PASQUOTANK RIVER BASIN REGIONAL COUNCIL

US Fish & Wildlife Service
Fish Hatchery
1104 W. Queen Street
Edenton, NC

June 16, 1999

AGENDA

4:00	Welcome and Call to Order	Chairman Erie Haste, Jr.
4:05	Introductions	ALL
4:10	Acceptance of Minutes from 4/8/99 Meeting in Columbia	Chairman Haste
4:15	Presentation/discussion of demonstration project summaries and proposals	ALL
6:00	Plans for Next Meeting (develop agenda items)	ALL
6:05	Adjourn	

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Minutes

The Pasquotank Regional Council's Demonstration Project Committee (Cheryl Byrd, Yates Barber, Lloyd Griffin, Harry Lee Winslow and Guy Stefanski) met from 2:00 to 4:00 prior to the regularly scheduled meeting to discuss project summaries submitted by members. There were no such summaries submitted to the Committee, so the majority of the meeting was spent reviewing project ideas from past meetings.

The full Council's meeting was called to order by Chairman Erie Haste, Jr. at 4:05 pm. He asked that self-introductions be made around the table from the following people in attendance:

Carl Parrott	Municipal Rep -- Dare County
Lloyd Griffin	Municipal Rep -- Pasquotank County
Ernie Brown	VA. Dept of Conservation & Recreation
Jack Simoneau	Currituck County
Harry Lee Winslow	Chowan County
Yates Barber	Environmental Science -- Pasquotank County
Cheryl Byrd	Dare County
Erie Haste, Jr.	Municipal Rep -- Perquimans County
Guy Stefanski	Albemarle-Pamlico National Estuary Program

Minutes from the April 8th meeting in Columbia were accepted without substantial changes.

After much discussion regarding possible demonstration projects, members decided to pursue the following ideas:

(1) Monitoring Effectiveness of Highway Best Management Practices (BMPs):

Council members are aware that highway construction is increasing in the Pasquotank River Basin and that stormwater runoff from highways contributes to water quality problems. To alleviate the impact of highway pollutants to sensitive waters, the NC Department of Transportation (NCDOT) constructs a series of highway best management practices (BMPs), which can include grassy areas and wetlands or retention ponds along road sides. The NCDOT is in the process of evaluating selected BMPs for their overall effectiveness in protecting water quality. Council members are interested in learning more about DOT's BMP evaluation project and are seeking ways to become involved. It may be that portions of the $26,000 grant funds available to the Council for demonstration projects could be used to support this initiative. (See Attachment A for more information).

ACTION: Jack Simoneau will contact David Chang, a Project Manager with DOT's Hydraulics Unit, to discuss a potential demonstration project with DOT and invite him to our next meeting on August 4th in Edenton.

ACTION: Guy Stefanski will contact Rodney Johnson, with the Albemarle Resource Conservation & Development, regarding their assistance in designing an appropriate monitoring component to the project. It is hoped that Mr. Johnson will attend the next meeting as well.

ACTION: Lloyd Griffin will check with Sam Chambers, Elizabeth City State University, to see if they could possibly perform the monitoring aspect of the project. As you may remember, ECSU is conducting several water quality monitoring projects within the Pasquotank River Basin.

(2) Fertilizer Injection Project:

Traditionally, farmers apply fertilizer on top of the ground utilizing a spinner. Utilizing this method, substantial amounts of fertilizer may be washed from the land during storm events. As an alternative, farmers can apply dry fertilizer to their land by injecting it directly into the ground instead of on top of it. A machine that applies fertilizer in this manner may reduce fertilizer application by 35% in some instances. Council member Harry Lee Winslow owns this type of equipment and has proposed the use of it by other landowners in the Pasquotank basin. Mr. Winslow has proposed to loan this equipment to other landowners and be reimbursed for the cost of its use. Grant funds would be used to offset payments by the landowners.

ACTION: Mr. Winslow will prepare a written summary regarding the Fertilizer Injection Project, including a proposed fee schedule, for discussion during our next meeting on August 4th.

ACTION: Lloyd Griffin will also ask Sam Chambers (ECSU) if he would be interested in monitoring before and after the use of the fertilizer injection equipment on selected sites as discussed above.

(3) Ocean Sands Water & Sewer District Demonstration Project:

A new company called ACHEMCO Inc. from Wilmington, NC, has developed a chemical oxidation process which uses no hazardous chemicals to treat both raw water for potable water use and wastewater for reuse purposes. Currituck County has recognized the need for a high-efficiency, cost-effective municipal waste treatment system for Corolla. Apparently, ACHEMCO proposes to utilize a mobile, modular unit (contained within one building) to treat wastewater generated by the Town of Corolla. This unit is capable of treating up to 150,000 gallons of wastewater daily with its by-products being pathogen free. The treated wastewater is odor free, suitable for landscape and golf course irrigation. The benefits of this technology appears to be lower initial

capital cost, lower annual maintenance cost, and smaller, more compact facilities compared to conventional treatment facilities required to provide the same level of treatment that ACHEMCO Inc.'s technology provides. Currituck County is providing about $61,000 for implementation of this technology. It is proposed that grant funds from the Council be used to offset some of the cost to Currituck County. (See Attachment B for more information).

ACTION: Jack Simoneau will find out more about the project's time line, including start-up dates, etc., and report back at our next meeting on August 4th.

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It was decided that the next meeting would be held, once again, at the USFWS Fish Hatchery in Edenton on August 4th beginning at 4:00 pm. The agenda for that meeting would focus on flushing out the three project ideas discussed above in order to move closer to developing proposals according to the demonstration projects guidelines.

There being no further business or discussion, the meeting was adjourned.

Attachment A.

The Water Resources Research Institute

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NC DOT launches programs to evaluate impacts of highway runoff on surface waters

Research has shown that runoff from hard surfaces carries various pollutants that have settled out of the atmosphere. In fact, some research indicates that the majority of nitrate in urban streams comes from washoff of atmospheric deposition on surfaces like streets and highways.

As North Carolina struggles to develop programs to restore and protect waterbodies suffering from nutrient over-enrichment—including the Neuse River and several of the state's most important drinking water supplies—it has become critical to know the amounts of nutrients that run off into sensitive surface waters from the state's 78,000 miles of highways.

In 1998, North Carolina's Department of Transportation became the first to receive a state-issued statewide NPDES stormwater permit. Under the mandate of this permit, NC DOT has launched a research program that will provide needed information on pollutant loading from highways. DOT expects that within two years, it will have a database that will allow characterization of runoff from various kinds of highways across the state. Parallel projects will also allow DOT to identify areas where highway runoff threatens sensitive waters and provide information about the most effective ways to reduce the effects of highway runoff on surface water quality.

Characterization of highway runoff

In a project just completed on highways in Charlotte*, Dr. Jy S. Wu and colleagues at the University of North Carolina at Charlotte produced important data on highway runoff quality and developed a protocol that will allow them to relate runoff characteristics to roadway imperviousness and traffic conditions across the state.

The researchers measured precipitation, runoff, and atmospheric loading; collected runoff; and counted traffic at three sites:

1. a 100% impervious 3-lane concrete bridge that carries 25,000 vehicles per day (urban);
2. a 3-lane asphalt highway with grassed shoulders and 61% imperviousness that carries 21,500 vehicles a day (urban); and
3. a four-lane highway with a grassed median and 45% imperviousness that carries 5,500 vehicles per day (rural).

They analyzed runoff samples for dissolved and suspended solids, chemical oxygen demand, oil and grease, a variety of metals, and several forms of nitrogen and phosphorous. Among the findings were the following:

- Total suspended solids (TSS) loading from the highways with grassed roadside shoulders and shoulders and median were lower than from the bridge. TSS loading from the site with the median was 30% less than from the site with only a grassed roadside shoulder. Reduced loading was attributed largely to simple runoff reduction. However, monitoring revealed that as precipitation depth increased, TSS removal attributable to runoff reduction decreased.
- Nitrogen compounds (NO_{3+2}-N, NH_3-N, TKN) were deposited on the urban highways at higher rates than on the rural highway. Atmospheric sources accounted for 10-30% of NO_{3+2}-N and 70-90% of TKN and NH_3-N in runoff at the urban sites.
- TSS and nitrogen pollutant loading rates were higher for the bridge site than rates reported in other studies of impervious roadways. Nitrogen and phosphorus loading rates for this site were within the range of loading rates reported for agricultural runoff. The researchers say loadings from this site are higher because bridges receive more de-icing chemicals and other maintenance activities. They note that runoff from bridges is of nationwide concern.
- Concentrations of nitrogen and phosphorous in runoff from all the Charlotte sites were higher than the average concentrations measured for rural highways in a nationwide study but lower than average concentrations for urban highway sites in the national study. However, when concentrations were converted to long-term loading rates, the Charlotte highways yielded 35.0. (Site 1) 11.3 (Site 2) and 21.4 (Site 3) kilograms per hectare per year (kg/ha-year) of total nitrogen compared to the U.S. average of 14.9. kg/ha-year. Moreover, in spite of its

median and roadside shoulders, Site 3 yielded a total phosphorous loading rate (9.1 kg/ha-year) almost 3 times the reported U.S. average (3.4 kg/ha-year).

Using methods developed in this project, Wu and colleagues will now monitor roadway runoff at ten sites distributed across the mountains, Piedmont and Coastal Plain and will develop seasonal pollutant loading factors for a variety of roadway surfaces and traffic volumes in each area. Sampling sites have been chosen on I-40 in New Hanover County, Wake County, Forsyth/Guilford Counties, and Buncombe County. University City Boulevard (N.C. 49) and W.T. Harris Boulevard in Mecklenburg County, U.S. 601 in Union County, and U.S. 74 in Rutherford County will also serve as sampling sites.

Data from the current and completed studies will serve to quantify nutrient and other pollution from highway runoff. According to the UNC-C researchers, highway pollutant loads in North Carolina are representative of roadway conditions across the southeastern United States.

Stormwater outfall inventory

The NC DOT stormwater program focuses on protecting "sensitive waters," defined as High Quality Waters (including all water supply and shellfishing waters), Outstanding Resource Waters, Nutrient Sensitive Waters, Trout Waters, and any waters of the state which have a rating of partially supporting or not supporting. To identify where highway runoff may be affecting sensitive waters, DOT has contracted with Ogden Environmental and Engineering Services to inventory its existing stormwater outfalls. Ogden will use a geographic information system (GIS) to record the location of DOT outfalls and match them with locations of sensitive waters. DOT will use information on outfalls and sensitive waters to prioritize locations for outfall retrofitting. Beginning in 2000, DOT will retrofit one priority outfall in each of its 14 districts each year for three years during the term of the permit, which ends May 31, 2003.

BMP evaluation

While university researchers and contractors are carrying out projects to help DOT evaluate the effects of highway runoff on sensitive waters, the department itself will be assessing the effectiveness of best management practices (BMPs) for reducing the effects of runoff. According to David Chang, a Project Manager with DOT's Hydraulics Unit, his unit will select BMPs listed in the N.C. Division of Water Quality's

stormwater guidelines that are applicable to highways and perform field evaluations. By the end of this year, DOT will produce a "tool box" identifying effective BMPs and their recommended uses. DOT will also field test additional BMPs and add them to the toolbox over the next four years.

The NC DOT stormwater program includes additional elements about which the WRRI News will report as they evolve.

* This project was funded by the Center for Transportation and the Environment, the U.S. Department of Transportation and the N.C. Department of Transportation through the Institute for Transportation Research and Education (ITRE) at N.C. State University. A complete summary appears in the journal article cited below:

Wu, Jy S., Craig J. Allan, William L. Saunders, and Jack B. Evett. 1998. "Characterization and Pollutant Loading Estimation for Highway Runoff." *Journal of Environmental Engineering* 124 (7, July 1998): 584-591.

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Attachment B.

April 21, 1999

TRANSMITTED VIA FAX: 232-3551

Mr. Bill Richardson
County Manager
P. O. Box 39
Currituck, NC 27929

RE: Ocean Sands Water and Sewer District
Demonstration Project

Dear Bill:

This letter is to provide some preliminary information concerning a new technology which may be beneficial to both the water and wastewater treatment facilities in the Ocean Sands Water and Sewer District. A new company called ACHEMCO Inc. from Wilmington, North Carolina, has developed a chemical oxidation process which uses no hazardous chemicals to treat both raw water for potable water use and wastewater for reuse purposes.

The Ocean Sands Water and Sewer District has the opportunity to be part of a demonstration project this summer which involves ACHEMCO Inc. setting up a prototype unit adjacent to the existing sewage treatment plant so it can treat a portion of the waste coming to the plant and demonstrate its capabilities. There will be a significant amount of water testing to help confirm its capabilities. If successful, it could be beneficial to both the treatment of wastewater as well as raw water for potable water, including a potential application for the proposed R. O. plant. This testing program will also provide needed information for ACHEMCO Inc. to become certified with EPA and NSF under both the wastewater and potable water categories within their Environmental Technology Verification (ETV) pilot programs. Preliminary information indicates that DENR is supportive of this project and will permit the pilot project with minimal paper work.

As currently envisioned, the expense of this demonstration would be a joint venture between the Ocean Sands Water and Sewer District and ACHEMCO. The costs involved have not been totally determined, but ACHEMCO Inc. plans to have that data when we meet with you on Tuesday, April 27, 1999. There also may be several sources of grant monies available for innovative technology purposes like this.

The benefits of this technology appears to be lower initial capital cost, lower annual maintenance cost, and smaller, more compact facilities compared to conventional treatment facilities required to provide the same high level of treatment that ACHEMCO Inc.'s technology provides.

Mr. George Moore, President of ACHEMCO Inc., is available to meet with the Board of Commissioners on Monday, May 3rd if that is suitable for your agenda. After our meeting on April 27th, we can provide the Board of Commissioners with more details about this project in preparation for the May 3rd meeting.

Please let me know if you have any questions.

Sincerely yours,

William P. McDowell, III, P.E.
President

WPMIII/rae

CC: Mr. George A. Moore (Via Fax: 910-763-1355)

ACHEMCO, INC.

Presents To:

Currituck County

Wastewater Treatment Proposal

For

Ocean Sands Water and Sewer District

150 Division Drive
Wilmington, North Carolina 28401
Phone (910) 343-3338 Fax (910) 763-1355
E-Mail: GESAG@AOL.COM

ACHEMCO, Inc.
P.O. Box 2297 Wilmington, NC 28402

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ACHEMCO, Inc.
P.O. Box 2297 Wilmington, NC 28402

EXECUTIVE SUMMARY

INTRODUCTION

Currituck County has recognized the need for a high efficiency, cost effective municipal waste treatment system for Corolla. ACHEMCO was contacted in March of 1999 to discuss the new innovative system designed to handle such. The ACHEMCO system SWAT (Solid Waste Alternative Treatment) provides treated wastewater at low capital and treatment costs. Designed in modular units, SWAT is easily expanded to address growth needs. Changing flow rates are detected, adjustments made, and treatment effectiveness automatically maintained. The area required for an ACHEMCO unit is less than the standard waste treatment system. The entire unit, contained within one building, allows it to blend into congested, high density areas, becoming almost invisible to the public. The by-products of SWAT are pathogen free; the treated wastewater is odor free, suitable as landscape and golf course irrigation. ACHEMCO's system produces water of a quality consistent with, or better than that required by many discharge permits.

1.1 COMPANY SUMMARY

ACHEMCO, Inc. (the Company), a North Carolina corporation, was formed in 1997 to design and install agricultural, industrial, and municipal wastewater treatment systems using of its proprietary technologies. A brief summary of the Company's present activities includes:
The Company has focused its efforts on two specific applications relating to the hog industry in NC: (i) inactive waste lagoon restoration, and (ii) elimination of waste lagoons through the use of a closed-loop recirculating system technology. In both applications, the processed solids are marketable as odorless and pathogen-free organic fertilizer. The chemically treated wastewater is reusable as flush-water for hog barns and/or crop irrigation.

ACHEMCO, Inc., is presently developing cost-effective intermediate systems to solve, or possibly bridge, a current municipal wastewater problem on St. Thomas and St. Johns in the US Virgin Islands. The St. Johns system is designed to process up to 300,000 gallons of waste water per day while the St. Thomas system processes 6.5 million gallons per day. The bio-solids recovered in the process become odorless and pathogen-free organic fertilizer.

The Company is currently in negotiations involving a permanent application of its technology at a distilled spirits industry on St. Croix. The organic solids will be captured for use as animal feeds, and the processed effluent recirculated for reuse in plant operations.

1.2 SCOPE OF TRIAL

ACHEMCO will provide treatment for the Ocean Sands Water and Sewer District located in Corolla, NC for a period of at least sixty (60) but not to exceed ninety (90) days. The trial will commence in June 1999 and run through September 1999. Treatment objectives include the processing of between one hundred (100,000) and one hundred and fifty thousand (150,000) gallons of raw wastewater per day. ACHEMCO will provide all the equipment (pumps, tanks, instrumentation) for the processing, as well as the necessary chemicals and personnel to operate the prototype.

1.3 ACHEMCO TESTING SCHEDULE

ACHEMCO will run base line tests on raw wastewater and treated wastewater that include:

I- Key performance indicators (data and charts)

1- Total coliform
2- BOD
3- COD
4- Ph
5- NH_3
6- P
7- K
8- Suspended solids
9- TDS
10- Total flow
11- Chlorine

II- Daily analysis of treated and untreated wastewater (with the exception of cations which are tested monthly)

pH	Standard Methods 19th edition (section 9-3)
BOD	Standard Methods 19th edition (Section 4-45)
COD	Standard Methods 19th edition (Section 5-4)
TKN	Standard Methods 19th edition (Section 4-92)
NO_3	Standard Methods 19th edition (Section 4-92)
Phosphates	Standard Methods 19th edition (Section 4-107)
Total Chlorine	Standard Methods 19th edition (Section 4-45)
Free chlorine	Standard Methods 19th edition (Section 4-45)
Total bacteria count	Standard Methods 19th edition (Section 9-20 & 21)
Coliform bacteria	Standard Methods 19th edition (Section 9-20 & 21)
Settleable solids	Standard Methods 19th edition (Section 2-56)
Total solids	Standard Methods 19th edition (Section 2-54)
Cations	AA method 3-13 / 3-15 (Ca, Pb, Fe, Al, Si, Co, Mo, Ba)

III- Solids reports

HPC	Standard Methods 19th edition (Section 9-20 & 21)
TKN	Standard Methods 19th edition (Section 4-92)
COD	Standard Methods 19th edition (Section 5-4)
pH	Standard Methods 19th edition (Section 9-3)

IV- Reports and meetings

Weekly

1- Report to County Engineer in writing
2- Laboratory data reports and spread sheet
3- KPI data and charts

Monthly

1- Meeting with County Engineer and staff
2- Monthly laboratory analysis averages and state certified laboratory results
3- Planning with County Engineer and staff

90 Day meeting

1- Proposal for replacement system and construction time line within 30 days.
2- Review all results with County Engineer and staff.

V- Trial protocol

During this trial test period the unit will be open for inspection by Currituck County Engineering staff at all times. Other group inspections will require 24 hours notice for scheduling purposes. EPA, DENR, and ETV will be observing during this certification process. ACHEMCO will give Currituck County Engineering staff 24 hours notice prior to any visit, assuming ACHEMCO has received such notice.

VI- Service plan

1- Chemical inventory - daily
2- Chemical makeup - as needed
3- System chemical performance - daily
4- System equipment performance check - daily
5- Sample composite (24 hour sampling)
6- Daily sample laboratory analysis
   Influent
   Effluent
   Solids
7- Flow data (daily chart)

1.4 PROPOSAL OBJECTIVES AND REPORT INFORMATION

The purpose of this proposal is to provide Currituck County with the opportunity to view the ACHEMCO system, in operation, for an extended period, at the Ocean Sands Water and Sewer District. ACHEMCO believes the SWAT system will treat wastewater at lower capital and treatment costs, while producing water superior to EPA, and DENR, standards. This trial will give Currituck County an opportunity to evaluate the treatment system and develop a baseline for future planning. During this ninety day period, Ocean Sands will defer 100,000 to 150,000 gallons of influent per day to ACHEMCO for treatment. The trial will run from June 15,1999, to September 13, 1999. Within thirty days ACHEMCO will summit a proposal for a full replacement of the Oceans Sands Wastewater System.

This proposal will include:

I- Key performance indicators
II- Laboratory analysis (untreated and treated wastewater)
III- Solids reports
IV- Capital costs
V- Operating costs

1.5 System Narrative and Flow Charts

The Achemco SWAT Unit is designed to treat influent with a low percentage of solids. SWAT is a *prototype* to be utilized in determining the efficencies of sewage separation and treatment techniques. The SWAT Unit, constructed on a flatbed trailer, consists of various chemical holding tanks and pumps located adjacent to the Unit. The influent is treated, and the liquid stream separted from the solids. Treated solids are than discharged to containment, and treated liquids become discharge or irrigation.

Attached is a drawing of SWAT. The untreated influent is pumped into the system from the left, passes through three treatment vessels, with treated liquids discharged into a common mixing box attached below the trailer bed. Solids are discharged from the *Discharge Tank, (T300)* by either gravity feed or pump.

I- Flow Process Description

Influent enters the unit either through a 3" suction line entering the *Feed Pump, P1*, or through a 4" line which bypasses *P1* (if the sewage is accepted from a pressurized system). Flow rate is immediately measured utilizing a *3" Rosemount Mag-Meter* flow element (accurate to within 0.04%). The mag-meter signals to an upstream *air-actuated flow control valve* that sets the *Feed Pump, P1* rate (in gallons per minute) to match the flow rate setting the operator inputs at the *Control Panel.* The Mag-Meter sends a second signal to the *XB-301* chemical feed pump (not shown on drawing). This pump controls the *XB-301* additions to the *Reaction Tank, (T100). XB-301* is Achemco's proprietary non hazardous treatment chemical. It effectively treats flow stream solids killing odors and allowing rapid separation of solids and liquids. A *polymer metering pump*, controlled by a downstream device, also injects a *polymer* solution into the sewage stream prior to entering *T100.*
Influent enters the *Reaction Tank, (T100)*, allowing for a predetermined amount of retention time (for chemical reactions to take place) prior to discharging the treated sewage. Contained within *T100* are two *sump pumps* utilized to ensure adequate mixing of chemicals. Also located along the bottom of *T100* is an *air sparger header system* for additional agitation.

The treated sewage is discharged from *T100* via gravity flow to the *Aging Tank, (T200).* Between *T100* and *T200*, the flow stream passes a *streaming current detector(* meter sensor) *SCD. The SCD* sends a signal controling a remote chemical injection metering pump. This pump injects the required amount of *polymer* for solids separation just downstream of *P1.* e. If necessary, solids can be removed from *T200* via the *Solids Pump, P2*, which is connected to both the *Aging Tank, (T200)* and the *Discharge Tank, (T300).*

The treated sewage stream passes from the *Aging Tank, (T200)* to the *Discharge Tank, (T300)* by one of two avenues. It can pass directly from the top of *T200* to the top of *T300* via a six-inch line, or it can flow from the bottom of *T200* to within 1 foot of the top of *T300* via two six-inch lines as shown in the drawing. Treated solids will be removed from the top of *T300* via the *Solids Pump, P2*, and sent to containment. Treated liquids will gravity flow from the rear of *T300* to the mixing box. *HTH*, (a chlorine disinfecting agent) is injected into this drain line just prior to entering the mixing box using *Chemical Pump, P3*. From the mixing box, the treated liquids exit SWAT (via a 4" quick disconnect fitting) to discharge or irrigation.

II- Air Scrubber

All three containment vessels, *T100, T200*, and *T300*, are connected by 4" air vent lines which are inter-connected to an air scrubber located between *T100* and *T200*. Various chemicals can be scrubbed (if required) from the vessel vented gases prior to discharge to the atmosphere. The scrubber is currently set up to scrub excess nitrates using dilute sulfuric acid as the scrubber agent. *Chemical Pump, P5*, sends a dilute sulfuric acid mist cascading down through the scrubber, chemically removing nitrogen compounds from the gases for reclaimation.

III- Chemical Mixing

Chemical mixing and storage for *XB-301* and *polymers* is accomplished with chemical totes located adjacent to the SWAT Unit trailer. The various chemical injection metering pumps are tied into the SWAT Unit electrical circuitry and are controlled by various flow devices located on the SWAT Unit. All chemical mixing is accomplished manually by operations personnel.

IV- Chemical Injection

There are two double-wall chemical storage vessels located on the SWAT Unit between *T100* and *T200* adjacent to the scrubber. One typically holds dilute sulfuric acid (utilized with the scrubber unit), and the other will be used to contain *HTH*, (chlorine as calcium hypochlorite). In addition, there are at least two chemical containment totes located adjacent to the SWAT Unit trailer. These will contain *XB-301* and *polymer*. The chemical injection metering pumps will be controlled by flow devices located within the SWAT Unit flow stream.

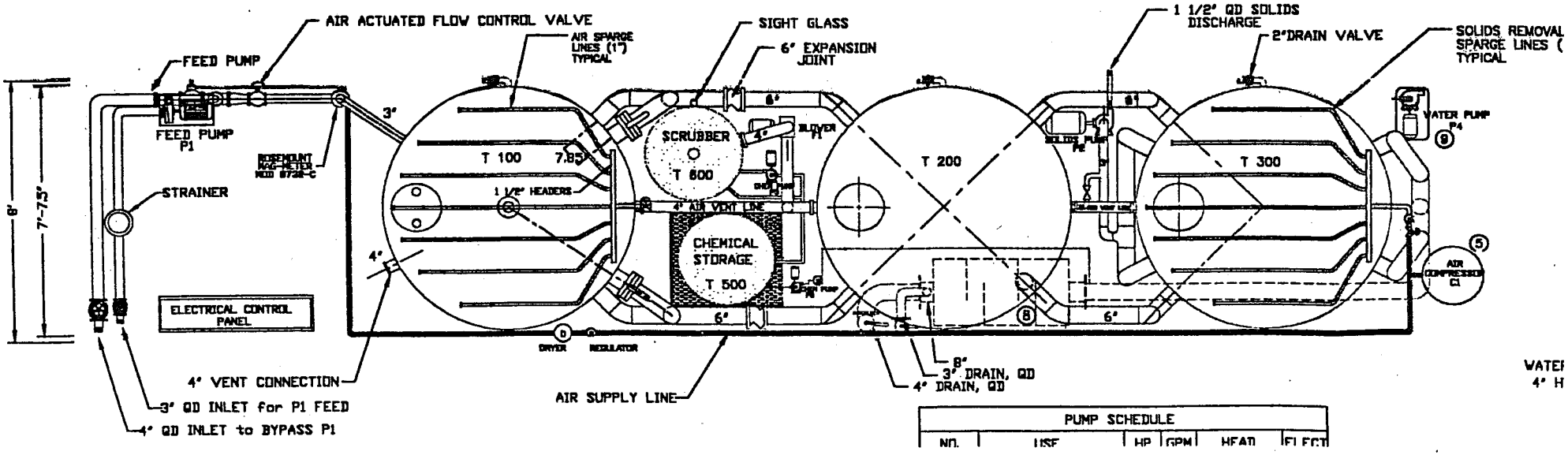
V- Solids Disposal

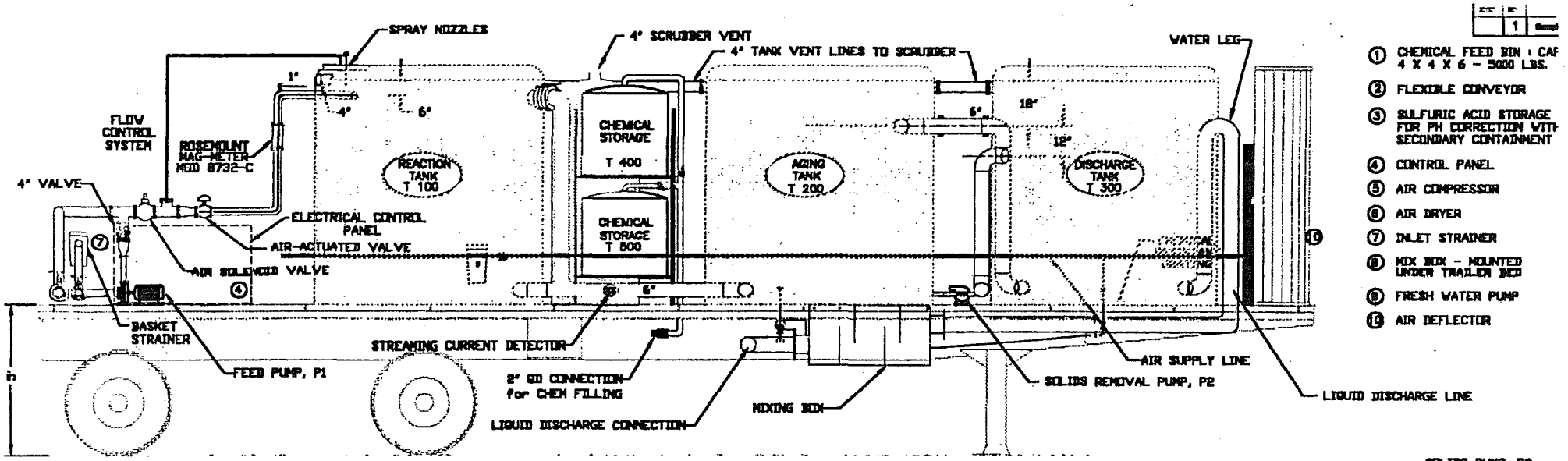
Solids from the SWAT Unit are removed from either *T200* or *T300* via the *Solids Pump, P2*, and sent to existing solids containment facilities. In the event that the SWAT Unit is utilized at a location without solids containment, temporary solids storage can be provided, complete with a dewatering sump pump that would return excess liquids to the system.

VI- Recycling of Treated Water

Achemco strongly believes in the recycling of treated wastewater. It appears to be a simple matter of filtering treated discharge water, passing it through a two-stage pressurized reverse osmosis unit (RO Unit), and recycleing *this* water for drinking. RO product water is pure, absent of viruses, bacteria, and heavy metals. For a moderate capital investment, an RO unit can be installed in conjunction with any sewage treatment system to provide substantial drinking water, for the municipalities.

ACHEMCO personnel have in excess ten years of experience in operation of RO's, including the design and construction of such equipment.


AIR ACTUATED FLOW CONTROL VALVE
AIR SPARGE LINES (1") TYPICAL
SIGHT GLASS
6" EXPANSION JOINT
1 1/2" QD SOLIDS DISCHARGE
2"DRAIN VALVE
SOLIDS REMOVAL SPARGE LINES (TYPICAL
FEED PUMP
FEED PUMP P1
STRAINER
ELECTRICAL CONTROL PANEL
T 100
7.85
1 1/2" HEADERS
SCRUBBER
T 600
4" AIR VENT LINE
CHEMICAL STORAGE
T 500
T 200
T 300
WATER PUMP P4
AIR COMPRESSOR C1
BLOWER P1
DRYER
REGULATOR
4" VENT CONNECTION
3" QD INLET for P1 FEED
4" QD INLET to BYPASS P1
AIR SUPPLY LINE
3" DRAIN, QD
4" DRAIN, QD
8'
7'-7.5'
3'
4'
6'
PUMP SCHEDULE
NO.
USE
HP
GPM
HEAD
EFFECT



1. CHEMICAL FEED BIN : CAP 4 X 4 X 6 – 5000 LBS.
2. FLEXIBLE CONVEYOR
3. SULFURIC ACID STORAGE FOR PH CORRECTION WITH SECONDARY CONTAINMENT
4. CONTROL PANEL
5. AIR COMPRESSOR
6. AIR DRYER
7. INLET STRAINER
8. MIX BOX – MOUNTED UNDER TRAILER BED
9. FRESH WATER PUMP
10. AIR DEFLECTOR

1.5 Key Issues associated with waste treatment and recovery

- ❑ Health, Safety, and Environmental
  - Waste containment
  - Safe and efficient waste collection and treatment
  - Solids recovery and transportation
- ❑ Production Facilities
  - Capacity limitations
  - Staffing

2.0 PROPOSAL OVERVIEW

2.1 Solution

ACHEMCO, has developed and patented products, processes, and systems which safely treat waste, and converts it to clean reuseable water and a pathogen-free, odor-free solid. The treatment and processing methods address all US Government environmental concerns on most systems, as well as being economically feasible in the municipalities capital investment and operating costs. ACHEMCO's system eliminates health risks by killing pathogens, and reduces odors. Installation time, and the area necessary to contain such a unit, is significantly less than for most traditional systems. ACHEMCO has been working with local, state, and federal legislators, as well as water management officials, and agencies, to not only introduce ACHEMCO's system, but to acquire the proper permitting allowing operation of the innovative environmentally-friendly technology.

2.2 Benefits

ACHEMCO's system is an economical solution for the growing municipal waste treatment problem. The on-site system eliminates fear of polluting the environment, government regulation, and subsequent heavy fines levied by environmental agencies. The system provides clean water for reuse, and a small foot print allows land to be set aside for other uses. The unit can to be enclosed in a single structure, and is not only odorless, but almost invisible. ACHEMCO system can operate in conjuction with older convential systems treating only a portion of the feed, or to polish an older system's treated effluent. Chemical treatment allows the system to operate part-time without killing bacteria the used in most aerobic systems.

2.3 Implementation

Setting up the ACHEMCO SWAT unit requires an area inside the fenced compound at Ocean Sands Waste Treatment System near the influent surge tank. SWAT itself is mounted on a forty-two foot tractor trailer. Connecting into the existing system will involve installing a suction pipe in the influent surge, tank and piping treated water to the rotary distributor tank. Solids will be pumped to the Ocean Sands solids slurry tank. All chemicals needed will be provided in high density poly tanks or totes by ACHEMCO. All power controls are located on the control panel on SWAT, and with the flip of a switch, can be deactivated if problem arises. SWAT's pumps and air moving systems use a total of 20.25 HP. Additional power is used for instrument controls, automatic pH controls, a streaming current controll, and the automatic sampler.

ACHEMCO will also need on-site space for a laboratory work area, as well as a location adjacent to SWAT for a Winnebagounit to be used by operators on 24 hour duty. It will be the responsibility of the ACHEMCO personnel to oversee the operation of SWAT

3.0 PROJECTED SCOPE AND MILESTONES

3.1 PROJECT SCOPE

ACHEMCO has divided the project into three primary phases.

PHASE I - approval by Engineering staff

- Copy of ACHEMCO liability Insurance
- Develop preliminary testing requirements
- Approval of site location
- Acceptance of time line
- Review and acceptance of certification testing schedules
- Agreement on cost of trial
- Application to DENR for approval of trial test period
- EPA /ETV schedule
- Currituck County engineering staff approval
- possible contract withCounty allowing test, insurance coverage, Ect.
- Discuss forms and conditions required for trial.

PHASE II

- Finalize test schedule
- Meet with County Engineering and Water and Sewer Authority
- County Manager approval

PHASE III

- Meet with Currituck County Commisioners
- Sewer Authority approval
- Finalize time line
- Finalize any contracts

PHASE IV

- Move SWAT into location
- Make necessary connections
- Insure all BMP standards are followed
- Review testing schedule with county engineering staff

PHASE V

- Operate system for up to a 90 day trial
- Daily analysis of raw wastewater
- Daily analysis of treated wastewater

PHASE VI

- End trial
- Issue final reports
- Remove equipment and tankage related to trial
- Clean trial work areas
- Issue proposal for new system

3.2 Deliverables

In order to initiate this project the following is required and would later become the deliverables of a contract.

1. SWAT will need to be on- site by June 15.
2. Three totes of product will be delivered to the site prior to start up.
3. All mechanical connections made to allow for safe enviromental responsible operations.

3.3 Project Milestones

PHASE I	PHASE II	PHASE III	PHASE IV	PHASE V	PHASE VI
System upgrade approval waste water test Test procedure approval County Engeering staff approval DENR approval EPA / ETV schedule proposal summitted	Currituck county manager approval	Currituck county Commisioners approval Currituck water sewer authority approval	Transport SWAT to Oceans Sands Waste treatment site Make necessary hook up to Ocean Sands System Review final test schedule with County Engineering staff Review test schedule with engeering staff Run base line study on raw waste	Start up SWAT Survey system daily Run full test profile daily 1- untreated waste 2- treated waste 3- Package waste 4- flows 5- Equipment check 6-Reports/charts	End trial run of SWAT Clean area of all equipment, and tankage. Issue final report Issue proposal
APRIL 1999	MAY 15, 1999	JUNE 1, 1999	JUNE 10, 1999	JUNE 15, 1999	SEPT. 13, 1999

3.4 CAPITAL SUMMARY

Capital investment - Capital investment over the ninety day period.

DESCRIPTION	COST	SALARIES & OTHER EXPENSES TOTALS
Chemical costs XB-301 150 LBS (13.20) XA-481 2250 LBS (2.60) HTH 400 LBS (1.31)	PER DAY / TOTAL 22.00 / 1980 65.00 / 5850 5.83 / 525	8,355.00
Consulting Costs Engineering (ACHEMCO) (1) Techencial support (1)	daily / per dium / days needed 300/100/10 200/100/90	 $4000.00 $27,000.00
OUTSIDE LAB COST	75.12/DAY	6760.80
Equipment and Tooling	147.63 / 13,286.67	13,286.70
Miscellaneous	19.45 / 1750.50	1750.50
TOTALS		**61,133.00**

3.5 Project Team

President	George A. Moore III (KEY CONTACT)	Office	1-888-850-4800
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		Car phone	910-471-3001
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Executive Vice President	Carl Byrd	Office	1-888-850-4800
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Technical Director	Bill McKnight	Office	1-888-850-4800
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Vice President, Operations	Gary Rafferty	Office	1-888-850-4800
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Laboratory Director	Sheila Moore	Office	1-888-850-4800
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		Home	910-253-4920
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		Car phone	910-617-2741
		Pager	910-397-4958
Engineering Director	Jim Tarlton	Office	1-888-850-4800
		Wilmington office	910-343-3338
		Fax	910-763-1355

4.0 SUMMARY:

4.1- REVIEW

ACHEMCO working with Currituck county is proposing a trial operation with it's SWAT system. This trial will run for sixty days to ninety days at a flow rate of between one hundred and one hundred fifty thousand gallons per day. Treatment will consist of pumping raw sewage from the Oceans Sands Water and Sewer District into the ACHEMCO treatment system. Water will be treated to a level sufficient for disposal through the rotary distributor system. Treated water will be returned to the treated holding tank at or better than DENR required values. ACHEMCO will have coverage for the trial on 24 hour call in the Outer Banks area.
During this period DENR, and the EPA/ETV representatives will be evaluating the SWAT system for approval as a waste treatment system and a potable water package treatment system. Advance notice will be given to Currituck county Engineering department for visits from these groups if ACHEMCO receives such notice..
The cost of the trial will be shared with a 85% ACHEMCO to 15% Currituck County cost ratio. The chart below will break down the actual cost of the trial.
Laboratory costs are based on quotes from Environmental Chemist Inc. (Break down sheet and quota sheet on following pages) a North Carolina certified laboratory. The number of test reported will supply Currituck with a good Data Base on not only the SWAT system, but also on the raw waste water, and their present treated waste water.

COST OF OCEAN SANDS TRIAL

ITEM	UNIT COST	ACHEMCO COST	CURRITUCK CO. COST	% ACHEMCO COST	%CURRITUCK COST
SWAT	$187,000.00	$ 187,000.00	$ -	100	0
Special equipment	$ 26,573.40	$ 13,286.70	$ 13,286.70	50.00	50.00
Chemical cost	$ 8,355.00	$ -	$ 8,355.00	0.00	100.00
Staff fees	$ 31,000.00	$ -	$ 31,000.00	0.00	100.00
lab cost	$152,577.00	$ 145,816.20	$ 6,760.80	95.57	4.43
miscellaneous	$ 3,501.00	$ 1,750.50	$ 1,750.50	50.00	50.00
TOTALS	$409,006.40	$ 347,853.40	$ 61,153.00	85.05	14.95