The Energy Cluster in Linnton

JUNE 27, 2005

Prepared by

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for

Olympic Pipeline Company
BP West Coast Products LLC
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Exhibits

I. Introduction

The City of Portland's 2004 Industrial Districts Atlas said it best: "Portland's industrial districts are unknown territory to most residents." The little-known energy facilities in Linnton, located in the northern portion of the Northwest Industrial District, are a case in point. The purpose of this report is to shed some light on these facilities and the relationship of these facilities to the Northwest region as a whole. This report will also discuss various industrial site conditions that presently contribute to a relatively healthy climate for the energy cluster in Linnton, and how those factors could be negatively impacted by the land use changes under consideration by the City of Portland in this portion of the Northwest Industrial District. We hope this information will be useful as the City prepares a draft of its Linnton Village Study later, and as it prepares for a larger discussion with stakeholders. That draft study, which is expected to be released on July 15, 2005, will evaluate various land use scenarios for potentially converting large portions of the industrially-zoned land in the Linnton Village Study Area (the "Study Area"), in the center of the energy cluster in Linnton, from industrial to residential and recreational use.

II. The Linnton Village Study Area

The Linnton Village Study Area (see Exhibit 1) is approximately 69.3 acres in size. Most of the land in the Study Area is zoned for industrial use. None of the land in the Study Area is zoned for residential purposes, though there are a few small parcels of nonconforming residential use interspersed within the Study Area. The residentially-zoned portion of Linnton is located on the hillside, west of the highway, outside the Study Area. Only a small portion of the Study Area, located along the east side of the highway, is zoned commercial. According to the Linnton Village Study Existing Conditions Report (June 29, 2004), three property owners—BP West Coast Products LLC (the former ARCO facility), Kinder-Morgan (the former GATX facility), and the Linnton Plywood Association—own 78.5 percent of the property in the Study Area. The two petroleum facilities owned by BP West Coast Products LLC (approx 16.83 acres) and Kinder-Morgan (approximately 13.27 acres), respectively, occupy almost half of the land in the Study Area (30.1 of 69.3 acres). These petroleum facilities operate 7 days a week, 24 hours a day. The industrial properties under consideration for residential and recreational uses in the Linnton Village Study are located between the BP West Coast Products LLC and the Kinder-Morgan Energy Partners petroleum terminals, between the Olympic Pipeline and the Willamette River.

III. The Convergence of Freight Infrastructure in Linnton

Certain factors make industrial businesses want to locate and invest in a particular area. As discussed in the City's Industrial Districts Atlas, one of the most important factors that drives industrial investment decisions is the convergence of freight infrastructure. Linnton is a good example of this convergence. In Linnton, the harbor, the railroad, and the highway have combined over the years, to make Linnton and Willbridge a prime location for terminal, storage, and distribution operations. In the 1960s, an additional piece of important infrastructure was built in this area—the Olympic Pipeline. As discussed below, the terminus of this pipeline in Linnton and Willbridge

reinforce this area's position as the prime entry point and wholesale distribution hub for most of the processed petroleum fuel used in Oregon and southwest Washington and for transportation of these fuels by barge to eastern Oregon and elsewhere. It is precisely in this area that the City of Portland is now considering locating hundreds of new homes and associated recreation uses.

IV. The Olympic Pipeline in Linnton

Oregon does not have any petroleum refineries, and is therefore completely dependent on shipments of refined petroleum. Refined petroleum enters the state in four ways—by truck, ship/barge, rail, and through the Olympic Pipeline. Of these four modes, most (roughly 65 percent) of Oregon's refined petroleum supply enters the state through the Olympic Pipeline. The pipeline is the preferred means of shipment because it is much cheaper to transfer petroleum by pipeline than it is to ship refined fuels to Oregon by barge, rail, or truck. It is also more energy efficient, more ecologically sound, and safer to ship petroleum by pipeline than by any other means.

The Olympic Pipeline is one of many petroleum pipelines located throughout the county. While other parts of the county have a much larger and more complex distribution system, the western states in general, and the Northwest specifically, have a very limited pipeline system for distributing refined petroleum products from the refineries to regional terminal points. In fact, the only pipeline distribution system in the Northwest Region is the Olympic Pipeline, which runs from northern Washington, where the refineries are located, to the Linnton and Willbridge areas in Portland, where the main concentration of petroleum terminals in Oregon are located. The Olympic Pipeline is owned by the Olympic Pipeline Company, which in turn is owned by BP (approximately 63 percent) and by Shell (approximately 37 percent). The Olympic Pipeline system runs for approximately 400 miles and is used to distribute aviation jet fuel, diesel, and various mixtures of gasoline. The pipeline system is comprised of 12-, 14-, 16-, and 20-inch pipes. In Linnton, the pipeline system generally runs along the railroad right-of-way, after crossing the Willamette River into Portland, at the Sauvie Island Bridge. It should also be noted that KM owns and operates a separate pipeline that transports refined petroleum from Linnton and Willbridge to Eugene. A separate pipeline transports refined petroleum to the Portland International Airport. The Olympic Pipeline system ships approximately 2.1 billion gallons of refined petroleum into the Portland area annually, or roughly 5.7 million gallons per day.

V. Petroleum Terminals in Linnton

The City's Industrial District Atlas ("IDA") describes these facilities as follows:

> "A group of petroleum terminals in the north half of the district are Oregon's distribution hub for gasoline, diesel and fuel oil, received from tanker vessels or the Olympic Pipeline for distribution to local markets." (IDA p. 24.)

Several large petroleum terminal facilities exist in Linnton and Willbridge. Two of these facilities, namely the Kinder-Morgan Terminal and the BP West Coast Products LLC Terminal, are located within the boundaries of the Study Area. These facilities have been located in Linnton for many years, and pre-date the construction of the Olympic Pipeline.

A. The Kinder-Morgan Energy Partners Petroleum Terminal in Linnton. The Kinder-Morgan ("KM") petroleum terminal in Linnton was formerly known as the GATX terminal. The KM terminal is approximately 13.27 acres is size. The KM facility is located on the northern boundary of the Study Area and is bounded by the railroad on the west, the river on the east, and the RK Storage facility on the south. All of the land adjacent to this facility is zoned for Heavy Industrial use, including the waterfront. This facility is located across the river from the Port of Portland Terminal 4, and Schnitzer Steel.

The Kinder-Morgan Linnton Terminal at 11400 N.W. St. Helens Road handles the motor fuels that power vehicles in Portland and the surrounding areas. Gasoline and diesel fuels are received by pipeline, barge, and tanker. Typically a barge or tanker will come into the facility once or twice a week while pipeline deliveries can occur several times per day. The motor fuels then go into one of the 34 tanks on site. (See Exhibit 2.) These tanks can store up to 20,000,000 gallons of gasoline and diesel. The largest tank holds 2.4 million gallons of gasoline. KM's largest tank is located near the southern property line of the site adjacent to the property that is being considered for new homes. Petroleum products leave the facility by being pumped onto a barge for upriver delivery, into a pipeline for delivery to southern Oregon or local transfers, or into tank trucks (each truck holding approximately 10,000 gallons).

For safety and security reasons the facility has lighting turned on during non-daylight hours. This lighting may become brighter in the future to provide better surveillance of the facility perimeter. Vessels that come to the dock provide a certain amount of their own lighting which is necessary since a good portion of the vessel transfers occur at night. Noise is generated from vessel pumps and facility pumps. These pumps utilize hundreds of horsepower to move the product. When the truck rack is in full operation, up to 75 trucks per day utilize the facility. These trucks operate 24 hours per day with peak activity in the morning hours. The facility has a rail spur that can handle up to 4 tank cars per day.

B. The BP West Coast Products LLC Terminal in Linnton. The BP West Coast Products LLC ("BP") terminal in Linnton was formerly known as the ARCO terminal. The BP terminal is located directly south of the Linnton Plywood Association site, and forms the southern boundary of the Study Area. It should be also noted that immediately south of the BP terminal, south of the Study Area, are the ST Services (formerly Mobil and Time Oil) and Pacific Northern Oil petroleum terminals. In Willbridge, further south, Chevron, Tosco, McCall Oil, and Kinder-Morgan have additional petroleum terminals. Shell also has a petroleum terminal located south of Willbridge (near the junction of N.W. St. Helens Road and Yeon Avenue).

The BP West Coast Products LLC Terminal in Linnton is located at 9930 N.W. St. Helens Road. At this facility, gasoline, ethanol, and diesel fuels are received via the Olympic Pipeline, as well as by barge, tanker, and railcar. Typically, a barge or tanker will come into the facility once or twice per week, while pipeline and railcar deliveries occur several times each day. The petroleum products then go into one of the 25 tanks on site. (See Exhibit 3.) These tanks can store up to 20 million gallons of gasoline, diesel, and ethanol. The largest tank (Tank No. 1) holds 3.3 million gallons of gasoline. BP's largest tank is located near the northern property line of the site, adjacent to the property that is being considered for new homes. Petroleum products leave the facility in three ways—either by being pumped onto barges for delivery upriver, by the pipeline which supplies southern Oregon, or by tanker truck (each truck holds approximately 10,000 gallons). Approximately 92 tanker trucks per day, or roughly 33,400 trucks per year, leave the facility loaded with petroleum products bound for locations in Oregon and southwest Washington.

VI. The Significance of the Energy Cluster in Linnton

The energy cluster in Linnton is not simply a collection of tanks and pipes (i.e., a "tank farm") that can be located anywhere. As explained above, the convergence of the freight infrastructure and all of the logistical investments that support it, have led to the creation of an efficient and highly regulated petroleum transfer and distribution network that economists refer to as a cluster. Oregon's petroleum energy cluster is centered in Linnton and Willbridge. As noted elsewhere in this report, there are approximately 62 bulk petroleum plants and terminals located in Oregon, but most are smaller than the terminals located in the Linnton/Willbridge area. The main concentration, capacity, and volume is situated, contained in, and handled through the nine petroleum terminals in theLinnton/Willbridge area.

The character of this energy cluster is much more than the facilities that are located there. While the nature and appearance of the facilities have a bearing on the character of the industrial area in Linnton and Willbridge, the character of this industrial area is significantly defined by the concentration of petroleum facilities that have formed a cluster along the pipeline, the highway, the rail line, and the river. The companies in this energy cluster in Linnton and Willbridge have, because of proximity and practicality, developed relationships with one another, and with other businesses in the industrial area. These interactions between companies in this industrial area are very important to its

character and to the overall function of the cluster. Economist Dr. Edward Whitelaw, a well-known Oregon economist, has phrased these interrelationships within the industrial sanctuary as "agglomerate economics" and has further characterized them as efficiencies of proximity.

The State of Oregon, with the help of economist Joseph Cortright, has prepared an analysis of Oregon industry clusters. Mr. Cortright has defined an industry cluster as a group of similar or interrelated firms that share common markets and technologies and draw on similar worker skills and facilities. Clusters of similar and related firms draw competitive advantages from the investment of labor, facilities, and other assets that accumulate in certain places forming a concentration of employees, facilities, and services. When a critical mass is achieved, it creates spillovers of knowledge and stimulates competition among firms. This concentration also creates strong buyer-supplier relationships. These are precisely the kinds of relationships that exist within the Linnton-Willbridge energy cluster. It is the land within the center of this cluster that the City is considering to convert from industrial to residential and recreational use.

VII. Healthy Industrial Site Conditions Needed to Support the Energy Cluster in Linnton

The City of Portland's Industrial District Atlas ("IDA") provides a framework for determining what types of site conditions make for healthy industrial districts. These factors are useful to consider in determining the conditions needed to support the energy cluster in Linnton and Willbridge. The factors identified in the IDA are: zoning, distance from residential zones, property values, site size, environmental constraints, proximity to transportation infrastructure, and access to sanitary sewer. In addition to these factors, the energy cluster also needs a site that can reasonably accommodate its particular safety and security concerns, both for the protection of the area surrounding these facilities, and for the protection of the facilities themselves. Several of these factors are discussed below.

A. Zoning. In Linnton, the existing energy cluster is located in and surrounded by IH (Heavy Industrial) zoned land. This zoning is ideally suited to the energy cluster. Portland Zoning Code Section 33.140.030 states that:

> "This zone is one of the three zones that implement the Industrial Sanctuary map designation of the Comprehensive Plan. The zone provides areas where all kinds of industries may locate including those not desirable in other zones due to their objectionable impacts or appearance. The developments standards are the minimum necessary to assure safe, functional, efficient and environmentally sound development."

The industrial sanctuary policies in the comprehensive plan, and the IH zone along the waterfront in Linnton that implement those policies, provide the regulatory framework for protecting the energy cluster in Linnton. These same policies and regulations allow other heavy industrial uses to safely locate there. As a matter of policy, this is an area that is reserved for all kinds of industries, especially heavy

industries that cannot be located in any other zone in the City.

B. Distance from Residential Zones. Distance from residential zones is a very important factor for most industrial uses, and is particularly important to the energy cluster in Linnton. Because of the inherent dangers associated with storing and transporting large quantities of highly flammable fuel and the conflicts that typically arise when residences are located close to heavy industrial facilities such as petroleum terminals, distance from residential zoning is an important consideration. Because the Linnton energy cluster provides Oregon and southwest Washington with most of its refined petroleum fuel, including nearly all of the jet fuel for the Portland International Airport, protecting this cluster from conflicting uses is especially important to Oregon's economy.

The IDA points out that nearby housing represents a significant constraint for many heavy industrial activities that produce off-site impacts, and for industries that are engaged in inherently dangerous activities, such as fuel storage and distribution facilities. According to the IDA:

> "Most of Portland's large industrial districts are on river plateaus and are generally buffered from neighborhoods by bluffs, major roadway, and in some areas employment zones. Only 2 percent of the land area in industrial districts is within 200 feet of a residential zone, and 10 percent is within 500 feet."

Currently, the energy cluster in Linnton is separated from residentially-zoned land by a major roadway (Highway 30), by a distance of several hundred feet, and by a significant change in elevation. If the industrially-zoned properties currently owned by Babbcock Land Company, RK Storage, and the Linnton Plywood Association (approximately 34 acres) are rezoned to permit residential use, all of the industrially-zoned land in Linnton will be located within 500 feet of a residential zone. This new residentially-zoned land would also be at the same grade as the petroleum terminals. Furthermore, because all of the scenarios proposed in the Linton Village Study seem to allow public recreational uses along the waterfront, there will be virtually no separation between public recreational activities and heavy industrial uses along the river if the land use scenarios proposed in the study are adopted. We trust that the City would not want to put the Linnton energy cluster in a position of being so close to new residential and recreational uses.

C. Safety and Security.

1. Natural Hazards.

The area in and around Linnton is subject to a number of natural hazards and risks, including wildfire, landslide, earthquakes, and flooding. As demonstrated by the City of Portland hazard maps, the earthquake hazard is high for the area, including the section of Linnton east of Highway 30 and the railroad tracks, given the susceptibility of the sandy soils and fill in that area to liquefaction. According to Patty Rueter, Portland

Office of Emergency Management, a recent mapping of the area shows a fault line that runs down Highway 30 and a high landslide risk for the hillside above the Linnton Plan area. The Linnton Village Study Area east of Highway 30 is shown to be in the path of a rapidly moving landslide risk, and according to Ms. Rueter, the rail line area is at the toe of this landslide risk. The Portland hazards maps also show that the Linnton area east of Highway 30 is susceptible to flooding, and that the hillside above the Plan area is susceptible to wildfires.

Of particular concern to emergency responders is that, coupled with all of these natural hazard risks, there is only one way in and out of the Linnton area—namely, Highway 30. If Highway 30 is blocked due to landslides, flooding, or toppled structures, this lack of alternate access will make it very difficult for people to flee or be rescued. The closest fire station, Fire Station 22 in St. Johns, is approximately 2.2 miles away, and is across the St. Johns Bridge. According to the Portland Fire and Rescue website, on-duty personnel include two company officers, five firefighters, and one firemedic. Under normal circumstances, the average response time from Fire Station 22 to Linnton is over 7 minutes. The Fire Bureau's goal is to have the first responding fire unit on the scene within 5 minutes and 20 seconds. If the St. Johns Bridge is inoperable, the closest fire station that would not require a bridge crossing is Station 6 on N.W. Front Avenue. According to the Portland Fire and Rescue website, on-duty personnel include one company officer, one harbor pilot, one engineer and one firemedic. Fire Station 6 is 5.3 miles away and the average response time from that station would be much longer than it would be from Fire Station 22 in St. Johns.

The City of Portland Natural Hazard Mitigation Plan ("Natural Hazard Plan") highlights the problem of having residential uses too close to areas where hazardous materials are stored and transferred. As a short-term earthquake mitigation action item, the Natural Hazard Plan states as follows:

> "During and [sic] earthquake, hazardous materials containment areas can be damaged affecting any nearby residential areas. The community of Linnton is situated between hazardous materials storage areas and other heavy industrial facilities, and is located adjacent to the alignment of the Olympic Pipeline. The majority of Linnton's residents live on the adjacent steeply sloping hillside, which is served by a substandard street system. Similar residential pockets in other heavy industrial areas, such as Guild's Lake, could be endangered if pipelines or hazardous materials' storage facilities rupture in an earthquake event. Evacuation from these areas could be complicated by earthquake-related debris." Natural Hazard Plan, pages EQ-26-27.

In short, putting hundreds of new homes at the base of a hillside that the City recognizes to be ecologically unstable makes very little sense, particularly when the area below the hillside is already occupied by the highway, a railroad, the Olympic Pipeline, and a number of petroleum storage and transfer facilities. New homes that might be located in this area would be extremely close to hazardous materials storage areas and would only have one way out in the event of an emergency—west onto

Highway 30. We trust that the City would not want to exacerbate an emergency response situation that is already complicated by natural hazards and access problems.

2. Coast Guard Regulated Security.

The events occurring on September 11, 2001, identified the need to consider additional security measures and equipment to protect the infrastructure of America's ports against acts of terrorism. Designated waterfront facilities such as the BP and KM terminals are regulated by the Coast Guard under the Department of Homeland Security requirements. The petroleum terminals along the Willamette River work closely with Portland's Captain of the Port, Marine Safety and Security Office, to ensure procedures and equipment are in place to respond quickly and safely to an actual, potential, or perceived security incident. Access to these facilities are now limited, controlled, and monitored 24 hours per day. Equipment such as fencing, gates, cameras, enhanced lighting, and guards all play a role in physically securing the facilities.

Increasing the number of people who might live and recreate in close proximity to the petroleum storage and transfer facilities makes it much more difficult to secure those facilities and ensure the safety of the area. It will make it more difficult to fully monitor the perimeter and it will provide additional opportunities for potentially dangerous individuals to in turn monitor the facilities undetected. The increased number of residents also increases the risk of tampering with the rail cars that are stored in the vicinity, some of which carry extremely hazardous materials. There is also a concern on the part of the facility operators that a new residential development near the tanks could cause the facilities to be viewed as a higher security risk by the U.S. Coast Guard, the FBI, and the Department of Homeland Security.

At the BP facility, access control is hampered by the Portland & Western Railroad right-of-way that runs through the site. The gaps in the perimeter that allow the trains to pass through also create areas vulnerable to unauthorized access. These gaps are currently fully monitored; however, an increase in the number of people living or recreating nearby increases the vulnerability of these gaps, because it creates an increase in the amount of foot and other traffic in these area. This could lead to future conflicts between those living in or using the area and facility security guards and terminal employees.

Increased access to the waterfront in the vicinity of the petroleum storage and transfer facilities by boat, foot or other means also causes increased security concerns. These facilities maintain docks and boat houses, and they operate 24 hours per day, 7 days per week receiving pipeline and barge shipments at all hours. Allowing more people increased access around the facilities in the water and at the water's edge makes it more difficult to monitor and control the facility perimeters and ensure the safety and security of dock operations, especially at night.

3. Impacts from a Potential Tank Fire.

In order to provide a realistic assessment of the impacts from a potential fire at one of the petroleum tanks located in Linnton, BP retained a consultant who has prepared a report (see Exhibit 4) describing the impacts from a fire at a large petroleum storage tank located closest to the northern property line of the BP facility, adjacent to the Linnton Plywood Association site.

This particular storage tank (Tank No. 1) is the largest tank on site and has a capacity of approximately 3.5 million gallons. As described in the report, if this tank caught fire, significant injury (second degree burns within 60 seconds of exposure) would likely be experienced at a distance of 695 feet from the tank (assuming no wind, which could significantly increase risk). Due to the volume of gasoline typically stored in this tank, the duration of such a fire could last as long as 15 hours. More severe injuries would likely occur closer to the tank. As noted in the report, extremely high heat levels would be experienced within 310 feet of the tank in all directions. In about 30 seconds, a 50 percent death rate would likely occur for people located this close to the tank.

We note that the Linnton Village Study scenarios assume a "buffer area" of approximately 400 feet from the edge of the property line, where this tank is located. It is not clear what uses the City might allow in this "buffer area," but on page 37 of the Linnton Neighborhood Plan (June 5, 2000), the buffer area would allow residential use, small industrial buildings, and public recreation uses within the 400-foot buffer area. The maps attached to the Linnton Neighborhood Plan show light industrial buildings located along the property line, adjacent to Tank No. 1. (See page 55 of the Linnton Neighborhood Plan.) Even if nothing was permitted within the 400-foot buffer area, the potential risk of significant injury and death would extend well beyond the 400-foot buffer zone.

It is important to realize that in the event of a fire or other emergency in the Linnton industrial area, there is only one way out—along Highway 30. In the event of a fire, one direction of Highway 30 is likely to be closed, depending on the direction of the wind during the course of the fire. In a fire emergency, motorists and pedestrians may not be able to travel in the direction of the smoke. The extremely limited access in Linnton therefore complicates evacuation of the area. We would also note that during the initial phase of a dangerous goods/hazardous materials incident, people within 800 meters (1/2 mile) would need to be evacuated. (See Emergency Response Guidebook, 2004 - Exhibit 5.)

VIII. Growth Capacity for the Energy Cluster in Linnton

It is important to put the energy cluster in Linnton in context. The Institute of Portland Metropolitan Studies (the "Institute") recently published its Metropolitan Briefing Book (2005), underscoring the fact that the economic health and growth of the region is dependent upon the efficient operation and utilization of the multi-modal transportation system serving the region. The multi-modal transportation system referred to by the Institute has brought about the concentration of

warehousing/distribution centers in the region, resulting in the importance of Portland as a major gateway. The significance of this sector on the regional economy is substantial. According to the Institute, warehousing and distribution facilities collectively generate approximately 17,242 jobs in the region, with wages estimated at $810 million. The total revenue generated from this industry group in the region is estimated at $2.8 billion, producing over $88 million in state and local tax receipts. These 2005 findings by the Institute illustrate that warehousing and distribution activities represent a sizeable component of the local and regional economy.

The warehousing and distribution sector of the regional economy is projected to grow substantially. According to the Institute's 2005 Briefing Book, there is little doubt that the Portland/Metro region will continue to experience positive population growth. The estimated rate of growth varies from year to year but is generally expected to increase between 1.5 and 2.5 percent per year on average over the next twenty years. In the past, there has been a much stronger demand for freight transportation than would have been expected from evaluating population growth and overall economic activity. For example, according to the Institute's 2005 Briefing Book, between 1990 and 2000, the national population grew by only 9 percent while freight ton miles increased by 19 percent and the value of manufacturing shipments increased by 38 percent, suggesting a much stronger demand for freight transportation activity than would have been expected from evaluating population growth and overall economic activity alone.

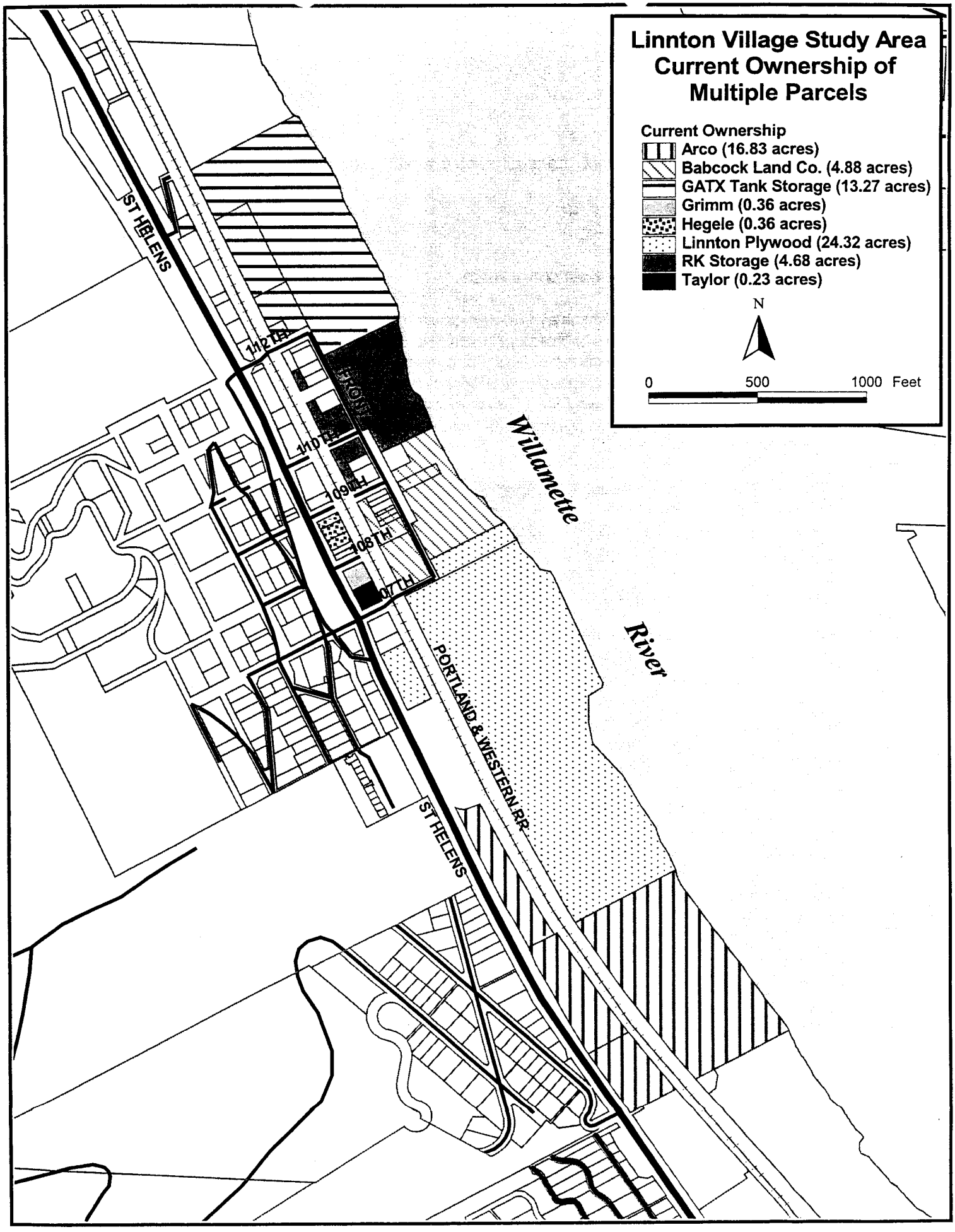
Freight movement is almost completely dependent upon access to an adequate and uninterrupted supply of refined petroleum. The concentration of petroleum bulk storage and distribution facilities in Oregon is described in a recent report prepared by the Oregon Economic and Community Development Department ("OECDD"), titled Oregon Industry Clusters (2003), authored by economist Joseph Cortright. That report indicates that there are presently 62 petroleum bulk storage stations and terminals in the state, employing 1,092 persons, with an average wage of $39,790. These firms are highly concentrated in the state, because Oregon's lack of refinery facilities requires more petroleum storage and terminal operations than would otherwise be expected. This data shows that this particular industry cluster is highly concentrated in Oregon and is growing faster than its counterparts nationally. The average wage levels for this industry cluster compare favorably with other leading industry segments, such as wood products, food processing, apparel/sporting goods, transportation equipment, metal, and creative services clusters.

Most of the refined petroleum enters this state and is distributed through the petroleum terminals in Linnton and Willbridge. Because of the existence of the pipeline, the railroad, the river, and the highway, Linnton and Willbridge have become the primary entry points for refined petroleum products in this state. Because of the above-mentioned constraints, such as the location of the highway, the railroad, the pipeline, the river, and surrounding development, the energy cluster in Linnton can only grow into the center of the Linnton industrial district, which is the land that the City is currently looking to rezone for residential and recreational uses. The so-called buffer area between the existing petroleum facilities and the proposed new residential uses that would be located in the center of the industrial district would not allow new petroleum

storage and terminal facilities to be located in that area. Even if zoning regulations would allow the so-called buffer area to be used as an expansion area for the energy cluster, such firms would have no interest in making long-term investments in new petroleum facilities that would be directly adjacent to new residential and recreational uses. It is vital to the health of the energy cluster, and to the overall growth in the warehousing and distribution sector of the region's economy, to allow the petroleum distribution and terminal facilities in Linnton and Willbridge to grow. The industrial land located between the BP and KM facilities is unique, because it is prime, multi-modal industrial land and because it is the only property where the existing energy cluster located in this area can grow. As a practical matter, taking a large amount of land located in the heart of the Linnton industrial area out of the heavy industrial inventory and converting it to residential and recreational uses will eliminate any opportunities for the energy cluster in Linnton to grow.

IX. Conclusion

The energy cluster in Linnton is vital to the economy of the state and the region, because the Olympic Pipeline and terminals associated with it in Linnton and Willbridge provide Oregon with most of its refined petroleum supply. Over time, industries in the energy cluster came to be located in Linnton because of the convergence of freight infrastructure and other favorable site conditions that allowed the cluster to flourish and grow. The introduction of new residential uses within the existing industrial area will make it significantly more difficult and risky for the energy cluster to operate and will make it virtually impossible for the cluster to grow in this area. These energy facilities are extremely valuable assets to the economy of the state and the region. The energy cluster in Linnton should not be compromised by placing new residential uses nearby.


Linnton Village Study Area
Current Ownership of
Multiple Parcels
Current Ownership
Arco (16.83 acres)
Babcock Land Co. (4.88 acres)
GATX Tank Storage (13.27 acres)
Grimm (0.36 acres)
Hegele (0.36 acres)
Linnton Plywood (24.32 acres)
RK Storage (4.68 acres)
Taylor (0.23 acres)
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0
500
1000 Feet
ST HELENS
112TH
110TH
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River
PORTLAND & WESTERN RR
ST HELENS

Exhibit 2

Kinder Morgan Energy Partners
Linnton Terminal

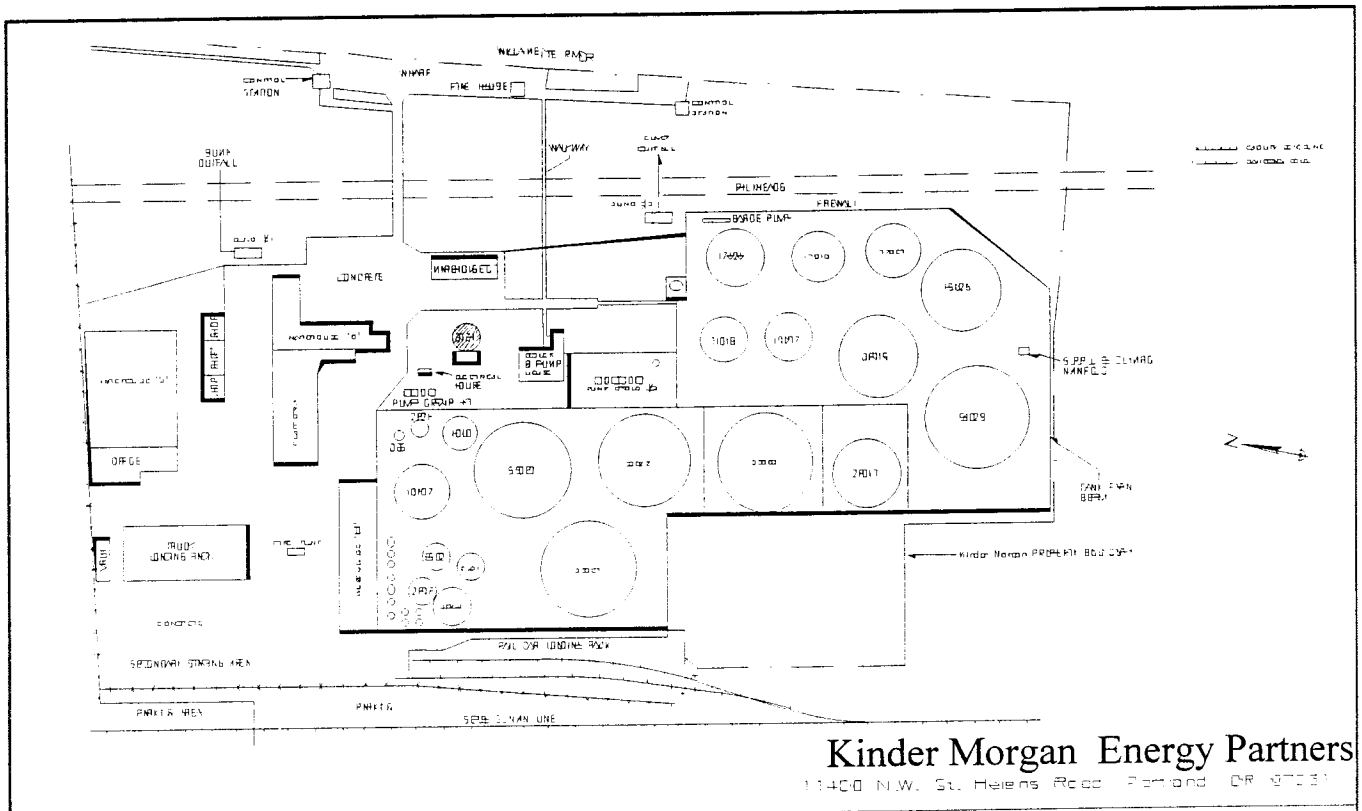
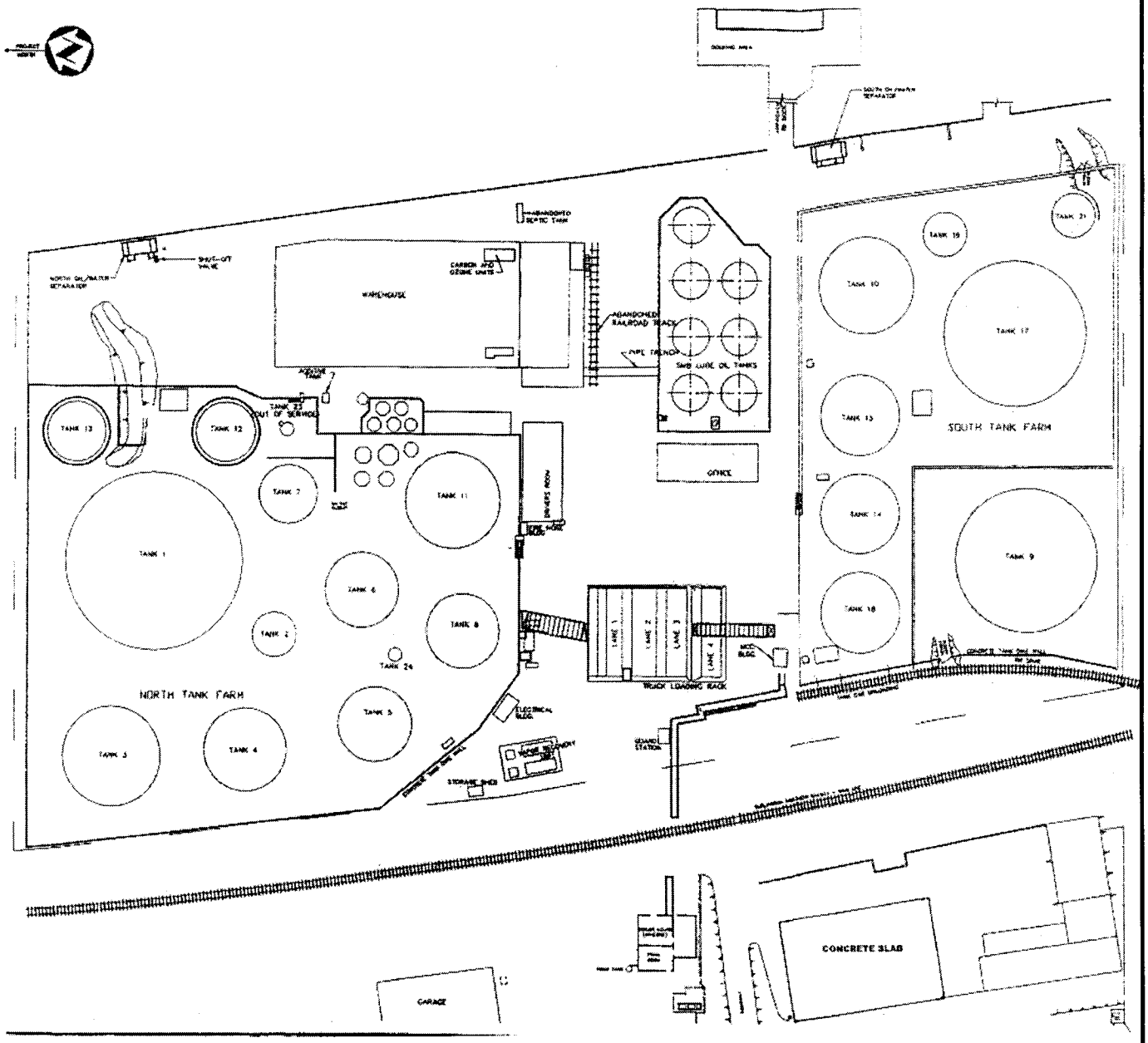


Exhibit 3

BP West Coast Products
Linnton Terminal



NOTE: Base drawing supplied by BP Products

TRC
Customer-Focused Solutions
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Windsor, CT 06095
(860) 298-9692

BP PRODUCTS NORTH AMERICA, INC.
PORTLAND, OREGON

FIGURE 1
FACILITY DIAGRAM

Date: 06/05 | Project No. 47098-0000-00001

Exhibit 4

TRC
Customer-Focused Solutions

June 23, 2005

Ms. Brenda Donovan
HSSE Advisor - NW Region
BP West Coast Products, LLC
9930 N.W. St. Helens Road
Portland, OR 97231

Re: Storage Tank No. 1, Terminal Fire Scenario
TRC Project No. 47098-0000-00004

Dear Brenda;

TRC Environmental Corporation has been retained by BP West Coast Logistics to conduct a consequence safety assessment for a potential fire event that could occur at the Portland Terminal. The emphasis of this assessment was to evaluate the potential radiant heat consequences of such an event outside the fence line of the facility if it were to occur at the largest gasoline storage tank, No. 1, which is located within the North Tank Farm. TRC used a previously developed petroleum industry study commonly called "LASTFIRE" published in 1998 as the basis for selecting this type of event for evaluation. The following sections provide a brief description of the facility, the results of this analysis as well as the assumptions used.

FACILITY

The terminal is located on St. Helens Road/Highway 30 in Portland and consists of 21 above ground product storage tanks, a truck loading rack, ship/barge dock, warehouse, office building, and truck maintenance garage. The terminal handles distillate fuels, different grades of gasoline, and ethanol. Storage of these products is split between two tank farms. The North Tank Farm has thirteen storage tanks (primarily gasoline and ethanol) in a single spill containment structure or dike wall. The largest storage tank in the north tank farm is Tank No. 1, which stores gasoline and has a working capacity of approximately 3,500,000 gallons. This is the terminal's largest tank that also happens to be located on northern end of the property directly adjacent to the land study area.

The South Tank farm has eight storage tanks that primarily handle diesel products also within a single containment structure.

The geography of this location is unique in that it is bound on the west by the Burlington Northern main rail line and St. Helens Road/Highway 30, and on the east by the Willamette River. An inactive industrial zoned area is immediately adjacent to the

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terminal on the north side and the southern boundary is adjacent to another petroleum storage facility, St. Services.

ANALYSIS/MODELING CONSIDERATIONS

Since the focus of this study was directed towards an event that could have significant impact outside the terminal's property, a tank fire was chosen as an appropriate scenario. A fire of this nature is modeled as a pool fire at an elevation relative to the surroundings. For this type of analysis a "pool" is defined as a liquid spill that has the dimensions equal to the surface area of the tank. In this case, the effective pool area is 15,837 square feet. The principle hazard to the surrounding area is from the thermal radiation emitted by the resultant flames.

Also, pool fires burn at a rate that depends on the product involved. The rate is usually expressed in terms of feet of liquid per hour, or an equivalent measure in other units, and may be used to estimate the duration of a fire involving a pool of known depth.

There are several thresholds that can be used to characterize the exposure to radiant heat from a fire[1]. For this study, the following levels are defined:

Twenty five (25) kw/m^2
At locations where the thermal radiation intensity is equal to this level of kilowatts per square meter (kw/m^2), wood or similar materials will ignite with extended exposure. Thus, long term sheltering inside the types structures available is not likely to be feasible at this level. Also, pain would be experienced in about a second, and blistering of bare skin would occur in less than 10 seconds. A fifty (50) % lethality would occur in about 30 seconds for personnel wearing clothing typical of warm weather.

Nine (9) kw/m^2
For 60 seconds exposure, this level is reported to correspond to a 1 % fatality probability for persons dressed in "average" clothing. Blistering of exposed skin occurs in about 20 seconds. People indoors or within a "shadow" zone of some form of shelter could survive for extended periods of time when the ambient level of exposure is at this intensity. Escape should usually be possible but with potential for minor injuries.

Five (5) kw/m^2
For 1-minute exposure, this level represents the threshold intensity for "significant" injury. That is, exposed skin could suffer second-degree burns (similar to severe sunburn) in 60 seconds under optimum exposure conditions. An exposure time of 60 seconds was chosen as this was felt to represent a time within which a person could seek shelter or leave the area.

[1] American Institute of Chemical Engineers: Guidelines for Evaluating Characteristics of Vapor Cloud Explosions, Flash Fires, and BLEVES., 1994.

The principal weather parameters that affect consequences from this type of study are wind speed and atmospheric stability. For pool fires, stability is not important; but wind speed can have a significant effect on the distance to a specified level of thermal impact. This is due to the flame tilt and flame "drag" which have the effect of moving the flame closer to a specific location in a downwind direction, but farther from a specific location in an upwind direction. Thus, a contour tends to be elongated in the downwind direction and shortened in an upwind direction compared to the case of no wind. Wind speed was not taken into consideration for this study in order to provide radial (in all directions) radiation impact distances.

RESULTS

This event for a fully involved fire in the largest gasoline tank represents the worst case for any single tank fire at this terminal. The maximum thermal radiation levels (25 kw/m^2 at the centerline of the flame) would be experienced at a distance of approximately 310 feet in all directions from this source. For comparison purposes, the north fence line is about 100 feet from the center of Tank 1. As calculated, this high radiation level is well beyond the existing property boundary. A radiant heat power of 9 kw/m^2 would reach to a distance of 515 feet from the tank and an exposure to 5 kw/m^2 would be experienced at 695 feet from the tank. These distances are based on open space exposure to Tank 1 with no effect from the prevailing winds. In addition, due to the volume of gasoline typically stored in this tank, the duration of such a fire could last as long as 15 hours.

If you have any questions regarding these analyses or require any further information, please do not hesitate to contact me, or Ray Topazio at TRC.

Sincerely,

TRC ENVIRONMENTAL CORPORATION

Albert A. Wilder

Albert A. Wilder, QEP
Senior Consulting Engineer

AAW/jeh

Exhibit 5

2004 Emergency Response Guidebook

A GUIDEBOOK FOR FIRST RESPONDERS DURING THE INITIAL PHASE OF A DANGEROUS GOODS/ HAZARDOUS MATERIALS INCIDENT

Fuel, aviation, turbine engine	128	1863
Fuel oil	128	1202
Fuel oil	128	1993
Fuel oil, no. 1,2,4,5,6	128	1202
Fumaryl chloride	156	1780
Fumigated unit	171	3359
Furaldehydes	132P	1199
Furan	128	2389
Furfural	132P	1199
Furfuraldehydes	132P	1199
Furfuryl alcohol	153	2874
Furfurylamine	132	2526
Fusee (rail or highway)	133	1325
Fusel oil	127	1201
GA	153	2810
Gallium	172	2803
Gas, refrigerated liquid, flammable, n.o.s.	115	3312
Gas, refrigerated liquid, n.o.s.	120	3158
Gas, refrigerated liquid, oxidizing, n.o.s.	122	3311
Gas cartridges	115	2037
Gas generator assemblies	171	8013
Gas identification set	123	9035
Gasohol	128	1203
Gas oil	128	1202
Gasoline	128	1203
Gas sample, non-pressurized, flammable, n.o.s., not refrigerated liquid	115	3167
Gas sample, non-pressurized, poisonous, flammable, n.o.s., not refrigerated liquid	119	3168
Gas sample, non-pressurized, poisonous, n.o.s., not refrigerated liquid	123	3169
Gas sample, non-pressurized, toxic, flammable, n.o.s., not refrigerated liquid	119	3168
Gas sample, non-pressurized, toxic, n.o.s., not refrigerated liquid	123	3169
GB	153	2810
GD	153	2810
Genetically modified micro-organisms	171	3245
Germane	119	2192
GF	153	2810
Glycerol alpha-monochlorohydrin	153	2689
Glycidaldehyde	131P	2622
Guanidine nitrate	143	1467
H	153	2810
Hafnium powder, dry	135	2545
Hafnium powder, wetted with not less than 25% water	170	1326
Halogenated irritating liquid, n.o.s.	159	1610
Hay, wet, damp or contaminated with oil	133	1327
Hazardous waste, liquid, n.o.s.	171	3082
Hazardous waste, solid, n.o.s.	171	3077
HD	153	2810
Heating oil, light	128	1202
Heat producing article	171	8038
Helium	121	1046
Helium, compressed	121	1046
Helium, refrigerated liquid (cryogenic liquid)	120	1963
Heptafluoropropane	126	3296
n-Heptaldehyde	129	3056
Heptanes	128	1206
n-Heptene	128	2278
Hexachloroacetone	153	2661
Hexachlorobenzene	152	2729
Hexachlorobutadiene	151	2279
Hexachlorocyclopentadiene	151	2646
Hexachlorophene	151	2875
Hexadecyltrichlorosilane	156	1781
Hexadiene	130	2458
Hexaethyl tetraphosphate	151	1611
Hexaethyl tetraphosphate, liquid	151	1611
Hexaethyl tetraphosphate, solid	151	1611
Hexaethyl tetraphosphate and compressed gas mixture	123	1612
Hexafluoroacetone	125	2420
Hexafluoroacetone hydrate	151	2552
Hexafluoroacetone hydrate, liquid	151	2552
Hexafluoroacetone hydrate, solid	151	3436
Hexafluoroethane	126	2193
Hexafluoroethane, compressed	126	2193
Hexafluorophosphoric acid	154	1782
Hexafluoropropylene	126	1858
Hexafluoropropylene oxide	126	1956
Hexaldehyde	130	1207
Hexamethylenediamine, solid	153	2280
Hexamethylenediamine, solution	153	1783
Hexamethylene diisocyanate	156	2281
Hexamethyleneimine	132	2493
Hexamethylenetetramine	133	1328
Hexamine	133	1328
Hexanes	128	1208
Hexanoic acid	153	2829
Hexanols	129	2282
1-Hexene	128	2370
Hexyltrichlorosilane	156	1784
HL	153	2810
HN-1	153	2810
HN-2	153	2810
HN-3	153	2810
Hydrazine, anhydrous	132	2029
Hydrazine, aqueous solution, with more than 37% Hydrazine	153	2030
Hydrazine, aqueous solution, with not less than 37% but not more than 64% Hydrazine	153	2030
Hydrazine, aqueous solution, with not more than 37% Hydrazine	152	3293
Hydrazine, aqueous solutions, with more than 64% Hydrazine	132	2029
Hydrazine hydrate	153	2030
Hydrides, metal, n.o.s.	138	1409
Hydriodic acid	154	1787
Hydriodic acid, solution	154	1787
Hydrobromic acid	154	1788
Hydrobromic acid, solution	154	1788
Hydrocarbon gas, compressed, n.o.s.	115	1964
Hydrocarbon gas, liquefied, n.o.s.	115	1965
Hydrocarbon gas mixture, compressed, n.o.s.	115	1964
Hydrocarbon gas mixture, liquefied, n.o.s.	115	1965

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Those substances designated with a **"P"** may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.
- Substance may be transported hot.
- **If molten aluminum is involved, refer to GUIDE 169.**

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- As an immediate precautionary measure, isolate spill or leak area for at least 50 meters (150 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

CAUTION: For mixtures containing a high percentage of an alcohol or polar solvent, alcohol-resistant foam may be more effective.

Small Fires

- Dry chemical, CO_2, water spray or regular foam.

Large Fires

- Water spray, fog or regular foam.
- Use water spray or fog; do not use straight streams.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material. • Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. • Use clean non-sparking tools to collect absorbed material.

Large Spills

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air. • Call 911 or emergency medical service.
- Give artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water. • Keep victim warm and quiet.
- In case of burns, immediately cool affected skin for as long as possible with cold water. Do not remove clothing if adhering to skin.
- Ensure that medical personnel are aware of the material(s) involved and take precautions to protect themselves.