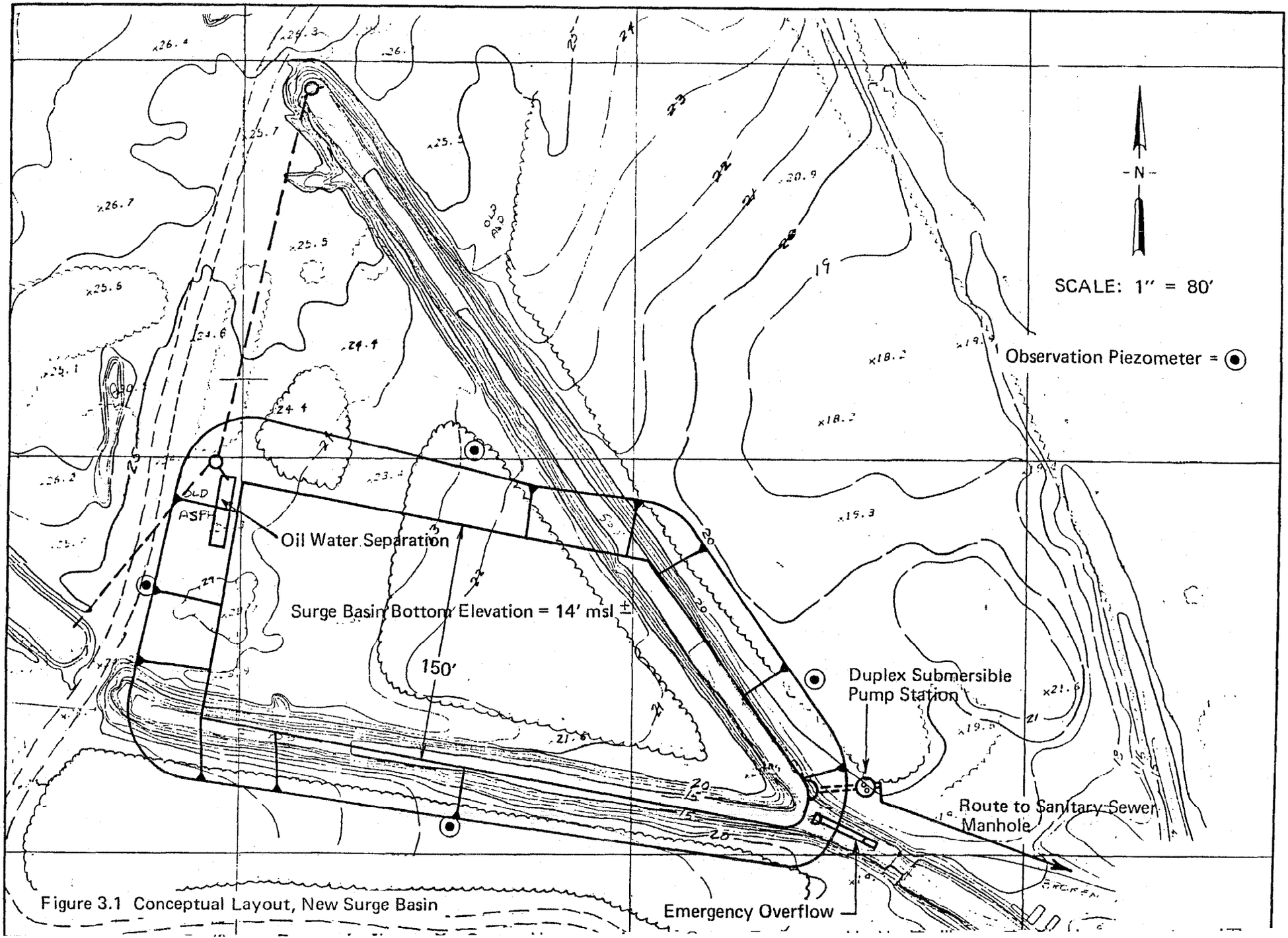

Figure 3.1 Conceptual Layout, New Surge Basin

to effect better ditch slope maintenance, all ditch slopes shall be regraded to a slope of 4:1, and regrassed or sodded. Material excavated for the surge basin and resloping will be used in site regrading.

- Install four piezometers around the surge basin to observe water table elevations as located in Figure 3.1.

- Monitor the quality of effluent being pumped to the WWTP and the WWTP effluent on a frequent bases during system startup and operation for parameters agreed upon with DER.

- Develop a health and safety plan for the Contractor to follow. It is suspected that the plan will call for organic vapor monitoring and level C personnel protection when working in oil contaiminated areas.

- Develop a site closure plan.

- Perform risk assessment to determine an acceptable level of clean up at the site based upon: migration pathways, potential receptors, potential health impacts, and available technology to further reduce concentration levels.

Estimates of capital and operating costs are presented in Appendix C.

APPENDIX A

Enviropact of Jacksonville, Inc.
Environmental Consulting and Analysis

1627 East 8 Street
Jacksonville, Florida 32206
Telephone: (904) 354-8755
Fla. Watts: (800) 432-9706

Client: Mr. William Roche
Environmental Division
Box 5
Code 184
Naval Air Station
Jacksonville, FL 32212-5000

January 9, 1984

Report # J 4319
Lab I.D. # 82223

Sample Received: 12/5/84 Collected by: Your Rep.
Sample Designation: # 5524. 84-12-02 (INFLUENT).

REPORT OF ANALYSIS

Aldrin	< 0.05	ug/l
Alpha-BHC	< 0.05	ug/l
Beta-BHC	< 0.05	ug/l
Delta-BHC	< 0.05	ug/l
Gamma-BHC	< 0.05	ug/l
Chlordane	< 0.1	ug/l
4,4'-DDD	< 0.1	ug/l
4,4'-DDE	< 0.05	ug/l
4,4'-DDT	< 0.1	ug/l
Dieldrin	< 0.05	ug/l
Endosulfan I	< 0.05	ug/l
Endosulfan II	< 0.1	ug/l
Endosulfan Sulfate	< 0.1	ug/l
Endrin	< 0.05	ug/l
Endrin Aldehyde	< 0.1	ug/l
Heptachlor	< 0.05	ug/l
Heptachlor Epoxide	< 0.1	ug/l
Toxaphene	< 1	ug/l
PCB-1016	< 0.5	ug/l
PCB-1221	< 0.5	ug/l
PCB-1232	< 0.5	ug/l
PCB-1242	< 0.5	ug/l
PCB-1248	< 0.5	ug/l
PCB-1254	< 0.5	ug/l
PCB-1260	< 0.5	ug/l

Analysis made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Radford S. Murphy

Radford S. Murphy
Laboratory Director

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Jacksonville, FL 32212-5000

January 9, 1985

Report # J 4319
Lab I.D. # 82223

Sample Received: 12/5/84 Collected by: Your Rep.
Sample Designation: # 5523. 84-12-01 (INFLUENT).

REPORT OF ANALYSIS

Aluminum	0.20	mg/l
Antimony	< 0.01	mg/l
Arsenic	< 0.005	mg/l
Barium	0.09	mg/l
Berillium	< 0.005	mg/l
Cadmium	0.26	mg/l
Chromium	0.73	mg/l
Copper	0.06	mg/l
Iron	1.6	mg/l
Lead	0.03	mg/l
Magnesium	21	mg/l
Manganese	0.05	mg/l
Mercury	< 0.5	ug/l
Molybdenum	< 0.01	mg/l
Nickel	0.04	mg/l
Selenium	< 0.005	mg/l
Silver	< 0.01	mg/l
Thallium	< 0.01	mg/l
Tin	< 0.5	mg/l
Titanium	< 0.01	mg/l
Zinc	0.08	mg/l
Cyanide	< 0.01	mg/l
Total Phenol	3.4	mg/l
Nitrate, as N	0.40	mg/l
Fluoride	1.10	mg/l
Color	120	UNITS
MBAS	0.26	mg/l
Sulfate	63	mg/l
Total Organic Nitrogen	12.8	mg/l
Total Organic Carbon	61	mg/l as C
Ammonia, as N	6.00	mg/l
Phosphorus, Total as P	3.08	mg/l

Client: NAVAL AIR STATION
Report # J4319 (INFLUENT)
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report of analysis continued...

VOLATILE COMPOUNDS

Acrolein	< 10	ug/l
Acrylonitrile	< 10	ug/l
Benzene	< 10	ug/l
Bis(Chloromethyl) ether	< 10	ug/l
Bromodichloromethane	< 10	ug/l
Bromoform	< 10	ug/l
Bromomethane	< 10	ug/l
Carbon Tetrachloride	< 10	ug/l
Chlorobenzene	< 10	ug/l
Chloroethane	< 10	ug/l
2-Chloroethylvinyl ether	< 10	ug/l
Chloroform	< 10	ug/l
Chloromethane	< 10	ug/l
Dibromochloromethane	< 10	ug/l
Dichlorodifluoromethane	< 10	ug/l
1,1-Dichloroethane	< 10	ug/l
1,2-Dichloroethane	< 10	ug/l
1,1-Dichloroethene	< 10	ug/l
1,2-Dichloropropane	< 10	ug/l
Ethyl Benzene	< 10	ug/l
Methylene Chloride	8,683	ug/l
Tetrachloroethene	< 10	ug/l
Trans-1,2-Dichloroethene	< 10	ug/l
1,1,1-Trichloroethane	353	ug/l
1,1,2-Trichloroethane	< 10	ug/l
Trichloroethene	37.7	ug/l
Trichlorofluoromethane	< 10	ug/l
Toluene	74.7	ug/l
Vinyl Chloride	< 10	ug/l
1,2-Dichloropropene	< 10	ug/l
1,1,2,2-Tetrachloroethane	< 10	ug/l

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Report # J4319 (INFLUENT)
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report of analysis continued...

BASE NEUTRAL EXTRACTABLES

Acenaphthene	< 10	ug/l
Acenaphthylene	< 10	ug/l
Anthracene	65.0	ug/l
Benzo(a)anthracene	< 10	ug/l
Benzo(b)fluoroanthene	< 10	ug/l
Benzo(k)fluoroanthene	< 10	ug/l
Benzo(a)pyrene	< 10	ug/l
Diethylphthalate	< 10	ug/l
Dimethylphthalate	< 10	ug/l
2,4-Dinitrotoluene	< 10	ug/l
2,6-Dinitrotoluene	< 10	ug/l
Dioctylphthalate	< 10	ug/l
1,2-Diphenylhydrazine	< 10	ug/l
Fluoranthene	< 10	ug/l
Benzo(g,h,i)perylene	< 25	ug/l
Benzidene	< 10	ug/l
Bis(2-Chloroethyl)ether	< 10	ug/l
Bis(2-Chloroethoxy)methane	< 10	ug/l
Bis(2-Ethylhexyl)phthalate	< 10	ug/l
Bis(2-Chloroisopropyl)ether	< 10	ug/l
4-Bromophenyl ether	< 10	ug/l
Butyl benzyl phthalate	< 10	ug/l
2-Chloronaphthalene	< 10	ug/l
4-Chlorophenyl ether	< 10	ug/l
Chrysene	< 10	ug/l
Dibenzo(a,h)anthracene	< 25	ug/l
Di-n-butylphthalate	< 10	ug/l
1,3-Dichlorobenzene	< 10	ug/l
1,4-Dichlorobenzene	< 10	ug/l
1,2-Dichlorobenzene	< 10	ug/l
3,3'-Dichlorobenzidine	< 10	ug/l
Fluorene	22.5	ug/l
Hexachlorobenzene	< 10	ug/l
Hexachlorobutadiene	< 10	ug/l
Hexachloroethane	< 10	ug/l
Hexachlorocyclopentadiene	< 10	ug/l
Indeno(1,2,3-cd)pyrene	< 25	ug/l

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Report # J4319 (INFLUENT)
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report of analysis continued....

BASE NEUTRAL EXTRACTABLES(continued)

Isophorone	< 10	ug/l
Naphthalene	42.7	ug/l
Nitrobenzene	< 10	ug/l
N-Nitrosodimethylamine	< 10	ug/l
N-Nitrosodi-n-propylamine	< 10	ug/l
N-Nitrosodipheny lamine	< 10	ug/l
Phenanthrene	< 10	ug/l
Pyrene	15.0	ug/l
1,2,4-Trichlorobenzene	< 10	ug/l

PESTICIDES

Aldrin	< 0.05	ug/l
a-BHC	< 0.05	ug/l
b-BHC	< 0.05	ug/l
g-BHC	< 0.05	ug/l
d-BHC	< 0.05	ug/l
Chlordane	< 0.1	ug/l
4,4'-DDD	< 0.05	ug/l
4,4'-DDE	< 0.05	ug/l
4,4'-DDT	< 0.05	ug/l
Dieldrin	< 0.05	ug/l
Endosulfan I	< 0.05	ug/l
Endosulfan II	< 0.05	ug/l
Endosulfan Sulfate	< 0.1	ug/l
Endrin	< 0.1	ug/l
Endrin Aldehyde	< 0.05	ug/l
Heptachlor	< 0.05	ug/l
Heptachlor Epoxide	< 0.1	ug/l
Toxaphene	< 1	ug/l
PCB-1016	< 0.5	ug/l
PCB-1221	< 0.5	ug/l
PCB-1232	< 0.5	ug/l
PCB-1242	< 0.5	ug/l
PCB-1248	< 0.5	ug/l
PCB-1254	< 0.5	ug/l
PCB-1260	< 0.5	ug/l

Enviropact
of Jacksonville, Inc.
Environmental Consulting and Analysis

Client: NAVAL AIR STATION
Report # J4319 (INFLUENT)
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report of analysis continued...

ACID EXTRACTABLES

2-Chlorophenol	87.3	ug/l
2,4-Dichlorophenol	930	ug/l
2,4-Dimethylphenol	< 5	ug/l
2,4-Dinitrophenol	< 15	ug/l
2-Methyl-4,6-Dinitrophenol	< 20	ug/l
2-Nitrophenol	30.2	ug/l
4-Nitrophenol	< 5	ug/l
Pentachlorophenol	< 10	ug/l
Phenol	34.6	ug/l
2,4,6-Trichlorophenol	< 5	ug/l

Analysis made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Radford S. Murphy

Radford S. Murphy
Laboratory Director

APPENDIX B

Appendix B

Enviropact of Jacksonville, Inc.
Environmental Consulting and Analysis

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Client: Mr. William Roche
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Code 184
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Jacksonville, FL 32212-5000

January 9, 1984

Report # J 4319A
Lab I.D. # 82223

Sample Received: 12/5/84 Collected by: Your Rep.
Sample Designation: # 5526. 84-12-04 (EFFLUENT).
sampled before it goes into the pond.

REPORT OF ANALYSIS

Aldrin	< 0.05	ug/l
Alpha-BHC	< 0.05	ug/l
Beta-BHC	< 0.05	ug/l
Delta-BHC	< 0.05	ug/l
Gamma-BHC	< 0.05	ug/l
Chlordane	< 0.1	ug/l
4,4'-DDD	< 0.1	ug/l
4,4'-DDE	< 0.05	ug/l
4,4'-DDT	< 0.1	ug/l
Dieldrin	< 0.05	ug/l
Endosulfan I	< 0.05	ug/l
Endosulfan II	< 0.1	ug/l
Endosulfan Sulfate	< 0.1	ug/l
Endrin	< 0.05	ug/l
Endrin Aldehyde	< 0.1	ug/l
Heptachlor	< 0.05	ug/l
Heptachlor Epoxide	< 0.1	ug/l
Toxaphene	< 1	ug/l
PCB-1016	< 0.5	ug/l
PCB-1221	< 0.5	ug/l
PCB-1232	< 0.5	ug/l
PCB-1242	< 0.5	ug/l
PCB-1248	< 0.5	ug/l
PCB-1254	< 0.5	ug/l
PCB-1260	< 0.5	ug/l

Analysis made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Radford S. Murphy

Radford S. Murphy
Laboratory Director

Envirapact
of Jacksonville, Inc.
Environmental Consulting and Analysis

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Jacksonville, Florida 32206
Telephone: (904) 354-6755
Fla. Watts: (800) 432-9706

Client: Mr. William Roche
Environmental Division
Box 5
Code 184
Naval Air Station
Jacksonville, FL 32212-5000

January 9, 1985

Report # J 4319A
Lab I.D. # 82223

Sample Received: 12/5/84 Collected by: Your Rep.
Sample Designation: # 5525. 84-12-03 (EFFLUENT).

REPORT OF ANALYSIS

Aluminum	< 0.05	mg/l
Antimony	< 0.01	mg/l
Arsenic	< 0.005	mg/l
Barium	< 0.05	mg/l
Beryllium	< 0.005	mg/l
Cadmium	< 0.005	mg/l
Chromium	0.03	mg/l
Copper	< 0.01	mg/l
Iron	0.19	mg/l
Lead	< 0.01	mg/l
Magnesium	19	mg/l
Manganese	0.03	mg/l
Mercury	< 0.5	ug/l
Molybdenum	< 0.01	mg/l
Nickel	0.04	mg/l
Selenium	< 0.005	mg/l
Silver	< 0.01	mg/l
Thallium	< 0.01	mg/l
Tin	< 0.5	mg/l
Titanium	< 0.01	mg/l
Zinc	< 0.01	mg/l
Cyanide	< 0.01	mg/l
Total Phenol	< 0.001	mg/l
Nitrate, as N	1.68	mg/l
Fluoride	0.90	mg/l
Color	30	UNITS
MBAS	0.16	mg/l
Sulfate	87	mg/l
Total Organic Nitrogen	11.6	mg/l
Total Organic Carbon	20	mg/l as C
Ammonia, as N	0.58	mg/l
Phosphorus, Total as P	1.98	mg/l

Client: NAVAL AIR STATION
Report # J4319A (EFFLUENT)
Pg. 2

report of analysis continued...

VOLATILE COMPOUNDS

Acrolein	< 10	ug/l
Acrylonitrile	< 10	ug/l
Benzene	< 1	ug/l
Bis(Chloromethyl) ether	< 1	ug/l
Bromodichloromethane	< 1	ug/l
Bromoform	< 1	ug/l
Bromomethane	< 1	ug/l
Carbon Tetrachloride	< 1	ug/l
Chlorobenzene	< 1	ug/l
Chloroethane	< 1	ug/l
2-Chloroethylvinyl ether	< 1	ug/l
Chloroform	< 1	ug/l
Chloromethane	< 1	ug/l
Dibromochloromethane	< 1	ug/l
Dichlorodifluoromethane	< 1	ug/l
1,1-Dichloroethane	< 1	ug/l
1,2-Dichloroethane	< 1	ug/l
1,1-Dichloroethene	< 1	ug/l
1,2-Dichloropropane	< 1	ug/l
Ethyl Benzene	< 1	ug/l
Methylene Chloride	< 1	ug/l
Tetrachloroethene	< 1	ug/l
Trans-1,2-Dichloroethene	< 1	ug/l
1,1,1-Trichloroethane	51.4	ug/l
1,1,2-Trichloroethane	< 1	ug/l
Trichloroethene	< 1	ug/l
Trichlorofluoromethane	< 1	ug/l
Toluene	< 1	ug/l
Vinyl Chloride	< 1	ug/l
1,2-Dichloropropene	< 1	ug/l
1,1,2,2-Tetrachloroethane	< 1	ug/l

Client: NAVAL AIR STATION
Report # J4319A (EFFLUENT)
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report of analysis continued...

BASE NEUTRAL EXTRACTABLES

Acenaphthene	< 10	ug/l
Acenaphthylene	< 10	ug/l
Anthracene	< 10	ug/l
Benzo(a)anthracene	< 10	ug/l
Benzo(b)fluoroanthene	< 10	ug/l
Benzo(k)fluoroanthene	< 10	ug/l
Benzo(a)pyrene	< 10	ug/l
Diethylphthalate	< 10	ug/l
Dimethylphthalate	< 10	ug/l
2,4-Dinitrotoluene	< 10	ug/l
2,6-Dinitrotoluene	< 10	ug/l
Dioctylphthalate	< 10	ug/l
1,2-Diphenylhydrazine	< 10	ug/l
Fluoranthene	< 10	ug/l
Benzo(g,h,i)perylene	< 25	ug/l
Benzidene	< 10	ug/l
Bis(2-Chloroethyl)ether	< 10	ug/l
Bis(2-Chloroethoxy)methane	< 10	ug/l
Bis(2-Ethylhexyl)phthalate	< 10	ug/l
Bis(2-Chloroisopropyl)ether	< 10	ug/l
4-Bromophenyl ether	< 10	ug/l
Butyl benzyl phthalate	< 10	ug/l
2-Chloronaphthalene	< 10	ug/l
4-Chlorophenyl ether	< 10	ug/l
Chrysene	< 10	ug/l
Dibenzo(a,h)anthracene	< 25	ug/l
Di-n-butylphthalate	< 10	ug/l
1,3-Dichlorobenzene	< 10	ug/l
1,4-Dichlorobenzene	< 10	ug/l
1,2-Dichlorobenzene	< 10	ug/l
3,3'-Dichlorobenzidine	< 10	ug/l
Fluorene	< 10	ug/l
Hexachlorobenzene	< 10	ug/l
Hexachlorobutadiene	< 10	ug/l
Hexachloroethane	< 10	ug/l
Hexachlorocyclopentadiene	< 10	ug/l
Indeno(1,2,3-cd)pyrene	< 25	ug/l

Client: NAVAL AIR STATION
Report # J4319A (EFFLUENT)
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report of analysis continued....

BASE NEUTRAL EXTRACTABLES(continued)

Isophorone	< 10	ug/l
Naphthalene	< 10	ug/l
Nitrobenzene	< 10	ug/l
N-Nitrosodimethylamine	< 10	ug/l
N-Nitrosodi-n-propylamine	< 10	ug/l
N-Nitrosodiphenylamine	< 10	ug/l
Phenanthrene	< 10	ug/l
Pyrene	< 10	ug/l
1,2,4-Trichlorobenzene	< 10	ug/l

PESTICIDES

Aldrin	< 0.05	ug/l
a-BHC	< 0.05	ug/l
b-BHC	< 0.05	ug/l
g-BHC	< 0.05	ug/l
d-BHC	< 0.05	ug/l
Chlordane	< 0.1	ug/l
4,4'-DDD	< 0.05	ug/l
4,4'-DDE	< 0.05	ug/l
4,4'-DDT	< 0.05	ug/l
Dieldrin	< 0.05	ug/l
Endosulfan I	< 0.05	ug/l
Endosulfan II	< 0.05	ug/l
Endosulfan Sulfate	< 0.1	ug/l
Endrin	< 0.1	ug/l
Endrin Aldehyde	< 0.05	ug/l
Heptachlor	< 0.05	ug/l
Heptachlor Epoxide	< 0.1	ug/l
Toxaphene	< 1	ug/l
PCB-1016	< 0.5	ug/l
PCB-1221	< 0.5	ug/l
PCB-1232	< 0.5	ug/l
PCB-1242	< 0.5	ug/l
PCB-1248	< 0.5	ug/l
PCB-1254	< 0.5	ug/l
PCB-1260	< 0.5	ug/l

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Environmental Consulting and Analysis

Client: NAVAL AIR STATION
Report # J4319A (EFFLUENT)
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report of analysis continued...

ACID EXTRACTABLES

2-Chlorophenol	< 5	ug/l
2,4-Dichlorophenol	< 5	ug/l
2,4-Dimethylphenol	< 5	ug/l
2,4-Dinitrophenol	< 15	ug/l
2-Methyl-4,6-Dinitrophenol	< 20	ug/l
2-Nitrophenol	< 5	ug/l
4-Nitrophenol	< 5	ug/l
Pentachlorophenol	< 10	ug/l
Phenol	< 5	ug/l
2,4,6-Trichlorophenol	< 5	ug/l

Analysis made in accordance with E.P.A., A.S.T.M., Standard Methods or other approved methods.

Respectfully submitted,

Radford S. Murphy

Radford S. Murphy
Laboratory Director

APPENDIX C

NAVFAC 1013/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED

SHEET 1 OF 6

ACTIVITY AND LOCATION: NAS Jacksonville--Solvent and Oil Dump Site

PROJECT TITLE: Remedial Action Plan--Solvent and Oil Dump Site

CONSTRUCTION CONTRACT NO

ESTIMATED BY

IDENTIFICATION NUMBER

CATEGORY CODE NUMBER

SUB ORDER NUMBER

STATUS OF DESIGN: ☐ PED ☐ 30% ☐ 100% ☐ FINAL ☒ Other (Specify) Preliminary Concept

ITEM DESCRIPTION	QUANTITY		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
Subtotal Construction Costs (Rounded)								
Earthwork								$258,000
Influent and Oil Separation								60,000
Outlet & Pump Station								56,250
								$374,250
Contingency @ 15%								56,200
								$430,450
Annual Estimated (Preliminary) O&M Costs,								
Excluding Disposal of Recovered Oil								$ 65,600

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S/N 0105-LF-010-1375

NAVFAC 1910/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED

ACTIVITY AND LOCATION: NAS Jacksonville--Solvent and Oil Dump Site

CONSTRUCTION CONTRACT NO

IDENTIFICATION NUMBER

ESTIMATED BY

CATEGORY CODE NUMBER

PROJECT TITLE: Remedial Action Plan--Solvent and Oil Dump Site

STATUS OF DESIGN: ☐ PED ☐ 30% ☐ 100% ☐ FINAL ☒ Other (Specify) Preliminary Concept

JOB ORDER NUMBER

ITEM DESCRIPTION	QUANTITY NUMBER	QUANTITY UNIT	MATERIAL COST UNIT COST	MATERIAL COST TOTAL	LABOR COST UNIT COST	LABOR COST TOTAL	ENGINEERING ESTIMATE UNIT COST	ENGINEERING ESTIMATE TOTAL
Surge Basin								
1) Excavation	25000	IPCY					2.75	68,750
2) Spread on Dump Site as Part of Site								
Regrading	25000	IPCY					2.25	56,250
3) Regrade Ditch Slopes to 4H:IV								
5300 LF @ 3.6 CY per LF	19000	CY					3.75	71,250
4) Additional Site Regrading to Maintain								
Runoff on Site - 10,600 LF x avg. 50 ft	530,000	SF					0.05	26,500
5) Seeding & Mulching								
5300 ft x 64 ft = 339,200 SF								
+ 10,600 ft x 50 ft = 530,000 SF	869,200	SF					0.03	26,100
6) Concrete Erosion Control "Letdowns"								
Assume total of 10 required	10	ea					500.00	5,000
7) 30-foot deep Observation Piezometers	4	ea					1000.00	4,000
SUBTOTAL								$257,850

S/N 0105-LF-010-1375

NAVFAC 13013/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED

SHEET 3 OF 6

ACTIVITY AND LOCATION: NAS Jacksonville--Solvent and Oil Dump Site

PROJECT TITLE: Remedial Action Plan--Solvent and Oil Dump Site

CONSTRUCTION CONTRACT NO

IDENTIFICATION NUMBER

ESTIMATED BY

CATEGORY CODE NUMBER

STATUS OF DESIGN: ☐ PED ☐ 30% ☐ 100% ☐ FINAL ☒ Other (Specify) Preliminary Concept

JOB ORDER NUMBER

ITEM DESCRIPTION	QUANTITY NUMBER	QUANTITY UNIT	MATERIAL COST UNIT COST	MATERIAL COST TOTAL	LABOR COST UNIT COST	LABOR COST TOTAL	ENGINEERING ESTIMATE UNIT COST	ENGINEERING ESTIMATE TOTAL
Surge Basin Influent								
1) Storm H_2O Pipe Manholes	3	ea					2500.00	7,500
2) Influent Screen - Inclined Screen	2	ea					2000.00	4,000
3) 15"ϕ RCP	400	LF					30.00	12,000
4) Oil-Water Separator								
Estimated Design Capacity = 300gpm								
Concrete	120	CY					225.00	27,000
Excavation	300	CY					6.50	1,950
Accessories (Oil Skimmer)	1	LS					7500.00	7,500
Pump								
Tank (1000 gallon)								
SUBTOTAL								$59,950

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S/N 0105-LF-010-1795

NAVFAC 11013/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED

SHEET 4 OF 6

ACTIVITY AND LOCATION: NAS Jacksonville--Solvent and Oil Dump Site

PROJECT TITLE: Remedial Action Plan--Solvent and Oil Dump Site

CONSTRUCTION CONTRACT NO

IDENTIFICATION NUMBER

ESTIMATED BY

CATEGORY CODE NUMBER

STATUS OF DESIGN: ☐ PED ☐ 30% ☐ 100% ☐ FINAL ☒ Other (Specify) Preliminary Concept

JOB ORDER NUMBER

ITEM DESCRIPTION	QUANTITY NUMBER	QUANTITY UNIT	MATERIAL COST UNIT COST	MATERIAL COST TOTAL	LABOR COST UNIT COST	LABOR COST TOTAL	ENGINEERING ESTIMATE UNIT COST	ENGINEERING ESTIMATE TOTAL
Basin Outlet								
Baffle	300	SF					5.00	1,500
Outlet Pipe	50	LF					25.00	1,250
Effluent Pump Station	1	LS					20,000.00	20,000
Overflow Structure (Concrete)	20	CY					100.00	2,000
4"ϕ Force Main to Nearest Domestic								
Sewer Manhole	1500	LF					15.00	22,500
Pavement Restoration	6000	SF					1.50	9,000
SUBTOTAL								$56,250

S/N 0105-LF-010-1375

NAVFAC 10012/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED

SHEET 5 OF 6

ACTIVITY AND LOCATION: NAS Jacksonville--Solvent and Oil Dump Site

PROJECT TITLE: Remedial Action Plan--Solvent and Oil Dump Site

CONSTRUCTION CONTRACT NO

IDENTIFICATION NUMBER

ESTIMATED BY

CATEGORY CODE NUMBER

STATUS OF DESIGN: ☐ PED ☐ 30% ☐ 100% ☐ FINAL ☒ Other (Specify) Preliminary Concepts

JOB ORDER NUMBER

ITEM DESCRIPTION	QUANTITY NUMBER	QUANTITY UNIT	MATERIAL COST UNIT COST	MATERIAL COST TOTAL	LABOR COST UNIT COST	LABOR COST TOTAL	ENGINEERING ESTIMATE UNIT COST	ENGINEERING ESTIMATE TOTAL
Operation and Maintenance Costs								
1) Site Operator							20,000.00	20,000
2) Mowing - 4 Times/Year								
at $1,500.00/Mowing	4	ea					1,500.00	6,000
3) Pumping Costs								
5 hp x 365 days x 24 hr/day =	33000	Kwhr					0.07	2,300
43,800 hp-hr = 32,600 Kwhr								
4) Oil Removal and Offsite Disposal								(Unknown)
(Unknown)								
5) Miscellaneous Site Earthwork								6,000
Maintenance								
6) Additional Treatment Cost	26.3×10^6	Gal					10¢/1000 gal	2,700
								———
SUBTOTAL O&M								$37,000+

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S/N 0105-LF-010-1775

NAVFAC 11013/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED

SHEET 6 OF 6

ACTIVITY AND LOCATION

NAS Jacksonville--Solvent and Oil Dump Site

PROJECT TITLE

Remedial Action Plan--Solvent and Oil Dump Site

CONSTRUCTION CONTRACT NO

IDENTIFICATION NUMBER

ESTIMATED BY

CATEGORY CODE NUMBER

STATUS OF DESIGN ☐ PED ☐ 30% ☐ 100% ☐ FINAL ☒ Other (Specify) Preliminary Concept

JOB ORDER NUMBER

ITEM DESCRIPTION	QUANTITY NUMBER	QUANTITY UNIT	MATERIAL COST UNIT COST	MATERIAL COST TOTAL	LABOR COST UNIT COST	LABOR COST TOTAL	ENGINEERING ESTIMATE UNIT COST	ENGINEERING ESTIMATE TOTAL
Analytical Chemistry Costs *								
-Surge Basin Influent (1/Week)	52	ea					275.00	$14,300
-Surge Basin Effluent (1/Week)	52	ea					275.00	$14,300
* Analysis for Volatile Compounds and Oil and Grease								
TOTAL O&M								$65,600

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S/N 0105-LF-016-1375