915018

DUNLOP TIRE CORPORATION

TONAWANDA, NEW YORK

RISK ASSESSMENT/REMEDIATION ASSESSMENT REPORT

INACTIVE DISPOSAL SITES NOs. 915018A, B & C

Submitted to:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

600 DELAWARE AVENUE

BUFFALO, NEW YORK 14202

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1.0 INTRODUCTION

1.1 Site Description and History

The 130-acre Dunlop Tire Corporation plant site is located at the junction of Sheridan Drive and River Road in the Town of Tonawanda, Erie County, New York (Figure 1-1). The property is bordered on the west by River Road, on the north by a rail spur, on the south by Sheridan Drive, and on the east by Niagara Mohawk Power Corporation property and Kenmore Avenue. The surrounding area is industrialized, although an isolated residential zone is found about 1,000 feet to the north. The western boundary of the site lies less than 1,500 feet east of the bank of the Class A Special Niagara River.

Three areas (Fill Areas A, B and C) on the Dunlop Tire Corporation site, have, over the years, been used for the disposal of waste. These wastes have reportedly included construction and demolition debris, scrap rubber, plastic, carbon black, fly ash, amines, antioxidants, and waste solvents. Process wastes were reportedly disposed of here from 1921 to the early 1970s.

Two of the areas previously used for waste disposal (Fill Areas A and B) lie in the western part of the site, and one (Fill Area C) in the eastern part. A portion of Area B is presently used as a parking lot. One part of this parking lot is paved and another is gravel-covered.

Field investigations have been carried out at the Dunlop site in 1982, 1983, 1985 and most recently in 1991. Limited environmental sampling was carried out in 1988 and 1990, as part of investigations on a neighboring property. The 1991 investigations were carried out by Dunlop under the terms of a Consent Order issued by the New York State Department of Environmental Conservation.

1.2 Objectives and Scope

This document, which attempts to qualitatively characterize the risk stemming from materials deposited on this site, serves as a companion document to the draft "Report of Field Investigation and Data Analyses," prepared in August 1991 for the site. In the field investigation report, the physical, hydrogeological, geological, and environmental conditions of the site were examined. This document, a risk assessment document that takes the field investigation report as its basis, discusses the potential impact of contaminated areas upon human populations and the environment. It does this by identifying exposure pathways and potentially exposed populations, by assessing the toxicity to, and the impact on, those populations by contaminants of potential concern, and by assessing the effectiveness of likely remedial measures in reducing or eliminating perceived risk.

2.0 NATURE AND EXTENT OF CONTAMINATION

2.1 Results of Previous Investigations

Surface water samples collected in 1981 showed total phenols at a concentration of 0.01 ppm. In 1982, Dunlop detected volatile organic compounds, as well as phenols, in soil samples taken from the site. In an effort to gain more detailed information, borings were made later in 1982 for 4 overburden monitoring wells and 2 bedrock monitoring wells. In December 1982, soil samples were taken, and in 1983, following well construction, groundwater samples were taken. Soil samples were analyzed for a limited number of volatiles as well as phenolic compounds; groundwater analysis was in turn limited to analytes actually found in soil samples. Three volatile organics (chloroform, trichloroethylene, and tetrachloroethylene) plus phenols were detected in soil samples, concentrations decreasing with depth. Phenols were detected at less than 1 ppm. Volatiles were detected in the low ppb range. None of the analytes detected in soils was detected in bedrock wells. Most of the volatiles detected in soils, as well as phenols, were found in the overburden wells. Analysis of samples taken in 1985 showed low levels of two volatile organics (chloroform and tetrachloroethylene) in groundwater samples, and phenols in several surface water samples.

Prior to 1991 no complete analysis of samples at this site had been undertaken.

2.2 Present Investigation

In 1991, at the request of the NYSDEC, six new monitoring wells were established, all in the overburden, to attempt to establish groundwater gradients at each site. Along with the six existing wells, these wells were sampled for Target Compound List (TCL) volatile organics, semivolatile organics, pesticides and PCBs. Target Analyte List (TAL) metals were also analyzed for, as was cyanide. If stains were observed during the taking of split-spoon samples, or if photoionization detector (PID) readings reached 5 ppm or higher, subsurface soil samples were to be collected. Since neither event occurred, no soil samples were taken. In addition to groundwater sampling, one surface sediment sample was obtained from each of 5 onsite ditches or drainageways. Since volatiles levels in sediments proved to be low, it was considered unnecessary to take surface water samples.

In the 1991 investigation, seven volatile organics (with few similarities to what had been detected previously) were detected in wells near Fill Areas A and B. Phenolic compounds were not found. Four of these volatile organic compounds (1,1-dichloroethane, 1,1,1-trichloroethane, dichloroethene, and benzene) were found at levels exceeding Applicable or Relevant and Appropriate Requirements (ARARs), (i.e., State- and Federal-determined limits) for the contaminants in question. Two of these exceedances were encountered upgradient of the Fill Areas, one downgradient, and one within Fill Area A (in a bedrock well). Two semivolatile compounds were found downgradient of the site, neither in exceedance of ARARs. Eleven metals were found in excess of ARAR values. Six of the metals that exceeded ARARs, (antimony, arsenic, cadmium, chromium, copper, and lead) were identified as metals of potential concern. Metals of potential concern were found in both upgradient and downgradient wells and within Fill Area A. In samples taken from wells adjacent to, or within Fill Area C, only one volatile organic compound (benzene) was found in excess of its ARAR value, and only one semivolatile organic compound was detected, but at levels below the ARAR value. Eighteen metals were found, eight of these in excess of ARAR values. Contamination with metals of potential concern appears to be higher in wells located in the Fill Area. No pesticides or PCBs were detected in groundwater samples taken from within or near any Fill Areas on the property.

Sediment samples taken at five locations throughout the Dunlop property, and analyzed for the same suite of analytes for which groundwater was analyzed, showed low levels (a maximum of 22 ppb) of contamination with five volatile organic compounds. Polycyclic aromatic hydrocarbons (PAHs) were the major semivolatile compounds detected in sediment. PAH concentrations were generally low except for sample SS-103 located above the settling pond and near a parking lot area. PAH concentration was 23.3 ppm at SS-103. Twelve pesticides were detected in sediments at relatively low concentrations, most of these at a single location (i.e., SS-103). All metals on the TAL list except for selenium and thallium were detected in sediment samples. Cyanide was found only at SS-103. Lead levels at this same location were high in comparison to other metals.

In sum, analytical data for groundwater samples indicated low levels of organic compounds in both overburden and bedrock monitoring wells. Two out of four volatiles (namely, 1,1,1-dichloroethane and 1,1,1-trichloethane) which exceeded ARAR were detected upgradient of Fill Area A, and, therefore, cannot be attributed to the inactive waste area. The presence of benzene in bedrock monitoring well BMW-2, and 1,2-dichloroethene in BMW-1, may also be attributed to an upgradient source, since these compounds were not detected in the corresponding shallow companion wells.

Eleven metals were found at levels exceeding groundwater quality standards among the wells. Most, however, are confined to areas within or adjacent to the Fill Areas, and are not migrating off site.

Analytical data for sediment samples obtained during this investigation showed low level contamination with volatiles, low to moderate levels of PAH contamination, low level contamination with pesticides, and low contamination with metals with the exception of lead at SS-103.

3.0 CHEMICALS OF POTENTIAL CONCERN

Data from all media were evaluated to identify chemicals of potential concern for the inactive waste disposal areas at the Dunlop Tire Corporation plant. The first step in the selection process was to determine which chemicals were attributable to the fill areas. For instance, chemicals considered attributable to background sources (e.g., 1,1,1-dichloroethane, 1,1,1-trichloroethane, and 1,2-dichloroethene in groundwater) were eliminated from consideration. Additional criteria utilized to select chemicals of potential concern included the following:

- Frequency of detection and concentration
- Toxicity
- Comparison with ARARs
- Mobility, persistence, and bioaccumulation

Based on these criteria, two organic compounds or classes of compounds (benzene and PAHs), and four metals (arsenic, cadmium, copper and lead) are considered potential chemicals of concern.

4.0 TOXICITY EVALUATION

Under the general heading of toxicity evaluation, both toxicity (the capacity for acute or chronic poisoning) and carcinogenicity (the capacity for causing cancer) are considered. According to EPA policy, the effects of non-carcinogens are not considered possible unless the threshold level of exposure for a chemical is exceeded. As a result, a range of exposures exists from zero to some finite value that can be tolerated with essentially no adverse effects. The hypothesized mechanism for carcinogens is referred to as non-threshold because there is believed to be essentially no level of exposure that does not pose a probability, however small, of causing cancer, i.e., no dose is totally risk-free. It should be noted that the following chemical profiles discuss potential toxic effects of chemicals in high concentrations or in pure form, and do not imply that these effects will be experienced at the concentrations found at Dunlop. Nor should it be implied that the exposure to these chemicals at such levels will increase the probability of cancer beyond that which results from other human activity.

4.1 Organics

4.1.1 Benzene

Toxicity

Benzene poisoning occurs most often by inhalation of the vapor at threshold levels, although poisoning by ingestion and skin penetration is also possible. Acute benzene exposure causes central nervous system depression, headache, dizziness, nausea, convulsions, and even coma or death.

Carcinogenicity

Benzene is a recognized human carcinogen, with a USEPA weight-of-evidence classification of A., i.e., there is sufficient evidence to support a casual association between benzene and cancer in humans. This is based on an increased incidence of nonlymphocytic leukemia from occupational exposure, and increased incidence of neoplasia in rats and mice exposed by inhalation and gavage.

4.1.2 **Polycylic Aromatic Hydrocarbons (PAHs)**

Toxicity

Noncarcinogenic PAHs detected onsite include naphthalene, 2-methylnaphthalene, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, and benzo(g,h,i)perylene. The effects of these compounds vary although most are considered primary irritants. EPA defines the critical effect of exposure to such chemicals as decreased body weight.

Carcinogenicity

The USEPA weight-of-evidence classification for all carcinogenic PAHs detected onsite (i.e., benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, ideno(1,2,3-id)pyrene, and dibenz(a,h)anthracene) is B2, a probable carcinogen based on limited evidence from animal studies.

4.2 Metals

4.2.1 Arsenic

Toxicity

Arsenic or its compounds may be inhaled or ingested through dust and fumes. Acute toxic effects are more often seen following ingestion of arsenic compounds (acute cases following inhalation being rare). Chronic toxic effects due to ingestion are rare, while chronic inhalation effects are relatively common.

Carcinogenicity

The USEPA weight-of-evidence classification of arsenic is A, a human carcinogen. This is based upon observation of increased lung cancer occurrence in workers exposed (primarily by inhalation) to arsenic compounds, and an increased incidence of skin cancer in human populations consuming drinking water high in inorganic arsenic compounds.

4.2.2 Cadmium

Toxicity

Cadmium compounds are easily absorbed through inhalation, but poorly by ingestion and skin absorption. Cadmium has a long half-life following absorption and storage in kidneys and liver. Both acute and chronic effects are possible. Chronic effects include kidney damage and mild hypochronic anemia. Other systemic effects are possible.

Carcinogenicity

The USEPA weight-of-evidence classification for cadmium is B1, a probable human carcinogen based on limited evidence from human studies, if exposure is via inhalation. A classification has not been determined for cadmium via oral exposure. Cadmium is also considered a teratogen.

4.2.3 Copper

Toxicity

Copper salts can act as skin irritants. Copper-containing fumes and dust can cause irritation to the respiratory tract, as well as causing nausea, skin discoloration, and even perforation of the nasal septum.

Carcinogenicity

Copper is not yet classified for carcinogenicity.

4.2.4 Lead

Toxicity

Lead may enter the body via inhalation of dust, fumes, mist, or vapors, or by ingestion of lead compounds. The ingestion route is of special importance in the case of organic compounds of lead, but is of no particular importance with inorganic lead compounds. In general, the inhalation route is of greatest significance. Lead is a cumulative poison with a number of systemic effects, the most critical effect being on the central nervous system.

Carcinogenicity

The USEPA weight-of-evidence classification for lead is B2, a probable human carcinogen based on limited evidence from animal studies.

5.0 POTENTIAL IMPACT ON HUMAN HEALTH AND THE ENVIRONMENT

Impact of environmental contaminants on human health or the environment depends on the existence of an exposure pathway. Such a pathway requires (1) a source of contamination, (2) the existence of a medium (e.g., groundwater, surface water, soil or air) by which the contaminants might move from their place of deposition to an environmental or human receptor; (3) the actual availability of a human or environmental receptor; and (4) a likely route of exposure (e.g., ingestion, dermal absorption or inhalation).

Exposure pathways to be considered at the Dunlop site include ingestion of groundwater, surface water, soil or sediment, dermal contact with soil or sediment and inhalation of dust from soil or vapors from soil or surface water.

5.1 Exposure Pathways

5.1.1 Groundwater

Results of previous investigations indicate that groundwater deserves initial consideration as an exposure pathway at this site. A number of factors help to determine the risk associated with contaminants in groundwater. These are: the amount of contaminant entering the aquifer; toxicity of the contaminant; the contaminant's mobility, persistence, solubility, and volatility; the permeability of the aquifer; and the proximity or number of human and environmental receptors. Evaluation of this exposure pathway requires the consideration of these factors.

Toxicity

According to USEPA's Superfund Chemical Data Matrix (1991), only three of the five chemicals of potential concern detected in groundwater at this site are highly toxic, taking toxicity in its broad meaning, as inclusive of carcinogenicity. These are arsenic, cadmium, and lead. The remaining two (benzene, and copper) are considered to be less toxic.

Mobility

Metals are not mobile in groundwater, especially in high-clay groundwater regimes. Metallic ions tend to be adsorbed onto clay particles and therefore not to move far from their point of deposition. All four metals of potential concern are expected to be strongly adsorbed.

Amount of Contaminant

Arsenic levels were found in excess of the ARAR value in only one well. Copper exceeded the ARAR value in two wells. Cadmium exceedances were found in six wells. (It should be noted that five of the six exceedances for cadmium were in wells constructed previous to this investigation. Screens used in these wells were galvanized steel. Consequently, since both cadmium and zinc are used in the galvanizing process, it is possible that cadmium detected in these wells is totally or in part a result of deterioration or leaching of the screen). Lead exceedances were found in five wells. The greatest exceedance was lead in the bedrock well in Fill Area C. Benzene exceeded the ARAR value in one overburden and one bedrock well. Benzene detected in the bedrock well is believed to be from an upgradient source since it was not detected in the corresponding shallow well. Benzene was detected in the overburden well, but only at one ppb. [It is not clear that the Dunlop site is the source of all these contaminants.]

Persistence and Solubility of Contaminant

All metallic contaminants are extremely persistent and insoluble. Benzene is somewhat soluble and may be less persistent.

Volatility of Contaminant

None of the four metallic contaminants is volatile. Benzene is considered volatile by definition.

Permeability of Aquifer

The substrate through which groundwater flows at the Dunlop site is extremely impermeable in the vertical and the downgradient direction (i.e., towards the Niagara River). Hydraulic conductivity has been measured at this site on the order of 10^{-8} cm/sec, making groundwater movement extremely slow.

Receptors

Potential environmental receptors are wildlife species living in or near the Niagara. Groundwater is not used as a potable supply source on site. There are no known uses of groundwater within three miles of the site.

Conclusions

Four of the chemicals of potential concern (i.e., the metals) are insoluble and expected to be immobile, particularly in the high-clay aquifer at the Dunlop site. Benzene is more mobile; however, its movement is expected to be retarded by its relative insolubility. In addition, the low hydraulic conductivity of the aquifer reduces groundwater movement, and essentially eliminates any chance for significant off site migration of these chemicals. Groundwater, therefore, is considered to be of no risk to environmental receptors. Since contaminants are virtually immobile, and because there are no known users of groundwater for potable water within three miles of the site, groundwater is also considered of no risk to human receptors. Therefore, risk associated with exposure to groundwater is considered no further in this risk assessment.

5.1.2 <u>Surface Water</u>

Surface water on the site consists, in wet seasons, of water moving through conduits and drainage ditches on various parts of the site. Past surface water analyses indicate that surface water contamination is slight. Most drainage flows to a collection pond where this small amount of contamination is removed by evaporation or sedimentation. Some surface water drains to Sheridan Drive and River Road, but is not expected to impact the Niagara River. Surface water is not expected to pose a risk to either environmental or human receptors.

5.1.3 <u>Ambient Air</u>

The air pathway is not considered to be significant because of the low levels of volatiles present on site. Most chemicals of concern are metals which are not volatile.

5.1.4 <u>Soils and Sediments</u>

Potential exposure pathways for soil and sediments include ingestion, dermal contact, and inhalation of windblown particles (fugitive dust).

Exposure to fugitive dust depends on soil particle size, extent of vegetation, the frequency of soil disturbance, and the landscape. Although actual particle size data is unavailable, descriptions of soil from boring logs indicate that material near the surface of fill areas does not contain many fine particles. In addition, the fill areas are generally well vegetated and are not in high traffic areas. Also, since the site is in an industrial area, the average wind speed on site will be reduced by surrounding buildings. All of the conditions described above would tend to significantly reduce fugitive emissions. Therefore, this pathway is not considered important at this site.

Exposure (by contact or ingestion) depends on the concentration of contaminants and the frequency of exposure. Since surface soil/fill was not analyzed during the investigation, the level of contamination in these materials is unknown. Groundwater data, however, indicate that the fill is contaminated. The frequency of exposure to fill materials is expected to be low to moderate since portions of the fill in these areas are covered by topsoil, gravel, asphalt, etc., and since these areas are located near plant buildings, but not in actual work areas. The concentrations of contaminants in sediments are known. The most significant contamination is at SS-103 which contains moderate concentrations of PAHs and lead. The frequency of human exposure to sediments, however, is expected to be minimal. Consequently, ingestion or dermal contact with exposed fill materials appear to be realistic exposure pathways. However, since exposure to sediments is expected to be minimal, ingestion and dermal contact with sediments are not considered pathways of concern.

5.2 Potential Receptors

5.2.1 Environmental Receptors

The only environmental receptors considered as potential targets of contaminants whose source is the Dunlop site are game fish and fish-feeding birds, such as herring gulls. None of these receptors appear to be threatened by either groundwater or surface water/sediment runoff from the Dunlop site. Contaminant movement via groundwater is, as has been shown above, not likely. Contamination of surface water with volatiles and metals of potential concern has been shown in past studies to be minimal. Sediments are most significantly contaminated at SS-103. Any contaminants that might move from this area would most likely be removed in the settling pond.

5.2.2 Human Receptors

As shown in the above analysis, there are no potential receptors located offsite since no significant contamination is expected to migrate from the site via groundwater, air, dust, or surface runoff.

Human exposure (via ingestion and dermal exposure) to soil/fill appears to be limited to site workers. The Dunlop site is an active industrial facility, with almost daily worker movement across or in the vicinity of contaminated areas. It is possible that workers will come in contact with contaminated soils during the course of routine activities at the site. It may be conservatively assumed that workers are exposed to this potential risk no more than 8 hours per week. Site trespassers are not considered a likely human receptor because site security effectively excludes them.

6.0 RISK ANALYSIS

Risk at the Dunlop site may be characterized in terms of present, or no-action, risk, and risk under a particular remediation scenario. The most likely remediation scenario at this site would be the placement of a layer of material to separate potential human receptors from direct contact with site soils. For purposes of risk analysis, the surficial barrier placed is presumed to be asphalt or topsoil.

6.1 No-Action Scenario

The only risk, albeit very slight, associated with the site under a no-action scenario appears to be the risk to plant workers resulting from direct contact or ingestion of in-place surficial soil.

Since the release of volatile organics during boring and other intrusive operations was not great enough even to warrant soil sampling, the risk of contact with volatile organics appears to be extremely low. Dermal contact with metals-contaminated soils presents little risk, as compounds of metals known to be on site are not easily absorbed through the skin and are expected to be present in low concentrations. There is a slight risk of contaminant ingestion as, for example, might occur if a worker ate following contact with site soils and had not washed his or her hands. This threat is, of course, mitigated by varying degrees of cover found on contaminated areas, such as asphalt, grass, gravel and scrub growth. Even considering this, however, potential exposure time of the target population is low, probably only a few hours per week at most. Given the narrowness of the exposure window and the relatively small population exposed, the risk posed even under the no-action scenario appears to be extremely low.

6.2 Remedial Action Scenario

The placement of a barrier, such as asphalt or topsoil, over the areas known to be contaminated with organic compounds and metals will render an extremely low-risk situation a no-risk situation from the view point of site soils. A barrier such as the one described will make it impossible for workers to contact site soils.

7.0 SUMMARY AND CONCLUSION

Qualitative risk analysis shows that no danger to human health and the environment, including the biota of the Niagara River, is posed by groundwater or surface water contaminated by organic compounds and metals at the Dunlop site. Exposure to volatile organics and fugitive dust are expected to be insignificant. Metals contamination of site soils or surface sediments is the only contamination deserving serious consideration. However, exposure frequency to metals is expected to be so low that risk will be insignificant. There is no risk to any offsite human receptor. Even under the no-action scenario, the risk to plant workers resulting from exposure to onsite soil is considered to be low to nonexistent. Placement of a barrier such as asphalt or topsoil over the zone known to be contaminated, would appear to eliminate the human health risk beyond reasonable doubt.