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M E M O R A N D U M

August 9, 1984

To: Bill Yake

From: Joe Joy

Subject: Eagle Harbor Facilities Tours and Historical Review - Part I: The Wyckoff Company

INTRODUCTION

A series of environmental investigations by the Washington State Department of Ecology (WDOE) and the U.S. Environmental Protection Agency (EPA) has been undertaken to discern the extent and source(s) of polynuclear aromatic hydrocarbon (PNA) and phenolics contamination of Eagle Harbor sediments (Joy, 1984). As part of this effort, three commercial facilities were toured by WDOE personnel.

The three commercial facilities were selected by WDOE and EPA staff during an April 2 meeting (Cunningham, 1984). These facilities were thought to be potential sources of PNAs and/or phenolics.

The three facilities chosen were (Figure 1):

- The Wyckoff Company - a pole and piling preserving plant
- The Washington State Ferries - a ferry maintenance and repair yard
- Diesel Oil Sales - a diesel storage facility

On April 12, Art Johnson and I accompanied Dave Wright and Craig Baker of the Northwest Regional Office (NWRO) on tours through these three facilities. The purpose of the visits was to review existing and historical operations and waste-disposal practices with facility managers, and to identify any practices contributing to the PNA and phenolics problems in Eagle Harbor.

In addition to the on-site tours, I have reviewed NWRO files and other materials pertaining to the facility sites and Eagle Harbor in general. The purpose of this review was to identify any past events that may have contributed to the current contamination problem in the harbor.

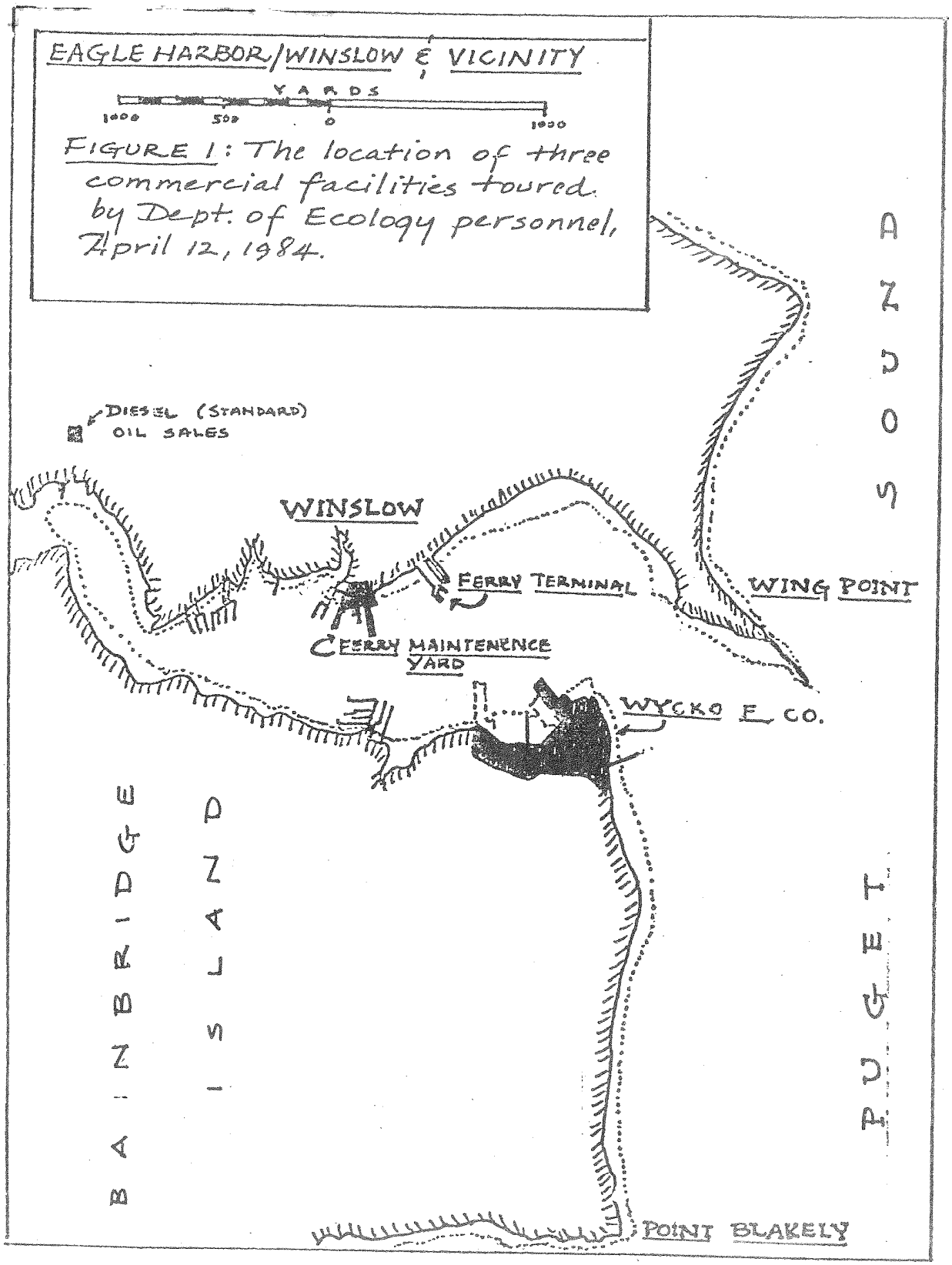

FIGURE 1: The location of three commercial facilities toured by Dept. of Ecology personnel, April 12, 1984.

Memo to Bill Yake
Eagle Harbor Facilities Tours and Historical Review - Part I: The Wyckoff Company

This memorandum is the first in a series of three discussing the findings from the tour and historical review for each commercial facility. The Wyckoff Company will be covered in this memorandum.

FINDINGS

On April 12, 1984, our WDOE party was met by Marc Walker, Don Johnson, and Chuck Stoddard of Wyckoff for the tour. Mr. Walker is the Eagle Harbor plant foreman, while Messrs. Johnson and Stoddard are from Wyckoff's area offices in west Seattle. The Wyckoff Company representatives explained the operation of the plant and some of the changes made in waste treatment processes over the years.

Layout and Operations

The Wyckoff Company Eagle Harbor facility occupies approximately forty acres on Bill Point (Figure 2). Site elevation is approximately ten feet above sea level. Most of the facility is located on pervious, fill materials; however, paved roads and surfaces are present in the log storage area. The facility has approximately 0.8 mile of shoreline that has been reinforced and improved over the years. In addition, the Wyckoff Company owns the tidelines to extreme low tide (approximately -4.5 feet), and has a twelve-year lease on bedlands in its log boom storage and docking areas (DNR, 1984).

The facility includes areas for the following operations (Figure 2):

- log rafting
- log peeling
- log storage
- log treatment
- chemical storage and wastewater treatment
- shipping
- aromatic oil and creosote unloading

In general, logs move from delivery and storage operations in the western portion of the facility, to treatment and shipping operations in the northeastern portion.

Creosote is unloaded from barges every twelve to fifteen months and transferred by pipleine from the westernmost dock to the storage tanks (Figure 2). However, no shipments of creosote had been received for six years. Aromatic oil is transferred from the eastern (Milwaukee) dock via pipeline to storage tanks. The oil is mixed with solid pentachlorophenate salt which arrives by truck.

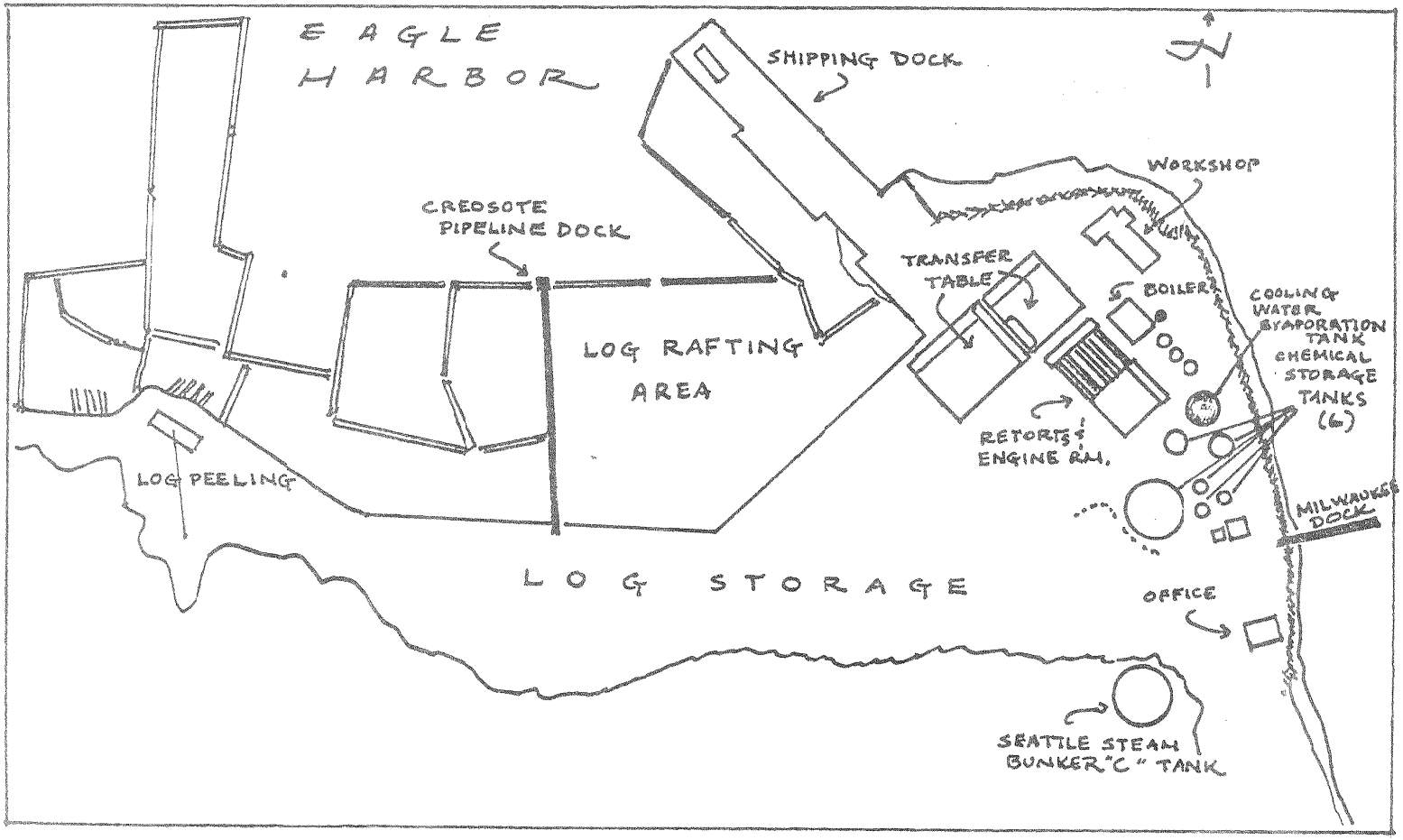

FIGURE 2: The Wyckoff Co. site plan, Eagle Harbor, WA.

Figure 3 shows the northeast portion of the facility in more detail. The structures located here that are dirctly associated with wood-preserving operations include:

- creosote and pentachlorophenol (PCP) storage tanks
- two deep wells
- the boiler house
- the engine room and retorts
- the wastewater control system: separators, pumps, and tanks

Poles and pilings had not been treated at the plant since March 1982[1]. Plant activities had been reduced to receiving, peeling, and storing logs. These logs are either shipped to the Wyckoff's West Seattle plant or remain stacked in the yard until treatment operations are resumed at Eagle Harbor.

The facility uses the Boulton method of wood preserving. Both creosote and pentachlorophenol are used in this pressure treatment. Briefly, the peeled logs are received into retorts where they undergo the following:

- an initial heating-vacuum phase (while being immersed in preservative) to remove moisture and natural oils from the logs
- a preservative pressure phase
- a second vacuum phase to return preservative to the storage tanks

The logs are moved out of the retorts onto the transfer table area (Figure 3). Here they are allowed to dry. Then they are either restacked and await shipment by barge, or they are placed in log boomed storage.

Waste Treatment

Process wastewater at Wyckoff is generated in two areas: (1) the retorts, or (2) the boilers. The wood-preserving area and the boiler area have separate wastewater treatment systems. Schematic diagrams supplied by Wyckoff describe the two systems (Figures 4 and 5).

The process effluent from the Boulton-type wood-preserving process contains:

- Water vapor from the wood
- Wood sugars and oils
- Low boiling fractions of preservative

[1]Treatment at the Eagle Harbor facility was resumed on May 15, 1984.

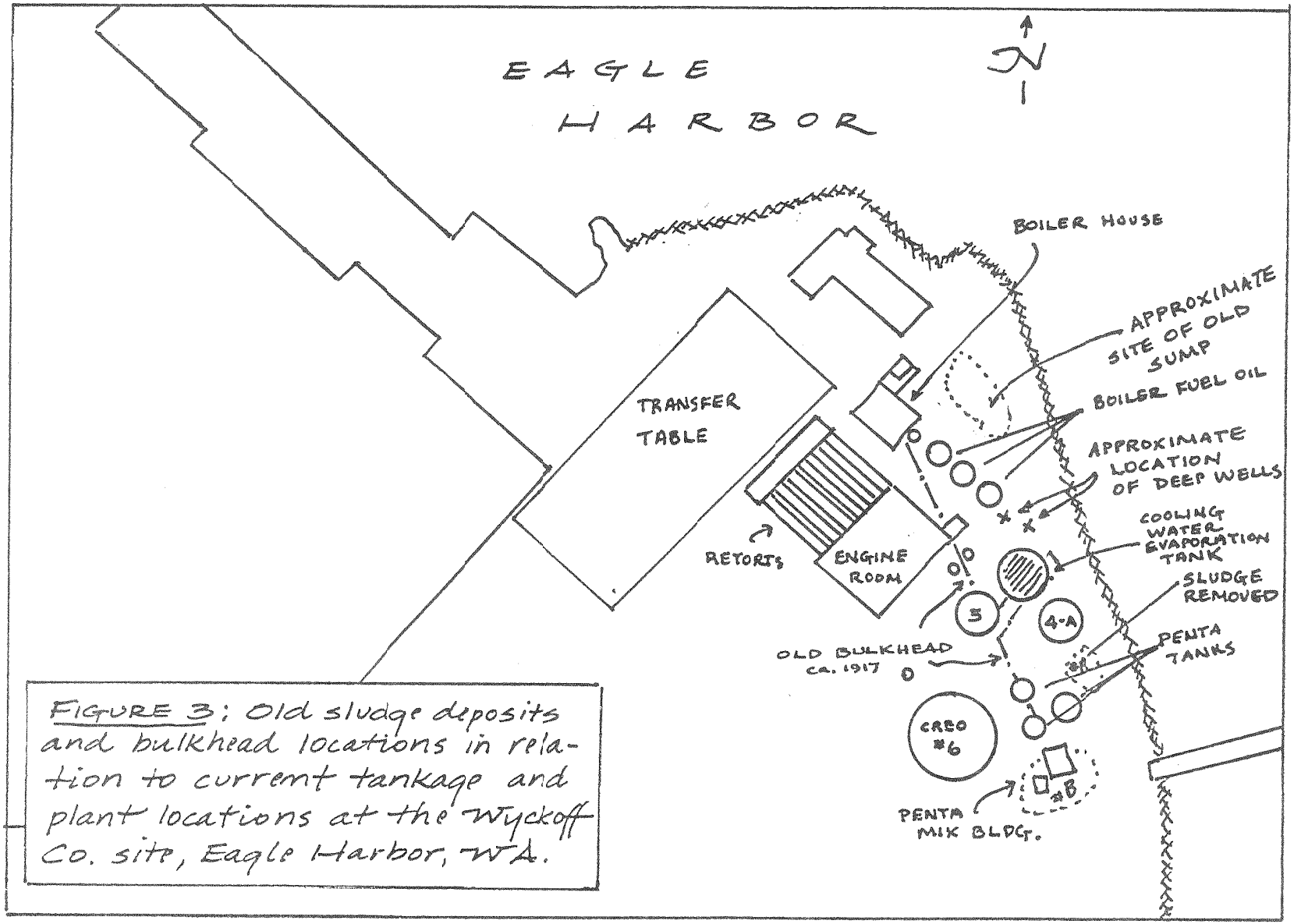

FIGURE 3: Old sludge deposits and bulkhead locations in relation to current tankage and plant locations at the Wyckoff Co. site, Eagle Harbor, WA.

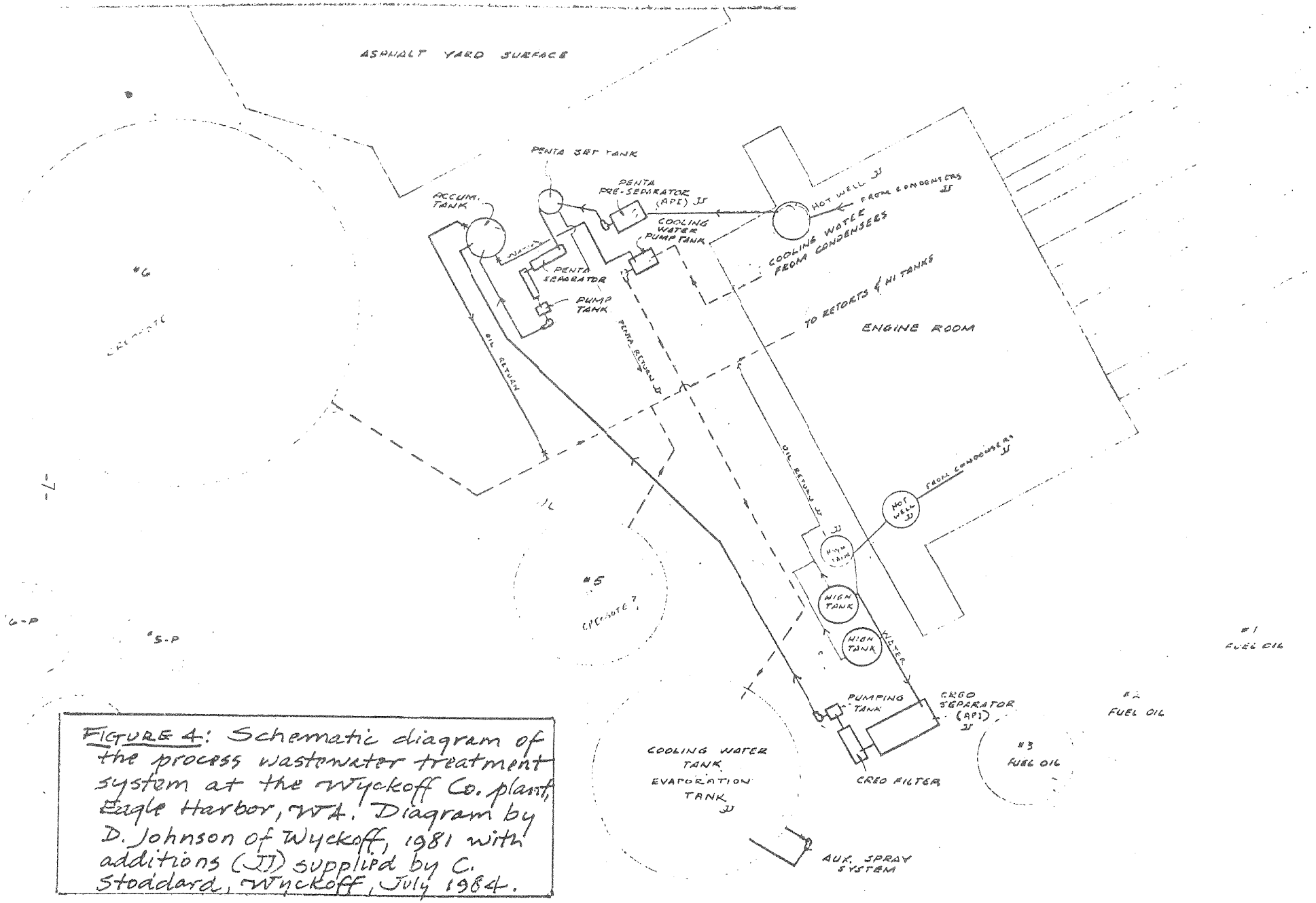

FIGURE 4: Schematic diagram of the process wastewater treatment system at the Wyckoff Co. plant, Eagle Harbor, WA. Diagram by D. Johnson of Wyckoff, 1981 with additions (JJ) supplied by C. Stoddard, Wyckoff, July 1984.

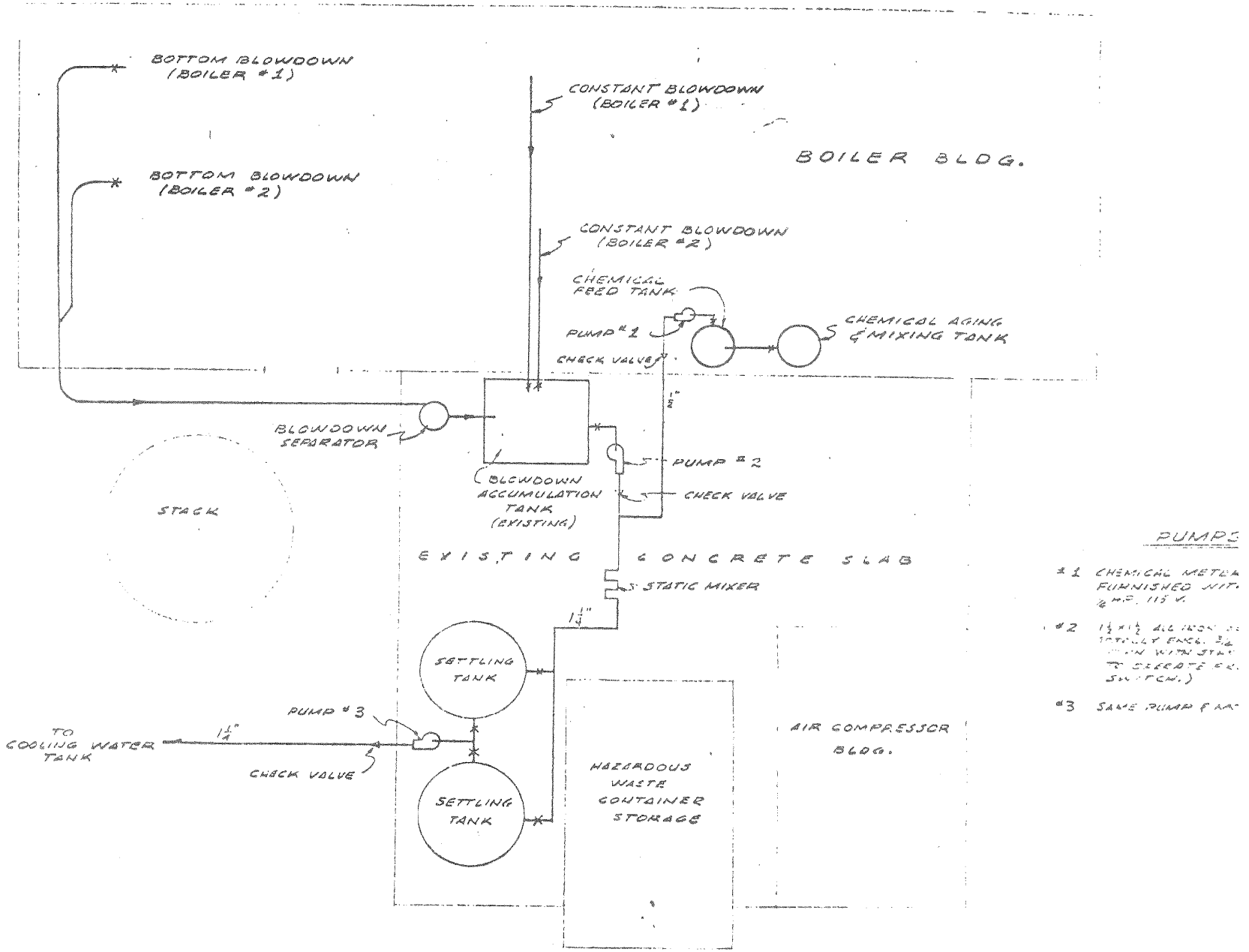

FIGURE 5: Schematic diagram of the boiler blowdown treatment system at the Wyckoff Co. plant, Eagle Harbor, WA. Drawn by D. Johnson, Wyckoff Co, 1981.

These are drawn-off the retorts by vacuum as vapor after the logs have been immersed in heated preservative.

At the Wyckoff plant, a system for pentachlorophenol and a system for creosote residue vapors are present (Figure 4). The systems are very similar in construction. Briefly, the steps are these:

1. The vapors are condensed in the condensers using cooling water from the cooling water evaporation tank.

2. The condensed wastewater is sent to a "hot well" where the volume is measured.

3. The oil and water phases are separated using a combination of settling (high) tanks, API separators, and plate filters (with oil absorbant).

4. The oil phase is returned to respective preservative storage tanks.

5. The water phase is combined with the cooling water returning from the condensers.

6. This combined water is pumped to the cooling water evaporation tank and recycled through the condensers as necessary.

Sludges accumulate in the separators, tanks, and filters. These sludges are placed in 55-gallon drums and stored in a covered area on a concrete slab next to the boiler building. The drums are periodically taken to a hazardous waste disposal site (Arlington, Oregon).

Most of the preservative from the retorts and all retort drippings do not enter the wastewater treatment system. Instead, they are drawn directly into the preservative storage tanks.

The boiler water is used to generate steam. The steam heats the preservative and applies pressure in the retort chambers. The retorts are jacketed so that no steam is directly in contact with preservative.

Blowdown is created in the two boilers at the plant, and this effluent is drawn-off and treated in the blowdown disposal system (Figure 5).

Blowdown contains boiler treatment chemicals and concentrated minerals and salts from the make-up water.

Treatment consists of the following:

1. The solids in the bottom blowdown are initially separated from the water using a settling tank.

2. Water from this initial separation is added to the constant blowdown water.

3. Flocculants and pH-adjusting chemicals are added and mixed with the combined dowdown water.

4. Floc and solids are settled-out in two additional tanks.

5. The water phase is drawn off the top of the settling tanks and piped to cooling water evaporation tank.

The wood-preserving effluent system is relatively new. The old system discharged into a sump (Figure 3). Transfer from the old system to the new, closed system was accomplished in late 1981 or early 1982.

Modification of sludge disposal was also made in 1981. Prior to that time, sludge was buried on site (? - 1971), or received by a disposal company and hauled to the county landfill (1971-1981).

Because wood-preserving activities had been suspended for some time at the site, the wastewater systems were not in operation during the tour. Messrs. Walker and Johnson told us the system piping had been cut and drained to protect lines and pumps from freeze damage. Dave Wright observed that the boiler blowdown collection system had been disconnected (Wright, 1984). In addition, a PVC line at the cooling water evaporation tank ancilliary spray system pump was cut. There seemed to be some confusion as to the location of the other end of the line and its destination. The line finally chosen was too small in diameter and led over the bulkhead.[2].

During the tour, we noted the processing area, including the transfer table, tank areas, and retorts, was not sealed and contained. No storm-water collection system is present except a diversion drain along the southern border of the property. At other wood-preserving facilities, process areas are contained to prevent the escape of spilled preservative (S.W. Regional Office Staff, 1984). Chronic spills, especially onto the transfer table, have created severe subsoil contamination at other facilities (Thompson, Wardrop, et al., 1978; S.W. Regional Office Staff, 1984).

Historical Review

Several documents were reviewed to construct a historical account of activities and events at the Wyckoff site. A visual aid was constructed to help summarize the major points of the compilation (Figure 6). A detailed history of the site follows:

[2]The line from the cooling water evaporation tank auxiliary pump has been removed entirely, and its purpose was unknown (Stoddard, 1982).

pre- 1940's	1940's	1950's	1960's	1970's	1980's

OWNERSHIP OF SITE:

- 1905 - Pike (Pile?) Preserver Co.
- Pacific Creosoting Co.
- West Coast Wood Preserving Co.
- Baxter - Wyckoff Co
- Wyckoff Co.

CHANGES IN LAYOUT & OPERATIONS:

- Burlap and asphalt wrapping of poles
- Creosote Treatment
- Fill and dredging on east shoreline (plant rebuilt ca. 1920's?)
- Retort and engine room moved to present location (1945 - 1946?)
- Regrading of log storage area

CHANGES IN WASTEWATER TREATMENT OPERATIONS:

- ?
- Oil separator in use for retort drippings; effluent through coke filter and discharged via outfall to harbor.
- Boiler water through separate outfall
- Process effluent to sump; outfall eliminated
- Closed system for process wastewater; sump eliminated

SLUDGE OPERATIONS:

- ?
- Sludges used as bulkhead fill and buried elsewhere onsite
- Sludges eroding from bulkhead fill; moved farther back onsite
- Sludges taken to local landfill
- Some old sludge removed to landfill
- Sludges collected and sent to hazardous waste site

INVESTIGATIONS:

- Report of dumping
- 1410 ppm of phenols in process water going to outfall
- Well testing
- Oil separator in need of repair
- Soil borings and consultant work
- Various reports of oil spills, and oil sheen on water and sediments

FIGURE 6: Major historical points of interest concerning the Wyckoff Co. site, Eagle Harbor, WA.

Date		References
1905	Pile (or Pike?) Preserver Company moves to Bill Point after one year at Port Madison. Poles wrapped in burlap and asphalt. Name soon changed to Pacific Creosoting Company.	Merriott, 1941 Bowen, et al., 1971
ca 1917	An earlier bulkhead with a wing wall is shown on maps of the site (Figure 3).	Dehn, 1972
1929	Pacific Creosoting Company applies for Corps of Engineers permit to dredge, bulkhead, and fill.	Aldis, 1984
1942	Deep well drilled to 813 feet (Figure 3). Casing perforated at 90 to 105 feet and at bottom. Artesian. One previous drilled well to 500 feet also artesian.	Sceva, 1957
1944	Aerial photo of the area shows shoreline and dock facilities similar to their present shape. Ponds situated where retorts currently stand. Creosote tank #6 present (Figure 3).	Army Service Map, 1944
1947	Inspector from the Washington State Pollution Control Commission (WPCC) made return inspection of West Coast Wood Preserving Co. plant plan. He finds plant clean and precautions taken against oil spills into Eagle Harbor. Also, less oil in harbor because treated logs are shipped by barge rather than rafting.	Young, 1947
1952	Department of Fisheries receives a report of night dumping of "cook liquor." Sand covered with oil at times.	Fitzgerald, 1952
	WPCC engineer investigates above complaint. Reports: (1) Plant has oil separators and condensers to prevent loss of material. (2) Slight oil slick in vicinity of outfall due to small quantities of naphthalene and phenol. (3) Spill of creosote "a year or two ago" during tanker unloading operations. (4) Present company waste practices adequate.	Jones, 1952a

Date		References
1952 (continued)		
	WPCC engineer describes plant operations. • Vapors from retorts condensed and re-tored to creosote tank • Wastes from drip pans under retorts pass through oil separator, coke filter and then discharged to Puget Sound.	Jones, 1952b
1953	WPCC inspector reports good operation of plant. Oil separator needs "replacement of chains on the skimming pipes."	Nielson, 1953
1956	WPCC Waste Discharge Permit No. 387 allows 1 MGD of cooling and effluent wastewater discharge from outfall. Effluent shall not exceed 10 ppm total oils and 1 ppm phenols.	WPCC, 1956
1957	WPCC inspector takes oil separator composite sample and cooling water grab sample. 1410 ppm phenols in composite sample. 0 ppm phenol in grab. Separator flow 0.004 MGD (11 gals/min for 6 hrs/day); cooling water flow 0.95 MGD. Inspector reports separator and cooling water not mixed. Beach is oiled adjacent to outfall.	Anon, 1957
	A 40' x 12' x 6' treated piling lined pit is constructed in the sand fill to dump effluent from oil separator. Water seeps through sand, and oil is skimmed off at regular intervals. Sludges are dug-out periodically and deposited on site.	Knox, 1957; Huntley, 1957; Knox, 1958; Knox, 1962
1959	Constant oil slick is reported off West Coast Wood Preserving Company plant. Shop foreman at plant believes it's from chronic oil spillage at the site.	Nielson, 1959
	Baxter-Wyckoff Company is new owner of the Eagle Harbor facility.	Bainbridge Review, 1959
1961	WPCC inspector notes that bulkhead is in need of repair. Oil separator sludges had been used in the past for fill behind bulkhead. Inspector suggests sludges should be deposited farther away. Waste Discharge Permit No. 1344 reiterates inspector's suggestion.	Knox, 1961

Date		References
1963	A routine inspection is made of facility while investigating a reported oil spill in Winslow. Plant is suspect, but no oil is seen on shoreline.	Knox, 1963
1971	Waste Discharge Permit No. 3680 for the Wyckoff Company: • 0.02 MGD wastewater allowed to be discharged to groundwater via seepage basin. • Sludges and waste oils deposited are transferred to portable steel containers and given to qualified disposal company. • Treated logs may be deposited in log pond after preservative drains, cools, and dries.	WDOE, 1971
1972	Washington State Department of Ecology (WDOE) and Environmental Protection Agency (EPA) request the Wyckoff Company to investigate oil seepage problem. The Wyckoff Company has nine test borings and one well drilled (Figure 7), and hires two consulting firms: Harbinger, Inc., and CH_2M Hill. Test borings and well were made to 30'. Visual observations were made of materials extracted. They revealed: • Creosote at some stratum in all borings. • Odor of creosote or creosote at 30' in all but one boring (#4). • Boring #4 had clay layer at approximately 24' with creosote above and very little below. • Most borings had soils with high or moderate permeabilities to 30', and no sign of change. • Water table at approximately 7.5'. • "During high tides, a 1/8" to 1/4" layer of creosote floated in the well" (test well drilled near boring #1). • Groundwater appears to be perched "higher than would normally be expected."	Dehn, 1972; Pacific Testing Lab, 1972; Allworth, 1972

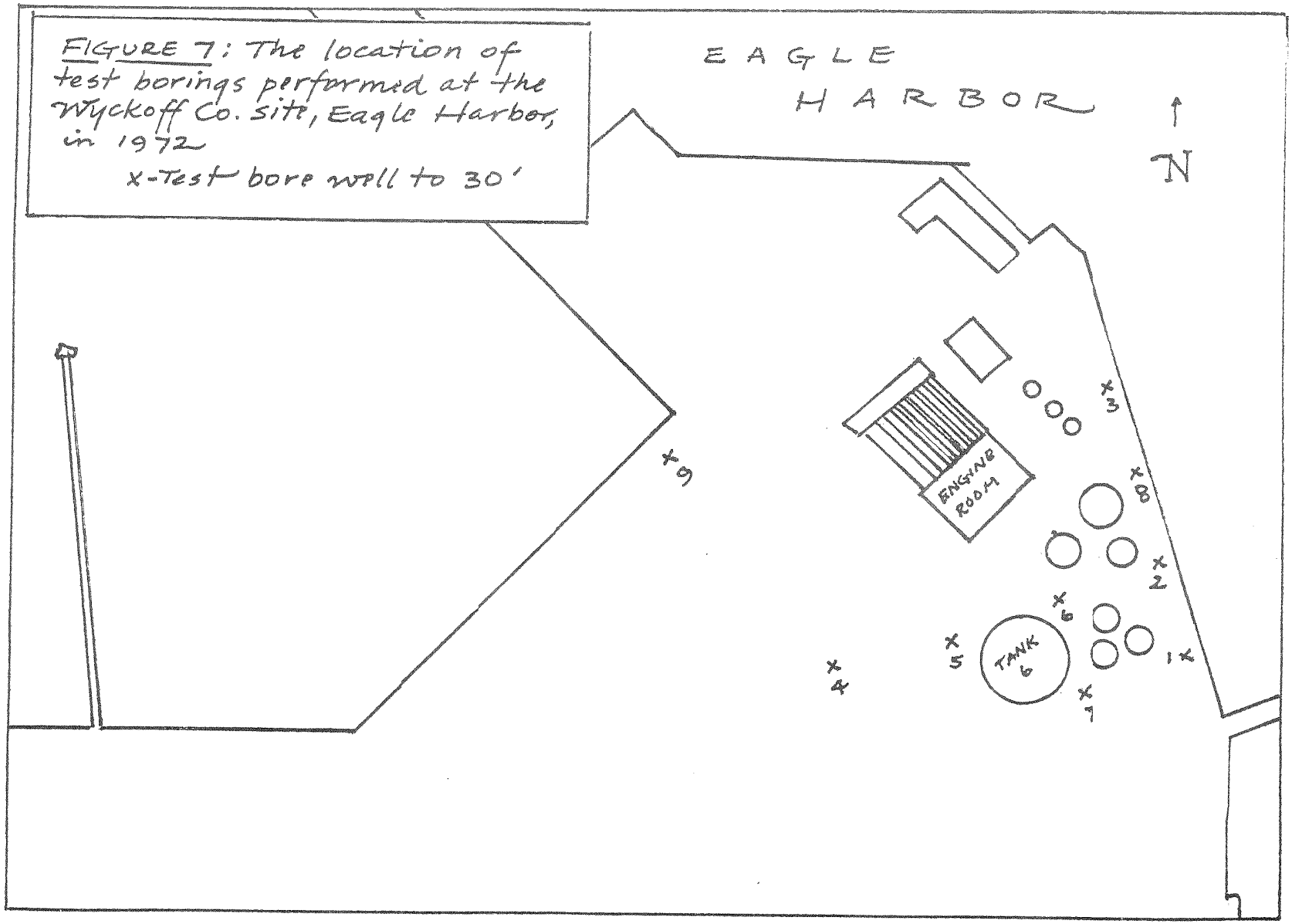
FIGURE 7: The location of test borings performed at the Wyckoff Co. site, Eagle Harbor, in 1972
x-Test bore well to 30'
EAGLE HARBOR
N
ENGINE ROOM
TANK 6
x1
x2
x3
x4
x5
x6
x7
x8
x9

Date	References

1972 (continued)

In addition to borings and the test well, the following operations were completed: — Dehn, 1972; Adam, 1972; Johnson, 1972; Allworth, 1972; WDOE, 1971

- Sludge deposit A (Figure 3) was removed and taken to a municipal landfill.
- Leaks in the creosote fill line were detected; the line was drained and capped.
- Tanks Nos. 6 and 4-A (Figure 3) were checked for leaks; none were detected.
- Several holes were dug to 7' depth in search of sludge deposits.
- A depuration (air flotation cell) unit was tested to separate creosote from groundwater; test results were discouraging.
- Water was analyzed from test well: 130 ppm total oils, pH 7, 3.2 ppm phenol.
- A new phenol lab method was found because of "illogical" results in creosote-water samples.

Recommendations from these studies were: — Adam, 1972; Dehn, 1972; Allworth, 1972

- Install shallower well to get higher concentration of creosote; then retest depuration unit.
- Experiment with other chemical methods of creosote and phenols removal from groundwater; e.g., activated carbon, sorbents, ozone, potassium permanganate.
- Drill more borings and wells to obtain better hydrogeologic data, and define extent of contamination.
- Test other tanks (walls and bottoms) and lines for leaks.
- Check tank sludges for corrosive activity.
- Excavated other sludge deposit (#B) and search for others.

Date		References
1972 (continued)		
	In addition, CH_2M Hill briefly discussed alternate control methods: • Bentonite or sheet pile barriers. • Interceptor wells. • Major excavation of contaminated materials.	
	Wyckoff reported these findings and recommendations to WDOE and indicated they would go ahead with additional tank testing.	Adam, 1972
1980	The Wyckoff Company renews its 12-year lease of bedlands for the purposes of log boom storage and docking facilities. An additional note is that the company owns the tidelands to the extreme low water.	DNR, 1980
	In response to queries by the Kitsap Co. Assessors office concerning the request by Wyckoff for reductions of assessed value of property because of soils, groundwater contamination, Baker responded: (1) Seepage of creosote continues despite efforts to control. (2) A new discharge permit is being worked-out. (3) Testing of soils and possible removal of those that are contaminated will be made if the Wyckoff Co. should leave.	Baker, 1981
1981	Waste Discharge Permit 3680 for the Wyckoff Company: • S1: discharge 0.005 MGD to groundwater until November 1981. • S2: no discharge of effluent to groundwater permitted.	WDOE, 1981

Date		References
1981 (continued)		
	• S4: (a) prevent entry of solid waste material into state ground or surface water. (b) prevent leachate entry into same without providing all known available and reasonable methods of treatment. (c) plan to handle solid wastes as per RCRA.	
	The Wyckoff Company notifies WDOE that ground sump will be eliminated by December 1981.	Johnson, 1981
1983	A draft report by a consultant hired by EPA suggests Wyckoff site should be switched from active to inactive status as a hazardous waste site. The reasons for this recommendation are:	Fuentes, 1983
	• Only a small quantity of sludge (hazardous waste) generated (<2000 lbs/yr).	
	• Effluent system is now closed loop.	
	• WDOE sees no groundwater contamination problem.	

Discussion and Conclusion

The main points of interest obtained from the site tour and historical review of the Wyckoff site are:

- The current wastewater systems are designed to eliminate the discharge of process and boiler effluent to surface and groundwater.
- The past wastewater system discharged effluents with high concentrations of phenols and oils into the groundwater (1957-1981) and Puget Sound (1946?-1957).
- The site has undergone at least two major reconstructions (1920s, 1940s), and much fill material has been added. The older methods of operation and their location on the site are uncertain.
- Incidental spillage in the treated log transfer and storage, and tank and process areas have been and continue to be uncontrolled.
- Some sludge disposal areas have been identified and have been removed from the site; however, some sludge deposits probably remain.
- Intertidal and subtidal areas beneath the creosote unloading dock and treated log storage boom area may contain treatment compound residuals from spillage.
- Creosote-like materials have been detected in subsoils at many points within the site to a depth of at least 30 feet.
- Seepage of light fraction oils into Puget Sound has been a chronic problem for at least 25 years.

These main points strongly suggest that the subsoils onsite and in adjacent shorelands have high concentrations of oils and phenols. Although the plant has not been preserving materials since 1982, chronic oil seepage from the site has continued. This seepage, in the form of oil slicks and discolored intertidal sediments, has been recognized for many years.

The following questions remain concerning the contamination at the Wyckoff site:

1. What are the quantities and characteristics of preservative materials in the subsoil and groundwater on the site?
2. Are there current sources of these materials contributing to further subsurface contamination?

3. To what extent are the materials moving off the site, how do their chemical characteristics change during this transport, and where will be their final destination?

4. To what extent do these materials constitute an environmental hazard?

5. If a hazard is present, what remedial actions can be taken to minimize or eliminate this hazard?

Many of these questions remain unanswered. However, the information from the work accomplished in this report may give some "clues" to questions 1 and 2. Much more investigation on-site and off-site would be necessary to satisfactorily answer all the questions.

With regard to question 1, some of the following data are available:

- Creosote-like oils were detected in some test bore holes to at least 30 feet (Allworth, 1972).

- In all but one test hole no impermeable layer was found for at least 30 feet (Allworth, 1972).

- Test bore #2 yielded a "heavy concentration of creosote" at 19 1/2 to 20 feet, just above "tight silt and fine sand" layer 1.5 feet thick; creosote was again detected below this layer (Pacific Testing Lab., 1972).

- The 800-foot well on site which is screened at 95 feet to 105 feet, has no creosote materials present (EPA, 1984).

Creosote is a multi-phase oil having constituents lighter and heavier than water. These constituents will separate-out vertically and horizontally according to chemical and hydrogeologic factors; e.g., soil permeability, groundwater direction and rates of movement, adsorption of contaminants to soil materials, biochemical degradation, and chemical solubilities. For example, creosote seemed to be retained in a heavier concentration above the low-permeability silt layer mentioned above than in gravel and coarse sands above and below the silt layer. Additionally, Allworth (1972) noted a "creosote oil" floating on the water table.

The nature of creosote, the permeability of the subsoils, and the chemical results of the well test suggest that the heaviest concentrations in most of the areas explored in 1972 may be found below 30 feet, but shallower than 95 feet.

With regard to the second question, there are also some data available from this report:

- Some testing of tanks and lines, and buried sludge removal was accomplished in 1972 (see 1972, above).

- Wastewater effluent is now entirely contained within a closed system and no longer discharged to groundwater or surface water.

- Should the plant resume full operations, some further control measures could be made to prevent further contamination.

It is unclear from the record if all tankage and lines have been tested. For example, the iron content tests suggested by CH_2M Hill in 1972 for bottom leaks may have been acomplished as planned by Wyckoff (Adams, 1972). During the 1984 tour, Wyckoff personnel were uncertain of line locations from older plant operations, so that lines may exist which have not been tested. In addition, sludge may have been removed from under the penta-mix building in addition to the deposit found south of tank #4A (Figure 3). However, the Wyckoff personnel were uncertain of this when asked in April of 1984.

Finally, from observations made on the tour, some actions could be taken to reduce contamination if the plant resumes normal operations. The areas in need of attention are:

- The treated log transfer and storage area.

- The tank storage and process area.

- The process wastewater treatment system.

Immediately after being treated in retorts, logs are moved through the transfer table to on-site storage areas (Figure 3). Freshly treated logs contain residuals of preservative in wood cracks. This preservative drips to the ground. As previously mentioned, heavy contamination of subsoils in the transfer table/treated log storage areas has been detected at other wood-preserving operations (Thompson, Wardrop, et al., 1978; Stoddard, 1984; S.W. Regional Staff, 1984).

Tank storage and process areas are also prone to accidental spillage from leaking valves and pumps. Any liquid material spilled to the ground would migrate downward through the highly permeable soils at the Wyckoff site.

The steps taken by Wyckoff personnel to protect the process wastewater treatment system from freeze damage are appropriate. However, the confusion observed during the tour concerning the proper reconnection of line from the cooling water tank auxiliary spray pump is distressing. Plant personnel should be intimately familiar with the wastewater flow system.

The following recommendations are made to ensure that accidental spillage of treatment compounds does not continue to occur when the plant resumes operations:

1. The treated log transfer and storage area and process and storage areas should be lined with an impermeable material. Preservative product and stormwater from these areas should be collected and treated before discharge into surface or groundwaters.

2. The process wastewater treatment system should be thoroughly tested and inspected by plant personnel with intimate knowledge of the system design. Other personnel should be instructed in the proper maintenance of the system and emergency response measures.

The Wyckoff Company and former companies at the site have had a documented attitude of cooperation with the WDOE, EPA, and before that, the WPCC. I see no change in the current attitude of the company personnel I have contacted, and I am confident of their continued cooperation.

JJ:cp

cc: Dave Wright
John Littler
Dick Cunningham

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