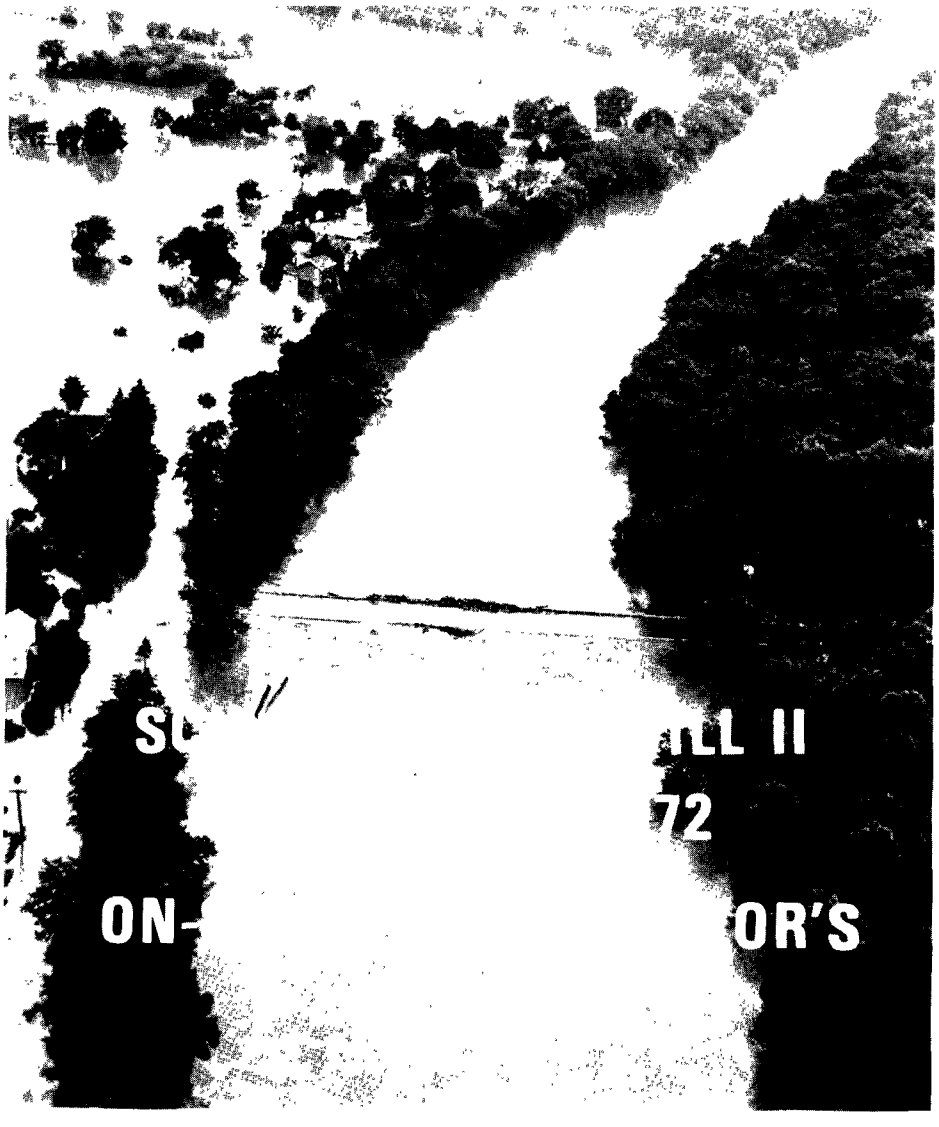
WATER POLLUTION PREVENTION AND CONTROL

OIL AND HAZARDOUS MATERIALS PROGRAM SERIES OHM 74-03-001



U.S. ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF WATER PROGRAM OPERATIONS

SCHUYLKILL OIL SPILL II
JUNE-OCTOBER 1972
POTTSTOWN, PENNSYLVANIA AREA

ON-SCENE COORDINATOR'S REPORT

Division of Oil and Hazardous Materials
Office of Water Program Operations
U.S. Environmental Protection Agency
Washington, D.C. 20460

and

Region III
U.S. Environmental Protection Agency
Philadelphia, Pennsylvania 19106

March 1974

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* Credit Pottstown Mercury (Staff Photo)

NSF Credit National Strike Force

I N T R O D U C T I O N

PURPOSE OF THIS REPORT

The Schuylkill flood and oil spill of 22 June 1972 was unique in several respects:

1. It was the second major oil spill to originate from a group of oil storage lagoons on the banks of the Schuylkill River at Douglassville, Pennsylvania, four miles West of Pottstown. (The first - Schuylkill I - took place on 13 November 1970.)

2. The spill clean-up process had to be performed against the background of the "Agnes" disaster, the worst inland flood on record in the United States.

3. Several key personnel of the United States Coast Guard and Environmental Protection Agency were involved in the clean-up of both spills.

4. Clean-up activities on the Schuylkill I spill had been reported in some detail by a documentation team. Their report entitled "Oil on the Schuylkill" was published by the Environmental Protection Agency, Division of Oil and Hazardous materials. The same documentation team has now been employed by the On-Scene Coordinator to report on the second spill, Schuylkill II.

Consequently, the situation offers an unusual opportunity to compare performances on both spills and to evaluate the readiness of all concerned groups to respond to a major emergency.

Any major disaster requires fast and effective response if life and property are to be protected and losses kept at a minimum. In many instances, the resources of Federal, State and Civic Governments must be coordinated with those of business, industry and the private sector.

Wherever the spillage of oil or other hazardous materials is involved, special technical knowledge, equipment and skills are required. Skillful administration is required while working under conditions of extreme emergency.

The 91st Congress of the United States directed preparation of a National Contingency Plan to deal with major oil spill emergencies. PL 91-224 provides a mechanism whereby Federal resources can be marshalled to deal with the unusual problems created by oil spills.

The plan was activated in June 1970. It included the organization of an oil spill "Strike Force" on a national level.

The National "Strike Force" has responded to several spill emergencies, and the Schuylkill River Spill of November, 1970 was the first.

As might be expected, experience gained in one emergency situation can be valuable in dealing with subsequent incidents. Consequently, accurate records of each oil spill clean-up are essential to the learning process.

This report is intended to document the activities of the National Strike Force, the Coast Guard, the Environmental Protection Agency and nearly a score of the other agencies which responded to the Schuylkill II emergency.

The flood and oil spill in 1972 involved an estimated 5,000,000 gallons of oily sludge from all the lagoons as compared with 3 million gallons or less from 2 lagoons in the 1970 spill.

The oil contained a high residue of lead and other potentially dangerous metals and hydrocarbons. Because the oil was carried on flood waters far beyond the banks of the Schuylkill River, the resulting contamination covered hundreds of acres of land. Obviously, this spread the pollution into homes, farms, industrial plants, public recreation areas and other terrain untouched by the first spill.

Farm animals, birds and thousands of people were exposed to the oil. Hydrocarbon vapors, toxic metals and chemicals represented potentially dangerous situations by exposing people and wildlife through direct contact, inhalation and drinking water. The extent of the danger was not known immediately and maximum precautions had to be taken until laboratory analysis of the waste oil and water could be completed.

Once the threat of an oil spill became known, intensive activity was generated at:

1. United States Coast Guard, Gloucester City, New Jersey: (Base Gloucester)

2. National Strike Force Headquarters (Strike Force) of United States Coast Guard, Governors Island, New York

3. Division of Oil and Hazardous Materials,(DOHM) Environmental Protection Agency, (EPA) Washington, D.C.

4. Philadelphia Regional Office of Environmental Protection Agency (EPA-Phila)

5. Edison Laboratories of Environmental Protection Agency, Edison, New Jersey (Edison Laboratories)

6. United States Corps of Engineers (USC of E)

7. Department of Environmental Resources of Pennsylvania, Harrisburg, Pennsylvania (DER-Pa.)

8. Civil Defense Agencies in cities and counties in the Schuylkill River Valley.

Official records of the oil spill clean-up operations include the following daily reports issued by several agencies as indicated:

1. Situation Reports, (SITREPS) from Base Gloucester from 22 June through 26 June, 1972.

2. Pollution Reports (POLREPS) from the Regional Response Team (RRT), EPA - Phila from 23 June through 28 June.

3. POLREPS from USCG Base Gloucester from 23 June through 28 June.

4. Information reports from USCG Base Gloucester from 27 June through 1 July 1972.

5. USCG POLREPS from Office of the On-Scene Coordinator, (OSC) from 28 June through 29 September.

6. A Daily Log from the Office of the OSC from 28 June through 25 September 1972.

Daily Newspapers in Schuylkill River Valley provided broad coverage of the flood disaster together with many details of the oil spill situation and related information.

Members of the documentation team conducted personal interviews on the site or by telephone with key personnel associated with the oil spill response. Documentation personnel kept comprehensive notes on activities which they observed personally during intermittent visits to the site from 3 July through 18 October 1972.

Based on the information from above sources, this report attempts to describe the cause of the spill, the means used to protect the public from the pollution hazard, the oil control and clean-up methods, final disposal of the polluted oil and debris, restoration of the polluted areas, the short-range effects and the probable long-term effects on the ecology. The Division of Oil and Hazardous Materials, through

Ocean Science and Engineering, is conducting continuing studies of the effects on the ecology.

The report will make special observations on many of the problems which persisted throughout the period. It will also suggest opportunities for improvement of the response to a major oil spill and it will discuss a list of special subjects which confront the on-scene commander in dealing with oil spill control and clean-up.

Most of the statements of fact in this report have been verified from one or more of the sources listed above. Where substantiation is not available, statements believed to be true were identified with the phrase, "it was reported that....."

Opinions and judgements expressed by the authors of this report are readily identified as such and are based on nearly five years of experience in oil spill control work including five major oil spills.

THE SCHUYLKILL SPILL OF NOVEMBER 13, 1970

Schuylkill I was described in the report "Oil on the Schuylkill." It may not be available to all readers of this report, so a brief summary of that spill is submitted herewith.

Berks Associates at Douglassville, Pennsylvania have been reclaiming used crank-case oil for about 20 years. Their process extracted useable crank-case oil from dirty oil drained from automobiles. By so doing, they provided a satisfactory disposal method for many thousands of gallons of used oil which might otherwise have been poured into sewer systems.

The process re-claimed approximately 95% of its feed stocks, but a heavy residue of sludge oil remained. For many years there was no use for this sludge, and it was stored in lagoons behind the Berks Associates plant on the banks of the Schuylkill River. Some of the lagoons were within 50 ft of the river.

Obviously, the location chosen for those lagoons proved to be most unfortunate. The hazard was recognized by the Pennsylvania Dept. of Environmental Resources and a safety dike was constructed between the lagoons and the river a few weeks before Schuylkill I took place.

In early November 1970, 10 days of heavy rain flooded the lagoons. Two of them over-flowed their dikes. The safety dike was breached and the oil sludge poured onto the surface of the Schuylkill River which was in flood but not over its banks.

A large portion of the spilled oil flowed from the Schuylkill River into the Delaware River and finally disappeared at sea. Substantial quantities of oil and oil-soaked debris were intercepted and recovered in the Philadelphia Area and trucked to land-fill disposal sites in New Jersey.

The disaster forced Berks Associates into bankruptcy and a federal judge decreed that no more residual oil was to be stored in the lagoons. Berks Associates consented to the decree, and their compliance was monitored by the Philadelphia Office of E.P.A.

During that period, Berks Associates was reactivated and some industrial customers were found who could use the residual oil from the lagoons. Several shipments of sludge oil were made to customers in the United States and Canada. Consequently, the content of the lagoons had been reduced measureably before Hurricane Agnes became a threat.

Experience in this case and in other major spills such as

Kodiak Naval Station (1970) and Indiana Harbor, Indiana (1970) has indicated that oil in storage is a continuing hazard unless the tanks or pipelines or lagoons are protected against unusual hazards to an extent never before considered necessary.

HURRICANE AGNES: JUNE, 1972

As Hurricane Agnes moved slowly from the Gulf of Mexico toward western Pennsylvania, it accumulated record quantities of water in its system and spread its storm clouds over an area reaching from Virginia to upper New York. At that point, the storm system remained stationary for days and released its torrents of rain. By the middle of June it was obvious that a major flood threat was building up. Disaster relief organizations began to prepare for action.

Any flood has the potential to wreck warehouses or break tanks or pipelines where oil or other pollutants may be stored. In Washington, D.C. the EPA Division of Oil and Hazardous Materials was aware of the possibility. Mr. Kenneth Biglane, Director o the Division of Oil and Hazardous Material, established a flood watch at strategic locations in the threatened area.

Oil and Hazardous Material regional offices were alerted and special observers were assigned to flood duty at Richmond, Virginia; Harrisburg, Wilkes-Barre and Philadelphia, Pa.; and at Elmira, New York. Dr. Allen L. Jennings of the Division of Oil and Hazardous Materials, Washington, D. C. was assigned to the Philadelphia Regional Office of Oil and Hazardous Materials.

At the same time, the Department of Housing and Urban Development, The Department of Health and Welfare and the Federal Small Business Agency were sending representatives to Pottstown. On 26 June, Pottstown Mayor Brower B. Yerger made the Washington Elementary School available to these agencies. The OSC, with the cooperation of Mayor Yerger, established the office of the On-Scene Coordinator in the Washington Elementary School on 28 June.

The lagoons at Berks Associates gave concern to personnel who had been associated with the Schuylkill Spill of 1970. Personnel at OHM-Offices, EPA, Oil and Hazardous Materials Offices at Coast Guard Base, Gloucester, New Jersey, at EPA Edison Laboratories, New Jersey and at the National Strike Force headquarters in New York watched developments. They realized that heavy rains might over-flow the dikes for a second time. Breakage of the dikes was not expected because they had been repaired and strengthened after the first spill.

Flash flooding in the river was a known hazard, but there was no reason to expect that the Schuylkill River would go 20 feet over its banks, and no forecasts of such flooding were published until 21 June. (It has been suggested that massive embankments on the Route 422 Bypass accentuated the effect of the flood in

the Pottstown area. Pottstown Mercury, 29 July)

Meanwhile, areas from Richmond, Virginia to Elmira, New York and all of Western Pennsylvania became flooded. The magnitude of the disaster was not understood even while it was taking place, but, as information came from devastated areas to Government Agencies and as news media released stories of the flood, disaster relief was summoned from available sources on the Central East Coast.

By 21 June, many of the resources available to a disaster emergency had been totally committed to the flood relief effort. Civil Defence Organizations, National Guard, Red Cross, Coast Guard, Navy, Army and a long list of federal agencies had sent their top personnel. Whole warehouses of materials had been shipped to stricken areas. Skilled manpower resources and emergency funds were becoming depleted.

Saving lives and the protection of property received top priority. (Exhibit 1)

Late at night on 21 June, severe flooding had reached Central Pennsylvania and by 04:30 hours on the morning of 22 June, Coast Guard auxiliaries in Lebanon were mobilizing for flood patrol and relief activities, local commanders phoned Coast Guard Base Gloucester asking for orders. At 09:30 hours the Civil Defense Director of Columbia County requested mobilization of the Coast Guard Auxiliary at Bloomsburg. Capt. R.I. Price, the Commanding Officer at Base Gloucester issued the necessary orders, assigned personnel to coordinate activities and dispatched mobile equipment to the flooded areas for rescue work.

Mobilization of resources was spreading. The Governor of Pennsylvania declared a state of emergency in the Central Pennsylvania area. The Naval Air Force dispatched rescue helicopters from Lakehurst, New Jersey and Willow Grove, Pennsylvania (See Exhibit 2.)

The first warning that flash flooding might be expected on the Schuylkill was received at Base Gloucester at 04:30 hours on 22 June. (Exhibit 3. SITREP ONE)

The first notice that oils and hazardous materials were present in the flood came from areas where rising waters washed out factories and warehouses along the banks of the Schuylkill River and huge inventories of industrial materials were swept into the flood.

Drums filled with many kinds of industrial chemicals floated away from shipping docks and storage warehouses. If these containers were not securely closed, their contents were spilled into the flood. Spilled materials included harmless

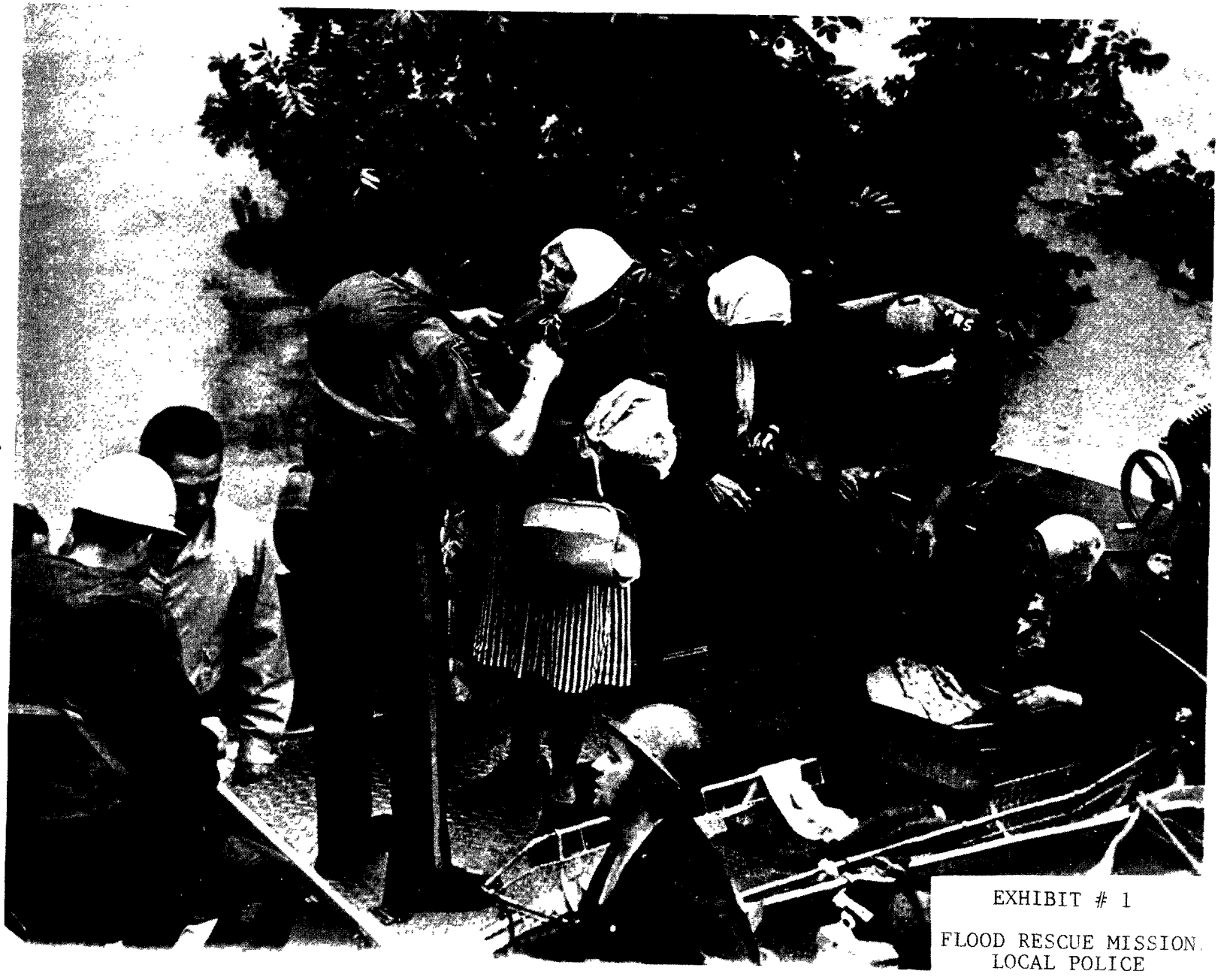

EXHIBIT # 1

FLOOD RESCUE MISSION
LOCAL POLICE

EXHIBIT # 2

RESCUE, NAVY 21

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FM COGARD BASE GLOU
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TO 0
SITREP ONE: CENTRAL AND EASTERN PENNA. FLOODING

1. SITUATION
   A. RECEIVED CALL VIA L/L AT Ø43ØQ FROM MR. STRETLER, COGARD AUXILLIARY, (717 838-3ØØ7) REQUESTING TRAVEL ORDER NUMBERS FOR COGARD AUX. ASSISTANCE IN LEBANON, PA. AREA. HE HAD BEEN NOTIFIED BY PA. CIVIL DEFENSE OF HEAVY FLOODING.
   B. RECEIVED REQUEST AT Ø93ØQ FROM MR. CARL HUNSICKER, CIVIL DEFENSE DIRECTOR FOR COLUMBIA COUNTY, PA. (717 784-3Ø12) REQUESTING COGARD AUXILLIARY ASSISTANCE IN AREA OF BLOOMSBURG, PA. TO RESCUE STRANDED FLOOD VICTIMS.
   C. GOVERNOR OF PA. HAS DECLARED STATE OF EMERGENCY IN THE AREA.
2. ACTION TAKEN
   A. ISSUED FIVE (Ø5) TRAVEL ORDER NUMBERS TO STRETLER.
   B. ISSUED ONE (Ø1) TRAVEL ORDER NUMBER TO MR. RUSS KRESSLER, FLOTILLA COMMANDER, AUX. FLOT. 5-1Ø, DIV. 5 FOR RESCUE WORK IN BLOOMSBURG, PA. AREA.
   C. HAVE CO-ORDINATED WITH LCDR. H. PINTER, DIR. AUX., SA, REGARDING COGARD AUXILLIARY ASSISTANCE. ASST. DIR. OF AUXL, SA, LT. J. TAMALONIS, HAS BEEN DESIGNATED AS AREA COGARD CO-ORDINATOR.
3. FUTURE PLANS
   A. TWO (Ø2) PIECES OF TRANSPORTABLE EQUIPMENT WILL BE RETAINED AT BASE GLOUCESTER FOR POSSIBLE USE IN DELAWARE RIVER WATER SHED WHICH HAS FLASH FLOOD WARNINGS NOW IN EFFECT.
   B. CONTINUE TO CO-ORDINATE COGARD AUXILLIARY ACTIVITIES.
4. CASE PENDS.

BT

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SITREP ONE - Base Gloucester

EXHIBIT # 3

liquids, poisonous or toxic compounds and acids. Even if the drums were secure, there was always the chance that they might be opened by children or by others who did not realize the danger.

Hundreds of drums were reported floating on the Schuylkill River and were beginning to reach the Philadelphia area and the Delaware River. There was a report that 600 barrels of lacquer and un-known quantities of other hazardous materials were involved.

Captain R. I. Price, Commanding Officer at Base Gloucester and Captain of the Port of Philadelphia, organized Coast Guard resources and requested assistance from industries on the Delaware River to gather these floating drums for temporary storage pending identification and return to the owners or for other disposal. He also obtained assistance from the Corps of Engineers at Fort Miflin, Pa., who continued to recover drums and other debris from the river bank and river bottom throughout the clean-up period.

Consequently, when flood waters finally entered the lagoons at Berks Associates late on 22nd of June and the contents of the lagoons poured out onto the flood, the Schuylkill River Flood and Oil Spill became a localized oil spill disaster, literally piled on top of the far greater disaster of a major flood.

Because so many resources had already been committed to the saving of lives and other flood relief problems in Western Pennsylvania, remaining resources capable of dealing with an oil spill did not have their usual reserves of personnel and materials to draw upon.

The fact that the Coast Guard, its National Strike Force and the EPA were able to mount a major oil control and clean-up campaign under those circumstances is a tribute to the planning and organization which had been done in advance and to the dedicated efforts of the personnel concerned.

REACTION TO THE OIL SPILL

It should be noted that all official action through 22 June had been based on the general flood situation and on the specific problem of hazardous materials in drums or barrels. Oil spills were not yet a reality, and the action taken before 18:00 hours on 22 June had been directed only to the hazards identified up to that time.

At 13:00 on 22 June, power failure caused shut-down of the plant at Berks Associates (Pottstown Mercury, 23 June) and at 15:00 EDT the flood waters overflowed the dike and the spill began. (Exhibit 4)

The flood crested at approximately 22:00 hours in the Pottstown area and waters began to recede slowly. By that time most of the contents of the lagoons had flowed into the river. The major spillage took place during hours of darkness.

The very beginnings of the spill may not have been observed because of darkness and because all residents of the Schuylkill Valley were concerned with evacuation of threatened homes, rescue of stranded personnel, saving of property and all the other high-priority activities associated with a flash flood of such magnitude. There is no evidence that word of the oil spill reached the Coast Guard or the EPA on the afternoon or evening of 22 June.

Fortunately, Base Gloucester was planning a helicopter overflight early on 23 June "for survey or assistance." (B. G. SITREPS TWO) Early on that day, Captain Price and Commander Dash of Base Gloucester and Mr. Malcolm Castor of EPA-Phila surveyed the area. There were hundreds of drums and barrels in the lower Schuylkill River. As their flight approached the Pottstown area, patches of black oil were sighted. The river was over its banks on both sides and the oil was spreading over the country side. It was obvious that a new dimension had been added to this major flood catastrophe and that specialists in oil spill clean-up technology should be brought into action as quickly as possible.

Captain Price took action as intended by the National Contingency Plan. He recommended that the Regional Response Team be activated immediately and that Base Gloucester, which was already involved with flood activities, could provide space and logistical support for a Regional Response Center.

Developments followed rapidly. The Regional Response Team, as provided for in the Regional Contingency Plan for Inland Waters, of EPA, Region III was activated, a Regional Response

EXHIBIT # 4

BERKS ASSOCIATES - FLOODED

Center was established in the headquarters office at Base Gloucester and Mr. Castor was designated to serve as On-Scene Coordinator. Authorization was obtained to use the National Contingency Plan revolving fund and personnel from EPA-Phila joined with Coast Guard personnel from Base Gloucester to form the first cadre for the RRT activities. (Details of the day by day activities of the RRT are contained in the following section of this report).

The first recorded notice of the oil spill was included in Base Gloucester's SITREPS FOUR of 23 June, quoting Mr. Castor that the dikes at Douglassville had been overrun by the flood "late 22 June." That report was on the teletype at 16:55 hours Z (12:55 local time). It was followed at about 01:04 hours Z (21:40 hours local time) by the POLREP ONE of the Regional Response Team which listed the actions taken up to that time.

Information about the spill spread rapidly through designated official channels and through the news media and the oil spill began to assume increasing importance among the many emergencies of the Hurrican Agnes Disaster.

From 23 June through 28 June activities of the RRT at Coast Guard Base Gloucester became inter-mingled with the mobilization efforts of a host of Federal Agencies and Departments, their Regional Offices, State, County and Civic agencies. Business, industry and volunteer groups were organizing, and their efforts had to be directed toward definite objectives and coordinated with other activities.

As the flood waters began to recede, continued over-flights and surface observations began to reveal the extent of the oil pollution and several of its unusual characteristics.

1. When the flood waters over-flowed the dikes, a substantial portion of the sludge oil spread over the flooded area downstream for about 15 miles.

2. The river had gone over its banks, and in many areas the oil was carried nearly a mile inland on both sides of the river.

3. The sludge oil was very sticky and heavy coatings of the oil covered much of the foliage, farmlands, roads and structures in the area. (Exhibit 5.)

4. Pools of oil came to rest in ditches, on low-lying fields and on islands in the river.

5. The oil/water mixture flowing out of the lagoons made channels in the dikes and the out-flow continued

Exhibit #5 OIL HIGH-WATER MARK-(NSF Photo)

Exhibit #6 AFTER THE FLOOD - (NSF Photo)

to feed oil into the flooded areas. (Exhibit 6.)

6. The worst pollution was concentrated in the area from Berks Associates at Douglassville to Pennhurst, a distance of about 15 miles.

7. The river continued to carry an oil slick further downstream as oil from the banks drained into the river or was washed into it by rains. (Exhibit 7)

Two contractors had been placed on standby basis to assist in cleaning up the oil pollution "When feasible", but fast currents in the river and continued rains delayed positive action on the oil pollution front. (Exhibit 8) There was general agreement that a major clean-up operation would have to be organized and that the National Strike Force should be called into action. Personnel from that organization had worked on Schuylkill I.

POLREP FIVE published by the RRT covering events of 27 June recorded a meeting with contractors "on a no-fee" basis to discuss a program for combating the oil spill situation. An on-site survey was conducted by a group from EPA, Coast Guard, and interested contractors, and the findings of that group led to the activation of the National Strike Force and change of the base of operations from Base Gloucester to Pottstown on 28 June.

EXHIBIT # 7

HEAVY OIL ON RIVER

EXHIBIT # 8

FAST CURRENT FLOW

ACTIVITIES OF THE REGIONAL RESPONSE TEAM

23 June through 28 June, 1972

The Regional Response Team realized very promptly on 23 June that it was faced with a complicated problem far greater than Schuylkill I.

It would have to deal not only with oil floating on the River, but also with a major oil pollution of river banks, farmland, roads, dwellings and structures of all kinds.

Furthermore, its operations would have to be coordinated with Base Gloucester's on-going program of flood rescue work, recovery of barrels, drums and floating debris on the lower Schuylkill and Delaware River areas.

Note: The Regional Response Team was made up of personnel from USCG, (Base Gloucester) and from EPA-Philadelphia (Environmental Emergency Branch). The National Contingency Plan directed that the OSC be supplied by EPA because the source of the spill on inland waters was in EPA's jurisdiction.

In the 6 days of its operation, the RRT took action on a host of problems. The POLREPS issued by the RRT included these items:

23 June
Overflight of Schuylkill area
Evaluation of Oil Spill Disaster
Activation of Regional Response Team with RRC at Base Gloucester.
Two contractors alerted for emergency action.
Plans to boom New Jersey Creeks to prevent encroachment of oil pollution.

24 June
Continued overflights
Conferences with USCG, USC of E and EPA to assess possibility of containing spilled oil.
Agreed that booms not feasible due to high current velocities.
USCG and C of E continuing Barrel and Drum recovery program.

25 June
Continued over-flights
N J Marine Police assisting in Barrel recovery.
Planning clean-up of oil contamination.

26 June
Overflights disclose very heavy accumulation of oil on flooded areas. (Exhibit 9)
N J National Guard assisting on Barrel recovery.

EXHIBIT # 9. POLLUTION

USCG Cape May alerted on Barrel problem. Vehicle survey in Douglassville confirmed Berks Assoc. to be source of major oil spill. Arranged for deflector booms to protect civic water intakes in Phoenixville area. Collection areas set up for recovered barrels.

27 June Overflights with EPA personnel in flooded area Meeting with contractors to discuss techniques for:

a. Containing oil still leaking at Berks
b. Protection of civic water intakes
c. Oil removal from river
d. Clean-up of oil-soaked vegetation

Joint survey by contractors, USCG, EPA groups. Delaware Civil Defense group added to Barrel recovery program.

Accomplishments of the RRT up to 28 June were considerably more than those summarized in the POLREPS exerpted above. Administration of an RRT operation includes problems of finance, public relations, communications, logistical support for field operations and billeting of detached duty personnel. Every day saw one or more Government Agencies added to the co-ordinated effort.

At the same time that the work load was increasing rapidly, it was obvious that the oil spill control and clean-up effort would soon require hundreds of personnel and many more skills. The problems of oil spill recovery and restoration of the polluted land area were assuming top priority.

Flood rescue had been accomplished and need for flood patrol was diminishing. The Barrel recovery program was working effectively and dangers of pollution in the Philadelphia - New Jersey areas were minimal.

This shift in emphasis was apparent to personnel who had worked on Schuylkill River I. They had experienced difficulties of transportation, logistical support, and communication when administering work crews in Pottstown from a Headquarters at Base Gloucester. Consequently, the question arose, and properly so, as to whether response to the oil spill 40 miles inland should continue to be administered from Headquarters at Base Gloucester.

It was proposed that the Regional Response Center be moved from Base Gloucester, and re-established in the Pottstown area, and that additional personnel from the National Strike Force be activated.

After considerable debate, the evidence was clear that the operation should be transferred to the Pottstown area. On 28 June the RRT was secured at Base Gloucester and the National Strike Force was activated.

In its 6 days of operation, the RRT did not initiate oil clean-up and recovery operations to deal with the oil pollution problem in the Pottstown area. This was due to two factors. First, the flood waters receded slowly and ground travel into the area was difficult until 27 June. Second, the magnitude of the oil spill was not immediately recognized as exceeding "the response capability of the region" on which it occurred, and that "national level involvement" was required. (See National Contingency Plan, Annex III, 1302.1 and 1312.1). Understandably, initial efforts to cope with the emergency were on a Regional basis, but Regional resources were already strained by the flood emergency.

The RRT did employ contractors to place preventive booms across some New Jersey creeks as was done in Schuylkill I, but these soon proved to be unnecessary and they were removed.

Also, the RRT served as a working force to maintain surveillance of the area, to report developments, to work with the Coast Guard on barrel and drum recovery, and to conduct preliminary conferences with contractors on methods for attacking the oil pollution problem when the river flow permitted. The RRT developed a substantial fund of information about conditions in the polluted area, it identified many problems which would have to be solved as soon as the river went back into its banks.

All this information was immedately available to the National Strike Force when that group came on the scene officially on 28 June. On that date the operation began a new phase. Mr. Thomas Massey, EPA Philadelphia, was appointed OSC at Pottstown, relieving Mr. Castor, and top priority was directed to the problems of the oil spill.

Base Gloucester continued its operations on floating drums on the lower Schuylkill and Delaware Rivers and several Base Gloucester personnel were assigned to duty at Pottstown.

Later, Coast Guard Auxiliaries were mobilized for traffic duty at Pottstown. The close cooperation between Base Gloucester and the OSC continued effectively.

Available evidence indicates that the decision to change OSC Headquarters from Base Gloucester to Pottstown was proper. Its effect was to keep the center of operations close to the area requiring the most attention, and to bring to the task

the special skills and equipment of the National Strike Force.

In summary, the Schuylkill II operations involved three different "game plans" within 9 days, and in the process, changed its headquarters from Gloucester City, New Jersey to Pottstown, Pennsylvania. Three different "field commanders" were involved- Capt. R.I. Price, Commanding Officer of Base Gloucester and Captain of the Port of Philadelphia: Mr. Malcolm Castor of EPA - Phila; and Mr. Thomas Massey of EPA - Phila.

While these organizational changes were being made, the characteristics of the disaster changed markedly, and it is to the credit of all personnel concerned that effective action continued at an increasing pace throughout the period and on a 24 hour basis.

ACTIVATION OF THE NATIONAL STRIKE FORCE

Activation of the National Strike Force provided the On-Scene-Coordinator with additional resources. The Strike Force immediately supplied special equipment for communications and for river operations. Many of its personnel had had extensive experience in combating oil spills and they had been training as a specialized team since its formation in the Summer of 1970.

The On-Scene-Coordinator assigned the Strike Force operation to Phase II and Phase III activities as outlined in the National Contingency Plan, while support operations were largely carried out by personnel from EPA, Region III.

The National Strike Force had some advance notice of the problems it would face on 28 June. Several of its key personnel were already familiar with the Schuylkill area and knew the situation at the Berks Lagoons.

Consequently, when word of the oil spill was broadcast on 23 June, Commander Robert Hanson of the National Strike Force began to plan for later involvement in the spill if necessary.

On 26 June, the news of the spill became more serious. OSC Castor had estimated its volume at 8,000,000 gallons. Cdr. Hanson, anticipating a call-up, dispatched CWO Wirt to the Pottstown area to serve as observer for the National Strike Force.

On 27 June, Mr. Wirt accompanied EPA and Coast Guard personnel on an overflight of the area and on a ground level inspection trip to the lagoons at Berks Associates as soon as roads were passable.

At Berks Associates, the lagoons were still pouring their contents into the flood, and large pools of oil on nearby fields were a probable source of more pollution. (Exhibit 17). The group met with Mr. Lester Schurr, Manager of Berks Associates. Mr. Thomas Massey, representing the Environmental Emergency Branch, EPA-Philadelphia, urged immediate action to close those two sources of additional spillage. Mr. Schurr obtained a bulldozer almost immediately, and Mr. Massey agreed that costs would be reimbursed by some Federal source, perhaps the revolving fund. Repairs of the dikes and a restraining wall in the fields were completed that afternoon. (Exhibit 18) This type of action is highly effective when the opportunity to stop all or a portion of a spill at its source is so evident.

Reports from all observers confirmed that the size of the spill and the widespread pollution would require the combined efforts of the National Strike Force, other Coast Guard Commands, the EPA, the Corps of Engineers and many other groups.

Appointment of Mr. Massey as OSC, transfer of the RRC to Pottstown and activation of the Strike Force took place on the following day, 28 June.

Fortunately, many of the administrative problems and some of the operations problems which confronted the OSC could be anticipated as a result of previous experience. For example, the report on Schuylkill One had identified several tasks which could be prepared for in advance of activation of an RRT or of the National Strike Force. Some of those recommendations have obviously been followed. The National Strike Force arrived at Pottstown on 28 June more thoroughly equipped for immediate action than had been the cast in Schuylkill One. Experience on other major spills, additional manpower and knowledge of the area gained in Schuylkill One enabled the Strike Force to fit into the OSC's organization with a minimum of wasted effort.

However, it is axiomatic that no two oil spills are alike and in spite of the benefits of advance planning the OSC and his staff were faced with many new situations which required prompt action.

While the National Strike Force was assigned primarily to clean-up operations, it assisted the OSC in other activities as requested and coordinated its efforts with the several support groups which had been set up.

For example, accurate records, on a day to day basis, are essential to a successful operation. The Strike Force started immediately to issue daily POLREPS, emphasing clean-up activities and technical matters. This supplemented the Daily Log of Events prepared by the OSC; and the two series of reports, plus the POLREPS, SITREPS and Communication files issued from Base Gloucester, have provided a continuing document of the combined operation. (Exhibit 10)

They demonstrate the vast amount of detail work required to combat a major oil spill. The National Strike Force or any other organization dealing with such a spill can expect new problems to develop every day while the operation is in its "emergency" stage. Those problems must be identified, solutions must be found and effective action must be taken if the whole operation is to succeed.

	22	23	24	25	26	27	28	29	30	1	2	3
SITREPS FROM BASE GLOUCESTER	1 2	3 4	5	6	7							
RRT POLREPS		1	2	3	4	5	Final					
POLREPS FROM BASE GLOUCESTER		1					Final					
BASE GLOUCESTER INFORMATION FILE	Messages to and from Cape May, Brooklyn CG HQ, III Dist. HQ, OSC, CG East											
STRIKE FORCE POLREPS							1	2	3	4	5 (cont.)	
DAILY LOG OSC							6/28	6/29	6/30	7/1	7/2 (cont.)	

S C H U Y L K I L L T W O

OFFICIAL RECORDS OF FLOOD CLEAN-UP OPERATIONS

(22 June - 3 July)

1972

EXHIBIT # 10.

The DAILY LOGS and POLREPS are very effective in listing the problems, actions and results. Exhibit 11 shows, for example, that in the period 28 June through 8 July there were nearly 475 items recorded in the POLREPS and DAILY LOGS.

In order to eliminate a mass of detail and to concentrate on major items for the purposes of this report, selected items from each DAILY LOG and POLREP have been extracted and listed on a single "Daily Events" page quite similar to the POLREP in outline form. (Exhibit 12)

By working from this "Daily Events" list of major problems, it has been possible to identify the date on which each new problem appeared, the time needed to work out a solution and the additonal time needed to implement the solution so that the problem could be considered closed.

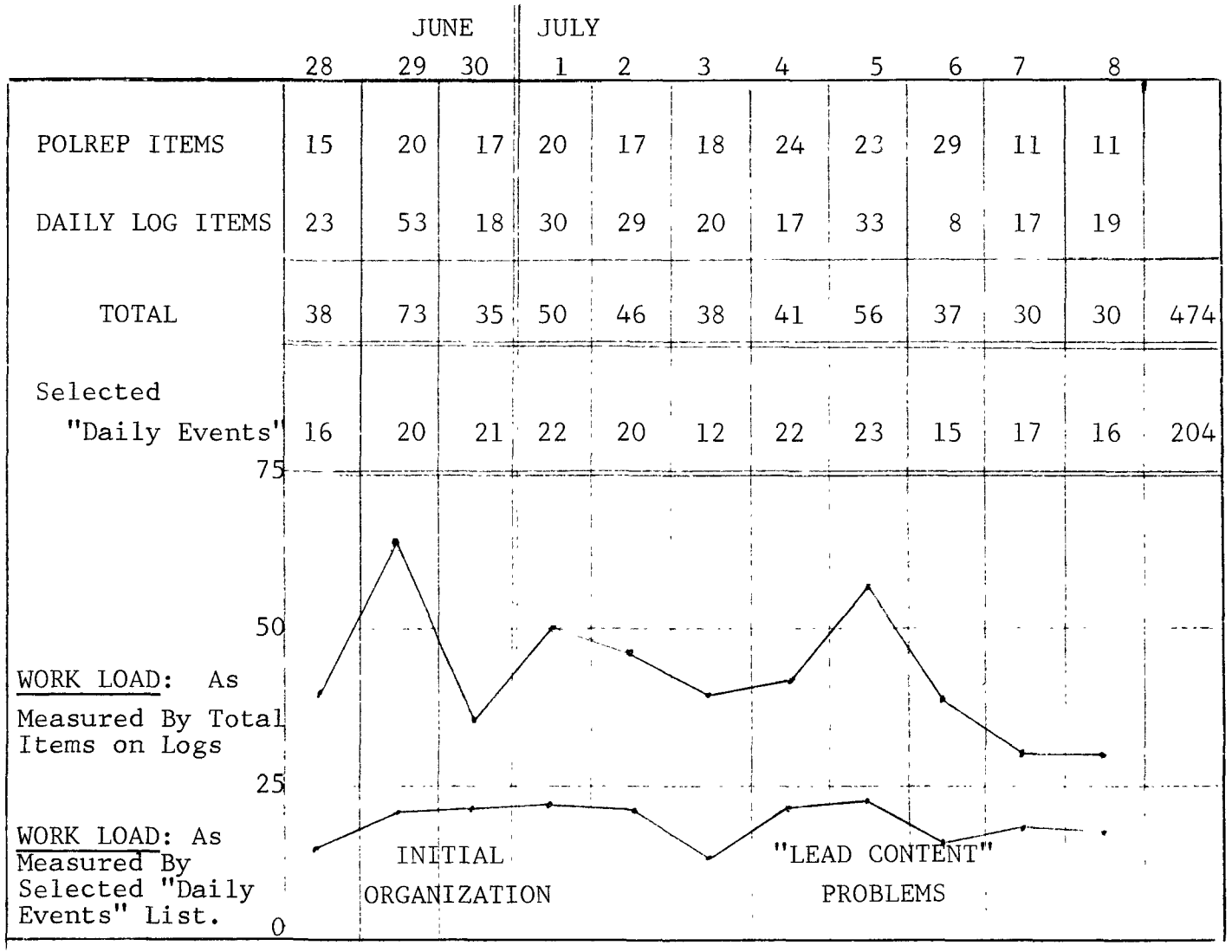
For example, Exhibit 13 lists 17 major problems which faced the OSC and his staff on 28 June. There were 9 problems identified with Administration. Most of these were routine, but recruitment of skilled personnel required a nation-wide search of Federal agencies, State agencies and industrial sources. The personnel problem continued for weeks.

5 problems were related to Oil Control Operations, but each one was a special case because of the nature of the spill, the materials spilled, the difficult terrain and the need for developing new clean-up methods or adapting old methods to the needs of this emergency. Consequently, those problems required many days of survey and research effort before satisfactory answers were developed.

3 major technical problems were recognized. Sampling of the river bottom was assigned to Ocean Science and Engineering under an emergency BOA contract. New clean-up techniques would be required to handle the polluted foliage and debris. Detailed survey of the area was needed to identify other technical problems as quickly as possible.

Some problems were solved almost immediately. Others remained on the "active" list for weeks, particularly those related to the development of new technology or disposal problems which encountered militant opposition from environmentalists.

Exhibit 14 lists the 9 selected problems of Administration encountered on 28 June and 3 additional items which showed up on the 1st, 2nd and 5th. Of the 12 problems in this category, only one was still unsolved as of 8 July.



S C H U Y L K I L L T W O

WORK LOAD BY DAYS, MEASURED BY PROBLEMS REPORTED

EXHIBIT 11

S C H U Y L K I L L T W O

DAILY EVENTS - Thursday, 29 June 1972

OFFICIAL SOURCES:

Situation Reports:

Action Taken:

1. Material
2. Personnel
3. Inter-Agency Support
4. Surveys and Research
5. Containment Clean-up and Disposal

Objectives and Plans

Other Sources of Information

EXHIBIT # 12

"SPECIAL EVENTS" Form

MAJOR PROBLEMS IDENTIFIED ON

28 JUNE 1972

ADMINISTRATION

- Office Space
- Communications
- Lodgings
- Staff Personnel
- Public Relations Contacts
- Contracting and Purchasing
- Legal Assistance
- Visitors
- Disaster Relief

OIL CONTROL OPERATIONS

- Protection of Sensitive Areas
- Filter Fences
- Location of Booms
- Disposal Site for Oily Waste
- Incineration of Oily Debris

TECHNICAL

- Samples of River Bottom
- Plan Clean-Up Operations
- Survey of Polluted Area

ADMINISTRATION PROBLEMS: 28 June - 8 July (inc.)

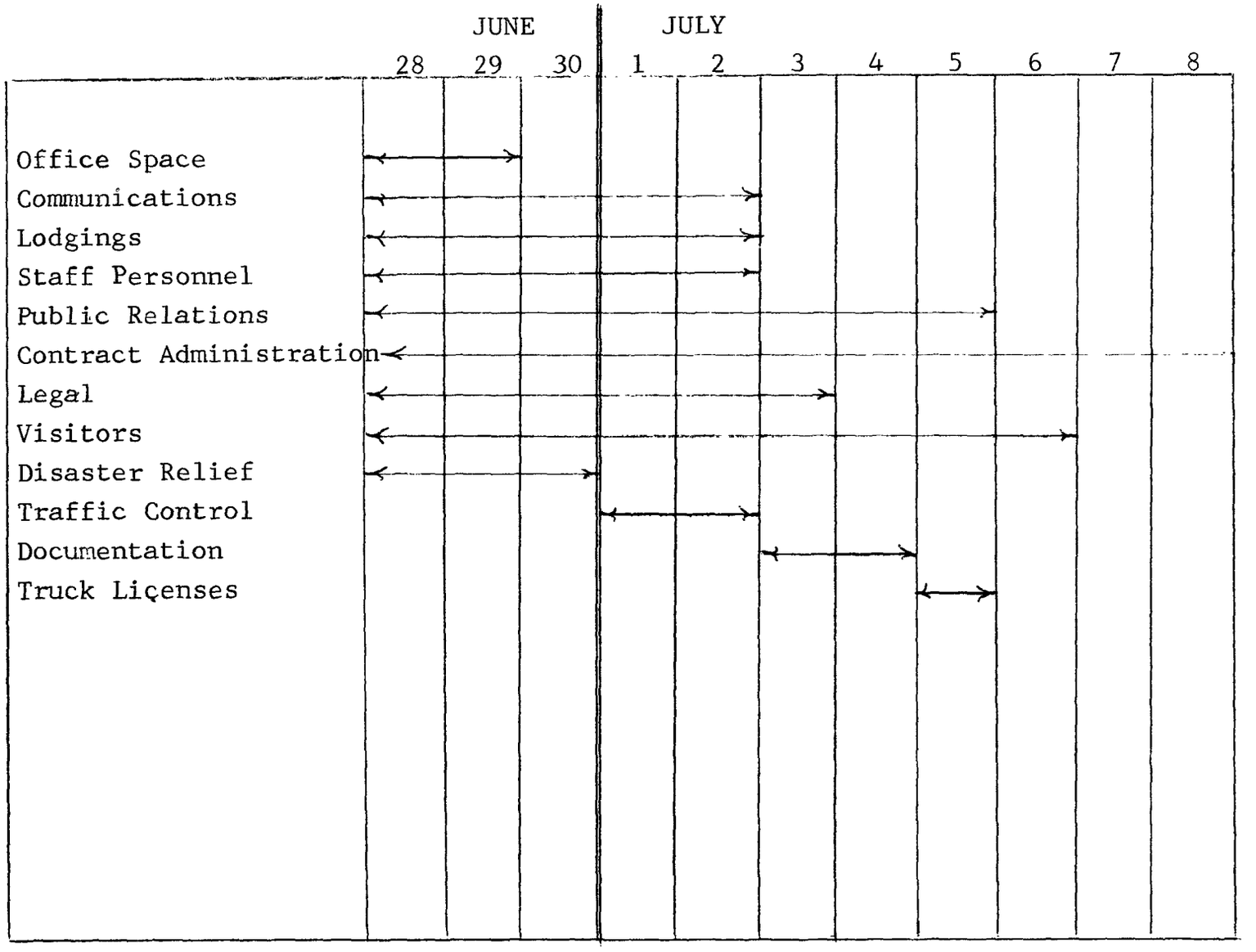


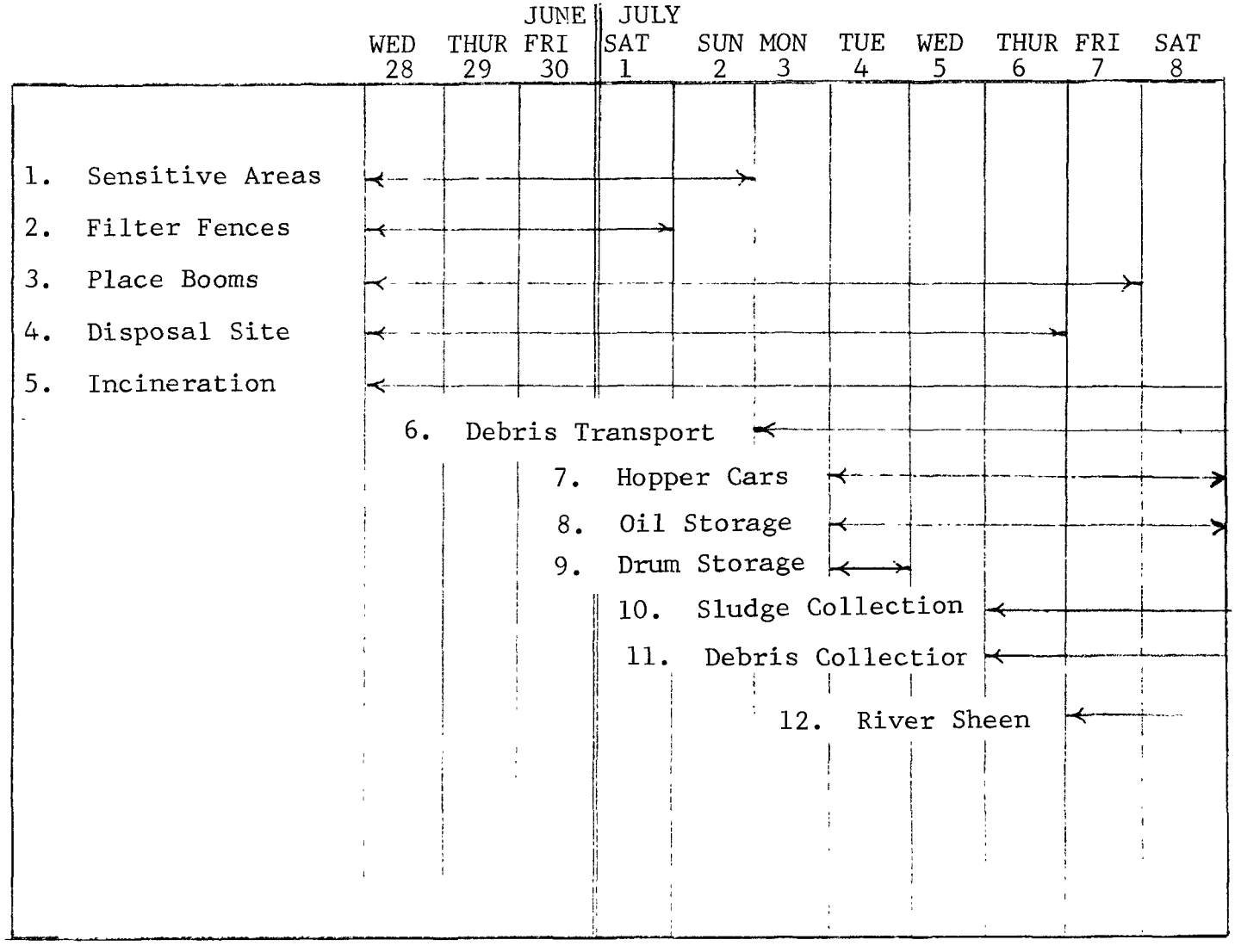
Exhibit 14

Exhibit 15 lists the 12 selected Operations Problems recorded from 28 June through 8 July and 7 of those were still un-solved on that date.

In the same manner, Exhibit 16 lists 3 major Technical Problems evident on 28 June and 5 more which appeared later in that period. Some of these problems required intensive survey and research before workable solutions could be found.

Review of the calendar chart exhibits for this period gives some idea of the task faced by an OSC in coping with so many tasks in a short time and while working under the almost unbelievable pressure of an emergency situation.

The availability of the National Strike Force was a major factor in freeing the On-Scene-Coordinator from some of the time-consuming problems of oil control and clean-up so that he could give adequate attention to the many other broad responsibilities of his office.



SPECIAL OPERATIONS PROBLEMS: 28 JUNE - 8 JULY (inc.)

EXHIBIT # 15.

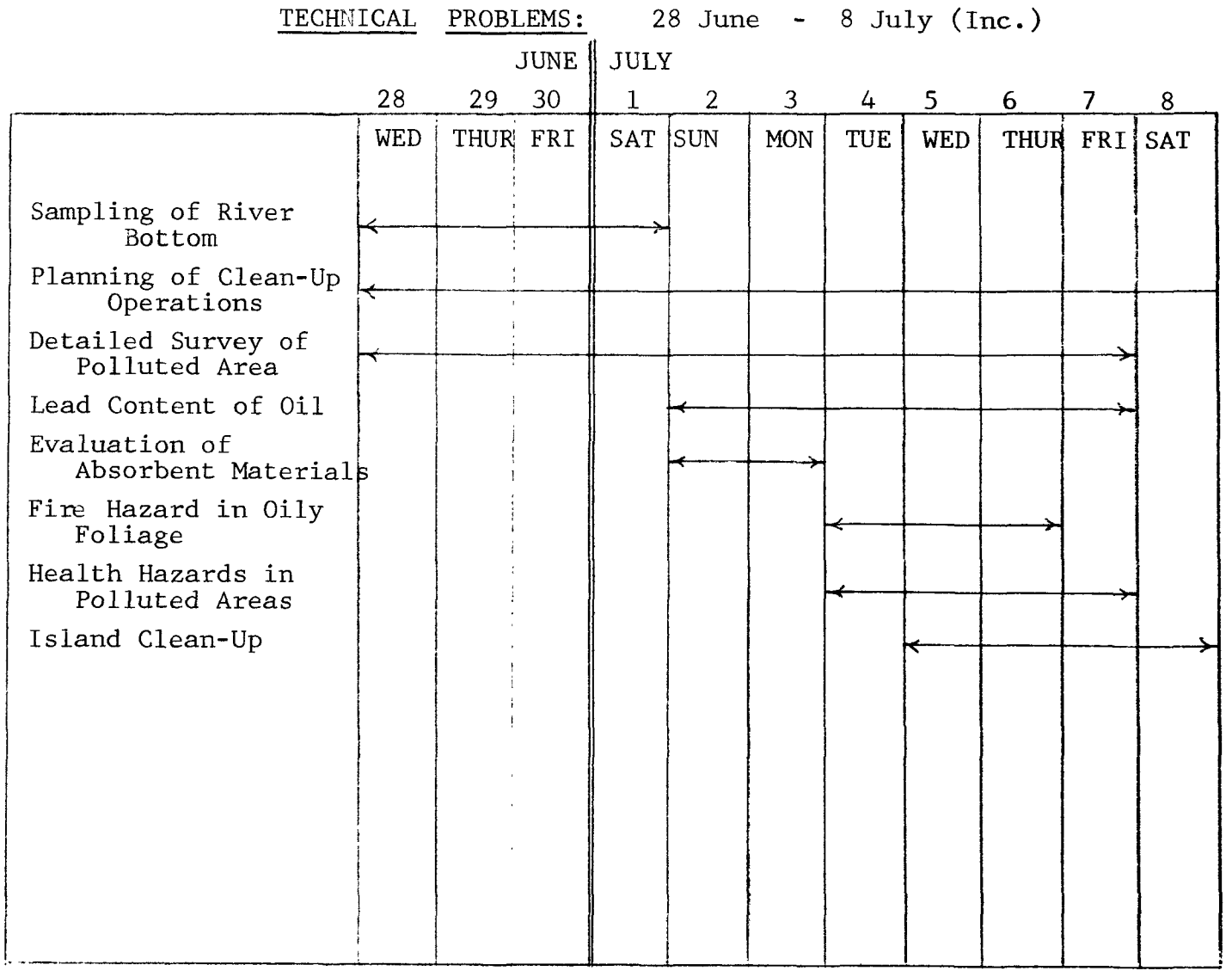

TECHNICAL PROBLEMS: 28 June - 8 July (Inc.)
JUNE
JULY
28 29 30 1 2 3 4 5 6 7 8
WED THUR FRI SAT SUN MON TUE WED THUR FRI SAT
Sampling of River Bottom
Planning of Clean-Up Operations
Detailed Survey of Polluted Area
Lead Content of Oil
Evaluation of Absorbent Materials
Fire Hazard in Oily Foliage
Health Hazards in Polluted Areas
Island Clean-Up

Exhibit 16

EXHIBIT # 17 LIQUID OIL IN STREAMS

EXHIBIT # 18 LAGOONS REPAIRED AFTER SPILL

NARRATIVE: 28 June - 8 July 1972

On 28 June Thomas I. Massey was appointed from EPA-Phila to act as OSC and the National Strike Force was activated. He made an immediate over-flight of the polluted area in company with Cdr. Robert Hanson and CWO Wirt of the National Strike Force, and Dr. Allen L. Jennings of EPA-OHM, Washington. Pollution on the river and on the flood plain was appalling.

In the first day of Strike Force action, temporary office space was found, telephone service was established and a mobile unit for communications was requested from the Coast Guard and placed in operation.

Base Gloucester supplied officer personnel who had worked on Schuylkill One. Additional personnel were requested from the Pacific National Strike Force based at San Francisco, from the U. S. Army Corps of Engineers, and from EPA-OHM in Washington.

Two contractors were authorized to start clean-up operations immediately each in a specified area. One concentrated on the installation of filter fences near Douglassville. Another started planning for deployment of booms and vacuum trucks for oil containment and recovery operations. (Exhibit 19)

It was immediately recognized that the spilled oil contained high concentrations of toxic metals and potentially toxic chemicals. Dr. Jennings took action to collect samples of the oil and of the river bottom for analysis by Ocean Science and Engineering.

At this point the impact of the total flood disaster became very evident. The need for help in all areas was critical, and many agencies which could normally supply clerical personnel or technical personnel had already been stripped of their staffs while the disaster was only a flood and not yet an oil spill. Nevertheless, a staff was assembled, and although personnel were in very short supply the paper work system did begin to function.

During this very hectic period, personnel who had previous oil spill experience proved invaluable in meeting the emergency problems. Captain Price assigned Lt. Kangeter and RD 2 Gill from Base Gloucester. Commander Hanson and CWO Wirt from the National Strike Force were already familiar with the area and had worked on Schuylkill One. Dr. Jennings of EPA-OHM provided technological assistance on chemical and biological matters. Mr. Thomas Massey, newly appointed OSC,

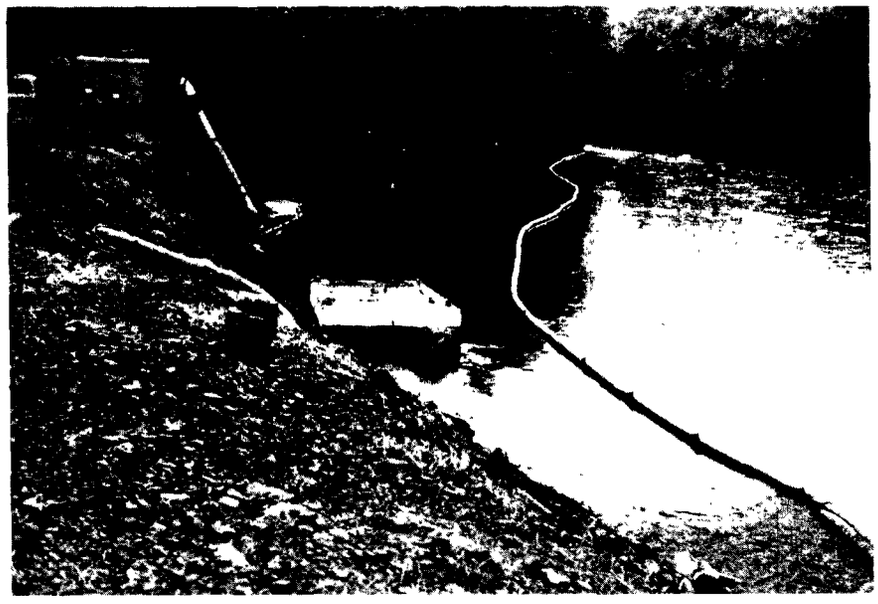


EXHIBIT # 19 BOOM BARGE AND VAC-TRUCK(South Bank)

EXHIBIT # 20 DIVERSION BOOM (North Bank)

had recently attended an OSC training course conducted by the EPA in Athens, Georgia.

These personnel were resourceful, they had a background of oil spill experience to draw upon and they were dedicated to solving the problems encountered. Such people can work together effectively without organization charts or specific guide lines under emergency conditions. And at the end of the first day's activities, the ground work had been laid for mobilizing an effective operation.

On 29 June progress was made on administrative matters and on assembling the materials and experienced personnel needed for an expanding effort. Cdr. Hanson requested immediate orders to transfer Chief Don Alberts from USCG Base Yorktown to temporary duty with the National Strike Force at Pottstown. Chief Alberts was experienced in many phases of oil spill operations and was appointed Technical Assistant to the OSC.

Additional office space was an urgent requirement. Through Mayor Yerger the OSC obtained space at the Washington Elementary School in Pottstown. The quarters were suitable for the OSC Staff and the National Strike Force and were used until the entire operation was terminated at the end of September.

By the end of the day, testing equipment for river bottom samples had arrived, 16 Coast Guard Personnel were on the scene including a cadre from the Pacific Strike Force at San Francisco. The Pennsylvania Department of Environmental Resources was asked to supply a staff man for liason purposes but the flood effort had taken precedence and they were unable to comply.

Several surveys of the area were conducted by air and by ground transportation. Reporters from the news media traveled throughout the area, usually accompanied by the OSC or Coast Guard personnel. Mr. Furia, Regional Administrator of EPA-Phila took part in surveys and outlined legal problems.

Top priority in combating the oil spill was to reduce leaching of oil from the lagoons and to protect the water intakes of cities down stream of Douglassville. Deflection booms were installed around the water supply intakes at Pottstown and at Pennhurst, at Black Rock Dam, and Kenilworth, but other clean-up operations could not be effective at this early date because rains had raised the level of the river again and this secondary flood did not crest until late on the 29th. Ground travel was restricted in many areas, and

air survey was restricted because of much of the polluted area was shielded from view by foliage.

Nevertheless, the contractors were set to work on oil recovery operations. Clean Water, Inc. began installation of a filter fence at Douglassville Bridge duplicating a fence which had been at that point in the later stages of Schuylkill One.

Under Water Technics, Inc., began the placing of diversion booms at various sites where heavy concentrations of oil on the river could be guided into quiet coves or back waters for skimming operations. (Exhibit 20,21)

The Corps of Engineers had taken emergency measures to protect the Phoenixville Water Supply inlet. A deflection boom had been installed. The Strike Force, now on hand with contractor crews working on the river, assumed the responsibility for maintaining that protection.

Air and ground transport were planned for news media, Mr. Furia, Mr. Massey and Cdr. Hanson. Briefing sessions were provided.

On 30 June the rain had stopped and there was welcome news that the water was no longer rising. Oil continued to flow into the river as a result of the rain and a heavy sheen of oil was visable.

A third contractor had been employed. Nepco, Inc. from Connecticut arrived on the site with two trucks, equipment and five men. They were assigned to a third area of operations.

Additional personnel from the Pacific Strike Force arrived bringing the Coast Guard total to 29 and to 10 from the EPA-Philadelphia.

The problem of cleaning or removing polluted foliage was pressing. (Exhibit 22) Joint discussion with the Pennsylvania Bureau of Sanitation engineers and the USC of E brought promise of additional manpower on that project. In addition, state and county agriculture specialists expressed the belief that oil covered branches and leaves need not be stripped from trees. It was felt that such action would be more likely to kill the trees than would the coating of polluted oil. Mr. W. R. Ruckelshaus, Administrator of EPA, arrived for a survey, briefing and a description of problems. Disposal of polluted materials was high on the list and the possibility of incineration was discussed.

EXHIBIT # 21 DIVERSION BOOM (South Bank)

EXHIBIT # 22 POLLUTED FOLIAGE WAS NOT REMOVED

Contractors completed work on two filter fences and started spreading absorbents on the river banks. The value of filter fences was questioned and a survey of their effectiveness was planned.

Fiscal arrangements with contractors began to emerge as a difficult problem. Contracting officers understandably hoped for firm estimates of the work to be accomplished, but such estimates could not be supplied at this date.

Every day brought its list of new areas to be cleaned, unforeseen problems of transportation and collection of oil soaked debris. The problems seemed likely to continue indefinitely. (See special reports section)

On 1 July the water level was definitely receding and the oil sheen was still visable on the river surface.

Equipment deployment and clean-up operations gathered momentum. The Strike Force received three boats and a truck and built one raft on the site. The Pennsylvania National Guard provided a helicopter and capable pilots throughout daylight hours (Exhibit 23). Pennsylvania C. of E. provided a work barge and contractors ordered more vacuum trucks.

Special problems required more intensive investigation and the OSC arranged a conference with the C. of E. in Pottstown to discuss the removal of oil soaked foliage. (Exhibit 24) Special over-flights were planned to locate areas which required priority action and Ocean Science and Engineering, Inc. personnel arrived to begin a program of water sampling and technical field support.

The Pilot Research and Development Corp. employed to consult on chemical problems suggested the possibility that contamination might be present in the river bottom area due to the concentration of poisonous materials in the oil sludge.

After three days operations, it became evident that the filter fences were not as effective on this spill as had been hoped. They required excessive maintenance, the sorbents had to be replaced frequently, the sorbents were expensive and their capacity to clean-up the oil sheen was not sufficient. A decision was made that no more filter fences would be installed.

On 2 July the flood waters were at normal level within the river banks and the river was flowing at about 2.5 to 3 knots in Pottstown at the Hanover Street Bridge.

EXHIBIT # 23 PENNSYLVANIA NATIONAL GUARD HELICOPTER

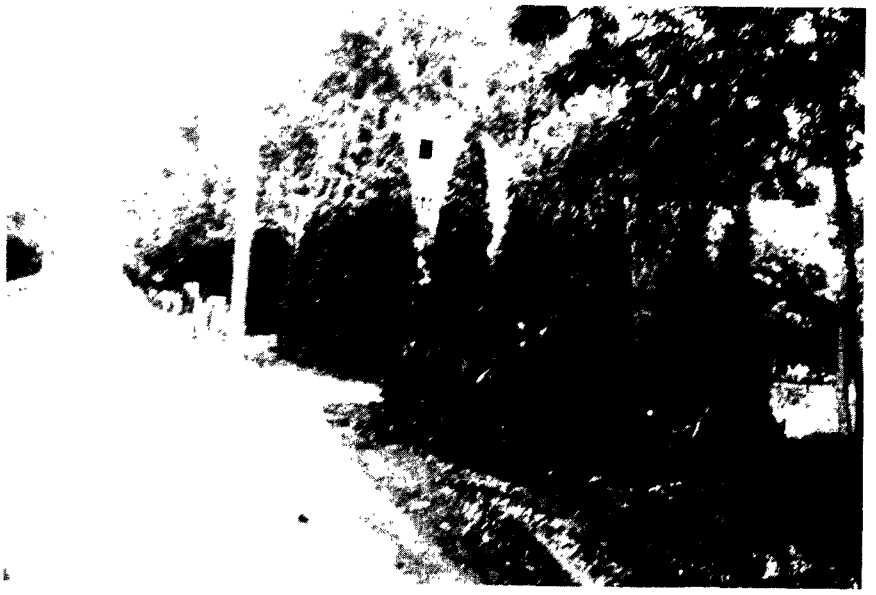


EXHIBIT # 24 OIL SOAKED FOLIAGE

Hot weather accelerated the evaporation of oil from ground and foliage. There was a possibility that fumes could become explosive and generate a fire hazard. Local and State fire officials were asked to investigate.

Ocean Science and Engineering reported that the sludge contained 16,500 parts per million of lead. This is an unusually high lead content. It is considered dangerously toxic and it suggested the need for immediate analysis of its potential for poisoning by contact and drinking water used by animals.

Reaction to that report resulted in the following:

1. All land-fill disposal plans were halted.

2. The City of Philadelphia started checking its water supply for lead content.

3. The State of New Jersey was notified and the OSC agreed to take back 10,000 gallons of waste already dumped in a New Jersey land-fill.

4. Pennsylvania Soil and Conservation Services notified farmers and dairy men.

5. The water sampling program was expanded. The Pennsylvania State emergency office in Reading agreed to assist this effort.

6. Decision made to use railroad tank cars and hopper cars for temporary storage of oily waste.

7. The news media warned the public of the dangers of any contact with the oil sludge.

8. The search for suitable disposal sites was continued.

Ocean Science and Engineering and the Pennsylvania Dept. of Agriculture predicted that most trees would survive the oil coating on their leaves.

On 3 July the danger of any future flooding was past but, the oil sheen continued on the river and was expected to increase, because rain showers and hot sun caused additional leaching of oil into the river.

The search for temporary storage produced five railroad tank cars in North Carolina. Delivery of the cars across Virginia and Pennsylvania on five railroad systems required intensive expediting.

Cdr. Hanson handled this problem and worked with railroad offices in Pottstown and Reading, with Mr. Iverson of the Interstate Commerce Commission and Major O'Leary of the Department of Defense Transportation Office in Brooklyn. After cars were located and needed repairs were planned, Lt. William Mueller of the Pacific Strike Force was assigned to follow through on the details. Continued pressure brought results and the project eventually dispatched more than 10 loaded cars per day to a disposal site recommended by the Pennsylvania Department of Environmental Resources.

The presence of lead poisoning in the polluted area offered such a threat to residents of the area that the Pennsylvania Dept. of Environmental Resources found necessary manpower to coordinate with Strike Force activities. All local water companies, civic officials, EPA-Phila and the DER met in conference with Mr. Kenneth Biglane of EPA, OHM-Wash., D. C.

It was finally decided to discontinue the filter fence at the Douglassville Bridge.

Commander Robert Hanson of the Strike Force and Mr. Thomas Massey, OSC, agreed that additional help was needed to provide a documentary record of the Schuylkill Two and the operations of the Strike Force. The authors of this report received telephone notice of this decision at 15:00 hours local time on this date. Mr. Altenburg and Mr. Kirk of the documentation team departed from Portland, Maine that evening and arrived in Pottstown on 4 July 1972.

On 4 July the flood waters had subsided and the river was inside its banks. A heavy oil sheen was apparent on the river surface.

Members of the documentation team arrived early on 4 July and signed in. The receptionist's desk found good motel accomendations promptly and arranged for a helicopter overflight of the area and for a briefing session with Thomas Massey, OSC, and Cdr. Hanson of the Strike Force.

It was immediately evident that the operations room for Schuylkill II was functioning far better after 5 days occupancy than had been the case on Schuylkill I. The room was larger, maps of the area were adequate, the communications system included recorders, video tape equipment and copying machines.

Sections of the room were adequately marked:

1. OSC desk
2. Reception area
3. Coast Guard Operations
4. Contracts
5. Legal
6. Public Affairs
7. EPA
8. Office Services

There was also a large conference room for briefing sessions and projection of video tapes.

Each section was staffed with at least one specialist plus assistants, had its own phone and was functioning with some effectiveness. The administrative groups were handling most of the routine contacts and house-keeping chores and the OSC and Coast Guard Strike Force personnel could concentrate on the problems of the flood and spill.

By this time the clean-up operation was spread over an area of 15 miles on both sides of the river. After a first reconnaissance of the area on 4 July, it was evident that a lot of work was being done, but there were several problem areas which would require better direction and more supervision.

There were:

1. Planning and Supervision of Contractor Operations

   This included the assignment or work areas, communications problems, clean-up techniques, additional manpower requirements, sources of materials and supplies, fiscal arrangements, deployment and use of equipment, scheduling of daily briefing sessions with contractors.

2. Disposal Problems

   These included methods for picking up and collecting oil soaked foliage and debris, pools of free oil and topsoil covered with oily sludge.

   Temporary storage for large quantities of the polluted materials was an intermediate operation to be followed by transport to a final disposal site. No adequate disposal sites were available. Being considered were land fill sites, refineries for the processing of free oil and an incineration process for burning foliage and branches.

3. Health Problems

   The public, workers and livestock in the area were exposed to poisoneous hazards. Public health officers were alerted to the problem and asked to set up a safety program.

4. Support for the Labor Force

   It was evident that the labor force would reach several hundred people before the job was finished.

Many of these were transient workers who required housing and food in addition to protective clothing and transportation.

At this point the daily roster listed 24 EPA personnel and nearly 30 from the Coast Guard. The problem of keeping Key Personnel advised of the day to day developments prompted OSC Massey to initiate a series of daily briefings, usually in late afternoon to review the major problems and to receive suggestions for their solutions. In many cases, decisions could be made on the spot after hearing from various department heads concerned. It became necessary to schedule these early enough in the afternoon to give contractors time to incorporate the decisions into their work schedules for the following day.

Typical of the sessions were the items discussed in the following paragraphs:

Lt. John Spreter of the Strike Force pointed out that vacuum trucks in the Berks area were full of liquid oil and sludge and had no place to dispose of their contents. He suggested that these trucks be permitted to unload their contents into one of the Berks lagoons for temporary storage until a permanent disposal site could be found.

Search for a disposal site was not successful and showed no promise of being completed within the next 48 hours. So permission was requested and obtained from EPA-Philadelphia to repair one of the lagoons at Berks, and to use it for temporary storage. It was agreed that the lagoon would be emptied permanently just as soon as the disposal problem could be solved.

Cdr. Hanson reported that 20 railroad tank cars had been started toward Douglassville but their arrival was indefinite. Also, the hopper cars being procured required repairing and sealing of the bottoms so that oily debris would not leak out in transit. It was estimated that upwards of 50,000 cubic yards of oil soaked debris would have to be transported in those cars to some as yet unknown site.

It was reported that contractors were frequently delayed in their operations pending receipt of specific instructions or permissions on environmental problems. Chief Alberts suggested that a Coast Guard officer and an EPA man should be assigned to work with each contractor in the field and to make decisions on operations and environmental matters in the area served by the contractor. This procedure was put into effect and later proved to be very successful in avoiding delays pending a decision from the OSC.

Groups working on clean-up had reported that wide spread use of absorbent was not working as well as expected and that its continued use should be reviewed and evaluated.

Islands began to appear in the river as the level of the water dropped. Pools of free oil were apparent on many of these islands. This raised the problem of transporting that oil to the mainland for collection and disposal. Manpower seemed to be the only immediate answer and bucket brigades were formed. This proved to be time-consuming and back-breaking work, but it did move a large volume of oil. (Exhibit 25)

Warm muggy weather was releasing fumes from the oil in low lying areas along the river bottom and this raised the possibility that toxic fumes were being breathed by the workers. It was agreed that no workers would stay in such an area for longer than six hours and that supervisors would watch carefully for any symptom of distress. It was also agreed that more help and medical expertise should be requested to monitor this problem.

Contractors had been requisitioning additional personnel and at the close of business on 4 July, Clean-Water, Inc. was using 60 laborers, Nepco had 35 to 40, and Underwater Technichs had employed 20 in their respective areas.

The clean-up and collection of polluted debris had not yet reached an effective stage. Each contractor was confronted with a series of different problems in his own area and he tended to use his own equipment in the manner that seemed the best to his own group. There was no uniformity in clean-up methods and it was very evident that the clean-up process as presently operated was expensive, slow and not always the best method for the environment.

The one common denominator which would help resolve this problem was to find a satisfactory disposal site for polluted waste. Efforts were going forward on many fronts to solve this problem. Unfortunately, in the time interval between Schuylkill One and Schuylkill Two, the general public had become very "gun-shy" of any material contaminated by oil. And public resistance to normal land-fill disposal was encountered in nearly every area that was investigated.

Nevertheless the investigation was continued and the fact that it was ultimately solved was another indication of the determination with which the OSC, the EPA and the Strike Force staffs attacked these new and difficult problems for which there was no precedent.

The problem of cleaning oil off the surface of the river was

EXHIBIT # 25 "THERE'S NO SUBSTITUTE FOR MANPOWER."

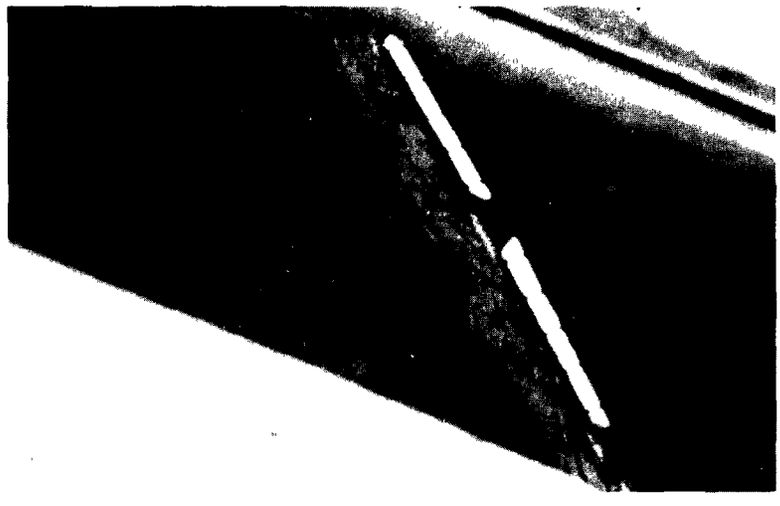


EXHIBIT # 26 DIVERSION BOOM AT HANOVER ST. BRIDGE

Note: RIVER FLOW IS FROM BOTTOM TO TOP. SHEEN TO LEFT OF BOOM IS COLLECTED INTO A SLICK OF HEAVY OIL ALONG BOOM, LEAVING SURFACE OF RIVER CLEAN DOWN-STREAM OF BOOM.

not receiving sufficient attention. Oil sheen on the river was a hazy light blue in color. Coverage was spotty.

Consequently, it looked relatively harmless. And priority was being given to the heavy accumulation on the river banks and the pools of free oil.

Nevertheless, a great deal of free oil was still showing on the surface of the river. The only attempt to attack that problem had been the initial installations of filter-fences which proved ineffective because of high currents and high volume of oil earlier in the spill.

Fortunately, no one wasted time by trying to put a boom directly across the river to contain the sheen. All the contractors.on the job had learned from previous experience that such a boom would have been ineffective. They did bring to this operation some knowledge of diversion boom techniques and such booms were installed at several points where heavy leaching of black or brown oil was flowing from the river banks. (Exhibit 26)

Here again, however, there was no uniform method for cleaning up the pools of oil which collected in the downstream end of these diversion booms. At one point, vacuum trucks were used; at another a bucket brigade was used to clean out the pools and still other cases where diversion booms were used, it was reported that the booms were left unattended and the oil eventually underflowed the boom when the capacity of the boom was exceeded.

The situation was not surprising. Very few people have had experience with diversion boom techniques and the recovery of oil from the pool created by those booms.

The OSC, Mr. Massey, had not had direct experience with that problem and he depended on Strike Force personnel for solutions to it. They, in turn, were primarily concerned with starting an effective clean-up along the river banks and with coaching the operations of the contractors. Consequently, the problem of cleaning oily sheen from the surface of the river remained on the research and survey agenda for several days.

In summary, Schuylkill Two had generated many problems which had never been encountered before. Some problems were quickly solved, others were being researched carefully and methodically and still others were baffling to all concerned and would require continuing effort in order to arrive at a workable solution.

On July 5 the official records indicated that clean-up operations were beginning to gain momentum. It was estimated that 24,700 gallons of liquid oil and sludge had been collected on that date.

Progress was evident on several fronts and the OSC planned a comprehensive review of the operations for late afternoon. This type of daily meeting with staff and key personnel was proving to be very effective in keeping all phases of operations on target. All participants at the meeting had an opportunity to express opinions, report new problems, and recommend solutions. The following minutes of the meeting (compiled by documentation team) are indicative of the many subjects covered on this date:

1. Health Problem. It had been recommended that personnel who experienced long exposure to polluted air should be given blood tests. There was also a continuing sampling program utilizing hydrocarbon air samplers of samples by Air Emergency Episode Office in Research, Triangle Park, North Carolina to detect the presence of any hydrocarbons in the air. Preliminary tests indicated that no danger - ous concentrations of fumes were present, but continued monitoring of the problem was planned. (Air pollution never did become dangerous.)

2. Drinking Water Supplies in the area were being sampled periodically. No dangerous conditions developed.

3. Liquid Oil removed from pools was being stored in the lagoons at Berks Assoc. on a temporary basis as authorized.

4. More booms were deployed to control leaching from the river banks into the water. Continued rain was expected to accelerate the leaching process.

5. Bucket brigades were working effectively to recover oil from pools in remote areas and on the islands.

6. The drum removal program was going forward satisfactorily. The Corps of Engineers was supplying a Land-Rover to haul drums to a storage site set up in Pottstown where local police provided security for the storage area.

7. Liquid oil recovered was being stored separately from recovered sludge. It was hoped that a refinery could be found to process liquid oil while sludge was expected to go to a land-fill disposal site.

8. The rail car procurement program was making progress. 20 tank cars were on order and the first one was expected on 7 July. 10 hopper cars were available and holes in their flooring were being sealed.

9. The state of New Jersey again emphasized that there should be no more dumping of oil waste within its boundaries.

10. County Commissioners of the three counties in the polluted area passed resolutions confirming that the clean-up operations by the Federal Government were necessary and legal and should be continued.

11. Plans to incinerate polluted waste and debris and to monitor lead emissions were continuing. A test pit was being prepared on the grounds of Berks Associates and the first test was planned for 7 July.

12. Extra labor was required. Originally 500 people were requisitioned. But the logistics of housing, sleeping and feeding so many caused a reconsideration. Local Red Cross and Salavation Army facilities had already exhausted their resources and were unable to provide further assistance. Personnel needs were revised to a level which could be administered by the contractors.

13. Ocean Science and Engineering, Inc. personnel reported that open pit burning of polluted materials would probably be unacceptable because of excessive air pollution.

14. Mr. Van Cleave of EPA and Chief Alberts of the Strike Force reported good progress on stationing a Strike Force officer, plus an EPA representative to act as a supervisory team with each contractor.

15. Operational areas for each of the three contractors were reviewed and assignments were revised.

16. Lt. Kangeter of Base Gloucester asked about possibilities of a final check point to prevent surface oil from flowing downstream beyond Black Rock Dam.

17. Mr. Van Cleave reported in detail on operational progress for this date. At the Berks Associates area, clean-up in the fields was moving forward. Pools of oil in the Hanover Street area were being cleaned up by hand on the islands in the river, and additional diversion booms had been placed around the island.

18. Opinion was expressed that substantial increase would be needed in the labor force and the possibility of using the National Guard was discussed.

19. Additional tank trucks were needed, and the Governor of Pennsylvania authorized un-licensed tank trucks to operate on highways during the emergency. State Police were notified.

It was evident that the efforts of the OSC and his staff were beginning to whittle away at the problems, but the major problems of disposal, efficient clean-up operations, health situation, contract administration and fiscal problems remained.

On 6 July a report was received that the State of Pennsylvania had located a possible land-fill site. This was most encouraging. It indicated that a break through in the disposal problem might be imminent.

Continued sampling of air, water and the materials in the polluted area indicated that there were no dangerous conditions. Recovery of liquid oil from swampy areas along the river was accelerated by the use of mule and horse power.

The first railroad car arrived and was loaded with sludge.

Mr. Furia, the EPA Regional Administrator made an on-scene inspection. Mr. Kenneth Biglane of Washington EPA, OHM, was present for an extended visit, and for survey of overall activities.

Pick up of liquid oil and polluted debris was accelerating.

The Corps of Engineers unit stationed at Pottstown reported that it had completed its plans for cleaning up of foliage and debris on the river banks and would be ready to start operations on a small scale within a few days.

On 7 July occasional rain showers persisted, and an oily sheen was still apparent on the river surface but the clean-up operation on the banks was accelerating.

Contractors needed additional supervisory personnel because more manual laborers were employed.

Berks Associates prepared to resume oil reclaiming operations but they planned no further use of the lagoons. Everyone concerned with the operation was agreed that as soon as the temporary storage program at the lagoons came to an end, the lagoons should be eliminated.

The collection of oil pools and polluted debris on the river banks and adjacent areas was progressing satisfactorily although there were many areas where mechanical equipment could not be used, and nothing but manual labor or horse power was effective.

On the surface of the river, however, it was apparent that a lot of oil was still present and visible in the form of a mottled sheen which was occasionally quite heavy.

The possibility of setting up a positive barrier to this oil was discussed. Members of the documentation team observed that diversion booms in use near the Hanover Street Bridge were proving very effective in collecting sheen from the surface of the river, concentrating it and then delivering it to locations at the river banks where it could be removed by skimmers or vacuum trucks. (Exhibit 26)

The situation was called to Cdr. Hanson's attention and he agreed that a diversion boom might be extended clear across the river at some locations where river current was not beyond operable limits.

A suitable location was found near the Pennhurst facilities of the Home Water Company and the placing of a diversion boom, a shore side settling tank and a skimming operation was suggested by a member of the documentation team. Such a boom would be about 1,300 feet in length. Additional boom material would be needed before it could be installed. (Exhibit 27)

On 8 July the situation on the river continued much the same. Local showers were falling on the polluted area, some oil was leaching into the river and the oil sheen on the surface of the river was still visible. Clean-up operations were continuing.

On this date, major progress was noted on the most troublesome problems, which had been confronting this operation.

1. Oil Sheen on River Surface

   The OSC obtained permission to install a diversion boom across the Schuylkill River with its downstream end secured at the Home Water Company at Pennhurst. The installation was successful in collecting both the oil sheen and floating debris. It was left in position until the entire operation was secured. (Exhibits 28 & 29)

2. Drum Identification and Disposal

   On the same day, a team of experts arrived from the Manufacturing Chemistry Association of the United

EXHIBIT # 27 DIVERSION BOOM AT PENNHURST *

*Note: RIVER FLOWS LEFT TO RIGHT

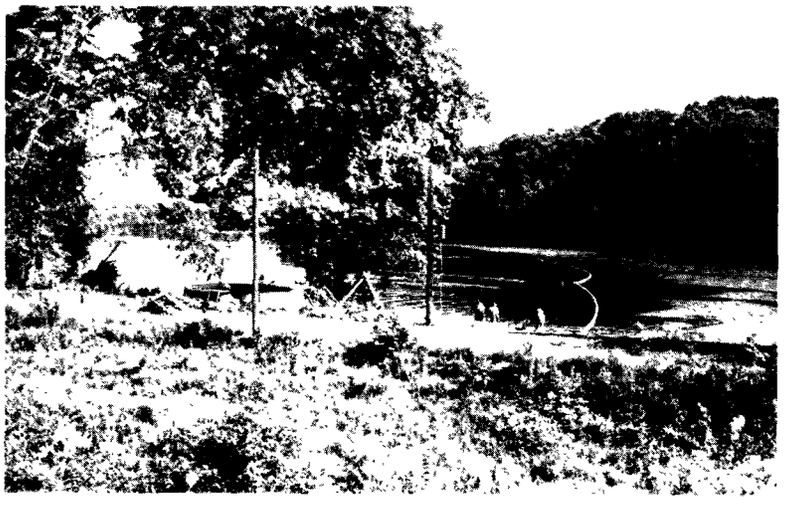
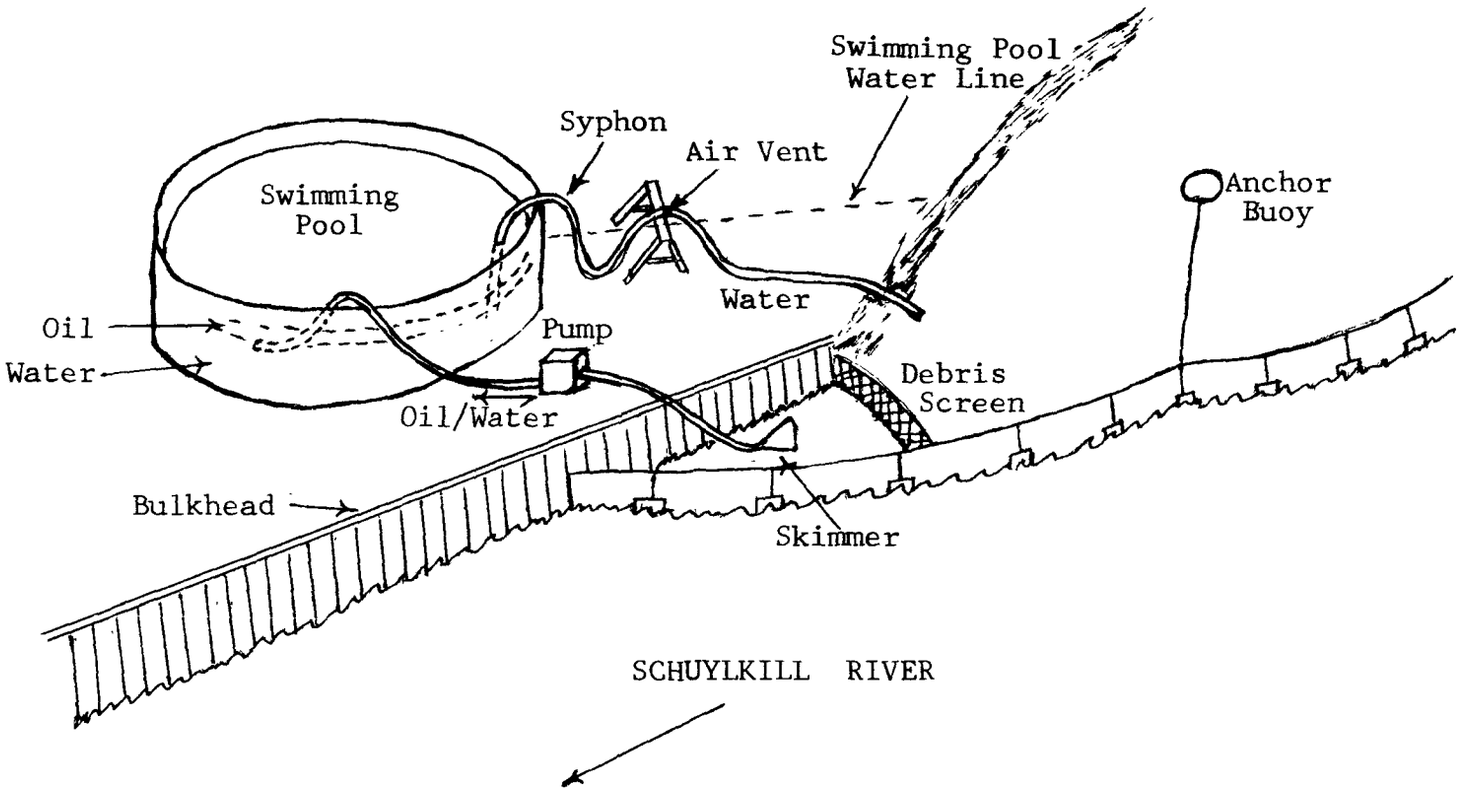


EXHIBIT # 28. SETTLING TANK & BOOM AT PENNHURST



SCHEMATIC of SKIM-SEPARATE-PUMP EQUIPMENT AT PENNHURST

EXHIBIT # 29.

States to assist in identifying the contents of the many drums stored in the drum holding area in Pottstown. This promised success in identifying the contents and returning them to their owners or sending them to final disposal destinations.

3. Temporary Storage of Recovered Oil

The use of one of the lagoons at Berks Associates as a temporary holding pool for liquid oil was continuing satisfactorily and it was being monitored by the Pennsylvania Department of Environmental Resources and personnel from the EPA-Phila.

4. Disposal of Oily Waste

A breakthrough was scored in the disposal problem. Montgomery County Commissioners agreed to accept sludge and debris at a land-fill site at West Conshohocken, Pennsylvania. The land-fill site was in an abandoned quarry.

Successive layers of debris were covered with layers of earth. This operation provided much needed capacity for disposal of the polluted debris.

5. Clean-up Methods

Research was continuing on methods of cleaning up fallen trees and other oil polluted debris along the river course. This had been the subject of numerous discussions with the Corps of Engineers personnel stationed at Pottstown. It was finally agreed that much of the debris on the islands in the river and on the lower edges of the river banks would gradually clean itself and that complete removal was not necessary. Some removal of underbrush was necessary so that ground clean-up crews could work effectively. This decision to limit the removal of trees and foliage wherever possible, went a long way towards standardizing the clean-up operation. It was in accordance with the later decision that the oiled underbrush need not be removed just for ecological considerations. (See special report section)

As of 8 July operations of the OSC had developed into a reasonable stable and effective effort. Production by all three contractor groups had picked up appreciably, most of the major problems were under control or well on their way to solution and the entire picture took on the aspects of a job which had finite boundaries. It was reasonable to

expect that no major problems would develop in the foreseeable future and that the entire operation could look forward to completion in late summer or early fall.

On 9 July it was evident that the OSC and staff and developed a vastly improved capability to solve a problem once it had been properly identified, and the activities of the Strike Force were becoming increasingly of a routine nature. At this point the policy was adopted of phasing out the National Strike Force operation as soon as possible.

Exhibit 30 shows the problems which still required careful supervision. The OSC's office would continue its careful supervision of contractors operations and a new OSC was scheduled to relieve Mr. Massey. Planning was needed by OSC and his staff to provide for final phase-out of the emergency effort by EPA and the Strike Force and to phase-in the program for final removal of polluted soil and foliage by the Corps of Engineers.

Research was continuing on the possible use of incineration as part of the disposal problem. Clean-up of debris in difficult locations along the river continued to present material handling problems.

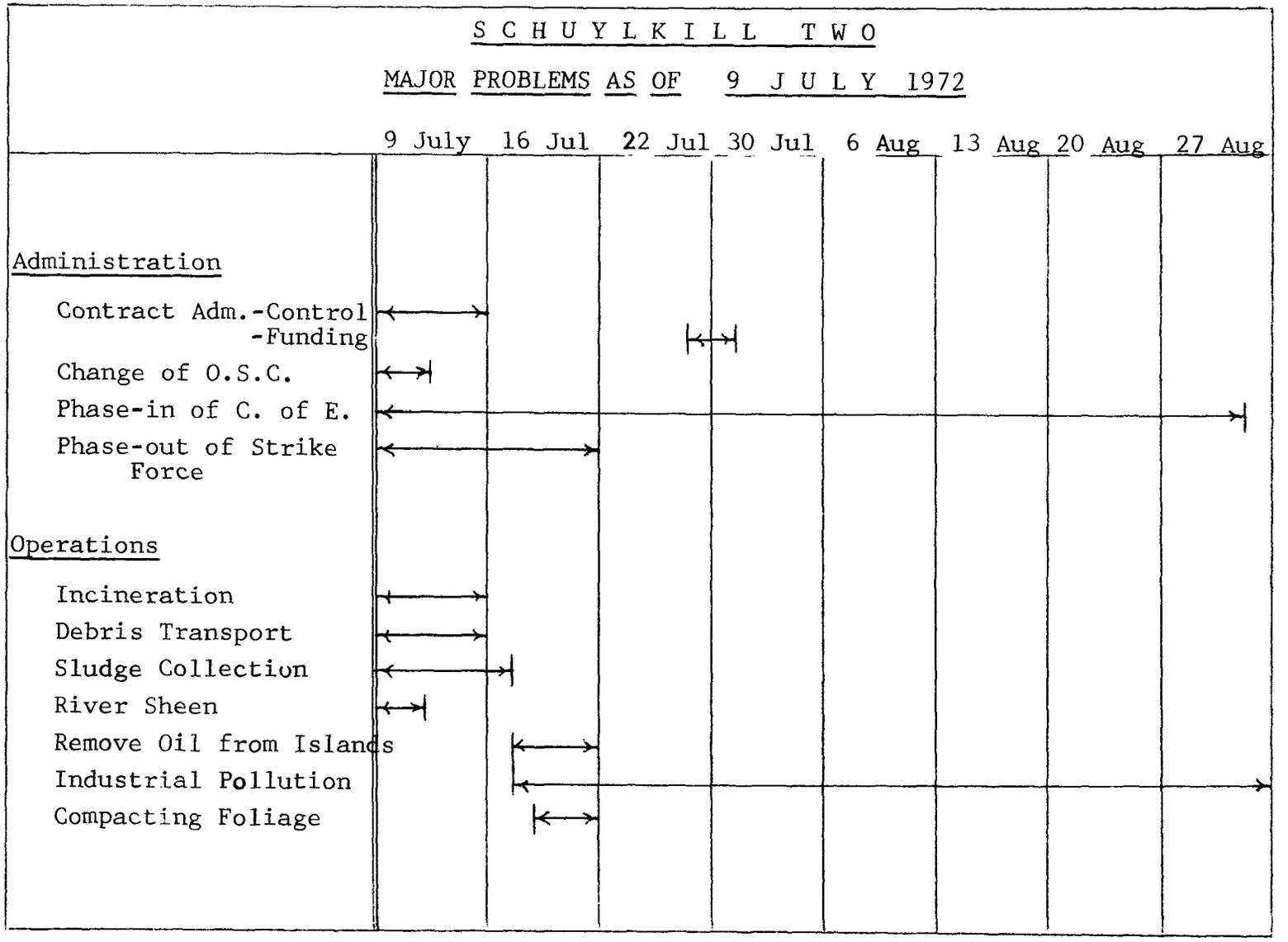

S C H U Y L K I L L T W O
MAJOR PROBLEMS AS OF 9 J U L Y 1972
9 July
16 Jul
22 Jul
30 Jul
6 Aug
13 Aug
20 Aug
27 Aug
Administration
Contract Adm.-Control
-Funding
Change of O.S.C.
Phase-in of C. of E.
Phase-out of Strike Force
Operations
Incineration
Debris Transport
Sludge Collection
River Sheen
Remove Oil from Islands
Industrial Pollution
Compacting Foliage
25 Sept.

Exhibit 30.

NARRATIVE - 10 July - 29 Sept.

On 10 July Mr. Robert Kaiser, EPA, Philadelphia, head of the Environmental Emergency Branch for Region III, arrived on the scene and relieved Thomas Massey as OSC.

Mr. Kaiser's initial actions were to re-evaluate the capabilities of the contractors, to revise their specific assignments and to start a program of releasing equipment and reducing the force of emergency personnel as rapidly as circumstances would permit.

On that same date, a summary of information on drum recovery, identification, and disposal was delivered formally to the Corps of Engineers office at Pottstown. (See summary in special subjects section.)

On 11 July all booms were removed from the river except for the diversion boom at the Pennhurst site, a total of 132,000 gallons of oil had been stored temporarily at Berks Associates, and plans were being made to release Coast Guard reserve personnel on 14 July. On 13 July, the Pacific Strike Force Team was released except for 3 men.

On 14 July the shipment of hopper cars to the land-fill site was increasing. A definite decision was made by EPA-Phila. that no open air burning of debris would be conducted in the Pottstown area or in the Norristown area.

As the activities of the three clean-up contractors were reduced and their work forces became smaller, the OSC required contractors to submit written requisitions for additonal equipment or manpower for specific situations. This brought the expenditure of funds under more direct and tighter control.

On about 14 July, Mr. R. E. Hess summarized the current instructions on removal of oily sludge from land in the polluted area. (See special subjects section.)

On 17 July some additional pools of heavy oil were found in the area between Hanover Street Bridge and Royersford. This posed a difficult problem in transporting the oil from the islands to the mainland.

As the area began to recover from the impact of the flood, both upstream and downstream of Pottstown, there were increasing reports of pollution from the industrial plants in the neighborhood. Each of these was responded to and investigated by personnel from the OSC office. Some pollution was caused as a result of cutting oil discharge from

a steel plant and chemical discharge from a die-casting plant. Corrective action was obtained from the owners in each case.

On 18 July it was decided to submit POLREPS every other day instead of every day. This was another indication that the clean-up operation was under control and it was becoming routine, although, there were still about 300 contractor personnel on the job.

On 19 July the identification of recovered drums was proving effective. Some were being returned to their owners. Others were being returned to people who could safely use the contents (owners unknown) and those which could not be so disposed of were scheduled for long term storage at Fort Miflin.

On 20 July the evaluation of the use of chipping machines proved that the chipping operation permitted a high degree of compaction in the land-fill and consequently was valuable because of the space which was saved. The chips also acted as a blotter of liquid oil and thereby facilitated the unloading operation.

Heavy duty, vacuum primed pumps were working successfully to pump oil from islands to the shore for distances of up to 200 feet. (See Special Section)

On 22 July the National Strike Force Team was released from its responsibilities and the OSC, Region III of EPA continued the clean-up operations without their services.

On 28 July there was some indication of a growing problem in the field of contract administration.

Reports were filtering down to the OSC from various sources that the Federal Government had placed a limitation on the funds to be spent on the Schuylkill Two operation and that the limit had already been exceeded. This raised the problem of honoring contracts made in good faith by the OSC before such a limit had been imposed.

The problem may have been triggered because of some questions about engineering contracts set up early in the emergency. At any rate, on 28 July a communication from the office of the OSC stated that the matter had been discussed at headquarters of EPA and at headquarters of USCG and that it had been agreed that any requests certified by the OSC to be essential in the performance of his function under phase II and III (of the National Contingency Plan) would be honored by the revolving fund.

It is fortunate for the future of the On-Scene-Coordinator activities and the success of the National Contingency Plan that the decision was made to honor these committments. They were obviously made in good faith and in times of great stress.

Any action by the federal government to disavow such commitments would have made it very difficult in the future to obtain whole hearted cooperation on an emergency basis from contractors and others who could assist in emergency operations.

On 31 July there was an indication that the Corps of Engineers was slowing down its recovery, storage and identification of drums for fiscal reasons. At that time there were approximately 1,000 drums estimated to be loose in the area and consequently, they were a hazard. This is another example of the need for adequate funds to do a complete and an effective job on these major disasters.

On 2 August Mr. Malcolm Castor summarized the entire drum clean-up situation in EPA, Region III, and listed 1,000 drums at Reading, Pa. nearly 300 at Norristown, hundreds of barrels and drums reported below the dam on the Potomac River near Martinsburg, West Virginia and other drums submerged and half submerged in the Delaware River below Philadelphia.

On the same day, the approaching school term made it necessary that the OSC office restrict its activities to a single room in the Washington Elementary School at Pottstown, Pennsylvania.

On 8 August the job of pumping out the lagoons at Berks Asso. was commenced. A fleet of trucks had been assembled for this purpose.

Through the later part of August, Contract Administration and cleaning up the loose ends of contracts was a major activity in the office of the OSC.

On 17 August the Corps of Engineers picked up activity on drum removal.

On 1 September the OSC's office estimated that 211 hopper cars had been loaded with debris.

On 20 September operations of Clean-Water, Inc. and of New England Pollution Control (Nepco) were terminated. The office of the OSC started to prepare an inventory of equipment and materials purchased by the revolving fund and used on this spill situation. Underwater Technics , Inc. was still active cleaning hopper and tank cars and returning them to the railroads.

On 29 September the office of the OSC issued POLREP 43, its final POLREP on the Schuylkill River Flood-Oil Spill.

The POLREP indicated that there was no visable sheen on the river, a total of 220 hopper cars had been unloaded at the

disposal site containing a total of 13,957 tons of oil soaked debris. 103 cars had been completely cleaned and returned to the railroads.

Operations of Underwater Technics, Inc. were terminated as of 30 Deptember 1972. All operations had been completed and the emergency phase of the case was considered closed.

PREPAREDNESS FOR OIL SPILL EMERGENCIES

The Schuylkill One emergency took place only four months after the National Contingency Plan was published. Mobilizing to meet that emergency was "a first time" experience for all concerned.

In Schuylkill Two, the initial flood emergency found Base Gloucester alert to the requirements of the occasion. Base personnel had made progress toward developing a Contingency Plan for the Delaware Basin Area. Some contact had been made with oil terminal operators on both sides of the river and the beginning of an oil clean-up association had been made. Plans had been drawn up for establishing a Regional Response Center at Base Gloucester to serve any emergency.

Consequently, when the Schuylkill River flooded, the search and rescue mission, the surveillance mission and the barrel and drum recovery program were handled with a minimum of delay.

When the Regional Response Team was activated on 23 June, the Regional Response Center was set up over night. Facilities for the OSC and his staff were immediately available and far more complete than in Schuylkill One.

The National Strike Force, as reported in the narrative, was alerted to the possibility of an oil spill and several of the personnel, obviously, "had their bags all packed" by the time it was decided to activate the group. The National Strike Force traveled to the Pottstown area with a good nucleus of equipment for assisting the On-Scene-Coordinator. Emergency service was nothing new to Strike Force personnel and they showed a commendable ability to work on priority items immediately. They lost no time in requesting assistance and in many cases recognized the need for help before the need became acute.

Direction and supervision of independent contractors was very difficult in the initial stage of the emergency because of the flood conditions and the unforeseen problems due to a coating of dirty oil over 15 miles of the Schuylkill River Valley.

The OSC, Mr. Thomas Massey, had attended OSC training courses, but he had not experienced the oil clean-up problems that confronted him on the Schuylkill. Under the circumstances, his reaction was to lean heavily on Strike Force personnel for technical assistance while he organized and directed the administrative staff. This turned out to be a good division of responsibility and the emergence of an effective team effort

was apparent as early as 4 July. In a very few days, the Strike Force demonstrated its ability to identify problems, to act upon them immediately if necessary and to research them carefully when time permitted a search for the best solution.

All personnel learned a great deal from this experience and it is safe to predict that experience so gained will show to good advantage when and if the Strike Force is confronted with another oil spill emergency.

Various aspects of this operation are reported in more detail in the discussions of special subjects which follows.

EVALUATION OF THE NATIONAL CONTINGENCY PLAN AND POTENTIAL SPILLS

The National Contingency Plan of June, 1970, emphasizes the problem of responding to an oil spill, and makes reference to "potential" spills in Paragraphs 306.1, 505.1, 506.2-4 and 506.2-5. Paragraph 506.1 directs that "when the OSC receives a report of a spill, or of a potential spill, the report should be evaluated."

If a potential spill is reported or if a potentially dangerous situation is known to exist, the evaluation would probably become the responsibility of a pre-designated Regional OSC who might or might not have the experience to evaluate a potential hazard of major importance.

Evaluation of a potential spill should be performed by a person trained and experienced in oil pollution control and clean-up operations. Fast action is always imperative. Discovery of the Schuylkill Two oil spill on June 23 resulted in immediate activation of the Regional Response Team and the Regional Response Center, but assistance from the National Strike Force was not initiated until June 28. Reports concerning other pollution incidents have indicated similar delays. (For example, the USNS Towle Spill in New York Harbor in 1971.) Until such time as there are trained and experienced oil control and clean-up personnel in all of the several EPA regions and Coast Guard Districts, those regions should be encouraged, or even directed, to call on the National Strike Force or more experienced EPA personnel for an independent evaluation of any hazard which might become a major spill. (As defined in paragraph 105.8)

It is recognized that immediate activation of the National Strike Force on every potential spill is not in accord with the intent of the National Contingency Plan, but use of NSF personnel to evaluate is suggested as a stop gap measure until trained and experienced personnel are available at all Regional Response Centers to deal with moderate or major pollution incidents.

The National Strike Force seems to be the logical group with knowledge and operations capability to permit effective preventive action an emergency such as this, but there seems to be no specific provision in the National Contingency Plan for taking preventive measures of such scope unless the forecasts of danger are specific and immediately threatening.

On the basis of present authorizations, any major strike force operations which eventually prove unnecessary would certainly be criticised as too costly. In this instance, hind-sight suggests that such expenditures would have paid for themselves several hundred times over.

It might be well to review the provisions of the National Contingency Plan with a view toward incorporating authorization for preventive measures and providing guidelines for the Strike Force Commander so that he could act instantly on his own responsibility.

It is our recommendation that the sections of the National Contingency Plan which call for immediate response to an alert should be reviewed and perhaps revised to insure that personnel from the National Strike Force are available to assist the pre-designated OSC in evaluating the threat of a major oil spill.

Such evaluation should not be delayed pending identification of "the responsible party" and pending that party's own decision as to its ability to control the potential spill. Such determinations inevitably require valuable time and they may be unduly influenced by the responsible party's financial status, sense of public relations, and knowledge or lack of knowledge of oil spill clean-up technology. An early evaluation of a hazardous situation by the pre-designated OSC assisted by experienced personnel from the National Strike Force could

provide hard information which would give immediate direction to control and clean-up activities if they should eventually become necessary.

In the case of Schuylkill Two, the initial response to the flood and to the oil spill which followed it, was in accordance with the National Contingency Plan.

In retrospect, how effective was the Plan in the first few days of the disaster?

Generally, it was a source of considerable strength because it made money, equipment and personnel available on a scale never before possible in an oil spill situation.

Specifically, it did not seem to provide for the flexibility of organization and the instant availability of trained personnel that this very complicated situation required.

The following items are suggested for review and possible change in the next up-dating of the Contingency Plan.

1. The OSC for a major pollution incident should be chosen for his ability to handle the situation at hand, even if this means bringing in an OSC from another region. In other words, if an experienced OSC is not available in the region of a spill, there should be no hesitation in bringing in a specialist from another region, from the Strike Force Team, or from any other source available. The pre-designated OSC in the spill region could then serve on his staff, gain valuable experience and be better prepared for the next emergency.

2. Experienced personnel should be requested to make an immediate and independent evaluation of the disaster potential in any major oil pollution incident which occurs or which threatens to develop.

3. The National Contingency Plan should expand on the responsibilities of Strike Force personnel in preventing oil pollution at locations where known hazards exist.

4. OSC Training Programs should be set up for all Coast Guard or EPA personnel who might be in line for such positions.

RELATIONS WITH BERKS ASSOCIATES

In Schuylkill One, Berks Associates was very definately the "Villain". In Schuylkill Two, Berks Associates was the "Victim" of an almost unpredictable disaster. Mr. Ruckelshaus, Administrator of EPA, called it an "Act of God".

In the period between Schuylkill One and Schuylkill Two, Berks Associates was bankrupt, but it had resumed operations in accordance with court orders resulting from legal actions following the first spill.

In Schuylkill Two, there was little that the company could do to assist the clean-up operations, but to cooperate with the OSC to the best of its ability.

As might be expected, many individuals were incensed that all the lagoons had not been emptied permanently after Schuylkill One and there were news reports of impending legal and political moves against the company and proposals to shut down the plant permanently.

However, there was a realization that Berks Associates performs a very useful service by recylcing waste crank-case oil and turning it into a useful product.

Furthermore, recent improvements in the process have eliminated the need for storage of waste sludge in lagoons.

As this report is written, the concensus of opinion seems to favor continuance of operations of the plant, always provided that the use of the lagoons is never resumed at that location.

USE OF INDEPENDENT CONTRACTORS

Clean-up of Schuylkill Two required the efforts of hundreds of laborers and many units of powered equipment. Local contractors are usually the best source for both labor and equipment. If the contractor has had previous experience on oil spill work, he may provide valuable skills and special knowledge. Hopefully, he will be resourceful and innovative in using his equipment to overcome problem situations.

On Schuylkill Two, three contracting firms were hired to perform the emergency pick-up of oil and polluted debris. Each firm had worked on previous spills, including Schuylkill One, and was acquainted with the area.

In addition many small contractors were hired on special assignments of short duration when extra vacuum trucks, tanker trucks, pumping equipment, and other items were needed.

Contractors are a valuable resource in emergency situations, but they can also be the source of fantastic costs for supplies, manpower, standby charges for idle equipment and overselling of proprietary items.

Control of the contractor operations should be given special attention in training potential OSC's because the costs of such contractor services are usually the most expensive items in the entire clean-up operations.

In an emergency, for example, contractors may purchase shovels, protective clothing, life jackets, or buckets in quantity and issue them to laborers on an "expendable item" basis. On one spill of record where about 100 laborers were employed, over 400 life jackets were issued and never recovered.

Some lack of control is to be expected, particularly during emergency situations in the early days of a clean-up operation, but someone on the OSC's staff should concentrate on the control of contractor expenses at the earliest possible moment.

Cost benefits must also be kept in mind. For example, the bull-dozer hired to close leaks in the lagoons on 27 June prevented the loss of perhaps 1000 barrels of oil waste. The bulldozer might have cost $1,000. for 10 hours work, but clean-up could have cost $20,000 or more if the oil had escaped, necessitating later pick-up by hand method.

The three major contractors hired on Schuylkill Two were experienced and capable. They responded promptly when called and performed many emergency tasks on the basis of

verbal agreements. During the first week of the emergency, many pieces of powered equipment were brought to the area by these contractors and put into operation or placed on stand-by status at various locations in the spill area.

Formal contracts, accurate records of equipment and man-hours under such circumstances are unlikely. Verbal agreements between the OSC and the contractor are necessary if action is to be achieved in the time available.

In this spill, contract officers came on the scene after the fact and did their best to review existing agreements. Gradually, the contract situation was recorded accurately and effective follow-up was possible.

Under such circumstances, some waste is inevitable. It would be very helpful if regional Contingency Plans contained some basic guidelines for the use of contractors in an emergency. Policies on overtime, stand-by charges, subsistence, housing and rating of personnel as skilled, un-skilled or specialist could be settled in advance. Failing that, the OSC or his contracting officer should have a reference list of equipment costs, and labor rates to give some indication of an acceptable level for such charges.

Obviously, it is highly desirable to have qualified contracting firms available for clean-up in emergency situations. Any contract matters which can be settled before the fact should save time and money when emergency action is needed. Every EPA region should cultivate a good working relationship with two or more reputable contractors in its district. The more people in business, the more reasonable will be the costs. This whole question of contractor - OSC relationship could well be a subject for special study under the National Contingency Plan.

SURVEYS AND RESEARCH

In the early stages of Schuylkill Two, several problems were encountered for which there was no ready answer. When immediate action was imperative, such action was based on available knowledge and best judgement of the OSC and NSF personnel.

The major problems required days or weeks of study before a conclusion was reached. In several cases the investigation involved many personnel and use of specialized equipment.

In these cases, special projects were identified and the responsibility for carrying them to completion was assigned to a member of the staff on an "ad hoc" basis. He (or she) coordinated efforts until the solution was reached.

This procedure was used effectively on several problems, including:

Rail Transport or Polluted Debris
Removal of Oil Sludge from Land
Incineration of Sludge and Debris
Water Analysis
Storage and Disposal of Drums

Sometimes the problem required the efforts of specialists from other Federal or State Agencies or from technical consulting firms, laboratories or industries with special knowledge.

When a solution was reached, all persons concerned had to be notified. This was done in several cases by publishing a summary report of the findings and the action to be taken. See following pages.

This method of "passing the word" worked effectively and provided valuable data for future use.

Recommendation: This practice or some variation of it should be adopted in any case where:

1. Notification should go to a number of individuals or agencies, or

2. When some new technique or procedure might be valuable to other OSC's on future emergencies.

3 July 1972

FOR RECORD

Investigation of Sludge Incineration. At the suggestion of Mr. Washoe, Pennsylvania Department of Environmental Resources, J. Cox contacted the City of Hazelton to investigate the feasibility of using their Fluidized Bed Incinerator for burning the waste oil sludge. Discussions with Mr. Bunk (Supt. of Sewer Authority) and Mr. Oscar Thomas, P. E. (Chairman of the Sewer Authority Board) disclosed the fact that the maximum design temperature of the incinerator is about 1400° F. Since the expected temperatures from oil sludge incineration is expected to be much higher, this alternative was not pursued further. The City of Scranton has an Open Hearth Incineration System which (in Mr. Thomas' opinion) is subject to the same limitation.

Investigation of Sludge Reclamation. Mr. Rubert Mahler, Vice President of Northeast Oil Service, called to offer his services to remove the sludge. He reports his firm is in the re-refining business (similar to Berks), and that his operation produces products (fuel oil, dust oils, etc.) within specifications, using processes (blending and distillation) which violate no regulations. His price would be 6-12 cents per gallon depending on analysis. A sample of oil sludge was given to him 4 July, and Mr. Mahler promised analysis and price figures within 2 days.

This alternative was discussed with Mr. R. Hess, EPA, Division of Oil and Hazardous Materials, Washington. He reports this firm has been the subject of some criticism since the operation can pass the heavy metals on into the finished product (i. e. home fuel oil). In burning such a product, the metals can coat the heat exchanger tubes, requiring expensive maintenance. This possibility and criticism was discussed frankly with Mr. Mahler who replied: 1) that his finished products were within specifications, 2) that since the heavy metals had to go someplace, his process avoided the accumulation of millions of gallons of sludge in lagoons, which sometimes produces environmental disasters, 3) that his firm has done business for some time with USCS First District (CDR Hanson was asked to verify the latter point).

Other Incineration Possibilities.
1) It was reported verbally that Rollins-Purle would not accept the sludge. However, an entry in the log (1 July?) reports they would accept this. This should be investigated further.

2) National Oil Reclamation Corporation, Hook Road & Commerse St., Bayonne, N. J. 07002, is under contract with EPA to develop a suitable oil re-refining operation.

7/6/73

TO: ALLEN JENNINGS

FROM: EDWARD LEPLEY

SUBJECT: SAMPLING AND ANALYSIS OF MUNICIPAL PLANT PROCESSED WATER FOR TOTAL ORGANIC CARBON; TOTAL ORGANIC CARBON: HEAVY METALS (Pb, Zn, Cd, Cu)

The four plants contacted were: Home Water Co., Norristown Water Works, Phoenixville Water Works, and the Pottstown Water Works.

Facilities for the analysis of TOC, Pb, Zn, Cd, and Cu were made available to these plants at no charge with a lab in Cincinnati, Ohio which would run the said test on a frequency of every two (2) or three (3) days. Instructions were given for two (2) plastic containers of one (1) liter capacity marked for time and date of sampling and acid added. In the TOC sample two (2) ml of concentrated H_2SO_4 per liter sample is to be added in the heavy metal sample three (3) ml of 1:1 HNO per liter is to be added. Shipments were asked to be sent Air Express at the plant's expense. The Cincinnati address is:

Chemical and Radiological
Activities Section
Room 705
5555 Ridge Road
Cincinnati, Ohio 45213

Attn: Mr. Richard J. Velton

Facilities at the Northeast Water Pollution Control Plant were also made available for TOC analysis and facilities at Tarzydal were available for the metal analysis of Zn, Pb, Cd, Cu. Cost and frequency considerations were sufficient to warrant considerable attention to the Cincinnati Lab for all test.

The Tarzdale lab did agree to report results from a Delaware River processing plant to be used by E.P.A. as a control.

All sampling was strongly urged but not ordered by E.P.A. All expense is the plants responsibility except for E.P.A. Cincinnati analysis.

Thank you,

(signed)

EDWARD LEPLEY

TO: Record

FROM: R. E. Hess
Chief, Operations Branch
Division of Hazardous Materials

SUBJECT: ARS advice on Removal of Oil (sludge) from Land

Dr. D. J. Menzies, Agricultural Research Service, Beltsville, Md. was contacted by telephone to request his advice on removal of oil waste lost from the Berks Associates facility from farm and woodland in the Pottstown, Pa. area along the Schuylkill River.

Dr. Menzies stated that oil pools should be removed from farm and forest land. Soil which is oil saturated to a depth of more than 4 inches should be removed; soil contaminated to depth of 4 inches or less should be plowed or disked (if farm land) or left.

Trees on which the oil waste adhered will suffer contact damage; however, systemic damage is not expected to occur. The opinion was expressed that oiled underbrush could be removed if it is determined that it constitutes a fire hazard; it need not be removed on the basis of ecological considerations.

Vegetable Gardens: Crops should be thoroughly scrubbed if they are to be used for human consumption. This is to reduce the possibility of ingesting sewage borne pathogenic bacteria rather than because of heavy metals contamination. Oil coated plants should be turned under after removal of oil pools and heavy oil concentrations on the garden surface.

1. OSC instruction on required clean-up issued on July 11, 1971 be followed; and

2. Farmers whose tillable land was contaminated be advised that Federal forces will remove oil and oil contaminated soil per the ARS recommendation and that fields with light oil residue be plowed or disked to a depth of 4 to 6 inches as soon as conditions permit.

3. Home gardners should be advised to scrub vegetables thoroughly before table use to remove sewage bacteria and residues. After removal of oil pools and earth saturated by oil to more than 4 inches depth, gardens should be plowed or spaded to 6 inch depth.

(signed)
R. E. Hess

Submitted to COE, Pottstown 7/10/72

Recommended Safety procedures for chemical drum pick-up and handling.

I. Full Drums - Intact

a) Contents identified by label

1) Use appropriate safety precautions when handling

b) Contents unidentified

1) Use maximum safety precautions when handling

II. Drums with contents, leaking or punctured

a) Use safety precautions as above

b) Transfer the contents by manual pumps to the clean empty drum and label as the original drum

c) Do not mix the contents of any one drum with another

d) Do not empty drum in an uncontained manner

III. Safety equipment

a) Acid resistant elbo-length gloves

b) Acid resistant gogles and face shields

c) (air) pressurized water fire extinguishers

d) Have available - Scott air packs.

IV. Assistance in any safety or handling procedure can be obtained from the EPA or MCA representative at 327/0440

(signed)

Allen L. Jennings

PERSONNEL

In almost every oil spill on record, the need for trained and experienced personnel is near the top of the priority list. In Schuylkill Two the broad scope of the operation required a wide varity of skills.

The National Contingency Plan implies that the region furnishing the OSC would also provide "trained and experienced" personnel to staff the OSC office.

When the National Strike Force was activated, Region III supplied the OSC and was able to supply most of the administrative personnel for his staff. Legal affairs, public relations, contracts, stenographic and office services were staffed by Region III with people who were trained in the general aspects of those subjects, but who were not experienced on oil spill situations.

It seemed to members of the documentation team that most of these personnel were functioning effectively in their assigned tasks as early as 4 July. The individuals were dedicated to the effort and grew up with their jobs.

Unfortunately, there was too much turnover in these administrative positions and about the time one person became truly effective, he or she could expect to be replaced by a new appointee.

Both OSC's, Mr. Massey and Mr. Kaiser, indicated that this turnover was more frequent than necessary and that it reduced the effectiveness of the administrative staff. On the other hand, it did expose more personnel to the experience of working on detached duty and in an emergency situation.

Region III was unable to provide many personnel experienced in oil spill situations. Most operations people were recruited by Commander Hanson as Chief of the National Strike Force.

Immediately, upon activation of the Strike Force, the OSC, through Commander Hanson, requisitioned personnel from the Pacific Coast, from Base Yorktown, Base Gloucester and other areas. The OSC retained Mr. Malcolm Castor from Region III, who had served as OSC of the Regional Response Team for a period of 7 days. He also requested assistance from EPA in Washington, D. C., Edison, New Jersey and other areas where capable talent was to be found. By approaching the problem on a national basis, it was possible to staff most operatins posts with well qualified personnel. Many of these personnel were in Coast Guard Services and the problem of rapid turnover was thereby avoided in most cases.

National Contingency Plans makes frequent references to the "trained personnel" who will be eventually available in each region, but no date is specified for the completion of such a program. Until such a comprehensive training program becomes effective, it will probably be necessary to staff major spill clean-up operation with personnel who are recruited on a National scale in the manner described above.

INTER - AGENCY COOPERATION

Paragraph 102.1 of the National Contingency Plan "provides for a pattern of coordinated ---------- responses to pollution spills by departments and agencies of the Federal Government."

Schuylkill Two required such cooperation, not only from Federal Agencies but from all levels of government and from private industry. Fortunately, willing and effective cooperation was achieved in almost every case when requested.

In the week prior to the oil spill, Base Gloucester requested assistance in recovering drums and floating debris in the Delaware Basin Area. Immediate and effective response came from other Coast Guard units, the Corps of Engineers, State Agencies in Pennsylvania and New Jersey, Civic Officials and Industrial Establishments in the Delaware River Basin.

There were occasions when requests were delayed due to shortage of trained personnel, mis-understanding as to specific items requested, or provision for funding the costs, but this is to be expected in an emergency situation.

There were some delays which might have been avoided. The National Contingency Plan of June 1970 emphasized response to an emergency on a regional basis. Consequently, there was a tendency for Region III of EPA to provide personnel or facilities from within its own regional organization even though better facilities or more experienced personnel might have been available from other regions.

The Pennsylvania Department of Envinonmental Resources had its hands full from the very beginning of the flood threat and was unable to provide liason personnel until early July. New Jersey Marine Police and others cooperated promptly on the drum recovery program, but refused emphatically to provide disposal sites for any oily debris. On the other hand, officials of Montgomery County, Pennsylvania, worked diligently and, finally, successfully to find a suitable disposal site, thus breaking the biggest bottleneck in the whole operation.

CLEAN UP ACTIVITIES OF THE U. S. ARMY CORPS OF ENGINEERS

The Army Corps of Engineers became involved in the recovery of oil drums and floating debris even before the oil spill took place. Captain Price, Commanding Officer at Base Gloucester had requested Corps of Engineers assistance from Fort Miflin, Pennsylvania when floating drums first appeared in the Philadelphia Harbor area on or about 22 June.

As flood damage increased it was apparent that the task of clearing debris from the Schuylkill River Valley was a major undertaking. The Office of Emergency Preparedness and the Corps of Engineers worked out a plan whereby the Corps would take over responsibility for clean-up of the river-bottom and adjacent areas as soon as the flood waters receded. A field office was established in Pottstown, Pennsylvania and staffed with Corps of Engineers personnel.

Removal of flood debris was one task, but removal of spilled oil and of oil soaked debris was a more complicated procedure. (For example, oil soaked debris could not be burned safely because of resultant air pollution.)

As early as 4 July, it was evident at the OSC's office that a substantial increase in manpower would be needed and that special treatment would be required for the oil soaked foliage and sludge.

By 11 July, the OSC's office had worked out satisfactory procedures for disposing of liquid oil, oily sludge and oil soaked debris. The Corps of Engineers was continuing its activities on drum removal, identification and disposal and was ready to start on its debris removal assignment.

When Mr. Kaiser assumed the OSC post on 11 July, joint conferences were set up with the Corps of Engineers to discuss the disposal of oily debris picked up by the Engineers.

It was agreed that the Engineers would segregate oil-soaked debris and oily sludge from the other debris in such a manner that the oily wastes could be disposed of through channels set up by the OSC's office. This involved the use of trucks for transportation to the approved disposal site as described earlier.

Early estimated indicated that $1,600,000. might be needed to fund the disposal of the oil soaked wastes, but the actual costs up to the time the OSC's office was closed were substantially less.

The Corps of Engineers started land restoration operations by mid-August, and some of the sub-contractors were at work in the Pottstown area when Documentation Team personnel made a final tour of the area on 18 October.

The division of responsibilities between the Corps of Engineers and the OSC's office was logical, with each group handling tasks for which it was trained. Final results of the clean-up program were very encouraging. By mid-October there was little visual evidence of the devastation that was present in July.

EQUIPMENT AND MATERIALS

The clean-up of oil soaked land on the banks of the Schuylkill River was accomplished by the use of manpower, horsepower, and standard earth moving equipment. The removal of top soil which had been mixed with sorbents and the pick-up of oily foliage and debris was a major exercise for front-end loaders, bull dozers, and trucks.

There were a few innovations when problems of terrain prevented access of heavy vehicles.

Removal of liquid oil and oily sludge from islands required the use of high-line cables and trolleys in some cases. In other instances Sykes pumps were installed on the islands to pump oily sludge for as much as 200 feet through a discharge hose to the river banks. This pumping operation moved a substantial quantity of sludge with little difficulty.

Removal of oil from the river surface has been discussed in the narrative. The boom and separating system used at Pennhurst proved to be a successful installation. It could probably have been installed nearly one week earlier at that location with equal success, but the early emphasis was on clean-up of the river banks.

Communication between the OSC office and the contractors' offices in the field was difficult in the early state of the clean-up.

Walkie-talkies were only partially successful and there were very few land-lines available to contractors. National Strike Force paid special attention to this problem and suggested that each contractor be equipped with a mobile headquarters unit. Small camper trailers were hired for the purpose, parked at a central location for each contractor and telephones were installed equipped with temporary land-lines. This gave each contractor a field headquarters with phone, office equipment and shelter. These mobile "command posts" might be considered by other contractors who work on oil spill clean-up. In addition to their convenience, they provided limited storage for items of equipment which could easily be lost unless safe storage is provided.

Sorbent materials were used extensively in the first six days of the clean-up effort. Sorbent granules were spread generously on oil covered ground and in pools of liquid oil. They were used in filter fences and on low bushes and shrubs. The results were mixed.

On oily ground the sorbent granules had a stabilizing effect. They reduced leaching of oil into the river and made it possible to walk or even drive vehicles in some spots without becoming mired.

The granules had a good "cosmetic" effect. They concealed the shiny black on leaves, shrubs or lawns and reduced the hazard of oil pollution on clothes and equipment.

When spread over oil pools, the granules absorbed some oil, but thickened the oil to a point that it was difficult to pump or to collect with vacuum trucks. Also, liquid oil could be disposed of at a refinery, but oil and sorbent "mush" was not as acceptable for that purpose.

Sorbent granules in filter fences had been effective in removing light sheen from the river during the last few days of Schuylkill One. In the early stages of Schuylkill Two there was a heavy sheen on the river and the current was too fast to allow the sorbents to handle the large volume of oil.

Other methods of collecting oil and sludge were working effectively and the widespread use of sorbents was discontinued about 7 July.

THE DIVERSION BOOM AT PENNHURST

Schuylkill II provided a very good deployment and operation test for the 'diversion' boom technique.

The the flood waters subsided, a large quantity of oil was deposited on the flood plains on each side of the river, and on the islands in the river. There was continual leaching of this oil into the river, and the rate of leaching increased when the oil was warmed by the sun or washed by rain.

The leaching created a sheen on the river which reached from bank to bank and extended many miles down river from the polluted area.

The oil sheen was difficult to see except from directly above, but was quite visable from the bridges spanning the river and very apparent during helicopter overflights.

Two short sections of boom had been installed as diversion booms in the heavily polluted areas near the Hanover Street Bridge. These booms diverted some of the heaviest leaching from the mid-stream islands to a small cove where skimmers removed the oil from the surface of the water. However, most of the leaching was escaping down river.

Three requirements had to be met in order to place a diversion boom to capture the oil sheen. A location had to be found where (1) There was easy access to the river bank for trucks and equipment; (2) The access spot was at a cove or backwater area of the river; and (3) The surface current of the river was slow.

Study of a topographical map showed that these requirements would probably be met at Pennhurst, and this was confirmed by an on-spot inspection.

The diversion boom installed at Pennhurst was about 1300 feet long and was swung at an angle approximately 30° to the centerline of the river. The down stream end of the boom was secured on the property of Citizens Home Water Company which had a low bulkhead on the river's edge.

Placing the boom posed some problems because it had to be launched at the down stream end and towed upstream against the current. The preferable deployment method would have been to launch it from the upstream anchor point - but, there was no access to the river at that point. However, by first towing the boom upstream along the river bank where the current

was minimal, and then cutting across the river, the up-stream end of the boom was delivered to its anchor point.

Because of the length of the boom and the current in the river, several midstream anchors had to be set. If these anchors had been set prior to the deployment of the boom, the operation would have gone more smoothly. After the anchors were set, it required many line adjustments to eliminate 'loops' in the boom.

The oil sheen was captured by the boom and diverted along the boom to the downstream anchor point. A skimmer and pump were installed at this location to remove the oil.

In spite of concentrating the oil sheen in one location the oil film was still very thin and oil-water ration passing through the skimmer was very low. Even when the skimming was done on an intermittent basis to allow more oil to collect, large quantities of water were collected.

To overcome this problem an oil-water separating tank was installed. The separating tank was an above-the-ground swimming pool which could be easily installed, and easily removed and stored for future use. The pool had a capacity of some 10,000 gallons. (Exhibit 28)

An automatic syphon kept the pool at a pre-determined depth in spite of the intermittent skimming operations. The syphon discharged upstream of the boom just in case any oil was discharged. Periodically the collected oil was vacuumed from the surface of the pool into a vacuum truck for transport to a disposal site.

A continuing problem was the floating debris which was collected by the diversion boom. A debris fence was installed to keep the debris away from the skimmer, but the debris had to be removed manually. Automatic debris harvesting, using a continuous running open mesh conveyor belt, might be justified under some conditions, but did not appear to be warranted at Pennhurst. (Exhibit 29)

The OSC and other observers reported that the diversion boom was fully effective and that there was no oil sheen on the river below the barrier.

As the clean-up operations progressed, the amount of leaching diminished and the oil sheen disappeared except during and immediately after periods of rain. The diversion boom was kept in place until the conclusion of the clean-up operations to catch any oil run-off after rainstorms and as a safety precaution. It should be noted that there was no water traffic or recreational boating in that stretch of the river so the diversion boom did not pose any navigation problems.

ESTIMATE OF OIL VOLUME RECOVERED

About mid-June, 1972, the lagoons at Berks Associates held approximately 8,000,000 gallons of oil waste and water. Just how much was oil and how much was water is not known.

The flood on 22 June released most of the contents into the river. The oil and water became mixed together by the churning of the flood waters, so the total volume of polluted liquid must have approximated the 8,000,000 gallon figure.

Clean-up of oil in pools along the river totalled 350,000 gallons of liquid oil-suitable for disposal at a refinery. (Exhibits 31 & 32)

In addition, an unknown quantity of oil flowed away on the river, or is still present in the ground or on the branches or trees and underbrush in the area.

Whatever quantity of oil does still remain is greatly diluted and worked into the ground.

The clean-up operation has removed all pockets of liquid oil which could be found. Ecologically, the area seems to be recovering rapidly from flood and oil damage.

OIL, SLUDGE and DEBRIS RECOVERED

OIL PUMPED FROM LAGOONS AFTER THE SPILL	2 July 10,000 Gal.
RECOVERED OIL PLACED IN LAGOONS FOR TEMPORARY STORAGE (Ex.32)	6 July-20 July 260,800 Gallons
OIL FROM LAGOON TO DISPOSAL SITE BY TRUCKS AND TANK CARS	21 July----------30 Aug. 350,000 Gallons
OILY SLUDGE AND DEBRIS SHIPPED TO DISPOSAL SITE IN HOPPER CARS	18 July----------29 Sept. 222 Hopper Cars Delivered A Total of 13,957 Tons of Sludge and Debris to Disposal Site.

Exhibit 31

GALLONS OF OIL RECOVERED FOR TEMPORARY STORAGE AT LAGOONS

'72 JULY	DAILY	CUMULATIVE
1	10,000	10,000
2	12,000	22,000
3	10,000	32,000
4	10,000	42,000
5	24,700	66,700
6	15,000	81,700
8	55,000	136,700
12	44,640	181,340
13	24,660	206,000
14	16,840	222,840
15	14,800	237,640
16	7,300	244,940
17	15,860	260,800

Exhibit 32

*U.S. GOVERNMENT PRINTING OFFICE: 1974 546-317/329 1-3