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April 7, 2015

Portland Planning and Sustainability Commission
1900 SW 4th Avenue, Suite 7100
Portland, OR 97201

Submitted in person and via email to: psc@portlandoregon.gov

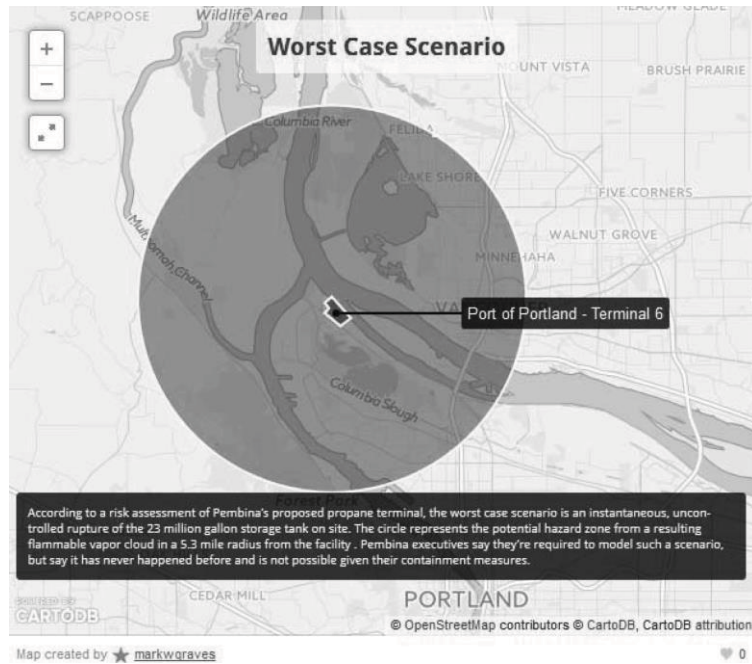
RE: Comment Opposing Proposed Draft Terminal 6 Environmental Overlay Zone Code & Map Amendments

To Portland Planning and Sustainability Commission Members,

Columbia Riverkeeper (Riverkeeper) and the Lands Council are deeply concerned about the potential environmental, public safety, economic and climate consequences of Pembina Marine Terminals' proposed propane project at the Port of Portland's Terminal 6. Riverkeeper and the Lands Council urge the City of Portland to deny proposed amendments to the environmental overlay zone code and zoning map, changes that would facilitate the construction and operation of Pembina's large propane export terminal. The information available to the Portland Planning and Sustainability Commission ("Commission") is insufficient to fully address the potential environmental, public safety, climate and economic ramifications of Pembina Marine Terminals' proposed propane terminal. As a result, the Commission should deny Pembina's requested amendment to allow liquid propane to be piped through environmental zones.

The Commission can choose to leave the environmental overlay zone code as it is. In so doing, the overlay zone would continue to prohibit the conflicting use of piping liquid propane – a hazardous material – through Portland's environmental overlay zone. The Economic, Social, Environmental and Energy (ESEE) analysis is meant to inform the Commission's deliberation on how retaining or altering the current prohibition on liquid propane pipes may impact the community. Yet, the ESEE does not provide a comprehensive assessment of the impacts of allowing liquid propane pipes as a limited use because Pembina has not yet produced critical information about the impact of the project. Examples of documents or reviews that should directly inform that Commission's decision-making regarding the Pembina project include:

- Final Quantitative Risk Analysis (QRA).** Pembina has provided an inadequate amount of time for the public, staff, and the Commission to review its risk analysis and independently vet its conclusions. The QRA is limited in its assessment of off-site impacts, but even its own analysis raises serious questions about the ability of local first responders to deal with worst case scenarios. How would first responders evacuate an area large enough to protect the public from a large liquid propane leak, fire, or explosion? The QRA fails to provide this level of detail but clearly identifies hazards that extend through large portions of Portland.



Source: *The Oregonian*, based on Pembina March 2015 Draft QRA.

- Analysis of rail & marine safety impacts outside of Pembina site.** Pembina's QRA notably omits any analysis of rail and marine hazards associated with liquid propane transport outside of the terminal site, itself. Approximately one in nine Multnomah County residents live within 500 meters of rail lines that could carry liquid propane unit trains (based on a similar analysis conducted for the same rail routes being used for coal).ⁱ These 80,000-plus individuals deserve detailed answers to how they may be impacted by potential propane transport through our community.

In its “worst case” analysis, Pembina fundamentally understates the potential risks from a rupture of multiple 30,000-gallon propane rail cars. On page 206 of Pembina's QRA, Pembina assesses the case of a single rail car exploding. The QRA does not assess the impact of multiple cars in a propane train failing, nor does it attempt to superimpose the resulting explosion or fire on neighborhoods near the rail line outside of the terminal site. Lastly, Pembina's draft QRA provides only a limited review of the different types of rail cars that may be used to deliver propane to the Pembina facility. Already, there are a range of DOT-112 cars available, and these cars have failed while carrying propane in Canada.

- Climate Action Plan.** Pembina has not demonstrated how its project would comply

with the City's existing climate policies. "Stewardship, development and maintenance" of the Portland's Climate Action Plan is one of three areas of responsibility specifically designated to the Commission. The City's draft Climate Action Plan currently contemplates establishing a local fossil fuel export policy and "opposing exports of coal and oil through Oregon." Columbia Riverkeeper and others have urged the City to include all fossil fuels - including liquid propane and liquefied natural gas (LNG) - in its fossil fuel export policy.ⁱⁱ

The Commission has not formulated – nor has the public fully vetted – an approach to assessing and preventing the climate change pollution that would result from the project. The Commission should not rush to make a change to its environmental overlay zone code on behalf of Pembina without clearly and methodically considering how such a change and the resulting terminal would conflict with the City's goals for addressing climate change pollution. The Commission simply has not had the opportunity to vet Pembina's climate pollution information or to develop an independent analysis. Even so, the City's ESEE indicates that the Pembina terminal would be a significant contributor to the City's own emissions, and carbon pollution related to the propane would be measurable on a global scale. Propane should be included with coal and oil as part the City's fossil fuel export policy, and the Commission should deny Pembina's proposal because it will conflict with the City's climate pollution goals.

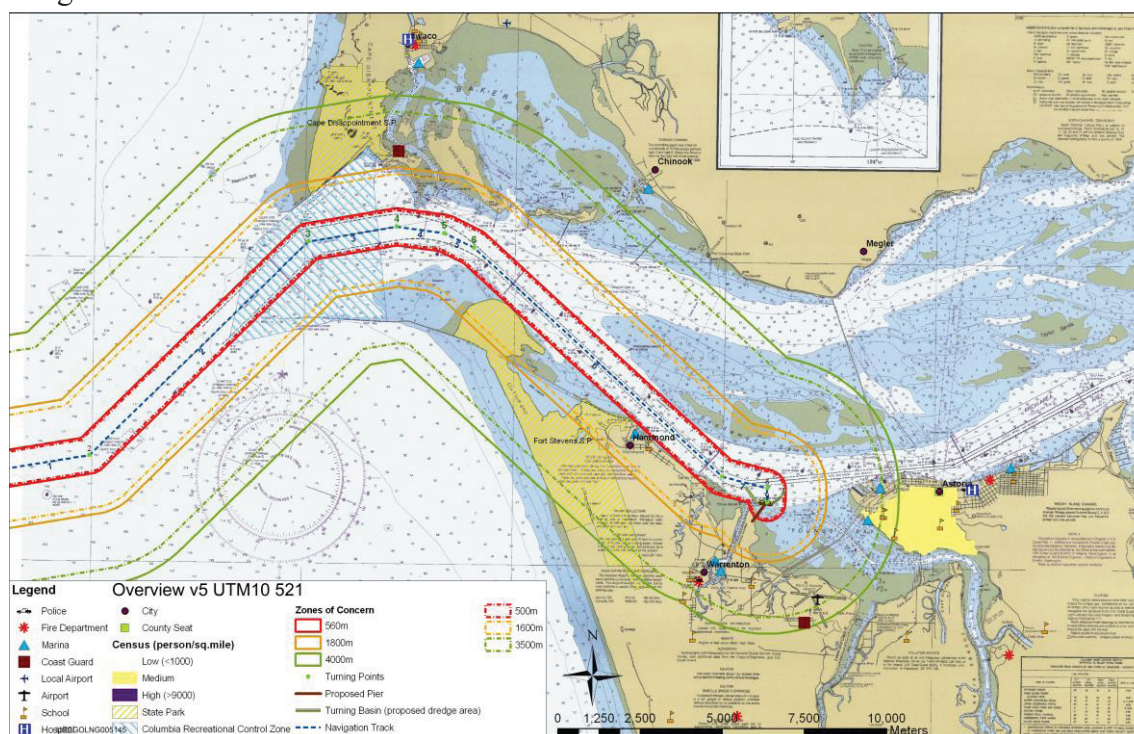
- **Draft Emergency Response Plan (ERP).** Pembina indicates that it will develop an ERP, but the Commission has not yet been provided a basic gap analysis to assess the feasibility of responding to an emergency at Pembina's proposed facility. Many commenters have noted that Portland is unprepared to deal with a large propane explosion or fire, and Pembina has provided no information to demonstrate that detailed planning has occurred to resolve the problem. Pembina has not yet identified evacuation zones in neighborhoods along the rail route, cities near the tanker transit route on the Columbia River, or areas near the facility during a large propane leak, fire, or explosion. The staff report indicates that, "depending on the size of the release and weather conditions, additional steps may include establishing roadblocks, notifying adjacent neighbors, or implementing shelter-in-place and/or evacuations of potentially affected areas." These measures are too vague to provide a basis for the Commission to approve Pembina's requested changes.

A large leak of liquid propane is not unimaginable, and a recent LNG leak in eastern Washington in March 2014 provides an indication of how an emergency might unfold. On March 31, 2014, an explosion at the Plymouth LNG facility in eastern Washington injured five workers and caused a recurring, large LNG leak. According to the Tri-City Herald, residents and workers were evacuated for two miles around,

and the explosion was heard 20 miles away in Oregon.ⁱⁱⁱ Some residents spent a night away from their homes as the hazard dissipated. Recognizing that liquid propane may behave differently than LNG, a liquid propane facility poses hazards that could meet or exceed those introduced by the LNG storage facility in Plymouth. An evacuation of a similar 2-mile radius or a much larger area in Portland near Pembina's liquid propane terminal – including Hayden Island homes and businesses – would potentially be untenable. Pembina has not provided information adequate to demonstrate that an evacuation would be feasible in the areas where it could be necessary.

- Waterway Suitability Assessment.** The Pembina project will impact the safety of downstream communities and impact other recreational and commercial users of the Columbia River. Pembina's QRA examines the hazards of a 550,000-bbl release of liquid propane from its largest tank, and this is roughly the same quantity that could be moved in a very large gas carrier. As a result, the hazard areas identified in Pembina's own worst case scenario may also apply to the entire tanker route.

According to Pembina, they have been directed by the Coast Guard to assess the impacts of liquid propane tankers as if they were liquefied natural gas (LNG) tankers. The map below was produced as part of the Waterway Suitability Analysis for Oregon LNG.



The Commission should recognize that the hazards for Pembina's propane tankers

would be similar to the zones shown for Oregon LNG's incoming tankers, except Pembina's tankers would travel much further upriver to Portland. Given the region's experience with LNG risks and the lack of information regarding the marine safety aspects of Pembina's proposal, the Commission cannot conclude that Pembina's projects will protect the economy, public safety, and environment of downriver communities.

Furthermore, the measures required to safeguard incoming and outgoing liquid propane tankers will disrupt other River users. These impacts are only lightly addressed in the City's ESEE. In highly controversial LNG projects downriver, the Coast Guard concluded that one-way commercial vessel traffic would be necessary in the shipping channel with very limited passing zones. Additionally, vessels would be restricted from coming within 500 yards of an LNG tanker without permission from the Captain of the Port. (See attached documents from the U.S. Coast Guard review of the Bradwood LNG and Oregon LNG terminal projects.) Similar measures – if applied to propane tankers visiting Terminal 6 in Portland – would significantly impact the entire lower Columbia River system, from the Columbia River bar to Terminal 6. The Commission needs more information about the impacts to other users of the Columbia River before approving Pembina's requested land use code changes.

- **National Environmental Policy Act (NEPA) or other environmental reviews.** Pembina has indicated that it plans to submit an application to the Army Corps very soon, but the public has not yet been able to review basic environmental information about the potential impacts of Pembina's project. For LNG projects in Oregon, state and federal environmental reviews produced significant information about unanticipated environmental, economic, and public safety impacts. The Pembina propane terminal deserves the same level of scrutiny, but the Commission is being asked to approve environmental overlay zone code changes prior to having adequate information about the environmental impacts of a large propane export terminal. It is premature for the Commission to approve a change to the environmental zone overlay without first understanding the environmental consequences of having a large propane facility at Terminal 6, and the City's ESEE is too incomplete to be relied upon to reach firm conclusions. Yet, information provided to the Commission thus far clearly indicates that the risks associated with Pembina's tanks, unit trains, and liquid propane tanker ships pose a significant threat to wildlife, aquatic resources, and human health and safety above and beyond the risks already present from other industrial uses in the Portland area.
- **Revised ESEE.** City staff produced an ESEE for public review long before Pembina had submitted critical information regarding the potential hazards of the proposed

facility. The public deserves a chance to see a revised ESEE before providing additional testimony to the Commission. The ESEE should also look at the impact of the project to the entire City – the Columbia River, rail routes through Portland, and nearby neighborhoods. Furthermore, the ESEE improperly excludes potential impacts to the riparian corridor from the Pembina proposal. All parts of the terminal enabled by the proposed zone changes are not water-dependent or water-related, but will impact the riparian resources of the City that are protected under Goal 5. The ESEE does not properly address the protection of Goal 5 resources, particularly given the catastrophic risks and extraordinary engineering measures required to mitigate those risks next to the Columbia River.

Because of the obvious hazards associated with Pembina's facility – evident even in Pembina's own QRA in the Worst Case Analysis at the end of the report – the burden of proof rests on Pembina to demonstrate that its project will protect the health, safety, and environment of Portland and other impacted communities. Pembina's submissions fall far short of ensuring that the project will protect these values. A retired Oregon state hazmat inspector recently told the *Oregonian*, "We've had a couple of tank cars every week here and there. Emergency responders are prepared to handle one car of propane being on fire...In terms of a major stack up, like we've had with crude oil, the metro area has never seen anything like that. There's just no capacity on hand to handle anything of that size."^{iv} Eyer continued, "When propane goes we have seen these multi-ton tank cars go for upwards of a half mile, literally taking off like rockets." The Commission should deny Pembina's proposal because of the projects' dramatic destructive potential and Pembina's failure to demonstrate that its project will protect public safety.

The Commission's decision to change Portland's environmental overlay zone code would facilitate increased propane-by-rail traffic that would impact communities near major rail lines. Lacking a specific rail route for the project, the Commission must assume that the proposed propane-by-rail traffic could impact the health and safety of Spokane, Vancouver, and many Columbia River gorge communities in addition to Portland's own neighborhoods. Likewise, downstream communities along the Columbia River shipping channel – such as Woodland, Rainier, Longview, Astoria, and Warrenton – face serious hazards from loaded liquid propane tankers. And because Pembina has not detailed the safety and security measures that would be necessary to protect the public from a large propane facility, the Commission also lacks information to assess how a properly functioning facility will impact public resources, such as emergency response capacity and river access.

Pembina will surely argue that our questions and those raised by Hayden Island residents, neighborhood groups, and local labor organizations should be resolved after the Commission approves its requested environmental zone code amendment. However, Portland's residents rely on their own Planning and Sustainability Commission – not future reviews and processes that

may be hidden from public scrutiny – to make difficult decisions and to protect the public’s interest. The Commission must not defer to other agencies whose review processes will be far from transparent. For example, most of the development of the Coast Guard Waterway Suitability Analysis will be developed in the absence of public input because of the security-sensitive nature of the information involved. Based on Oregon’s experience with LNG proposals, the final recommendations will be public, and these recommendations will directly impact the ability of people to fish, recreate, and do commerce in and near the Columbia River. Additionally, development of the Emergency Response Plan will only involve a limited range of perspectives and may not trigger public hearings, despite the enormous risks and lack of capacity described in the Oregonian’s recent article from March 21st. In short, the public trusts the Commission to require and use detailed information in determining whether Pembina’s proposal warrants the requested environmental overlay zone changes, and that information is simply not available to the Commission at this time.

The proposed Pembina Marine Terminals propane project in Portland is similar in many ways to highly controversial liquefied natural gas (LNG) proposals on Oregon’s coast and Columbia River. Oregonians have debated the safety, economic impact, and environmental implications of LNG proposals for over ten years because the projects would dramatically change the communities around them. Pembina’s proposal is similar in the hazards it introduces to nearby communities. Yet, unlike LNG terminals in Warrenton and Coos Bay, it has received little detailed review, and it may never receive a thorough, unbiased consideration if the Commission rushes to grant the requested changes to the environmental overlay zone code and map. Based on Pembina’s own QRA and Oregon’s long experience with assessing LNG projects, the Commission has the information it needs to reject the Pembina project and the company’s requested land use changes. At the very least, the Commission should create the time and opportunity for the public to gain knowledge about the implications of liquid propane storage and transport.

Because of the volume and complexity of material submitted on or before April 7, we request that the Commission hold the record open for no less than 7 days. We urge Commissioners to recognize that they are being asked to make a very significant decision without the benefit of critical environmental, public safety, health, and economic information, and we further ask that the public be given the opportunity to review new information submitted prior to and during the Planning Commission’s hearing. If a decision must be made soon, the Commission should deny the requested environmental overlay zone changes and map amendments because the Commission cannot reasonably conclude that Pembina’s proposed propane terminal will be compatible with the City’s economic, environmental, public safety and health, and climate goals and policies.

Sincerely,



Daniel Serres

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Columbia Riverkeeper
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On behalf of:

Laura Ackerman
Organizer and Oil Policy Director for the Lands Council
25 W. main Ave. Ste. 222
Spokane, WA 99201
509 209-2404

cc:

Tom Armstrong, Supervising Planner

ⁱ Multnomah County. 2013. The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon.

ⁱⁱ City of Portland Draft Climate Action Plan. March 2014. P. 69.

ⁱⁱⁱ "Evacuation radius near Plymouth plant to be reduced." Tri-City Herald. March 31, 2014.

^{iv} "Study says North Portland propane terminal would be safe; neighbors point to other risks." Oregonian. March 21, 2015.



16611/Oregon LNG
April 24, 2009

Ms. Kimberly Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, DC 20426

LETTER OF RECOMMENDATION (LOR) ANALYSIS FOR OREGON LNG

Dear Ms. Bose:

On April 24, 2009, the Coast Guard completed a review of the Waterway Suitability Assessment (WSA) for the proposed Oregon LNG receiving terminal submitted by Halcrow, Inc. on behalf of Oregon LNG in March of 2008. This review was conducted following the guidance provided in Navigation and Vessel Inspection Circular (NVIC) 05-08 of Dec 22, 2008. The review focused on the navigation safety and maritime security risks posed by LNG marine traffic, and the measures needed to responsibly manage these risks. During the review, the Coast Guard consulted a variety of stakeholders including state and local emergency responders, Marine Pilots, towing industry representatives, members of the Harbor Safety Committee, and the Area Maritime Security Committee.

Based upon this review, I have determined that the Columbia River and its approaches are not currently suitable, but could be made suitable for the type and frequency of LNG marine traffic associated with this project. Additional measures are necessary to responsibly manage the maritime safety and security risks. The proposed risk mitigation measures are found in section 5 and section 7 of the submitted WSA. This LOR analysis clarifies as necessary, and in some cases expands the recommendations needed to responsibly manage the navigation, safety and security risks. The specific measures, and the resources needed to implement them where applicable, are described below and in a separate supplementary analysis which is being provided to you under the terms and conditions established for handling Sensitive Security Information. The supplemental analysis also includes a copy of the Oregon LNG WSA.

The following is a list of specific risk mitigation measures that are recommended to responsibly manage the safety and security risks of this project. Details of each measure, including adequate support infrastructure, will need further development through the creation of an Emergency Response Plan as well as a Transit Management Plan that clearly spell out the roles, responsibilities, and specific procedures for the LNG vessel and all agencies responsible for security and safety during the operation.

Navigational Measures:

- **Safety/Security Zone:** A moving safety/security zone will be established around the LNG vessel extending 500-yards around the vessel but ending at the shoreline. No vessel may enter the safety/security zone without first obtaining permission from the Coast Guard Captain of the Port (COTP). The expectation is that the COTP's Representative will work with the Pilots and patrol assets to control traffic, and will allow vessels to transit the Safety/Security zone based on a case-by-case assessment conducted on scene. Escort resources will be used to contact and control vessel movements such that the LNG Carrier is protected.

April 24, 2009

While the vessel is moored at the facility there will be a 200 yard-security zone around the vessel. In addition, there will be a 50 yard security zone around the LNG Terminal when there is not a vessel at the dock.

Resource Gap: Resources required to enforce the safety/security zone are discussed under Security Measures in the supplemental analysis.

- Vessel Traffic Management Due to a narrow shipping channel and navigational hazards, it is recommended that LNG vessels meet the following additional traffic management measures:
 - A Transit Management Plan be developed in coordination with River Pilots, Bar Pilots, Escort Tug Operators, Security Assets and the Coast Guard prior to the first transit.
 - Due to the sudden weather changes on the Oregon coast and the relatively exposed location of the proposed terminal, a weather matrix must be a part of the recommended Transit Management Plan. This matrix would be prepared by the Applicant and would consider the entire duration of the planned port call by the LNG vessel. Where sustained winds are forecast to exceed 25 knots at any time during the port call, the LNG vessel would be required to remain at least 50 nautical miles from the coast. Additional considerations would include the weather conditions that require calling a Pilot to attend an LNG vessel that is at the terminal, when a Pilot must remain on board during the transfer of LNG to the facility, and the weather considerations that would call for a suspension of the transfer operation and the subsequent departure from port of the LNG vessel. Once prepared, this matrix would be submitted to the Coast Guard for review and inclusion in the overall Transit Management Plan. Additional simulation studies may be required to validate the proposed weather matrix.
 - The Transit Management Plan will be reviewed within six months of the first arrival, and followed by an annual review to ensure that it reflects the most current conditions and procedures.
 - For at least the first six months, that there be at least two Pilots aboard the LNG vessel throughout the transit.
 - For at least the first six months, that all transits be completed during daylight hours only, unless approved in advance by the COTP. After the first six months, it is anticipated that night transits may be recommended at certain times of the year to minimize disruptions to the waterway from the CR buoy to buoy 12. These times include the busiest fishing seasons from June through September.
 - The LNG Vessel board Pilots at least 5 miles seaward of the CR Buoy.
 - Overtaking by or of the LNG Vessel is prohibited without COTP approval.
 - Meeting situations of commercial vessels will be closely controlled. All meetings to be pre-arranged via Channel 13 VHF Bridge-to-Bridge and would be limited to the following areas:
 - Commercial piloted vessels avoid meeting in all turns (excluding fishing vessels under 200 feet).
 - Weather and bar conditions permitting, vessels may arrange for meetings to occur between the CR buoy and buoy 12, and between buoy 25 and buoy 27.
 - 24 hours prior to arrival, the Coast Guard, FBI, Bar Pilots and River Pilots, Escort Tug Masters, and other Escort assets would meet to coordinate inbound and outbound transit details. Subsequent coordination meetings or phone call confirmation would be required 4 hours prior to arrival and 1 hour prior to arrival.
 - Vessel transits and bar crossings would be coordinated so as to minimize conflicts with other deep draft vessels, recreational boaters, seasonal fisheries, and other Marine Events.

Resource Gaps: The recommended Vessel Transit Management Plan would be approved by the COTP at least 60 days prior to the first arrival.

- Vessel Traffic Information System: The current Vessel Traffic Information System on the Columbia River is limited to AIS receivers and a handful of cameras. In order to ensure vessel safety and security, this capability would need to be augmented with a robust camera system capable of monitoring the entire transit route. Due to weather concerns, these cameras would be equipped with detectors capable of monitoring vessel traffic in wind, rain and fog conditions common on the river.

Resource Gaps: Camera system with complete coverage of the entire transit route, capable of detecting vessel traffic in wind, rain, fog, and dark conditions. Access to the feed of this system should be granted to local, regional, state, and federal emergency responders.

- Tug Escort and Docking Assist : Due to the confined channel and high wind conditions, each LNG Carrier would be escorted by two tractor tugs, which would join the vessel as soon as safe to do so. Both tugs would be tethered at the direction of the Pilot. A third and fourth tractor tug would be required to assist with turning and mooring.
 - All four tugs will be at least 75 Ton Astern Bollard Pull or larger and equipped with Class 1 Fire Fighting equipment.
 - Based on the Maneuvering Simulation Study of January 3, 2008, LNG vessels would be limited to transiting during periods of 25 knots of wind or less. Additionally, extreme wind and weather conditions may require a third escort tug for any LNG vessel.
 - While unloading, all four tugs would remain on station to assist with emergency departure procedures. Two of the standby tugs would remain at the ready in the terminal basin, monitoring passing vessel traffic and immediately available to assist if maneuverability casualties of a passing vessel occurs. Whenever these tugs are utilized to assist a passing vessel, the Coast Guard would be notified as soon as it is safe to do so.
 - Tug escorts would be made in accordance with recognized industry standards, practices, or port guidelines that are developed specifically for "Tug Escorts."
 - "Best Achievable Protection" must be incorporated into tug and facility best practices. "Best Achievable Protection" means the highest level of protection which can be achieved through both the use of the best achievable technology and those manpower levels, training, procedures, and operational methods which provide the greatest degree of protection achievable.

Resource Gaps: Four 75 Bollard Ton Tractor Tugs with Class 1 Fire Fighting capability. Tug escort standards and practices would be developed and implemented for LNG Carriers operating on the Columbia River in concert with the Coast Guard Sector Portland Harbor Safety Committee. "Best Achievable Protection" will require review and concurrence of the Harbor Safety Committee.

- Navigational Aids: Any additional aids to navigation would be privately funded and maintained by the Applicant, and the location and permitting would be accomplished in accordance with current Coast Guard and Corps of Engineers procedures:

LETTER OF RECOMMENDATION ANALYSIS FOR OREGON LNG

16611/OREGON LNG
April 24, 2009

- PORTS (Physical Oceanographic Real-Time System) station at the terminal site contracted with NOAA to provide real time river level, current and WX data
 - A telemetric wind speed meter sited at the proposed terminal. In addition to providing the terminal and Operation Centers with current wind speeds, this meter would transmit data to the National Weather Service in accordance with NWS procedures.
 - Doppler docking station.
 - The available data for river current speeds at the terminal location is limited and unreliable. The installation of a turning basin by dredging the river bottom will impact the current data. As soon as practical after the dredging is complete and preferably before the final orientation of the pier face is completed, a river current study is recommended in the vicinity of the pier.
 - A quick-release mooring system is recommended to allow for vessel departures on short notice without the aid of additional personnel ashore.
 - Facility light shielding is recommended to preventing interfering with other Columbia River vessel traffic.
- LNG Carrier familiarization training for Pilots and Tug Operators: Prior to the arrival of the first vessel, joint simulator training is recommended for Pilots and Tug Operators identified as having responsibility for LNG traffic.
 - Dynamic Under Keel Clearance System: Installation of a real time system for data collection on under keel clearance is strongly recommended and will increase the ability to safely navigate the Columbia River Bar in varying conditions. The lack of accurate data, will limit the conditions under which a vessel may safely transit the bar. An immersion study of deep draft LNG vessels transiting the bar during summer and winter conditions is recommended within the first 12 months.

Resource Gap: Actual data on LNG tanker immersion.

Safety Measures:

- Vessel and Facility Inspections: LNG tankers and facilities are subject to (at a minimum) annual Coast Guard inspections to ensure compliance with federal and international safety, security and pollution regulations. In addition, LNG vessels and facilities are typically required to undergo a transfer monitor.

Resource Gap: Additional Coast Guard Facility and Vessel Inspectors.

- Shore-Side Fire-Fighting: Firefighting capability is extremely limited along the entire transit route. Shore side firefighting resources and training would need to be augmented in order to provide basic protection services to the facility as well as the communities along the transit route.

Resource Gap: To be determined in conjunction with local, regional, and state response agencies through the Emergency Response Planning process. Prior to the approval of the Emergency Response Plan (ERP), adequate cost sharing arrangements for project related training, equipment, maintenance, and staffing will need to be addressed for all of the communities impacted by the project.

- In-Transit Fire-Fighting: It is recommended that all crew members assigned to the escort and assist tugs be trained in the use and limitations of the installed Class I firefighting systems. Significant resource and jurisdictional issues exist in any marine fire incident on an underway vessel in the Columbia River. Current planning and preparedness efforts focus on a shore based response to a vessel moored at a facility.

Resource Gap: Development of a concrete plan for managing underway firefighting, including provisions for command and control of tactical fire fighting decisions as well as financial arrangements for provision of required training, mutual aid and identification of suitable locations for conducting fire fighting operations is critical to ensuring the safety of the port and securing the waterway.

- Public Notification System and Procedures: Adequate means to notify the public along the transit route, including ongoing public education campaigns, emergency notification systems (such as reverse 911 and siren systems), and adequate drills and training are recommended. Education programs must be tailored to meet the various needs of all river users, including commercial and recreational boaters, local businesses, local residents, and tourists.

Resource Gap: Current public notification capabilities vary greatly, and as part of the ERP process, a comprehensive notification system, including the deployment of associated equipment and training, will need to be developed in conjunction with local, regional, and state emergency responders.

- Gas Detection Capability: With the exception of the HAZMAT team in Astoria, gas detection capability is not resident and may not be available to initial responders along the transit route and at the facility. Emergency response personnel (both Police and Fire) require appropriate gas detection equipment, maintenance, and training.

Resource Gap: Gas Detectors, appropriate training, and maintenance infrastructure to be developed as part of the ERP process in conjunction with local, regional, and state emergency responders.

- Communication Systems and Protocols: Inter-agency communications pose a significant obstacle to joint operations. Deployment of a Regional Communication Plan and associated equipment is recommended to ensure that the facility, associated command centers, emergency responders, Coast Guard, Tug Operators, Escort Vessels, and Pilots can communicate in an effective manner. The system should provide for monitoring and communicating on both secure and unsecure (e.g. Ch. 16, 13, 22), as well as sending and receiving both speech and data.

Resource Gap: Operation specific and contingency communications plans and appropriate (intrinsically safe) equipment to coordinate both routine escorts and emergency operations. Equipment to transmit and receive both voice and data in a secure and unsecure environment. These gaps will be addressed as part of the ERP process in conjunction with local, regional, and state emergency responders.

Security Measures:

- Security Boardings, Waterway Monitoring, Shoreline Patrols, and Vessel Escorts: Extensive security measures will be recommended to provide adequate protection for LNG vessel while

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transiting the Columbia River and moored at the facility. The details of these measures are Sensitive Security Information, and are outlined in a separate supplementary analysis.

- Facility Security Measures: LNG facilities are subject to the security regulations outlined in 33 CFR 105, and are required to submit a Facility Security Plan (FSP) for Coast Guard approval, and undergo (at a minimum) an annual Coast Guard security inspection. The facility should also develop a plan to provide for appropriate security measures from the start of construction through implementation of the Coast Guard approved FSP.

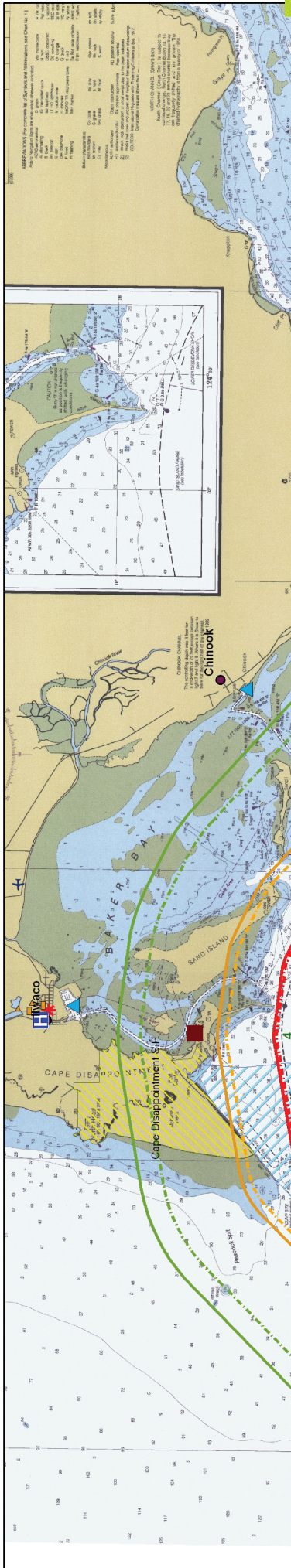
In the absence of the risk mitigation measures proposed by the Applicant as modified and clarified by the measures described in this analysis and the resources necessary to implement them, or in the absence of any changes to existing Coast Guard policy or guidance to lessen safety and security requirements, the Columbia River would be considered unsuitable for the LNG marine traffic associated with the Oregon LNG terminal. Due to the dynamic nature of the Columbia River, the applicant should be required to submit an annual update to the Waterway Suitability Assessment to the Coast Guard which will be revalidated by the COTP and AMSC. For further information, please contact Mr. Russ Berg of Coast Guard Sector Portland at (503) 240-9374.

Sincerely,



F. G. MYER
Captain, U.S. Coast Guard
Captain of the Port
Federal Maritime Security Coordinator

Copy: Oregon LNG
Thirteenth Coast Guard District (dp)
Coast Guard Pacific Area (Pp)
Commandant, Coast Guard Headquarter (CG-5222) (CG-741) (CG-544)
Commander, MLCPAC (sm) (le)



Legend Overview v5 UTM10 521

- Police
- Fire Department
- Marina
- Coast Guard
- Local Airport
- Airport
- School
- Hospital
- City
- County Seat
- Census (person/sq.mile)
 - Low (<1000)
 - Medium
 - High (>9000)
- State Park
- Columbia Recreational Control Zone
- Zones of Concern
 - 500m
 - 1600m
 - 3500m
- Turning Points
- Proposed Pier
- Turning Basin (proposed dredge area)
- Navigation Track

<http://www.ecfr.gov/cgi-bin/text-idx?rgn=div5&node=33:2.0.1.6.34>

§165.1335 Security Zone; Vessels Carrying Hazardous Cargo, Sector Columbia River Captain of the Port Zone.

(a) *Location.* The following area is a security zone: **All waters within 500 yards, in all directions, of any vessel carrying hazardous cargo**, as determined by the Captain of the Port (COTP) Columbia River, while such a vessel is located in the Sector Columbia River COTP Zone as defined in 33 CFR 3.65-15 and the COTP Columbia River determines that a security zone is necessary and enforcement of the security zone is practicable.

(b) *Regulations.* (1) In accordance with the general regulations in 33 CFR part 165, Subpart D, no person or vessel may enter or remain in a security zone created by this section without the permission of the COTP Columbia River or his/her designated representative. Designated representatives are Coast Guard personnel authorized by the COTP Columbia River to grant persons or vessels permission to enter or remain in a security zone created by this section. Subpart D of 33 CFR part 165 contains additional provisions applicable to a security zone created by this section.

(2) To request permission to enter a security zone created by this section, contact Coast Guard Sector Columbia River at telephone number [503-861-6212](tel:503-861-6212) or via VHF channel 16 (156.8 MHz) or VHF channel 22 (157.1 MHz).

(c) *Notification.* When a security zone is created by this section, one or more Coast Guard vessels will be present to enforce the security zone and the COTP Columbia River will issue a local broadcast notice to mariners.

[USCG-2009-1134, 76 FR 28317, May 17, 2011]



Study says North Portland propane terminal would be safe; neighbors point to other risks

Ted Sickinger| The Oregonian/OregonLive By Ted Sickinger| The Oregonian/OregonLive
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on March 21, 2015 at 7:00 AM, updated March 23, 2015 at 12:24 PM

To hear executives from Pembina Pipeline tell it, there is little to no risk from a proposed \$500 million propane export plant at the Port of Portland's Terminal 6, opposite West Hayden Island.

But detailed submissions from the company last week to the Portland Planning and Sustainability Commission include a chilling worst-case scenario.

An uncontrolled, instantaneous rupture of a storage tank containing 23 million gallons of propane could send a flammable vapor cloud over a big swath of North Portland or Vancouver, according to a risk assessment done by independent experts.

Pembina executives note that such a calamitous failure of a double-walled storage tank has never happened, and would be "impossible" given the safety features at the facility.

Their risk assessment, compiled by Oslo, Norway-based DNV GL, estimated the risk and potential loss of life from various disaster scenarios, including jet fires, pool fires, vapor cloud explosions, and boiling liquid expanding vapor explosions. The cumulative risk of all scenarios modeled was a single fatality every 38 years.

"Even in the highly unlikely event of very bad things happening, the people who live close to this facility would not be harmed," said Eric Dyck, the Pembina executive in charge of the Portland project told commissioners. "The risk of a very serious event doesn't extend beyond our facility itself."

Neighbors and environmental groups have conducted **their own safety analysis of the facility** and drawn very different conclusions. They say Pembina's analysis isn't thorough enough.

They are especially concerned no one has assessed the risk of mile-long trains that would haul propane to the new plant. The trains would move through densely populated areas of Portland every other day.

Likewise, twice a month, ships laden with propane would traverse the Columbia River for 100 miles to the ocean.

Critics say the safety margins in Pembina's study are largely theoretical, relying on simulations and accident data from smaller tanks. While they praised the company's safety record, they claim Pembina hasn't adequately addressed the risks of a terrorist attack at the facility and question whether it would survive a major earthquake.

"Portland really needs to make a decision," said Rob Ebersole, a Hayden Island resident and retired engineer who presented at Tuesday's workshop. "Do we want to be an oil and gas energy trans-shipment terminal? Are we willing to tolerate the risks to our neighborhoods?"

The Planning & Sustainability Commission is set to vote April 7 whether to grant a zoning exception that would allow Pembina to run a short pipeline to load tankers over a strip of land along the shoreline at Terminal 6 that is zoned as a conservation area.

The zoning vote has become a proxy for the entire city approval of the terminal since no other permit decision requires a comprehensive review of the project. Once the commission votes, the Portland City Council will consider final approval.

The commission took public testimony on the terminal earlier this year. Apart from business and labor groups who back the project, that testimony has been overwhelmingly negative, much of it from neighbors.

"You may think those of us in St. Johns are a bit provincial," testified Ben Poe, a neighborhood association member. "But we grow weary of being the city's repository for everything that stinks, burns or blows up."

Pembina's risk analysis is so dense that the planning commission has hired a consultant to review its accuracy and translate the results. Commission staff say they hope to have those results in about a week.

Earlier this month, Port commissioners in Longview unanimously rejected a proposed propane terminal similar to the one planned in Portland. Commissioners there expressed concerns over safety and said the project provided too few jobs to justify the risks.

Pembina executives Tuesday highlighted the company's unblemished safety record in Canada. They also walked through the fail-safe measures they plan to incorporate in every stage of the plant's design.

The company said the terminal will be designed to withstand a magnitude 9 earthquake, far worse than the temblor most forecasts call for in Portland. Plans call also call for a 100 foot deep retaining wall to fight potential soil liquefaction on site during a big quake.

Much of Tuesday's public testimony and several questions from commissioners focused on what wasn't in Pembina's submissions - details on rail and marine safety.

Potential rail routes for transporting propane to Pembina's proposed export terminal near West Hayden Island are highlighted in red and green. (Courtesy Port of Portland)

Pembina says supplying the propane terminal would take a train with 100 tanker cars every other day. Those trains would travel through densely populated areas of Portland or Vancouver. Likewise, a tanker carrying 23 million gallons of propane would pass by multiple population centers twice a month on its way to the Pacific Ocean.

Michael Eyer, a retired Oregon state hazmat rail inspector, told The Oregonian/OregonLive that the region has never seen such large volumes of propane in a single train.

"We've had a couple of tank cars every week here and there. Emergency responders are prepared to handle one car of propane being on fire," Eyer said. "In terms of a major stack up, like we've had with crude oil, the metro area has never seen anything like that. There's just no capacity on hand to handle anything of that size."

En route to the terminal, the propane is the responsibility of the railroad carriers, not Pembina, so those risks were not part of the company's risk assessment. Pembina has promised to use newer, safer railcars, but says it can't comment on potential rail routes through the metro area because it has yet to choose between two carriers, BNSF or Union Pacific.

The Port of Portland's rail maps show three potential routes: through Vancouver and over the railroad bridge east of Interstate 5 to Hayden Island; through Troutdale and the Northeast Portland neighborhoods of Cully, Kenton and St. Johns; or even down the I-84 corridor past the Moda Center.

Propane poses less risk than crude oil of causing environmental damage if it leaks from a tank car, Eyer said. But when it ignites, it's far more dangerous.

"If it goes, you don't want to be anywhere in the vicinity," Eyer said. "When propane goes we have seen these multi-ton tank cars go for upwards of a half mile, literally taking off like rockets."

Given the timeline on the vote, a comprehensive analysis of rail safety may not be forthcoming. Neither the city nor state can impose specific safety requirements on rail carriers, and the Coast Guard won't finish its waterway suitability report on the project until late summer.

That may leave city officials to vote on the project without enough information to assure the public the rail and marine operations will be safe.

"It's a fair question," said Tom Armstrong, a city planner working on the project. "We will present the information we have and it will be up to each commissioner to decide if that's sufficient. Eventually, it will be up to the City Council to decide if those issues have been adequately addressed."

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- Staff writer Rob Davis contributed to this report

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UPDATE: Evacuation radius near Plymouth plant to be reduced

By Kristi Pihl

Tri-City Herald Staff Writer March 31, 2014



Liquefied natural gas vapors continue to leak Tuesday from the damaged storage tank at the Northwest Pipeline facility near Plymouth. Officials reduced the size of the evacuation zone because of steps overnight taken to reduce the leakage. BOB BRAWDY — Tri-City Herald [Buy Photo](#)







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Plymouth, WA — It's unknown when Plymouth residents will be able to return to their homes after an explosion and fire at a nearby natural gas facility Monday morning triggered fears of a second, larger explosion.

Up to 1,000 residents and agricultural workers were evacuated from a two-mile radius around Northwest Pipeline in south Benton County after the explosion, which caused slow leaks from a massive storage tank and injured five people.

Hazardous materials experts entered the liquefied natural gas facility Monday afternoon for the first time nearly eight hours after the initial explosion and fire inside a building at Northwest Pipeline, a subsidiary of Williams Partners.

The 8:22 a.m. explosion sent shrapnel into a 14.6-million-gallon storage tank, rupturing it and starting the gradual leak of super-cold liquefied natural gas. Williams Partners officials say the tank was only one-third full.

A Washington State Patrol robot and a Williams Partners helicopter were sent in Monday afternoon. Joe Lusignan, Benton County Sheriff's Office spokesman, said the hazardous material experts assessed damage after reviewing information gathered by the robot and helicopter.

The evacuation remained in place Monday night and Highway 14 between Interstate 82 and Paterson was closed, he said. Officials encouraged citizens to stay out of the area.

Traffic also was shut down on the Columbia River and the rail lines near the plant.

The river traffic and Highway 14 were expected to reopen late Monday. The evacuation zone was reduced to a one-mile radius.

"This is considered a large leak," Lusignan said.

The experts and Williams Partners employees planned to enter the plant a second time Monday night to see if there was a way to stop the tank from leaking, said Capt. Devin Helland of Benton Fire District 1.

The vaporized natural gas could explode if mixed with the right amount of oxygen and atmosphere and there was an ignition source, said Capt. Jeff Ripley, also with the fire district. Such a blast would kill anyone within a radius of up to three-quarters of a mile.

First responders had to wait for the natural gas to dissipate before entering the facility to investigate. That happened slowly, because the gas is cooled to minus 260 degrees. It froze as it leaked, plugging the hole, until the ambient temperature warmed the ice plug, allowing the liquid to continue to leak and vaporize, Ripley explained. The cycle of freeze, thaw and vaporize repeated itself over and over again.

An east wind helped disperse the natural gas, which was not considered dangerous, officials said. A large cloud of fumes floated in the area as the gas escaped into the air.

Northwest Pipeline shut down the pipeline and the facility at Christy Road and evacuated the 14 company workers who were on site at the time.

One worker was taken to a burn center and four others to local medical facilities, Ripley said. Up to 120 responders were in Plymouth Monday afternoon, including regional fire crews and law enforcement agencies, state Department of Transportation officials and Washington state troopers.

Williams Partners spokeswoman Michele Swaner said they still do not know the cause of the explosion.

“We will have to go in and go through piece by piece, look at the facility and where the whole incident began,” she told the Herald. “It just takes a little bit of time.”

Investigators from the state Utilities and Transportation Commission also will investigate.

Benton County deputies went door to door Monday morning to get people out of homes and businesses. AgriNorthwest and Crop Production Services have facilities in the Plymouth Industrial Park near Northwest Pipeline and there are also vineyards and orchards in the area.

The fumes were causing the deputies to feel nauseous, Lusignan said.

Kyla Christianson and her children, who were home for spring break, watched the scene from their house about a quarter mile from the plant.

“There were these two (tanks) that the gas sits in and the fire was in between them,” she said. “The ambulances were hauling down there. You could smell gas. It was in the air and making people sick.”

Some of the evacuees went across the river to the fairgrounds in Hermiston, where the Red Cross responded to help displaced residents.

The pipeline at the Plymouth liquefied natural gas facility connects to a natural gas pipeline which runs through Kennewick and Pasco in populated areas. Williams Pipeline is the transporter, with the line running from the top of Washington state at the Canadian border down to almost the New Mexico border.

The 20-inch-wide main line is operating, but the segment that's extended to the plant has been closed off, Swaner said. She didn't know how long the plant would be shut down.

The Northwest Pipeline facility has two storage tanks, each about 90 feet tall, and four vaporizers on about 72 acres, according a recent inspection by the Utilities and Transportation Commission. The facility began operating in 1975 and was expanded in 1979.

The commission last inspected the facility in November 2013, said Amanda Maxwell, the commission's communications manager.

"It was a clean inspection," said David Lykken, the commission's director of pipeline safety. Inspectors found no violations of pipeline safety regulations.

Inspections, which occur annually, include a review of operation and maintenance records and a check of the plant itself to make sure it is maintained according to safety regulations, he said.

Swaner said Williams Partners goes above and beyond what is required and spends a lot of time and money on making sure that the company's pipelines are well-maintained and inspected on a regular basis.

"Pipelines are highly regulated and safety is of utmost concern," Swaner told the Herald. "We work with emergency responders and have mock emergencies so that we know what the duties are and the hours are, so we work as a coordinated team."

Tank ruptures are rare, Lykken said. Local fire and law enforcement officials could not recall a similar incident in the Tri-Cities in recent decades.

This time the incident didn't involve an underground pipeline, but there have been at least three major gas explosions in the Pacific Northwest in the past 15 years.

In 2003, a 26-inch-wide Williams-Northwest line in Auburn ruptured, shooting debris and rocks hundreds of feet into the air. There was no fireball and no one was injured, but hundreds of people were evacuated. Swaner said that Auburn line was completely replaced in 2006.

In 1999, an Olympic Pipe Line Co. line carrying liquid gas ruptured near Bellingham, causing a huge explosion and killing three people.

That same year, a Williams-Northwest natural gas pipeline exploded near Pendleton in rural Umatilla County. No one was killed but it left some 10,000 customers without heat for days.

-- Herald reporters Tyler Richardson and Kristen M. Kraemer contributed to this story.

Read more here: <http://www.tri-cityherald.com/2014/03/31/2904040/natural-gas-facility-on-fire-near.html#storylink=cpy>

*Embargoed until
March 1, 2013*

The Human Health Effects of Rail Transport of Coal Through Multnomah County, Oregon

A Health Analysis and Recommendations for Further Action



Health Assessment and Evaluation



February 2013

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Introduction

Balancing the potential benefits and harms of using coal as an energy source is an ongoing challenge for local communities and the global economy. Coal is a natural resource that has long been used to power a wide variety of activities. It is a non-renewable resource; the bulk of the coal mined today is about 300 million years old and will not be replaced during human existence. Though it is a naturally occurring substance, coal can be dangerous to human health, especially in its particulate form. Additionally, the extraction, transportation, and combustion of coal can have major impacts on natural, social, and economic conditions.

This health analysis considers the potential impacts and human health consequences of three proposed coal export projects that could result in rail transport of coal through Multnomah County.

The goals of this analysis are to:

- Synthesize scientific knowledge about the human health impacts of coal transportation by rail
- Identify the populations in Multnomah County who might be affected
- Describe the most likely human health impacts of coal transportation locally

To do so, the effects of the following are examined:

- Rail freight traffic in general, such as noise, locomotive emissions, and roadway congestion
- Coal as a specific cargo

The Multnomah County Health Department conducted this analysis at the request of Multnomah County Chair Jeff Cogen. As Chair and CEO of Multnomah County, Chair Cogen has responsibility for protecting the health of county residents. Based on the findings, the Health Department has identified potential actions for consideration by the County Chair and other concerned community leaders.

Overview of Analysis

This analysis considers the potential impacts of coal export projects that could result in the transport of coal through Multnomah County. Though coal would travel through the county, it would not be mined, loaded, unloaded, or burned here. This analysis considers the proposed Kinder Morgan Terminal, Millennium Bulk Terminal, and Port of Coos Bay projects. The analysis is based on descriptions of the projects provided by two sources: a white paper by the Western Organization of Resource Councils¹ and investigative research by *The Oregonian*² (see *Table 1*). This analysis considered the impacts of the three proposed projects together, using conservative estimates for the number of trains and volume of coal they will carry.

Table 1: Potential Routes and Freight Volumes of Proposed Projects

Project	Annual Coal Shipments (est. millions of tons)	Trains Per Day (est.)	Possible Route to Port
Kinder Morgan	15.0 initially, then up to 30.0	4-6	Along the north bank of the Columbia River on BNSF rails, crossing into Multnomah County on the Columbia River Rail Bridge at Hayden Island, turning northwest onto Portland & Western rail line along U.S. 30
Millennium	27.6 initially, then up to 48.5	8-9	Could travel on either bank of the Columbia River - if carried by Union Pacific, could travel along the south bank parallel to Columbia Blvd. and through Kenton before turning north on the Columbia River Rail Bridge
Coos Bay	6.6 initially, then up to 11.0	4	On Union Pacific tracks parallel to I-84, then south through the Central East Side of Portland and along Route 99E

Sources: *The Oregonian*² and WORC¹

This analysis focuses on one specific stage of the coal cycle (transportation) by one shipping mode (rail) in one geographic location (Multnomah County). This means that the analysis does *not* consider the health impact of coal that would be carried on barges along the Columbia River or trains that might travel along the north bank of the Columbia River in Washington State. Nor does it address potential indirect effects of coal transportation which could have positive or negative health consequences.

Positive indirect effects might include economic development related to railcar construction, increased public revenue from taxes on diesel-fueled coal trains, and/or improved rail infrastructure.

Negative indirect effects might include displacement of other products carried by rail, fisheries depletion that could affect people's

diets and livelihoods, or health impacts of substances sprayed on coal to reduce dust. These issues, as well as the broader implications of the extraction, transportation, and combustion of coal on climate change, are discussed in many studies and white papers in the health and environment sectors³⁻⁶ and energy sectors.⁷⁻⁹

Methods

This health analysis used two techniques: *literature review* and *spatial analysis*. Literature review is a systematic process of synthesizing previous research on a topic. This analysis relied as much as possible on peer-reviewed scientific literature, but also used other sources such as documents produced by not-for-profit organizations, the railroad industry, and the general media.

Spatial analysis involves using mapping software to understand geographical differences. This analysis used spatial analysis

to identify and describe the populations in the county who may be most affected by coal transportation by rail. The data about the population were obtained from the U.S. Census Bureau, the Portland State University Population Research Center, and a tabulation of Census data computed by the Metro regional government called the Equity Composite.¹⁰ *The Oregonian* provided a computer file mapping the potential routes for the proposed projects.

Literature review findings

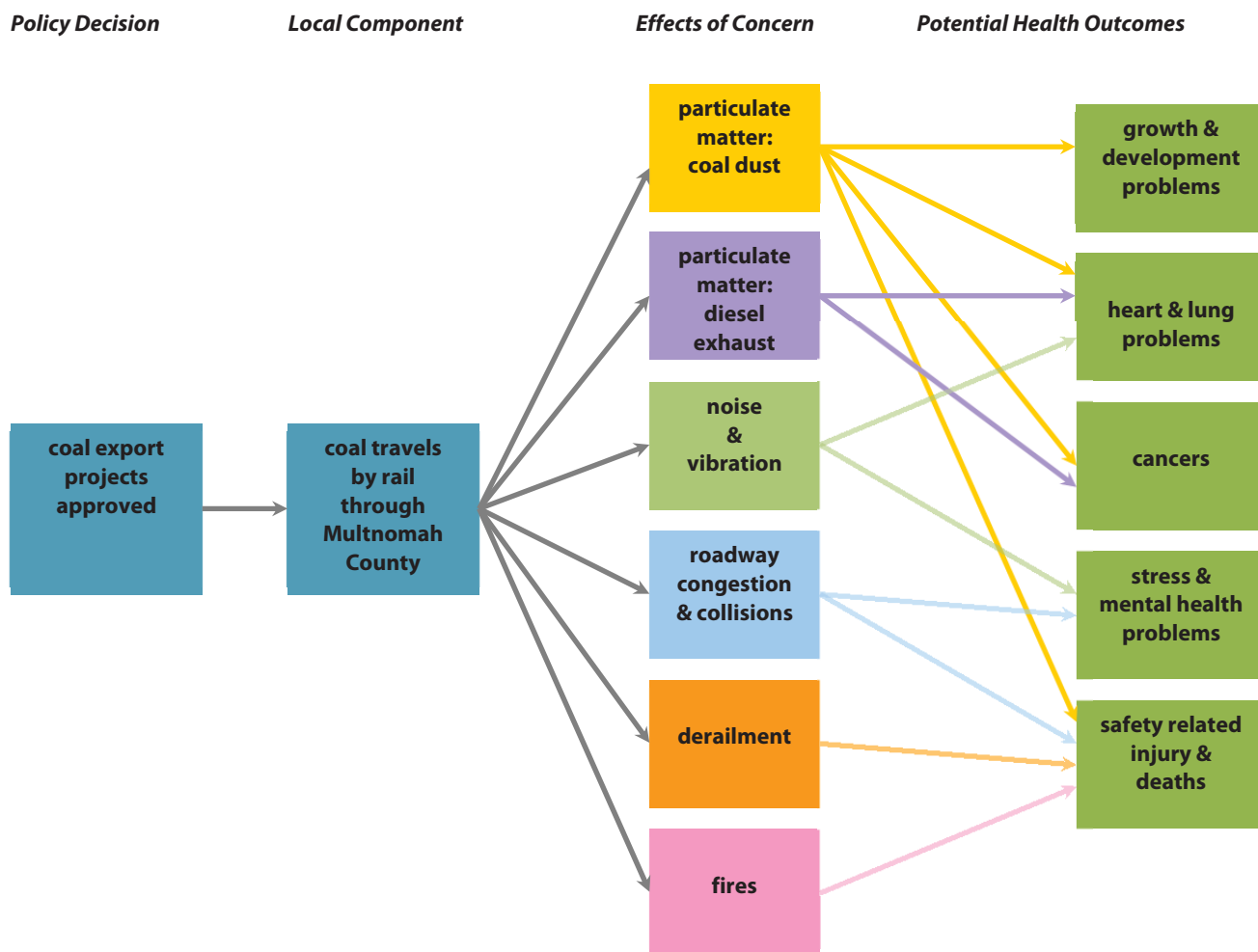
The literature review identified six potential local environmental effects of concern related to coal transportation:

1. Emission of particulate matter in the form of coal dust
2. Emission of particulate matter in the form of diesel locomotive exhaust
3. Production of noise and vibration by train movement
4. Congestion and collisions along roadways and rail lines
5. Train derailments
6. Fires due to spontaneous combustion of coal

The literature review also found that the above six effects are associated with the occurrence of the following health outcomes:

- Heart and lung problems
- Cancers
- Growth and development problems
- Stress and mental health problems
- Injury
- Death

Nearly all of these health outcomes are associated with more than one of the environmental effects of concern. The schematic diagram in *Figure 1* illustrates these relationships. The colored arrows represent effects of concern; the arrows point to the health outcomes with which the effects are associated.

Figure 1: Relationships between coal transportation by rail, environmental effects of concern, and health outcomes

This figure does not reflect the possible cumulative or synergistic impacts of these health outcomes on individual and community-level health.

Potential effects of concern, associated health outcomes, and local implications

This section reviews each of the six environmental effects and their associated health outcomes. For each effect, this analysis examines how the three proposed coal transport projects might impact Multnomah County and provides a concluding statement that summarizes the analysis of that impact.

Emission of particulate matter: Coal dust

Associated health outcomes: heart and lung conditions such as heart attacks, strokes, asthma, and coal worker's pneumoconiosis (black lung disease); cancers; growth and development problems; community-level health

Particulate matter is a general term to describe small particles in the air, of which coal dust is one type. Particulate matter is toxic to human beings because it can enter the bloodstream after being inhaled. According to the World Health Organization, particulate matter is hazardous to human health even in extremely small quantities.¹¹

Heart and lung conditions

Particulate matter can threaten cardiopulmonary health, the effective circulation of blood and utilization of oxygen in the body. The World Health Organization has reported that long-term exposure to particulate matter in the environment leads to a reduction in life expectancy from cardiopulmonary mortality.¹² Particulate matter is associated with a host of respiratory problems, including

impaired lung functioning¹³ and inhibited lung development in young people.¹⁴ Particulate matter can exacerbate and contribute to the onset of asthma,^{15–17} a disease that affects about nine percent of Multnomah County residents.¹⁸ Young people, older adults, and people with heart conditions are especially vulnerable to these problems.

Coal dust, as one specific type of particulate matter, is associated with certain health outcomes. Extreme exposure to coal dust, such as working 10 or more years in a coal mine,¹⁹ can lead to coal workers' pneumoconiosis (CWP), a debilitating condition that often causes death. CWP is extremely rare in Oregon. From 1968 to 2006, only one Oregonian died from CWP.¹⁹

Cancers

Inhalation of particulate matter in general is associated with increased risk of multiple types of cancer.²⁰

Cadmium, which can be present in coal dust, has been found to contribute to risk for lung and nasal cancer.^{21,22} However, an expert panel convened by the World Health Organization in 1997 found no conclusive link between coal dust and cancer.²³ Consultants reviewing the health effects of coal dust for an Australian mining company in 2005 came to the same conclusion.²⁴

Growth and development problems

Coal dust may contain traces of the heavy metals, such as lead, mercury, chromium, and uranium, that are toxic to the human nervous system. Children are particularly vulnerable to

heavy metals which can lead to decreases in birth weight and children's growth rate, and intellectual development problems.²⁵ The amounts of these metals in a sample of coal vary depending on where the coal is mined. There is little evidence about the effect that heavy metals in coal dust may have on people exposed to coal dust in the environment.

Community-level health

There may be other effects of environmental coal dust on human health, but it is difficult to draw conclusions based on the limited research available. Most of what is known about the health impacts of coal dust on people is based on high levels of exposure—usually occurring in coal mining or processing workplaces. Little is known about people exposed to low levels, such as people who live in communities through which coal is transported. However, some studies suggest that living near coal operations has health effects. For example, research conducted near coal mines in England found that children living closer to coal mines more frequently visited physicians with respiratory complaints than did those living farther away.^{26–28} However, the same research team found that, despite increased doctors' appointments, there was little conclusive evidence that children's health status was worse as a result of the increased dust levels in the community.

Studies of communities in the Appalachian region of the U.S. suggest that there are community-level health effects of coal exposure.^{29–32} These studies have found that even people who do not work in mines, but live near them, may experience higher mortality rates related to heart, respiratory, and kidney problems. However, the mechanisms for these impacts are not fully understood and may be the result of other factors such as the effect of high poverty rates on community health.

Implications for Multnomah County

The three proposed coal transport projects will not result in the loading and unloading of coal in Multnomah County, but might result in roughly 125,000 tons of coal moving through the county per day. Estimates of the amount of coal dust shed by trains during shipping vary from less than one percent to up to three percent of the load.^{33–36}

Due to their concern about the serious threat that coal dust poses to the stability of the train structure and its rail lines, BNSF Railway has been conducting research regarding the impacts of coal dust from loaded coal cars as they depart from the Powder River Basin.³⁷ From these studies, BNSF Railway reports that shippers can take steps to reduce coal dust releases, including the use of a proper loading chute and the application of a dust suppression topper agent (e.g., a surfactant) to the coal shipment at the time of loading.

The company states that the proper application of certain topper agents along with the use of a modified loading chute can potentially reduce coal dust levels by at least 85 percent. However, there is no evidence of independent verification of these findings. In a series of cases before the federal Surface Transportation Board, utility companies that are required to follow BNSF Railway's rules for shipping coal have argued that there is insufficient evidence for the effectiveness of these substances and that shippers should not be responsible for the costs of applying them.^{38–41}

The available research, including studies by railroads, government agencies and university researchers, suggests that many factors, such as how the coal is loaded, the speed the train is traveling, weather conditions, and the use of protective sprays, would influence the amount of coal dust released by trains traveling through Multnomah County.

Conclusion

There are well-established health risks of exposure to coal dust in occupational settings. However, there are significant gaps in the scientific literature regarding how much coal dust is shed by trains carrying coal, how far coal dust travels from rail lines, and the health effects of inhaling this environmental coal dust. This makes it difficult to conclusively state what the local impacts of coal dust might be.

Emission of particulate matter: Diesel locomotive exhaust

Associated health outcomes: heart and lung conditions such as heart attacks, strokes, and asthma; cancer

As discussed in the *coal dust* section above, particulate matter in the environment is dangerous to human health. Diesel particulate matter, a specific type of particulate matter that is released by engines powered by diesel fuel, has distinctive health hazards.

Heart and lung conditions

Inhalation of particulate matter is associated with several heart and lung conditions, as discussed in the *coal dust* section above.

Cancers

Inhalation of particulate matter is associated with cancers, as discussed in the *coal dust* section above. In the case of diesel particulate matter specifically, the relationship with cancer is conclusively documented. Diesel particulate matter is one of a few substances that is designated as a known carcinogen by the World Health Organization.⁴²

Implications for Multnomah County

Freight train locomotives are powered by very large diesel engines. Diesel particulate matter is one of the air toxins that contributes the most to air pollution-related health risks in the Portland region. According to a recent

estimate by the Oregon Department of Environmental Quality, in 2017 the region's airshed will have on average more than ten times the level of diesel particulate that is considered safe.⁴³ However, in general, trains contribute a relatively small percentage of total diesel particulate air pollution in our region (i.e., an estimated 7%).⁴⁴

The three proposed coal transport projects might result in 16-19 new train trips through Multnomah County. This might represent an estimated 15-20 percent increase in total train trips in Multnomah County compared to the current number of trips. Thus, the trains carrying coal would contribute a moderate increment of train-related diesel emissions in the region.

Conclusion

By virtue of using diesel engines, rail transportation of coal through Multnomah County will result in the emission of diesel particulate matter, a known health hazard. However, coal trains would add a relatively small increase to already-high levels of diesel particulate matter in the region, the vast majority of which is released by sources other than trains.

Production of noise and vibration by train movement

Associated health outcomes: stress and mental health problems; high blood pressure

High blood pressure

Noise can threaten cardiopulmonary health, the effective circulation of blood and utilization of oxygen in the human body. Noise, especially at high levels, can contribute to high blood pressure, a risk factor for heart disease.⁴⁵⁻⁴⁷

Stress and mental health

Noise and vibration, such as that produced by trains, can affect people's stress levels and mental well-being. Stress influences health through the secretion of stress-related hormones and causing behaviors (particularly coping mechanisms) that can increase risk of disease.⁴⁷ At lower environmental noise levels, there is a weak association between noise and mental health symptoms and anxiety.⁴⁸ One study of military aircraft noise found that exposure to higher levels of noise was associated with nervousness and depression.⁴⁹ Because reaction to noise is influenced in part by the time between noises⁵⁰ and the "difference in sound pressure levels [loudness] between a noise event and background,"⁵¹ train noise is particularly disruptive.

Implications for Multnomah County

Trains are one of many sources of noise in Multnomah County, and noise from trains has long been a concern of several county neighborhoods, such as Cathedral Park, Brooklyn, and Eastmoreland. While train vibration is felt only locally, horn noise can travel long distances and would contribute to background urban noise. As discussed above, coal trains might represent a moderate increase in freight rail traffic in the region.

Conclusion

Coal trains could produce more noise per trip than other trains as a result of their length and heavy load. However, activity near rail yards, such as loading and unloading, causes the majority of train-related noise, and these activities will not take place in Multnomah County. Therefore, trains carrying coal would likely add a relatively small increment of noise in areas that already experience industrial noise.

Traffic congestion and collisions along roadways and rail lines

Associated health outcomes: stress; injury and deaths

Stress

Train traffic-related congestion may cause stress. Stress influences health through the secretion of stress-related hormones and causing behaviors (particularly coping mechanisms) that can increase risk of disease.⁴⁷

Safety-related injury and deaths

Safety concerns include train collisions with other motor vehicles, bicycles, or pedestrians; decreased visibility near rail tracks due to dust; and property damage, such as to vehicle windshields by pieces of coal falling from trains. Congestion at intersections crossed by coal trains could increase response times for emergency vehicles and/or disrupt emergency routes, which could lead to increased severity of medical problems and even death due to delayed medical care.

Implications for Multnomah County

Comparing the potential routes to federal transportation data suggests that there are approximately 50 locations where coal trains might cross public roadways in Multnomah County. Like other trains that travel through Multnomah County, each coal train would travel through several at-grade crossings per trip. Given the length and weight of coal trains, the force of a collision involving a coal train could cause major injuries and property damage. According to the Federal Railroad Administration, there were three train-involved collisions in Multnomah County in the first three quarters of 2012 (January-September). These collisions resulted in two injuries and no fatalities.⁵² Over the past ten years, there have been seven deaths and 224 train-related injuries in Multnomah County for any reason. The data

for the past ten years shows that these incidents are on the decline.⁵³

As trains pass through at-grade crossings, the flow of motor vehicles, bicycles, and pedestrians is disrupted and delayed. Trains are required to travel at low speeds through urban areas to decrease the risk and severity of collisions. Because of their length (up to 1 ¼ miles long) and low speed, coal trains could block roadways for relatively long periods of time. In densely settled areas, such as the city of Portland, this could result in a cumulative delay of up to two hours per day at each crossing.⁵⁴ It could also disrupt routes and increase response times for emergency vehicles called to fires, medical incidents, and other public safety crises.

Conclusion

Coal trains could cause significant delays and result in roadway congestion, including delays in emergency response. Coal trains could also collide with vehicles and pedestrians, but U.S. data indicates that coal train collisions are rare. In Multnomah County, train collisions (carrying all types of cargo) are infrequent and are on the decline. There is no evidence that increased coal train traffic would change this trend.

Train derailment

Associated health outcomes: injury and deaths

Injury and deaths

Coal dust is known to degrade railroad tracks and prevent adequate water drainage from the railbed. Poor drainage contributes to slippery and warped rails. The National Wildlife Federation reports that there were thirteen derailments of trains carrying coal in the United States in 2012, representing 1 percent of all U.S. train derailments (13 out of 930). The 930 derailments and collisions in the

U.S. caused eight fatalities in 2012, none of which were in Multnomah County.

Implications for Multnomah County

According to the Federal Railroad Administration, there were five train derailments reported in Multnomah County in the first three quarters of 2012 (January–October) and there were no related injuries or deaths.⁵² Two derailments occurred in rail yards and three were due to track defects.

Conclusion

These data suggest that train derailments are fairly uncommon in Multnomah County and that the introduction of coal trains is unlikely to result in many additional derailments.

Fires due to spontaneous combustion of coal

Associated health outcomes: injury and deaths

Injury and deaths

Coal combusts at low temperatures. Spontaneous combustion occurs because coal produces heat as it decomposes upon contact with oxygen. Fires are most likely to occur in areas where coal is stored in large piles for long periods of time without being moved, such as at power plants.⁵⁵ Spontaneous combustion is more likely in freshly-mined coal. Packing strategies such as those that compact the coal can reduce the likelihood of combustion while being transported by train.⁵⁶ Given coal's combustibility, fires and attendant injuries and property damage could also occur as a result of a train collision.

Implications for Multnomah County

Coal from the Powder River Basin would only travel through Multnomah County; it would not be stored or processed within the county. However, Powder River Basin coal may be particularly susceptible to spontaneous

combustion as a result of its chemical composition. According to discussions between mining and energy companies that handle Powder River Basin coal, there have been reports of fires in railcars and barges transporting this type of coal.⁵⁵ Based on what we know about the proposed projects, coal would be transported in uncovered cars to let heat dissipate, which would decrease the likelihood that coal would catch fire.

Conclusion

Though Powder River Basin coal may be particularly susceptible to combustion, the literature review suggests that fires in railcars carrying coal through Multnomah County are unlikely. This is because coal is most likely to catch fire where it is mined, processed, or stored and because shippers use packing techniques to prevent fires during transit.

Spatial analysis findings: Populations in Multnomah County likely to be affected

The literature review indicated that some populations in Multnomah County could be more vulnerable to the health impacts of coal transportation than others. Vulnerable populations include:

- People living close to the rail lines carrying coal
- People who are susceptible because of their age (i.e., youth and older adults)
- Populations who are at increased risk of the associated health outcomes due to their race, ethnicity, income, and/or level of exposure to other health risks.

For people who fall into several of these categories, risks may be multiplied. This section describes each of these populations to the extent that local data were available.

Populations living near rail lines that might carry coal: Census tract-level analysis

Generally, it is reasonable to expect that residents living closer to rail lines carrying coal would be exposed to higher levels of coal dust and diesel particulate matter than those living further away. Similarly, noise-related problems

and traffic delays are more likely to occur among those living and working closer to railroad tracks.

As previously stated, there are significant gaps in the scientific literature regarding how much coal dust is shed by trains carrying coal, how far coal dust travels from rail lines, and the health effects of inhaling this environmental coal dust. The lack of scientific information limits the ability of this analysis to quantify the number of people potentially affected or the severity of the effects.

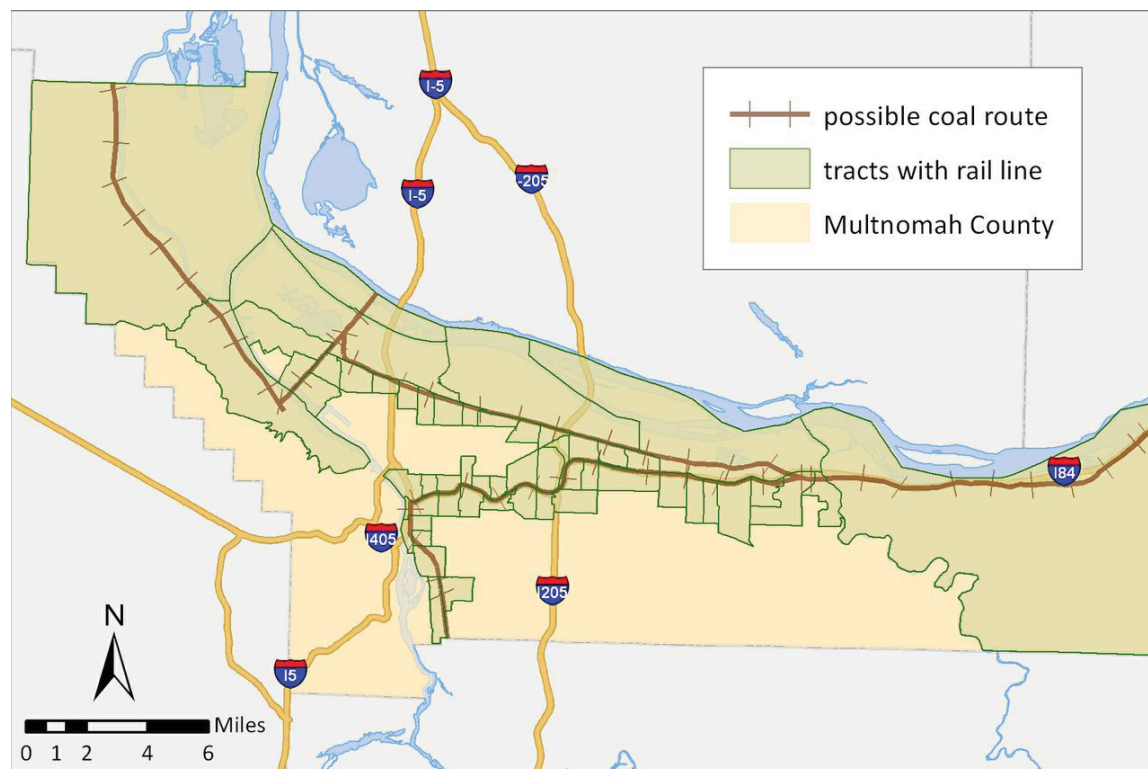
However, this analysis drew upon the available literature to estimate that coal dust may travel approximately 500 m to 2 km (1/3 to 1 ¼ miles) from the train tracks, depending on weather conditions and train speed.^{57,58} Census tracts—relatively small geographic areas used for census-taking—offer a rough proxy for the 2 km distance from the rail line. Using this approximation allowed the Health Department to utilize Census Bureau data to describe potentially affected populations.

Almost one-third of Multnomah County's population lives in census tracts that either border or cross rail lines that may carry coal. As shown in *Figure 2*, many of these people live

near major roadways and industrial areas and probably already experience a high burden of air pollution and noise disturbance.

Accordingly, the potential burdens of the coal export projects would fall on the same populations who are already exposed to the highest levels of air toxins and industrial noise.

Figure 2: Census tracts containing or adjacent to rail lines that might carry coal



Sources: Metro,⁵⁹ Census 2010, The Oregonian²

Table 2, on the following page, presents the most current census data available at the tract level regarding populations who may be especially vulnerable to health impacts related to coal transport. As shown in Table 2, the demographics of the tracts near rail lines are similar to the county population as a whole; however, people of color make up a larger proportion of the population in tracts near rail lines than they do in the county as a whole. As a result, people of color may be disproportionately exposed to the effects coal transportation.

Not only are people of color in Multnomah County more likely to live by the rail lines that

might carry coal, they may also be more vulnerable to some of the health consequences of coal transportation, such as heart disease. For example, in Multnomah County, African Americans have a higher rate of deaths caused by strokes as compared to Whites.⁶⁰

The causes of these racial and ethnic differences are complex. A wide body of research has found that race and ethnicity are associated with health status—independent of poverty status—because of stress, access to health care, and other factors.

. **Table 2:** Characteristics of population living near rail lines that may carry coal (estimates)

	Tracts that contain or border rail lines that may carry coal Number (%)	Multnomah County overall Number (%)
Race/ethnicity (source: Census 2010)		
Basis of computations: Total population in 2010	229,482	735,334
People of color (Non-White + Hispanic Whites)	62,218 (27.1%)	172,913 (23.5%)
Hispanic of any race	28,503 (12.4%)	80,138 (10.9%)
Non-Hispanic		
White	167,264 (72.9%)	562,421 (76.5%)
Black	18,376 (8.0%)	41,401 (5.6%)
Asian	13,255 (5.8%)	47,950 (6.5%)
American Indian/Alaska Native	2,920 (1.3%)	7,825 (1.1%)
Native Hawaiian/Pacific Islander	1,667 (.7%)	4,029 (.5%)
Age (source: Portland State University 2011 Population Estimates)		
Basis of computations: Estimated population in 2011	231,413	741,961
Over 65 yrs.	25,841 (11.2%)	79,977 (10.8%)
Under 18 yrs.	47,832 (20.7%)	154,840 (20.9%)
Other social characteristics (source: American Community Survey 2006-2010)		
Basis of computations: Population for whom poverty status is determined, 2006-10 estimate (Table S1701)	216,063	697,596
With incomes at or below 200% of federal poverty level	78,264 (36.2%)	239,753 (34.4%)
Basis of computations: Population 5 years and over (Table SF4 DP02)	210,532	667,150
Speak English less than very well	19,920 (9.5%)	62,241 (9.3%)

Populations who might experience the greatest effects:

Census block group-level analysis

Of people who live within 2 km of rail lines carrying coal, those who live within 500 m are even more likely to be affected. An estimated 82,000 people, or about one in nine Multnomah County residents, live within 500 m of the rail lines that might carry coal.^{*} This is close enough to predict that these people would experience some, if not many, of the effects of coal transportation.

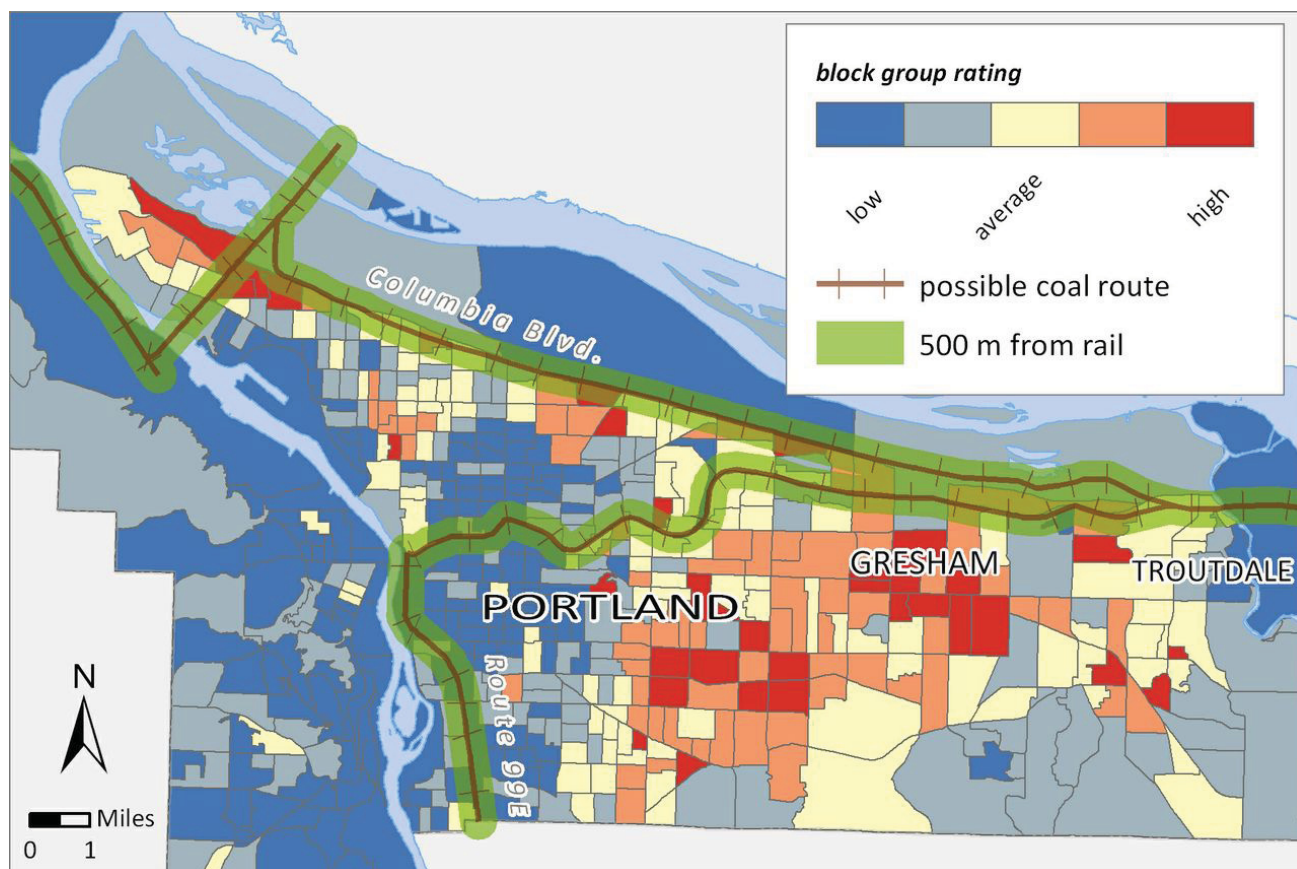
To describe the population living within 500 m of the proposed coal routes, this analysis used a recent analysis conducted by Metro, called the Equity Composite.¹⁰ Metro used data at the census block group level to identify populations that have historically experienced social and health disadvantages based on race, ethnicity, age, or income and compared it to other areas in the metropolitan area. Block groups are geographic units created by the Census Bureau that are one level smaller than census tracts. The map of the demographic measure from the Equity Composite provides a rough illustration of the characteristics of the population living within 500 m of the potential coal train routes.

Figure 3 on the following page shows that some of the block groups near the proposed coal transportation routes have relatively high proportions of residents belonging to disadvantaged demographic groups. These block groups are shaded in red or orange and cluster along rail lines that parallel Columbia Boulevard and neighborhoods in North Portland (e.g., Kenton and St. Johns). By contrast, more advantaged block groups, shaded in blue, are common along the lines that parallel Interstate 84 and Oregon Route 99E.

This suggests that, given similar volumes of rail traffic, people who live along the Columbia Boulevard and Willamette Bridge rail lines could suffer more serious health effects than would their counterparts in other parts of the county because the racial, ethnic, income, and age composition of these areas increase their vulnerability to health problems.

^{*} A more conservative estimate of how far coal dust might travel, based on the findings of two articles.^{57,58}

Figure 3: Concentration of vulnerable demographic groups in census block groups (Metro Equity Composite demographic measure) with 500-meter radius from rail lines that might carry coal



Sources: *The Oregonian*,² Metro regional government^{10,59}

Key Concerns and Recommendations for Potential Actions

The purpose of this health analysis was to help Multnomah County better understand the potential health impacts of transporting coal by rail before any of the proposed projects are implemented. Health risks attributable to coal transportation would add to the multiple effects of rail freight that Multnomah County residents already experience. A substantial increase in rail traffic—carrying coal or other freight—would likely increase the proportion of the population affected by these issues and/or the magnitude of the effects. Ultimately, it is reasonable to expect that this would likely increase the prevalence and/or severity of the associated health outcomes, as well.

In addition, coal transportation might result in cumulative and/or synergistic impacts that this analysis is unable to estimate. *Cumulative impacts* are the sum total of the various individual impacts. *Synergistic impacts* describes how combinations of environmental or health factors can strengthen, weaken, or block the effects of other factors.

Policymakers, community leaders and residents must weigh these new potential risks in light of existing risks as well as the potential positive effects of expanded rail transportation on the local economy.

Concerns

This analysis of the potential health consequences of coal transportation through Multnomah County identifies two key concerns:

Additional rail freight traffic increases health risks

Specifically, there is likely to be increased exposure to diesel particulate matter as a result

of locomotive exhaust. This conclusion is based on:

- The well-established connection between exposure to diesel particulate matter and health problems
- The high likelihood that coal trains, as any other train, would emit diesel particulate matter
- The severity of the health outcomes associated with diesel particulate matter (e.g., respiratory problems, cancer)

The geographic areas of highest concern are located near the tracks by Columbia Boulevard and in North Portland neighborhoods (e.g., Kenton and St. Johns). Residents in some of these areas of concern are already exposed to relatively high levels of diesel particulate matter from living near major roadways and industrial areas. The social groups of highest concern are: communities of color, children, older adults, and people earning low incomes.

The health risk posed by coal traveling as rail cargo through Multnomah County is uncertain due to insufficient scientific evidence

Given the well-established risks of exposure to coal dust in occupational settings, the Health Department concludes that more research is needed to assess:

- How coal dust could disperse during coal transportation by rail and the extent that people would be exposed
- What the immediate, cumulative, synergistic and long-term health impacts of this dust could be on a community

Recommendations

The Multnomah County Health Department recommends the following actions for consideration by local policymakers and community leaders to address these key concerns and raise awareness about Multnomah County's potential vulnerability.

Invoke the precautionary principle

The precautionary principle holds that in the event of insufficient evidence that an action may cause harms, the burden of proof falls on those taking the action to demonstrate that it will not be harmful.⁶¹

Under the precautionary principle, it is reasonable for policymakers to call upon the coal industry, including rail companies who would be transporting coal, to demonstrate that coal transportation would *not* be harmful to the public's health and safety. This call to industry could catalyze further public discussion about the uncertain risk of coal transportation, the demands for more research, and the need for local planning to assure the health and safety of Multnomah County communities.

Call for a programmatic federal Environmental Impact Statement of coal export in the Pacific Northwest

The information and evidence gaps identified in this analysis reinforce the calls from other communities and organizations for a comprehensive review of the risks and threats of coal export projects by the relevant federal agencies (e.g., the Federal Bureau of Land Management and U.S. Army Corps of Engineers).

The proposed plans for transport of coal across the Pacific Northwest do not exist in isolation, but rather will affect communities throughout the region. Therefore, it is reasonable for local policymakers to call for the federal government to conduct a region-wide review of the environmental, health, and transportation issues related to exporting coal from Northwest ports. Such a "programmatic" environmental impact statement (EIS)⁶² could address several potential health impacts identified through this analysis including: roadway congestion, collisions, and the disproportionate impact on environmental justice communities, such as people of color and people already exposed to the health burdens of industrial processes.

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February 28, 2007

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WATERWAY SUITABILITY REPORT FOR BRADWOOD LANDING LNG

Dear Mr. Hoffmann:

On February 28, 2007, the Coast Guard completed a review of the Waterway Suitability Assessment for the Bradwood Landing LNG Terminal project submitted by Northern Star Natural Gas, LLC in May of 2006. This review was conducted following the guidance provided in Navigation and Vessel Inspection Circular (NVIC) 05-05 of June 14, 2005. The review focused on the navigation safety and maritime security risks posed by LNG marine traffic, and the measures needed to responsibly manage these risks. During the review, the Coast Guard consulted a variety of stakeholders including state and local emergency responders, Marine Pilots, towing industry representatives, members of the Port Waterway Safety Committee, and the Area Maritime Security Committee.

Based upon this review, I have determined that to make the Columbia River suitable for the type and frequency of LNG marine traffic associated with this project, additional measures will be necessary to responsibly manage the navigation, safety and security risks. The specific measures, and the resources needed to implement them where applicable, are described below and in a separate supplementary report which is being provided to you under the terms and conditions established for handling Sensitive Security Information. This supplemental report also includes a copy of the Bradwood Landing LNG Waterway Suitability Assessment. This determination is preliminary because the required NEPA analysis has not yet been completed.

The following is a list of specific risk mitigation measures that must be put into place to responsibly manage the safety and security risks of this project. Details of each measure, including adequate support infrastructure, will need to be further developed through the creation of an Emergency Response Plan as well as a Transit Management Plan that clearly spell out the roles, responsibilities, and specific procedures for the LNG vessel and all agencies responsible for security and safety during the operation.

Navigation Measures:

- Safety/Security Zone A moving safety/security zone shall be established around the LNG vessel extending 500-yards around the vessel but ending at the shoreline. No vessel may enter the safety/security zone without first obtaining permission from the Coast Guard Captain of the Port (COTP). (The expectation is that the COTP's Representative will work with the Pilots and patrol assets to control traffic, and will routinely allow vessels to transit the Safety/Security zone based on a case-by-case assessment conducted on scene. Escort resources will be used to contact and control vessel movements such that the LNG Carrier is protected.)

February 28, 2007

While the vessel is moored at the facility there shall be a 200 yard-security zone around the vessel. In addition, there will be a 50 yard security zone around the LNG Terminal when there is not a vessel at the dock.

Resource Gap: Resources required to enforce the safety/security zone are discussed under Security Measures in the supplemental report.

- Vessel Traffic Management Due to a narrow shipping channel, numerous navigational hazards, and the proximity to populated areas, LNG vessels will be required to meet the following additional traffic management measures:
 - A Transit Management Plan will be developed in coordination with River Pilots, Bar Pilots, Escort Tug Operators, Security Assets and the Coast Guard prior to the first transit.
 - This plan will be reviewed within six months of the initial arrival, and followed by an annual review to ensure that it reflects the most current conditions and procedures.
 - For at least the first six months, there will be at least 2 Pilots throughout the transit.
 - For at least the first six months, all transits will be daylight only, unless approved in advance by the COTP.
 - The LNG Vessel must board Pilots at least 5 miles before the CR Buoy.
 - Overtaking by or of the LNG Vessel is prohibited without COTP approval.
 - Meetings situations of commercial vessels will be closely controlled. All meetings must be pre-arranged via Channel 13 VHF Bridge-to-Bridge and will be limited to the following areas:
 - From the CR buoy to Tongue Point, with the exception that commercial vessels shall avoid meeting in all turns, and between buoys 22 and 29, and buoy 33 and 42,
 - Vessels may arrange meetings from Tongue Point to Rice Island between buoy 42 and 54,
 - Altoona to Pillar Rock Miller Sands Light #11 to Light # 17,
 - Price Island to Puget Island between buoy 32 and Bradwood.
 - 24 hours prior to arrival, the Coast Guard, FBI, Bar Pilots and River Pilots, Escort Tug Masters, and other Escort assets will meet to coordinate inbound and outbound transit details
 - Vessel transits and bar crossings will be coordinated so as to minimize conflicts with other deep draft vessels, recreational boaters, seasonal fisheries, and other Marine Events

Resource Gaps: The Vessel Transit Management Plan must be approved by the COTP at least 30 days prior to the first arrival.

- Vessel Traffic Information System / Vessel Traffic System The current Vessel Traffic Information System on the Columbia River is limited to AIS receivers and a handful of cameras. In order to ensure vessel safety and security, this capability will need to be augmented with a robust camera system capable of monitoring the entire transit route. Due to weather concerns, these cameras must be equipped with detectors capable of monitoring vessel traffic in wind, rain and fog conditions common on the river. In addition this capability may need to be augmented in the future with additional command and control capability and the establishment of a full Columbia River VTS.

Resource Gaps: Camera system with complete coverage of the entire transit route, capable of detecting vessel traffic in wind, rain, fog, and dark conditions. An additional AIS repeater

located in Astoria is also required to provide complete coverage of the Lower Columbia. If implemented, a fully staffed VTS would require at least 2 watch standers and a supervisor or 20 personnel to maintain round-the-clock coverage.

- Tug Escort and Docking Assist Due to the confined channel and high wind conditions, each LNG Carrier must be escorted by two tugs; at least one of which must be a tractor tug, which will join the vessel as soon as safe to do so. The primary tug will be tethered at the direction of the pilot. A third tug will be required to assist with turning and mooring.

All three tugs will be at least 60 Ton Astern Bollard Pull or larger and equipped with Class 1 Fire Fighting equipment. Based on the Maneuvering Simulation Study of November 4, 2005, vessels over 140,000 m³ will be limited to transiting during periods of 25 knots of wind or less. Additionally, extreme wind and weather conditions may require a third tug escort tug for any LNG vessel. While unloading, all three tugs will remain on standby to assist with emergency departure procedures.

Resource Gaps: Three 60 Bollard Ton Tractor Tugs with Class 1 Fire Fighting capability.

- Navigational Aids Buoys or Daymarks will be required:
 - Three Aids at Bradwood, outlined in Figure 3, on p. 8 of the Vessel Maneuvering Simulation Study of November 4, 2005.
 - Range on Upper and Lower Desdemona Reach
 - PORTS (Physical Oceanographic Real-Time System) station at Bradwood contracted with NOAA to provide real time river level, current and WX data
 - Doppler docking station similar to the one found in Savannah River
- LNG Carrier familiarization training for Pilots and Tug Operators Prior to the arrival of the first vessel, simulator training will be required for Pilots and Tug Operators identified as having responsibility for LNG traffic.
- Dynamic Under Keel Clearance System Installation of a real time system for data collection on bar conditions is strongly recommended as increasing the ability to safely navigate the Columbia River Bar during marginal conditions. The lack of accurate data, will limit the conditions under which a vessel may safely transit the bar. An immersion study of deep draft LNG vessels transiting the bar during summer and winter conditions is required within the first 12 months.

Resource Gap: Actual data on LNG tanker immersion.

Safety Measures:

- Vessel and Facility Inspections LNG tankers and facilities are subject to (at a minimum) annual Coast Guard inspections to ensure compliance with federal and international safety, security and pollution regulations. In addition, LNG vessels and facilities are typically required to undergo a pre-arrival inspection, and transfer monitor.

Resource Gap: Additional Coast Guard Facility and Vessel Inspectors.

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- Shore-Side Fire-Fighting Firefighting capability is extremely limited along the entire transit route. Shore side firefighting resources and training will need to be augmented in order to provide basic protection services to the facility as well as the communities along the transit route.

Resource Gap: To be determined in conjunction with local and regional response agencies through the Emergency Response Planning process. Prior to the approval of the Emergency Response Plan, adequate cost sharing arrangements for project related training, equipment, maintenance, and staffing will need to be addressed for all of the communities impacted by the project.

- In-Transit Fire-Fighting Significant resource and jurisdictional issues exist in any marine fire incident on an underway vessel in the Columbia River. Current planning and preparedness efforts focus on a shore based response to a vessel moored at a facility.

Resource Gap: Development of a concrete plan for managing underway firefighting, including provisions for command and control of tactical fire fighting decisions as well as financial arrangements for provision of mutual aid and identification of suitable locations for conducting fire fighting operations is critical to ensuring the safety of the port and securing the waterway.

- Public Notification System and Procedures Adequate means to notify the public along the transit route, including ongoing public education campaigns, emergency notification systems (such as reverse 911 and siren systems), and adequate drills and training are required. Education programs must be tailored to meet the various needs of all river users, including commercial and recreational boaters, local businesses, local residents, and tourists.

Resource Gap: Current public notification capabilities vary greatly, and as part of the Emergency Response Planning process, a comprehensive notification system, including the deployment of associate equipment and training, will need to be developed.

- Gas Detection Capability With the exception of the HAZMAT team in Astoria, gas detection capability is not resident and may not be available to initial responders along the transit route and at the facility. Emergency response personnel (both Police and Fire) require appropriate gas detection equipment, maintenance, and training.

Resource Gap: Gas Detectors, appropriate training, and maintenance infrastructure.

- Communication Systems and Protocols Inter-agency communication pose a significant obstacle to joint operations. Deployment of a Regional Communication Plan and associated equipment is required to ensure that the facility, associated command centers, emergency responders, Coast Guard, Tug Operators, Escort Vessels, and Pilots can communicate in an effective manner. The system must provide for monitoring and communicating on both secure and unsecure (eg Ch. 16, 13, 22), as well as sending and receiving both speech and data.

Resource Gap: Operation specific and contingency communications plans and appropriate (intrinsically safe) equipment to coordinate both routine escorts and emergency operations. Equipment to transmit and receive both voice and data in a secure and unsecure environment.

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Security Measures:

- Security Boardings, Waterway Monitoring, Shoreline Patrols, and Vessel Escorts Extensive security measures will be required to provide adequate protection for LNG vessel while transiting the Columbia River and moored at the facility. The details of these measures are Sensitive Security Information, and are outlined in a separate supplementary report.
- Additional Measure While A Cruise Ship is in Port While cruise ships are moored or anchored at the Port of Astoria, LNG vessels will be restricted to transiting in good visibility (6 miles or more). In addition, any cruise ship will also require separate waterside security, during the LNG Transit. Finally a Cruise Ship and LNG Carrier shall not be placed in a meeting situation.

Resource gap: Sufficient Coast Guard or local law enforcement assets to provide adequate and independent security for both vessels.

- Facility Security Measures LNG facilities are subject to the security regulations outlined in 33 CFR 105, and are required to submit a Facility Security Plan (FSP) for Coast Guard approval, and undergo (at a minimum) an annual Coast Guard security inspection. The facility shall also develop a plan to provide for appropriate security measures from the start of construction through implementation of the Coast Guard approved FSP.
- Sandia Study The WSA proposes to receive vessels with up to 200,000 m³ cargo capacity. The Sandia Report is based on consequences of LNG breaches, spills and hazards associated with LNG vessels having a cargo capacity no greater than 148,000 m³ and spill volumes of 12,500 m³. There remains some question as to the size of hazard zones for accidental and intentional discharges and the potential increased risk to public safety from LNG spills on water for larger vessels. Based on these existing uncertainties, Northern Star must either complete a site-specific analysis for the largest sized LNG vessel or limit arrivals to vessels with a cargo capacity no greater than 148,000 m³ until additional analysis addressing vessels with higher cargo capacities is completed.

In the absence of the measures described in this letter and the resources necessary to implement them, or in the absence of any changes to existing Coast Guard policy or guidance to lessen safety and security requirements, the Columbia River would be considered unsuitable for the LNG marine traffic associated with the Bradwood LNG terminal. Due to the dynamic nature of the Columbia River, the applicant shall be required to submit an annual update to the Waterway Suitability Assessment to the Coast Guard which shall be revalidated by the COTP and AMSC. For further information, please contact LT Shadrack Scheirman of Coast Guard Sector Portland at (503) 240-9307.

Sincerely,



Patrick G. Gerrity
Captain, U.S. Coast Guard
Captain of the Port
Federal Maritime Security Coordinator

Copy: Thirteenth Coast Guard District (dp)
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