

Health Assessment for

IMPERIAL OIL CO., INC./CHAMPION CHEMICALS

CERCLIS NO. NJD980654099

MARLBORO TOWNSHIP, MONMOUTH COUNTY, NEW JERSEY

JUL 30 1990

Agency for Toxic Substances and Disease Registry
U.S. Public Health Service

HEALTH ASSESSMENT
IMPERIAL OIL COMPANY
MONMOUTH COUNTY
MARLBORO TOWNSHIP, NEW JERSEY

Prepared by:
Environmental Health Service
New Jersey Department of Health (NJDOH)

Prepared for:
Agency for Toxic Substances and Disease Registry (ATSDR)

OBJECTIVES

The Phase I Remedial Investigation of the Imperial Oil Company Superfund Site has been completed. The objectives of this Health Assessment based upon the current stage of site remediation are:

- * To assess the nature and magnitude of health effects which may be associated with the site;
- * To identify, if necessary, any immediate actions that need to be taken to prevent or minimize exposure to hazards and contamination associated with the site;
- * To identify, if necessary, deficiencies or gaps in the data or information associated with the site;
- * To document the concerns of the community with respect to the site;
- * To identify, if necessary, additional exposure and sampling points;
- * To assess whether a health study of the site is indicated.

(This health assessment focuses on public health issues. Environmental and natural resources issues, which may play a key role in the remediation of the site, are not addressed in the assessment. The emphasis of the health assessment on public health issues is not intended to diminish or minimize the importance of environmental resources within the remediation design.)

SITE SUMMARY

The Imperial Oil Company/Champion Chemical (IOC) is an oil blending and recovery facility. It is an active facility, which until recently employed 10-15 workers on-site at any one time. Imperial Oil was engaged in the custom blending of lubricants, primarily for the military. The Phase I Remedial Investigation/Feasibility Study (RI/FS), part of the United States Environmental Protection Agency's (USEPA's) remediation process has been completed. The IOC site and its immediate surroundings have demonstrable contamination of soils, surface water, sediments, and groundwater. Among the contaminants are PCBs, arsenic, lead, trichloroethylene, phthalates, and total petroleum hydrocarbons.

Public health concerns center around the impact of contamination on area water supply, surface water discharge into recreational areas, and exposure of local residents and workers to contaminated soils.

The IOC site was included on the USEPA National Priorities List issued in December of 1984. Of 110 New Jersey sites currently on the NPL list the IOC site is ranked 89th.

The Imperial Oil Site is considered to be a public health concern because humans have probably been exposed to hazardous substances at concentrations that may result in adverse health effects. Although human exposure to on-site/off-site contaminants is likely to be currently occurring and probably occurred in the past, this site is not being considered for follow-up health studies.

SITE DESCRIPTION

The Imperial Oil Company (IOC) site occupies an area of approximately 4.2 acres in Marlboro Township, Monmouth County. It consists of seven production, storage and maintenance buildings, and fifty-six above-ground storage tanks. A sandy soil extends over those areas not covered by buildings, asphalt, or pavement. The process area is enclosed by a six-foot chain-link fence and is protected by 24 hour security personnel.

Wooded areas are located east/northeast of the site. A fire pond occupies the northeast corner of the property line, from which an intermittent stream flows to the northwest and eventually into Lake Lefferts, located 1.3 miles away. The site is bordered by railway and power lines on the north/northwest, beyond which is a wetland bog. Two automobile scrap yards are situated to the northwest of the site. Two waste oil dump areas, also located to the northwest are designated off-site area #1

and off-site area #2. These areas, which are part of the investigation, are not fenced or posted.

The site is currently operated as an oil-blending facility, but has been the location of various chemical and industrial operations since 1912, including the production of tomato by-products, arsenic acid, calcium arsenate, flavors, and essences. In 1950, Champion Chemical Company (a sister corporation of IOC) acquired the location to operate an oil reclamation operation, and shared the facility with Eagle Asphalt. During the period from 1950 to 1953, large piles of oil-saturated soils were allegedly stored on-site until their removal to the Morganville dump. At about the same time, additional oil contaminated materials were reportedly discarded on the east side of the property.

In September of 1978, during an investigation of Burnt Fly Bog, (a 90-acre hazardous waste site 3 miles north-west of IOC) Champion Chemical/Imperial Oil was alleged to be a responsible party (NJDEP). The IOC site subsequently came to the attention of regulatory authorities. In 1981, a NJDEP site inspection found oil-contaminated soils at the base of the tank farm area. NJDEP and IOC then entered into an Administrative Consent Order agreement (ACO) to clean up the site.

The IOC site was included on the National Priority List issued by USEPA in December of 1982. Analysis of soil and waste pile samples confirmed contamination, and a Remedial Action Master Plan, completed by the USEPA in 1983, concluded that soil and ground water on-site and sediment off-site were polluted with heavy metals and organic priority pollutants, including PCBs.

In June and November of 1984, the Occupational Safety and Health Administration (OSHA), responding to an internal referral, visited IOC and issued citations for failure to have employees wearing protective equipment and clothing in the oil-separator area, and for safety violations related to slippery floors.

In the past, the Local Health Department and the Monmouth County Prosecutor's office, have jointly cited IOC for alleged pollution activity and investigated the Imperial Oil site for these violations. Subsequent to these citations, the NJDEP awarded a contract to E.C. Jordan Company to conduct a Remedial Investigation/Feasibility Study (RI/FS) of the IOC site.

COMMUNITY CONCERNS

Local officials and citizens have been very active with regard to the Imperial Oil site, and were responsible for bringing the site to the attention of NJDEP. According to official transcripts, the following summary of issues represent the highlights of the NJDEP public meeting of May 13, 1987.

- * What are the health risks to children utilizing the site for recreation?
- * What is the impact of the site on the water quality of Lake Lefferts, which is under active consideration as a potable water source for Matawan Borough?
- * There is concern that contamination is more widespread than is generally known; pockets of contamination may not have yet been found, or dumping of contaminants may still be occurring. What efforts will be made to define the extent of contamination?
- * There is dissatisfaction with the ACO of 1981 because it did not address off site contamination.
- * Has Imperial Oil been identified as responsible for off-site contamination?
- * Imperial Oil is still in operation 5 1/2 years after the consent order was issued. How much worse has the problem grown in that time?
- * What will be done to recover clean-up costs?
- * Is there funding available for site remediation?
- * What is the impact of the site upon proposed residential development in Aberdeen Township?

SITE VISIT

Information used in this assessment includes information provided by NJDEP and NJDOH personnel who have been to the site. A site visit to the Imperial Oil Site, to gather information for this health assessment, will be conducted by NJDOH personnel.

ENVIRONMENTAL CONTAMINATION

During early preliminary investigation, and during Phase I of the RI/FS, contamination was confirmed in: an on-site waste pile, tanks and associated soils, off-site dump areas, buildings and surrounding areas on-site, and in groundwater. The following information is taken from the Phase I RI/FS report:

SOILS:

Alteration of the natural upper soil surface and subsurface is evidenced by a layer of fill materials from two to more than

ten feet thick. Both off-site and on-site subsurface soils have been sampled. On-site and off-site surface soil samples were obtained at 15 locations. Fill material was observed in every boring and in every surface soil sample in the active portion of the IOC facility. The fill consists of sand, silt, and gravel mixed with variable amounts of ash, oil sludge and filter clay water, wood fragments, coal, and brick/concrete rubble.

In July 1987, volatile organic chemicals (VOCs) were detected in surface, near-surface, and water table depth soil samples and included benzene, ethylbenzene, tetrachloroethene, toluene, trans-1,2-dichloroethene, 1,1,1-trichloroethane, trichloroethylene, styrene, 2-butanone, carbon disulfide, 2-hexanone, 4-methyl-2-pentanone, and xylenes. Semi-volatile organic chemicals (SVOCs) detected from both on-site and off-site samples were phthalates, polynuclear aromatic (PNA) compounds and chlorinated benzenes. PCBs, arsenic, chromium, and lead were also discovered at elevated concentrations. Total petroleum hydrocarbons (TPH) were evident in 32 out of 37 soil samples.

GROUNDWATER:

The major aquifer for deep groundwater in this area is the Englishtown which is derived from quartzitic sands and has a recharge outcropping at the IOC facility and surrounding areas. A shallow groundwater system occurs as a perched water table incorporated into the fill zone underlying the site. The groundwater aquifer has been determined at the present time to flow in a northeasterly direction from the site, emptying into the fire pond and thus discharging, after heavy rains, into the Birch Swamp Brook and Lake Lefferts.

Samples were obtained from six new groundwater monitoring wells installed as shallow and deep pairs, and four shallow groundwater monitoring wells remaining from a previous evaluation. Three additional samples were obtained from private wells located adjacent and southeast of the site. No indication of a contaminant plume dispersing off-site was observed.

In July 1987, elevated concentrations of Hazardous Substance List (HSL) contaminants were not detected in three residential wells. Two monitoring wells produced samples that were contaminated with benzene-toluene-xylenes (BTX), phthalates, polynuclear aromatic compounds (PNAs), other aromatic compounds, PCBs, tetrachloroethylene (PCE), trichloroethylene (TCE), 1,2,4-trichlorobenzene, and arsenic. Five monitoring well samples contained TPH residues, one of which was 100% TPH.

SURFACE WATER AND SEDIMENT:

Four surface water and sediment samples were collected from Birch Swamp Brook: upstream and downstream from the site, from

the fire pond, off-site area #1, and off-site area #2. In July 1987, the four surface water samples did not demonstrate any elevated concentrations of TPH or HSL compounds. Inorganic elements were present at concentrations which were at or below National Primary Drinking Water Regulations. The concentration of arsenic in the surface water approached the maximum contaminant level (MCL) for arsenic.

In July 1987, elevated levels of VOAs, SVOAs, PCBs, TPHs, chromium, arsenic and lead were detected in downstream sediment samples. No contaminants were detected in the one upstream sediment sample.

Fish samples taken from Lake Lefferts in 1981 detected one species with 0.17 ppm of PCBs. Whether or not this low concentration of PCBs is due to the contamination at the Imperial Oil Site cannot be established.

The contaminants of concern both on-site and off-site were identified and are listed in Tables 1 and 2.

Table 1: On-Site Contaminants of Concern; Imperial Oil Site.
Maximum Concentrations in Parts Per Million (ppm)

Contaminant	Surface Soil	Groundwater*	Oil Layer**
Chromium	463	-	-
Lead	229	-	-
Arsenic	118	0.052***	-
PCBs	8.5	0.190	5.6
BTX	-	-	13.4
Butylbenzyl Phthalate	-	-	22
PAHs	-	1.630	52
Tetrachloroethylene	-	0.035	-
Trichloroethylene	-	0.160	-
1,2,4-trichlorobenzene	-	0.170	-
Total Petroleum Hydrocarbons	140,000	895	-
Total Aromatic Compounds	-	1.045	-

* Ground water samples were from ground water monitoring wells.

** Oil layer was in soil. Samples were removed from Monitoring Well 3.

*** Arsenic concentration that is reported was found in surface water.

Table 2: Off-Site Contaminants of Concern; Imperial Oil Site.

Contaminant	Maximum Concentrations in Parts Per Million (ppm)		
	Soil	Sediment	Groundwater
Arsenic	-	294	-
Lead	-	6,850	-
Bis(2-EH)phthalate	-	650	-
PCBs	-	41.5	-
Total Petroleum Hydrocarbons	160,000	330,000	1.600

QUALITY ASSURANCE/QUALITY CONTROL

A quality assurance/quality control (QA/QC) review was conducted by NJDEP's Bureau of Environmental Measurements and Quality Assurance (BEMQA). Field audits of sample collection and quality assurance performance were undertaken by BEMQA and found acceptable without qualification. The three potable well samples together with a field blank and trip blank were also found to be acceptable.

Problems were encountered in the metals analyses. These samples were rejected because of analytical deficiencies. Similarly, the BNA and pesticide/PCBs fraction had high detection limits due to very high levels of non-target analytes in some samples, which necessitated increased dilution (NJDEP Memo from BEMQA to Technical Coordinator, 1987).

DEMOGRAPHICS

The location of the IOC site is in an area utilized primarily for industrial purposes. Much of the surrounding area is characterized by wetlands, scrub forest, power lines, scrap yards and an active railway. The only reported recreational activity that takes place in the vicinity is dirt-biking and snowmobiling. There is no reported agriculture or animal husbandry in the area except for an apple orchard one-half to three-quarters of a mile north-northeast of the site. Neither hunting nor wildlife activity are reported to be a factor at this site.

There are approximately 30 scattered residences within a mile of the site which use domestic well water for potable purposes (Monmouth County Health Department). The nearest residence is within approximately 100 feet of the employee

parking lot. There are additional residences located along the road to the facility. There are parcels of land south/southeast and to the north of the site that are under consideration for development, or are in the planning stage of development. A small commercial center in Morganville is located approximately 1/2 mile southeast of the site, and the town of Matawan is 3 miles to the north. The size of the population within a four mile radius of the site is 25,200 according to a Monmouth County Planning Board 1970 census.

Lake Lefferts, a swimming and recreation area, is situated about one and one-quarter miles north of the site, and receives surface water drainage from a watershed area which contains the IOC site. Lake Lefferts provides fishing, bathing, and boating opportunities, as well as being identified as a future potable water resource for the Borough of Matawan.

The Marlboro Township Municipal Utilities Authority's water supply wells are located approximately two miles south of the site and obtain water from the Raritan-Magothy aquifer which underlies the Woodbury Clay aquifer. The Woodbury Clay formation is the lower confining strata for the Englishtown aquifer, the expected receptor for groundwater pollution from the IOC site.

The Devitte Military Academy is located approximately one mile to the southwest of the site. No other sensitive populations that may be impacted by the site have been identified.

ENVIRONMENTAL DATA GAPS

The following is a summary of gaps or deficiencies, affecting the accuracy of assessing the potential public health implications of the Imperial Oil site:

- * The current number of monitoring wells are inadequate to define the contaminant distribution in the groundwater. Only three groundwater samples from private potable wells have been collected. These wells are considered poor candidates for sampling because they are dug wells, and are of indeterminate depth. The extent, rate, and direction of movement of the highly contaminated oil layer coating the groundwater should be characterized with more certainty.
- * The impact to off-site areas where vegetative stress is evident needs to be better characterized.
- * Data is needed relating to the nature and extent of possible air contamination due to VOCs and fugitive dusts.

- * Information is needed concerning the extent and rate of soil/sediment migration. During times of increased precipitation, erosion of contaminated soils or sediments may occur with surface water runoff to the north from the IOC site.
- * Further soil samples from western portion of the waste pile, from the off-site areas, from a septic system/leach field behind the facility laboratory, and from the filter clay pile need to be collected. Media that require additional analyses are: soils associated with process and storage tanks, sediments in storm drains, sludges of unknown composition in storage tanks, and soils covered by site buildings and paved areas. Other features of the facility that should be subjected to further attention are the storm drainage system on-site and the possibility of a bypass system in the catchment area.
- * An important source of information regarding the extent of water contamination from the site that has not been addressed to date are irrigation wells. According to Local Health Officials, these wells are used primarily for lawn watering. Many of these wells, which derive their water from shallow regions of the Englishtown aquifer, did not originally appear in Health Department records and some of them may not be registered with NJDEP. It is not clear whether the private residential wells, that were tested during Phase I of the RI/FS, were irrigation wells or abandoned wells.

EXPOSURE PATHWAYS

Primary exposure pathways associated with the site focus upon the off-site areas that may have been used for the disposal of chemical wastes. This area of the site is easily accessible and contains high concentrations of petroleum hydrocarbons (See Table 2). Exposure pathways may include dermal contact, accidental ingestion, or inhalation of suspended soil particles. Dirt biking occurs near the contaminated areas and could provide opportunities for dermal exposure as well as inhalation of contaminated soil particles from disturbance of area surfaces.

Groundwater contamination is indicated by the analyses of groundwater samples from monitoring wells. The utilization of domestic wells by residents for non-potable purposes such as irrigating lawns, swimming pools and sprinklers may potentially lead to dermal exposure, ingestion, or inhalation of volatilized contaminants. These domestic wells have not yet been tested.

A small stream flows intermittently from the surface water contamination zones to Lake Lefferts, a recreational and future reservoir area. If Lake Lefferts is impacted by the Imperial Oil Site, recreational and potable use of the water in the lake could be a public health concern.

On-site workers may be subject to dermal and inhalation exposures. The operators of the facility need to comply with OSHA regulations and the workers on the site need to be aware of the applicable OSHA regulations.

PUBLIC HEALTH IMPLICATIONS

Without additional information about the contaminants on the site, it is difficult to assess the potential impact of the site on public health. Pathways exist for people in the area to be exposed to concentrations of chemicals that could pose a chronic health concern. Of particular concern is the off-site area, where petroleum hydrocarbons have been detected and vegetative stress has been noted. The downstream surface water and sediments, on-site groundwater, and on-site soils are contaminated with several carcinogenic or potentially carcinogenic substances, several liver, kidney, and nervous system intoxicants, and a variety of irritants.

The fact that the site is active, and workers are on-site, together with the previous OSHA violation, raises concern for employee protection and safety.

The contaminants present in on-site soils may serve as a source for the migration of pollutants to off-site areas through groundwater and surface water mechanisms. Soils present a contact hazard for workers and trespassers (both on-site and off-site). The two unfenced off-site waste dump areas to the north of the facility present contact hazards for residents (primarily dirt-bikers).

CONCLUSIONS AND RECOMMENDATIONS

On the basis of the information reviewed, the Imperial Oil Site is considered to be a public health concern because humans have probably been exposed to hazardous substances at concentrations that may result in adverse health effects. As noted in Environmental Contamination and the Exposure Pathways sections, human exposure to VOCs, PCBs, and lead is probably occurring and has probably occurred in the past via ingestion, dermal contact or inhalation of suspended soil particles.

A Phase II sampling plan is currently being finalized, which will address many of the data and information gaps and deficiencies, that were previously identified. A primary importance of the Phase II investigation is the completion of potential migration pathways from the site.

Although evidence of a contaminant plume has not yet been established, a need for additional data relating to the nature and extent of a groundwater plume is needed. The influence of the site on present and future quality of water resources in the area is of critical concern.

Off-site (unfenced) areas need to be restricted and warning signs posted. Contact with these areas could adversely affect health.

Hazardous waste site warning signs, which have been posted near the site, have been repeatedly torn down and replaced. These signs need to be maintained to insure awareness of the hazardous materials present at the site.

Additional residential wells in the area need to be sampled. Irrigation wells which draw from shallow groundwater sources could be useful for characterizing the spread of contamination.

Allegations and concerns of citizens regarding the site including hidden pockets of oil drums, or other waste dumps in the wetlands, need to be addressed.

In accordance with CERCLA as amended, the Imperial Oil Company site has been evaluated for appropriate follow-up with respect to health effects studies. Since a nonworker population exposed to on-site and off-site contaminants at a level of public health concern has not yet been identified, the Imperial Oil Company site is not being considered for community follow-up health studies at this time. However, workers on-site may be exposed to contaminants at levels of public health concern and this should be referred to the appropriate authorities for possible follow-up. If data become available suggesting that human exposure to significant levels of hazardous substances is currently occurring or has occurred in the past, ATSDR and NJDOH will reevaluate this site for any indicated follow-up.

This Health Assessment was prepared by the State of New Jersey, Department of Health, Environmental Health Service, under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry. The Division of Health Assessment and Consultation and the Division of Health Studies of ATSDR have reviewed this Health Assessment and concur with its findings.

REFERENCES

Superfund Documents:

Agency for Toxic Substances and Disease Registry (ATSDR) Site Summary, August 1988.

New Jersey Department of Environmental Protection (NJDEP), Community Relations Plan for Imperial Oil Site, December 1984.

NJDEP Fact Sheet for Imperial Oil Site, May 1987.

United States Environmental Protection Agency (USEPA), Hazard Ranking Score Documentation, August 1982.

USEPA, Remedial Investigation/Feasibility Study Sampling Report, July 1987.

Memorandums and Minutes:

Memorandums, NJDEP Bureau of Environmental Measurements and Quality Assurance to the NJDEP Technical Coordinator, Subject: QA/QC Review, February-December 1987.

Minutes, Public Meeting, June 1987.

Interviews:

Burnt Fly Bog Citizens' Committee Representative.

Monmouth County Environmental Health Coordinator.

Monmouth County Extension Service Representative.

NJDEP Site Manager.

NJDEP Technical Coordinator.

Occupational Safety and Health Administration (OSHA) Regional Inspector.

USEPA Regional Enforcement Officer.

USEPA Regional Remediation Officer.