TALKING CRUDE

a look at the impacts of crude by rail and other transportation means

This presentation will attempt to explain what the Crude by Rail projects would mean to the Harbor's environment, each individually, and all three collectively

FOSSIL FUELS

They are of global concern

- **As CO_2 increases, the impacts of fossil fuels become even more important**

- **Rise of more than 2° Celsius will make parts of Earth uninhabitable, including U.S.A.**

- **Three crude oil projects proposed for Grays Harbor will house nearly 100 million gallons of fossil fuels**

Global warming is driven by CO2 and other greenhouse gasses. Climate scientists say that 350 ppm is the maximum CO2 level in our atmosphere that will keep the global warming less than 2°C. The current CO2 level is already over 392 ppm

FOSSIL FUELS

Oil and other fossil fuels are made of fossilized dead organisms

let's not follow their path.

The important take home here is oil and other fossil fuels are made of dead organisms, let's not follow their path

BAKKEN OIL BASIN

Where will it come from?

- **Crude coming to Grays Harbor from Bakken formation in North Dakota**
- **Rail trip is over 1,500 miles**
- **Each train is 100 - 125 railcars long, holding 3.5 million gallons of crude**
- **Crude is unrefined petroleum, composed primarily of hydrogen & carbon. It contains 100's of toxic or carcinogenic components including:**
  - **Benzene**
  - **Chromium**
  - **Mercury**
  - **Nickel**
  - **Sulfur**
  - **Toluene**

The Bakken Oil field was well past its prime production levels until Hydraulic Fracturing was done to free more natural gas (methane) and crude oil from the shale formations

FRACKIN' THE BAKKEN

- **Hydraulic Fracturing cracks rocks by violently injecting pressurized fluid, which includes unknown chemicals, sand and water**

- **Fracking process now goes deeper than before, down to at least 7,000 ft. and uses more water and chemicals**

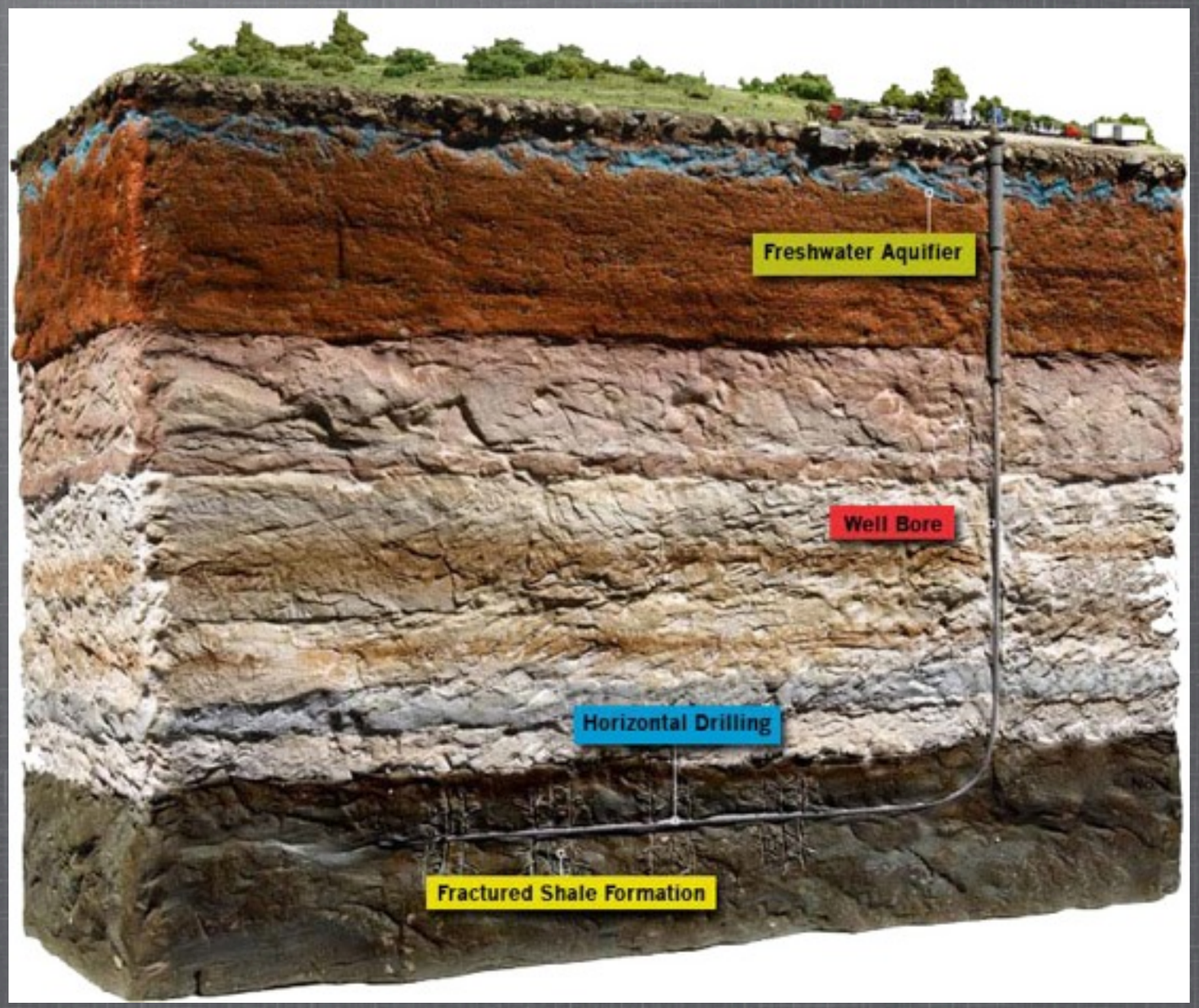


illustration by Megan Caponetto &Tom Schierlitz

The energy from the injection of a highly pressurized hydraulic fracturing fluid creates new channels in the rock, which can increase the extraction rates and ultimate recovery of hydrocarbons.

FRACKIN' THE BAKKEN

Potential impacts:

- Contamination of ground water
- Risks to air quality
- Migration of fracking chemicals
- Surface contamination from spills and flowback and the health effects of these
- Spent fracking fluids return with gas and oil production

Sand-like material that is injected along with water into the shale

The Hydraulic Fracking ruptures the Bakken Shale formations, and the Ceramic Proppant is added to keep the ruptures from closing.

THE ROUTE

What route will it take?

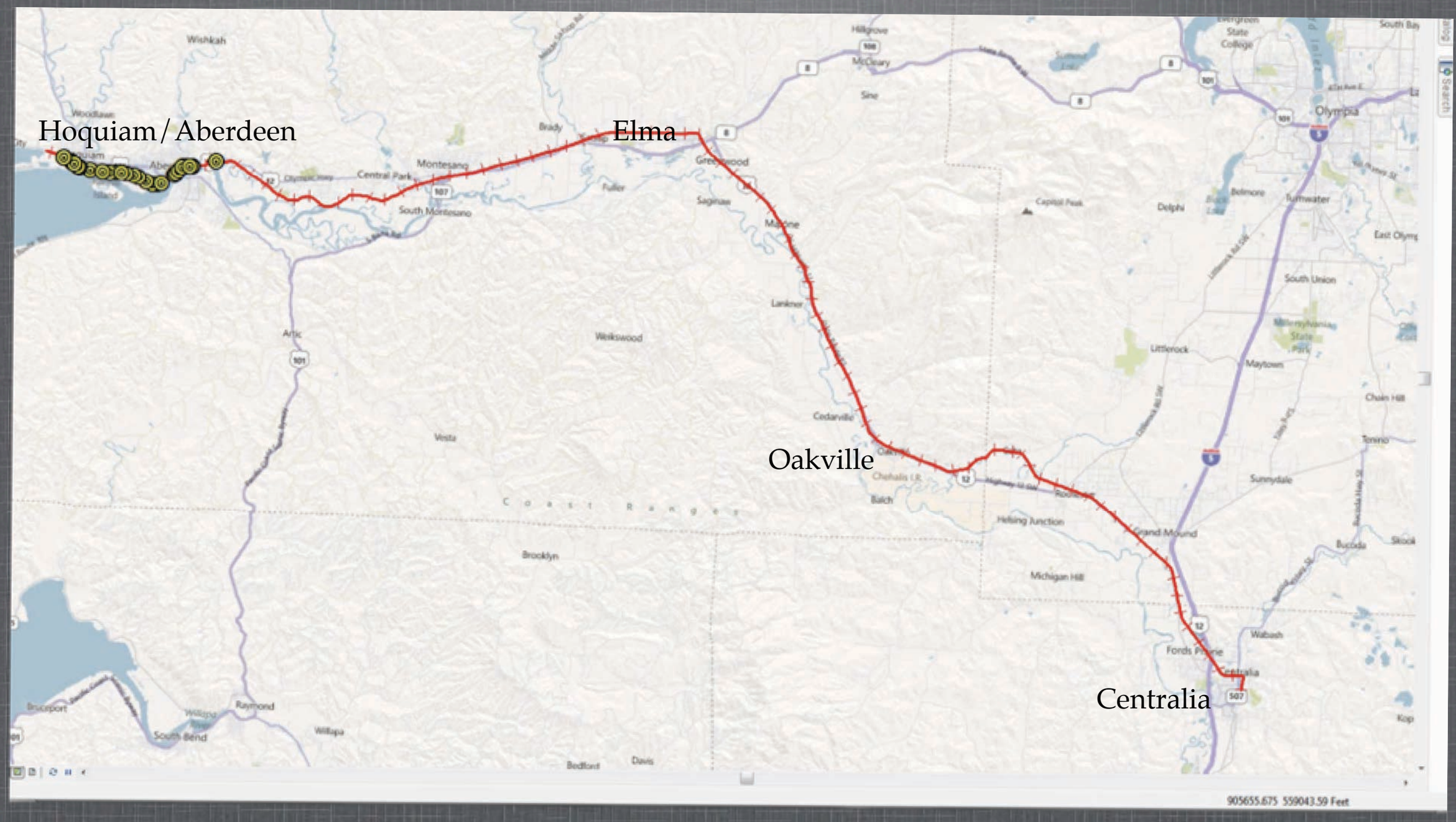
- From North Dakota through Montana, Idaho and enters Washington around Spokane

- Rail tank cars weigh 108 tons each

- Need to travel the scenic Columbia Gorge to get to Centralia

THE ROUTE

Once it gets to Centralia



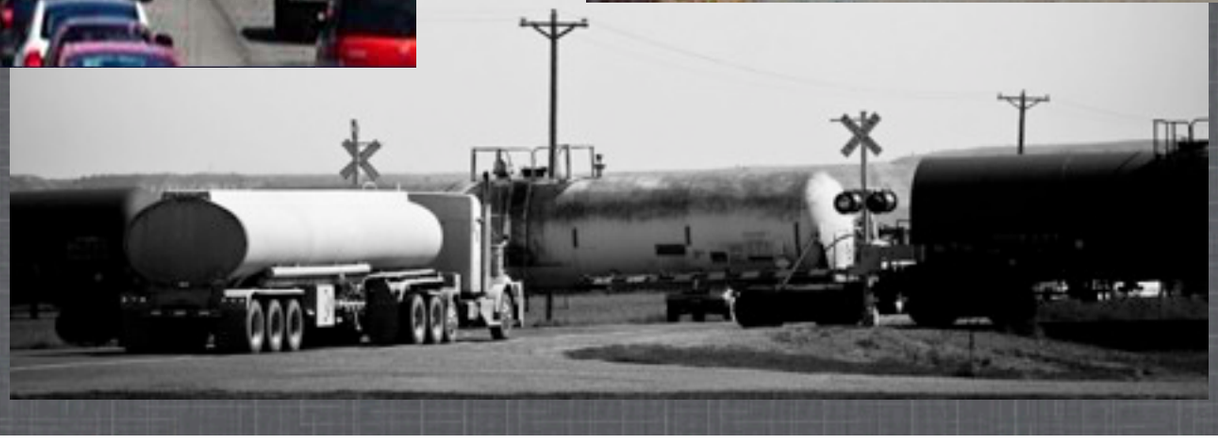
Over 100 crossings of creeks, rivers and streams along the way,
the majority of them are fish-bearing - 27 major named rivers and streams.

The PSAP route is shown from it's start in Centralia to its current end in Hoquiam. The yellow circles show the grade crossings in Aberdeen and Hoquiam

THE ROUTE

Some of the cities it affects

•Centralia •Fords Prairie •Grand Mound •Rochester
•Chehalis Village •Oakville •Cedarville •Porter •Malone
•Elma •Greenwood •Satsop •Brady •Montesano
•Central Park•Junction City •Aberdeen •Hoquiam



THE ROUTE HERE

Elma Crossings - 1-1/2 long train

1-1/2 mile train crosses over 11 at grade, surface interruptions of traffic. Limiting access from 2nd street at the East of the City and stretching to 1/4 mile past North Calder on the west. Those of you from Elma, probably will recognize some of the photos of crossings shown here. Those who don't just know that the city is totally bifurcated by the rail line and critical emergency services might be delayed here and elsewhere along the route. This closes off the popular Lloyd Murrey Park, more popularly known as 10th Street Park.

THE ROUTE HERE

So many crossings

The grade crossings (yellow circles) in Aberdeen start near the Log Pavillion and are shown all the way to the current end of the tracks at Paulson Road. The green flags are schools and daycare facilities. The red crosses are the Hospital and the Hospital's East Campus.

THE ROUTE HERE

How long is a 1-1/2 mile train?

Taking the Elma train, this shows the length of a unit train, beginning at the Log Pavilion, and ending just short of the Aberdeen Sewage Plant. This would totally block the Gateway Mall

THE ROUTE HERE

How long is 1-1/2 mile train?

The train continues, spanning the distance from the sewer plant to just short of the Harbor Paper treatment lagoons near 28th Street.

THE ROUTE HERE

How long is a 1-1/2 mile train?

Continuing, it stretches from 28th Street to the middle of the former Anderson-Middleton log yard.

THE ROUTE HERE

How long is a 1-1/2 mile train?

With the head of the train at the route's end, the end of the train will still be at the K Street crossing near the sewage pumping station

THE ROUTE OUT

Via Ship

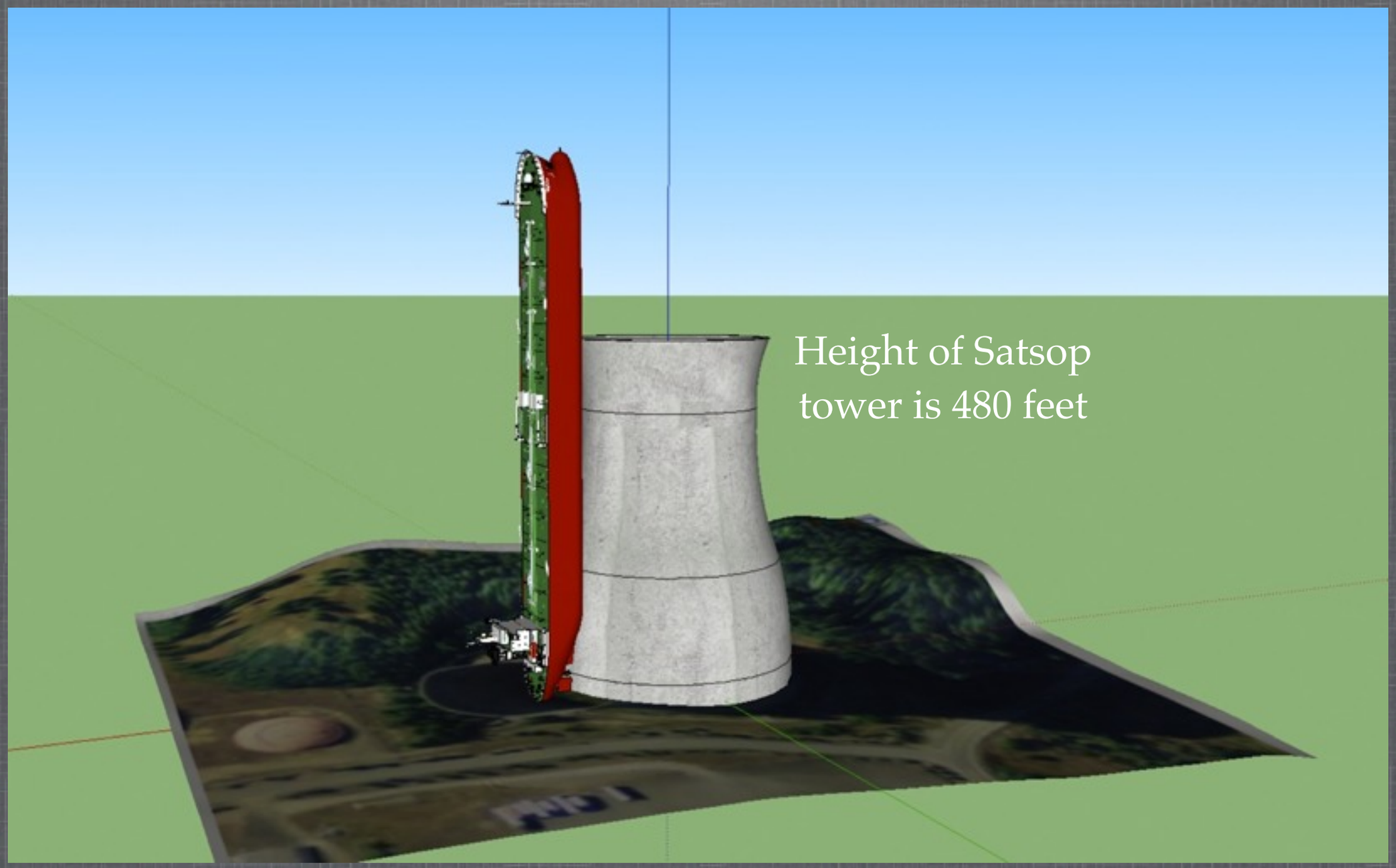
Primary shipping will be via Panamax-sized ships

- **660’ - 950’ long, about**
- **105’ wide**
- **Hold an estimated 16 million gallons of oil in addition to their fuel and ballast**
- **Capacity 65,000 DWT**

Panamax tankers are double hulled vessels, which would typically be loaded to approximately 50,000 metric tons, in order to be able to navigate the ship channel.

THE ROUTE OUT

how big?



Thanks to the sketch-up skills of Jarred Figlar-Barnes this shows a comparision of a typical Panamax ship to the Nuke towers at Satsop.

THE ROUTE OUT

Articulated tug & barge (ATB)

The ATB is used for smaller payloads.

- **480’ long**
- **78’ wide**
- **6.4 million gallons of oil**
- **20 - 34, 000 DWT**

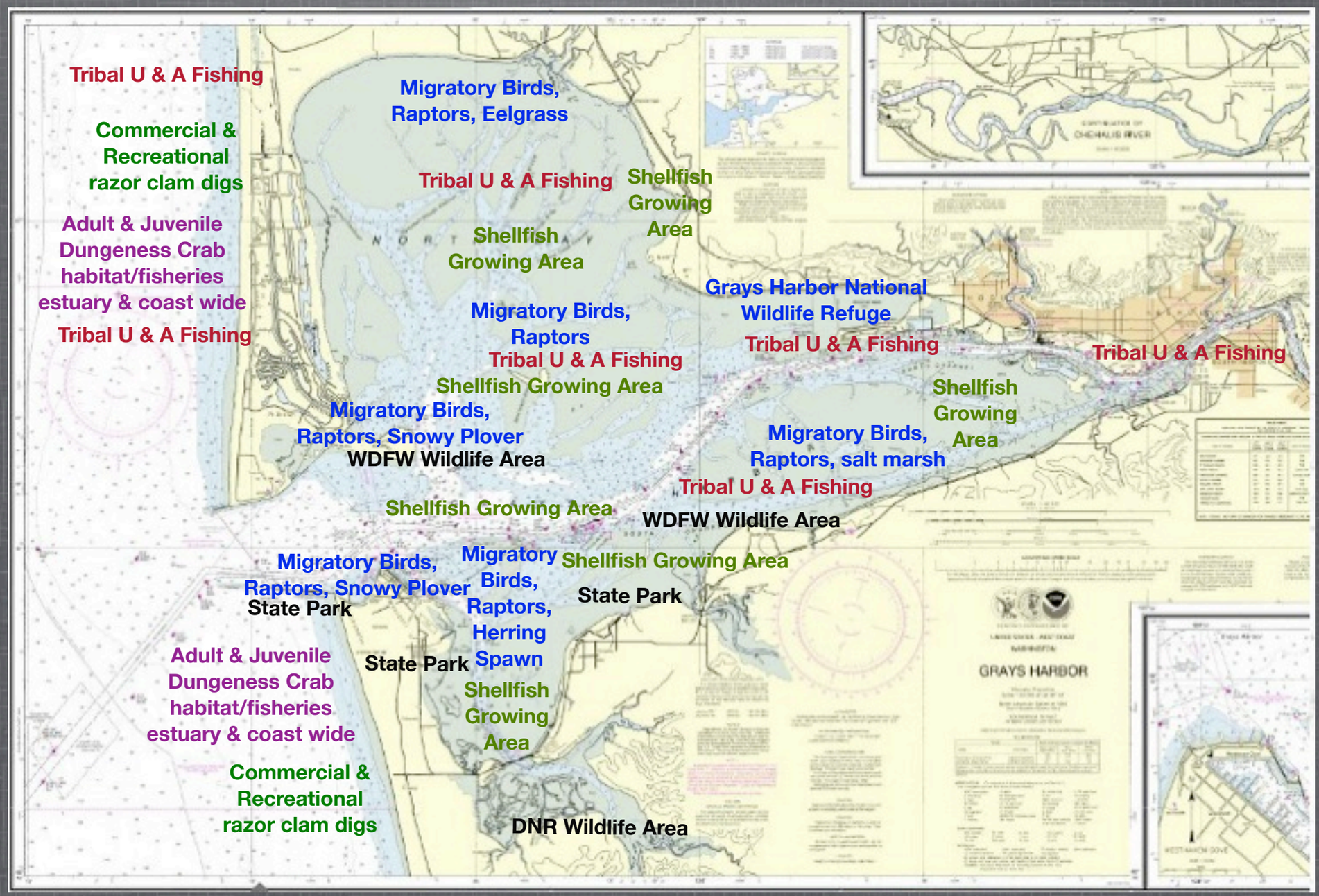
Westway Terminals expects to ship their crude oil using Articulated Tug and Barge, with the barge holding approximately 20,000 metric tons.

THE ROUTE OUT

Going North or South

Vessels entering and heading out of the Harbor cross important Tribal, commercial fishing and crabbing areas that support Tribal treaties and important commercial and recreational coastal economies.

Vessels going north would also pass the Olympic Coast National Marine Sanctuary.



Vessels entering or leaving the harbor have to pass a myriad of important sensitive areas that provide and insure the sustainability of
tribal, recreational and commercial resources.

WHEN OIL ESCAPES

Spill happens

Washington State has the ability to only recover between 19% - 39% of a 50,000 barrel spill (2.1 million gallons) in the critical first 48 hours.

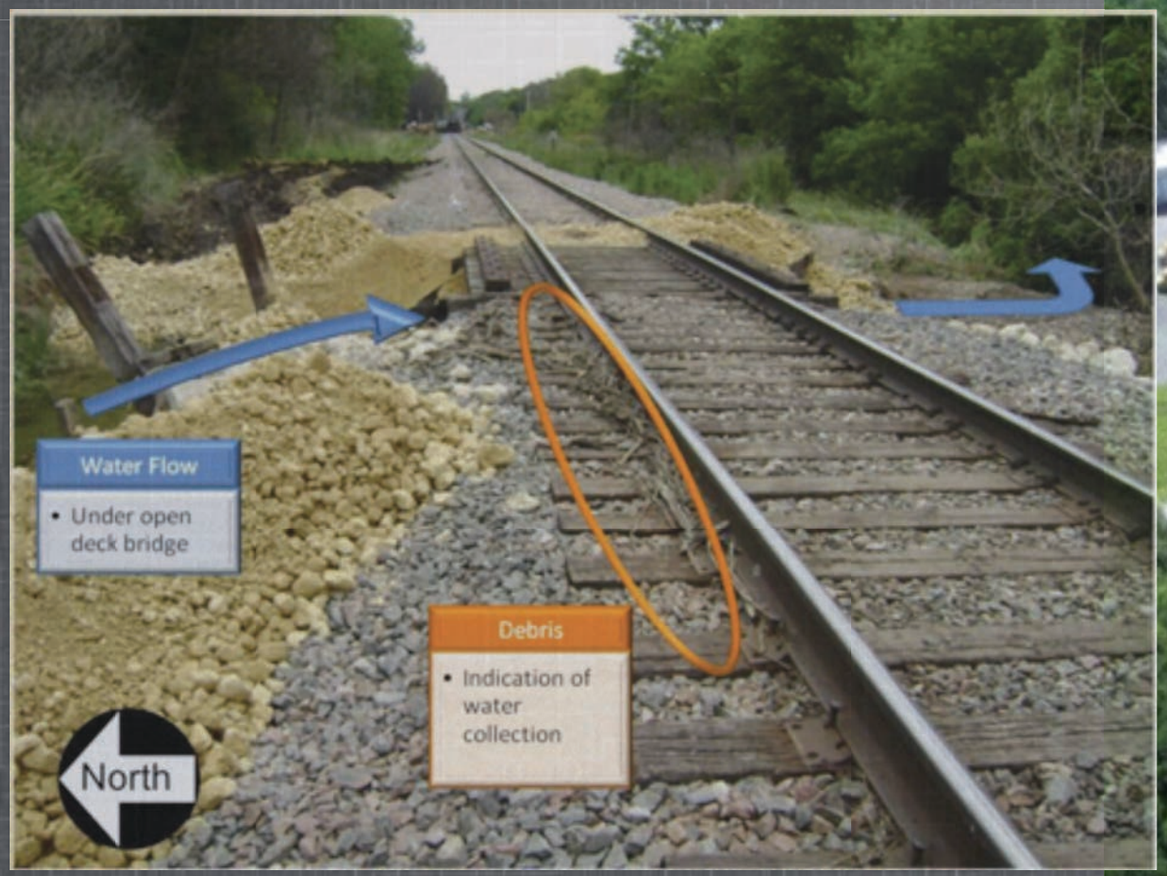
Dept. Ecology/Puget Sound Partnership
Publication Number: 11-08-002

Photos by Rick Macwilliam
Lake Wabamun ,Alberta

There are no certified oil response personnel listed in the Grays Harbor area. The study determined that Washington may be at risk of oil spills ranging in size from 250,000 to 2 million barrels. Demand for boom, workboats, and response personnel to implement sensitive area protection through Geographic Response Plan (GRP) deployment will vary depending upon the timing and severity of potential impacts to GRP sites.

WHEN TRAINS DERAIL

Spill happens



- **The track ballast washed out at the railroad bridge.**
- **The tankcars traveling at 36 mph derailed and ruptured**

National Transportation Safety Board Report June 19, 2009

This derailment was due to a washout of the ballast due to flooding. This is a crossing that is similar to many of the ones along the trip from Centralia. The rails were then not properly supported, and moved, causing the derailment.

WHEN OIL ESCAPES

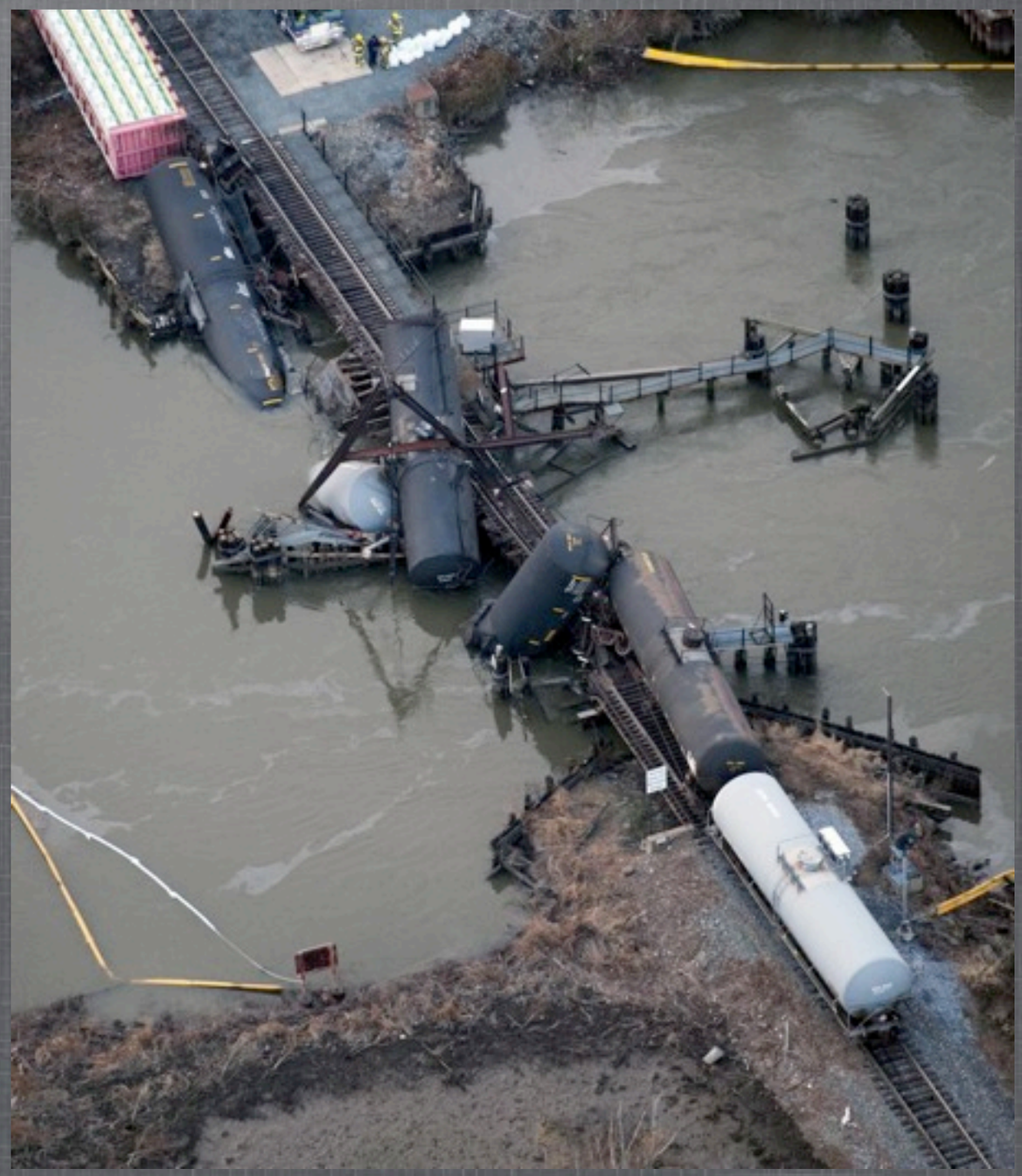
Spill happens

Industry admits that trains have nearly 3 times the number of spills as pipelines.

Vancouver Sun

Local Rail Spills

- **2003 Edmonds 5,000 gallons**
- **2004 Vashon Island 1000 - 1500 gallons**
- **2012 Seattle Interbay 3000 gallons**

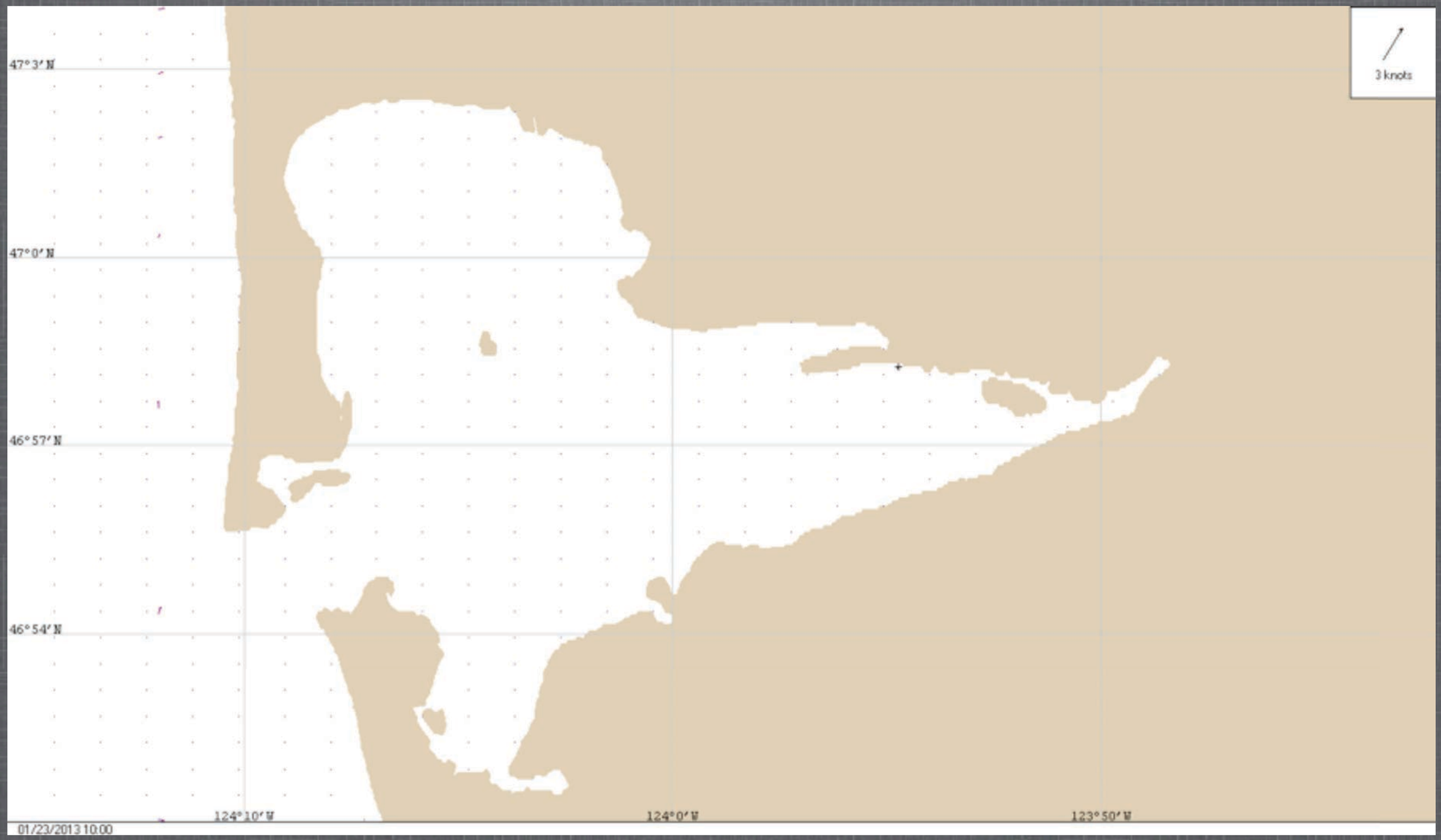


Paulsboro, NJ November 30, 2012

Washington State at the time of the 2003 - 2004 spills only had equipment to clean 100 oiled birds in the first 48 hours

WHEN ERRORS OCCUR

spill happens



This animation is showing variable 3 - 25 knot wind only
NOAA buoy WPTW1, January 23, 2013

This is showing a spill and how it spreads throughout the harbor. Note it is wind only and does not show the impacts of tide or current. This is based on the winds of January 23, 2013 as recorded by NOAA buoy WPTW1 (near Westport). This was chosen because it is typical of this time of year and shows what happens when the winds are variable. The black splots are the best guess of what will happen and the red splots are estimated trajectory and are referred to as a “minimum regret”. The reliability of red splots is 90%. This shows a spill based on 1000 splots. Knots to mph ~1.15 times.

WHEN OIL ESCAPES

Spill happens

Average vessel loading and unloading spills from 1970 - 2012

- 83 spills per year of less than 2,100 gallons

- 9 per year of spills from 2,100 - 210,000 gallons

International Tanker Owners Pollution Federation (ITOPF) 2012

All the proponents state that they will use all the latest measures to prevent spills, but even with the best measures, equipment failures can cause leaks. This slide shows the most common spills are less than 50 barrels, but also shows that larger spills of 50 to 5,000 barrels have averaged 9 per year

WHEN OIL ESCAPES

Spill happens

- **Approximately once a month, a large ship somewhere along the West Coast runs into trouble because of equipment problem or mechanical failure**

Pacific States/British Columbia Oil Spill Task Force, Seattle PI 2002

- **Over the past 20 years, the Coast Guard responded to "tens of thousands of oil spills"**

National Incident Commander Report, USCG 2010

In case someone asks: 275 Notifications 56 Unknown sheen cases 20 Mystery drum removals 7 Sunken vessels 10 V 275 Notifications 56 Unknown sheen cases 20 Mystery drum removals 7 Sunken vessels 10 Vessel discharges 5 Facility discharges or releases

www.uscg.mil/d13/sectcolrvr/ops/imd.asp

WHEN OIL ESCAPES

Oil & Water Don't Mix

New Carissa grounding off Coos Bay in February 1999

- Estimated loss of 70,000 gallons of fuel into the surrounding coastal areas

- Estimated 3.5 millon oyster deaths were attributed to the spill

- Clausen Oysters was forced to shut down operations, lost 70% of their crop and their entire business was threatened with bankruptcy

Clausen Oysters is in North Bend, OR – near Coos Bay and was nearly bankrupt until the lawsuit won the damages and paid for their attorneys. Note: this picture is of one ship, broken into two pieces. Comparatively speaking a Panamax ship would hold 228 times more and the ATB would hold 91 times more.

WHEN OIL ESCAPES

The Nestucca Oil Spill 1988

- **231,000 gallons of bunker C fuel spilled**
- **Slick dispersed over 800 square miles from Grays Harbor to Vancouver, BC**
- **More than 13,000 oiled birds were collected by rehabilitation workers**
- **Actual mortality was 4 to 6 times greater than collected, over 56,000 birds**
- **Undetermined impacts to fish and other marine organisms**

Photo Courtesy of Olympic National Park

A local spill of one panamax would be 71 times greater impact.

WHEN OIL ESCAPES

Birds can die

Great devastation of wildlife can occur when birds, oil and water mix. Crude and the dispersants used in clean up efforts bioaccumulate and can cause many problems to wildlife including:

- Hypothermia
- Predation
- Sinking or drowning
- Loss of body weight
- Dehydration
- Internal injuries
- Poisoning
- Inability to breed

Some of the greatest environmental problems from the Deepwater Horizon blowout in the Gulf of Mexico, may eventually be traced to the use of Corexit oil dispersant breaking the oil into small globules throughout the water.

WHEN OIL ESCAPES

Grays Harbor is an Area of Hemispheric Importance

Grays Harbor is home to the Grays Harbor National Wildlife Refuge, an Area of Hemispheric Importance as defined by the Western Hemisphere Reserve Shorebird Network (WHRSN).

Visited by at least 500,000 shorebirds annually.

Grays Harbor is a Site of Hemispheric Importance as it serves more than 500,000 shorebirds annually, and more than half of the West Coast population of Red Knots.

WHEN OIL ESCAPES

Grays Harbor is an Area of Hemispheric Importance

Many leave from GH and go directly to the Gulf of Alaska.

WHEN OIL ESCAPES

Marine resources suffer

Massive Fish Kill in Louisiana

- Oil spills present immediate harm to deep ocean and coastal fishing and fisheries and may permanently affect fisheries
- Mass mortality in contamination of fish and other food species caused by toxic and smothering oil
- Long-term ecological effects include: poisoning marine and coastal organic substrate, interrupting the food chain and creating areas of “dead zone” because of low oxygen
- Some of the most productive oyster leases and shellfish beds in Grays Harbor are located on the north shore next to the shipping channel

WHEN OIL ESCAPES

Economies are impacted

State of Washington 2000 - 2011
Value of Marine Resources

All species of fish	$2,428,876,118
Dungeness Crab	$590,562,612
Oysters	$382,707,062
Shrimp	$53,169,634
Razor clams	$2,293,073

National Marine Fisheries Website

These figures are for commercial industries and does not take into consideration recreational activities.

WHEN OIL ESCAPES

Rare and important coral reefs are at risk

- Waters 30 miles west of Grays Harbor are one of only two places in the world where glass sponge coral reefs are found

- Oil and the chemicals used to disperse oil harm coral growth and the ability to reproduce and produce energy from photosynthesis

- Shorter exposure to high concentrations are just as toxic as longer exposures at lower levels

- Early development forms are particularly sensitive to toxic effect and oil slicks can significantly reduce larval development and viability

NOAA Coral Reef Conservation Program, May 2011

Healthy coral reefs are among the most biologically diverse and economically valuable ecosystems on earth, providing valuable and vital ecosystem services. Coral ecosystems are a source of food for millions; protect coastlines from storms and erosion; provide habitat, spawning and nursery grounds for economically important fish species; provide jobs and income to local economies from fishing, recreation, and tourism; are a source of new medicines, and are hotspots of marine biodiversity.

FIRE BURNS

Fire superheats underlying water layer

- **Large oil tanks are subject to “boilover”, causing an increased burning rate by a factor of two**

- **This is particularly true in earthquake prone areas**

Hiroshi Koseki/G.W. Mulholland Fire Technology Feb. 1991

When crude burns it emits chemicals that affect human health, including:

- carbon dioxide
- carbon monoxide
- lead
- nitrogen oxides
- particulate matter
- polycyclic aromatic hydrocarbons (PAH)
- sulfur dioxide
- volatile organic compounds (VOC).

When crude oil is shipped, there is still some percentage of water contained in it. When the Crude sits in the tanks, the water, being heavier, sinks to the bottom, A tank fire can cause Super-heated steam, aerating the crude oil, vaporizing it, and intensifying the fire.

FIRE BURNS

Ways that it can start

- Lightning strikes
- Maintenance error (e.g., welding)
- Operational error (e.g., over-filling)
- Sabotage
- Equipment failure
- Crack & rupture
- Static electricity
- Leak & line rupture
- Open flames
- Natural disasters
- Runaway reactions (tank impurities)

A study of storage tank accidents, Chang & Lin,
Journal of Loss Prevention in the Process Industries, 2006

Lightning strike, New Jersey Tank Farm 2007

FIRE BURNS

Smoke chokes

Smoke from an oil fire contains:

- **Polycyclic aromatic hydrocarbons PAHs believed to be carcinogenic**

- **Spread of these PAHs would be further exacerbated by Grays Harbor winds and rains**

- **Smoke and petroleum inhalation and ingestion to many of the symptoms of Gulf War illness**

CDC study

crude oil tank farm fire Puerto Rico, 2009

Center for Disease Control and Prevention 1999 study. Contrary to claims that crude doesn't burn easily these photos are of tanks that did catch fire.

THE ACCIDENT WILL HAPPEN

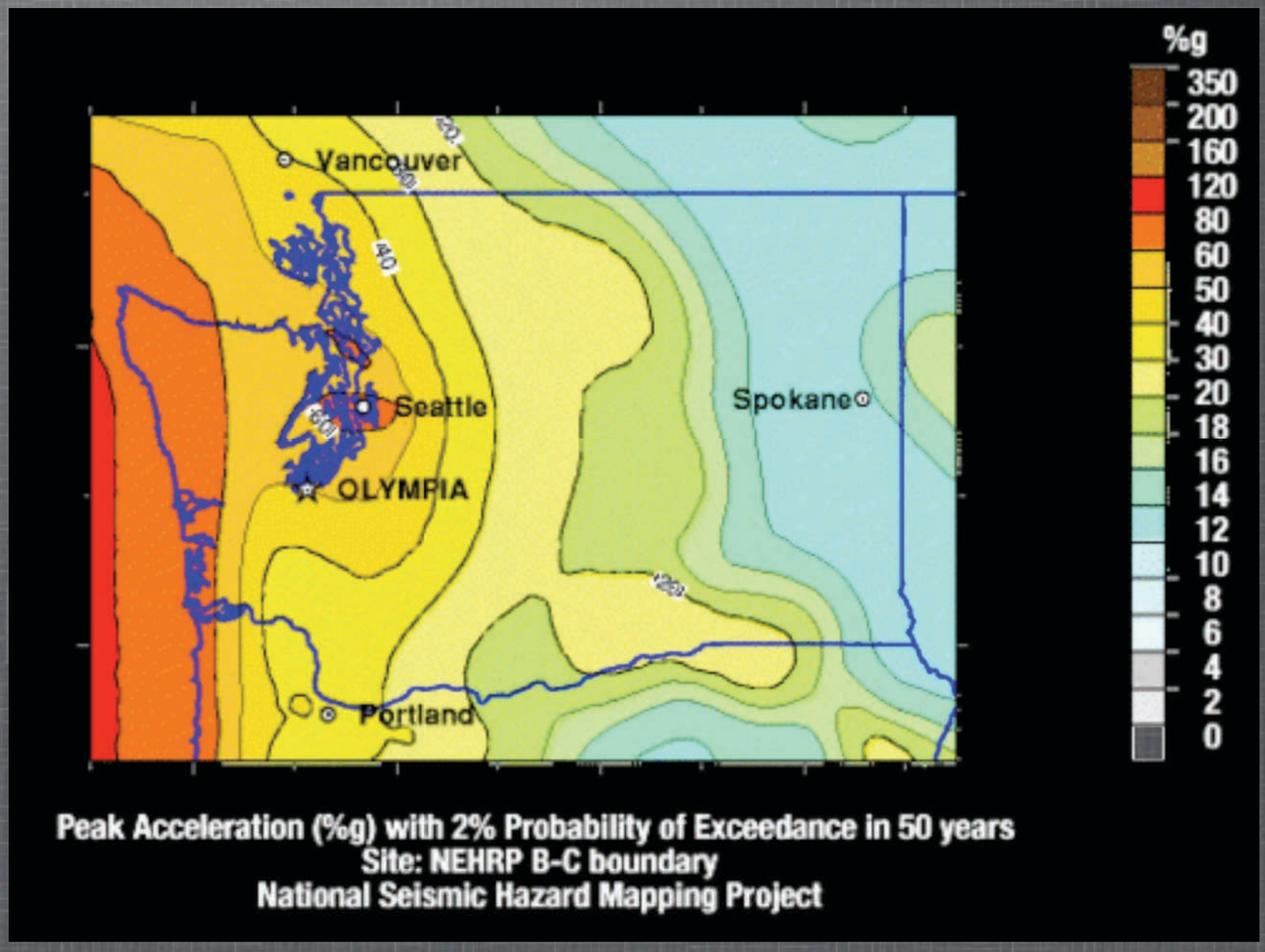
Maybe an earthquake

- Washington experiences over 1000 earthquakes each year

- We are due for a Cascadia Subduction earthquake

- Such an event could create a land drop of 2 meters (about 6-1/2 feet) and cause shaking for 2 minutes or longer causing liquifaction of the soils, especially fill materials

- Most of the urban shorelines on the Harbor are fill material and subject to liquefaction



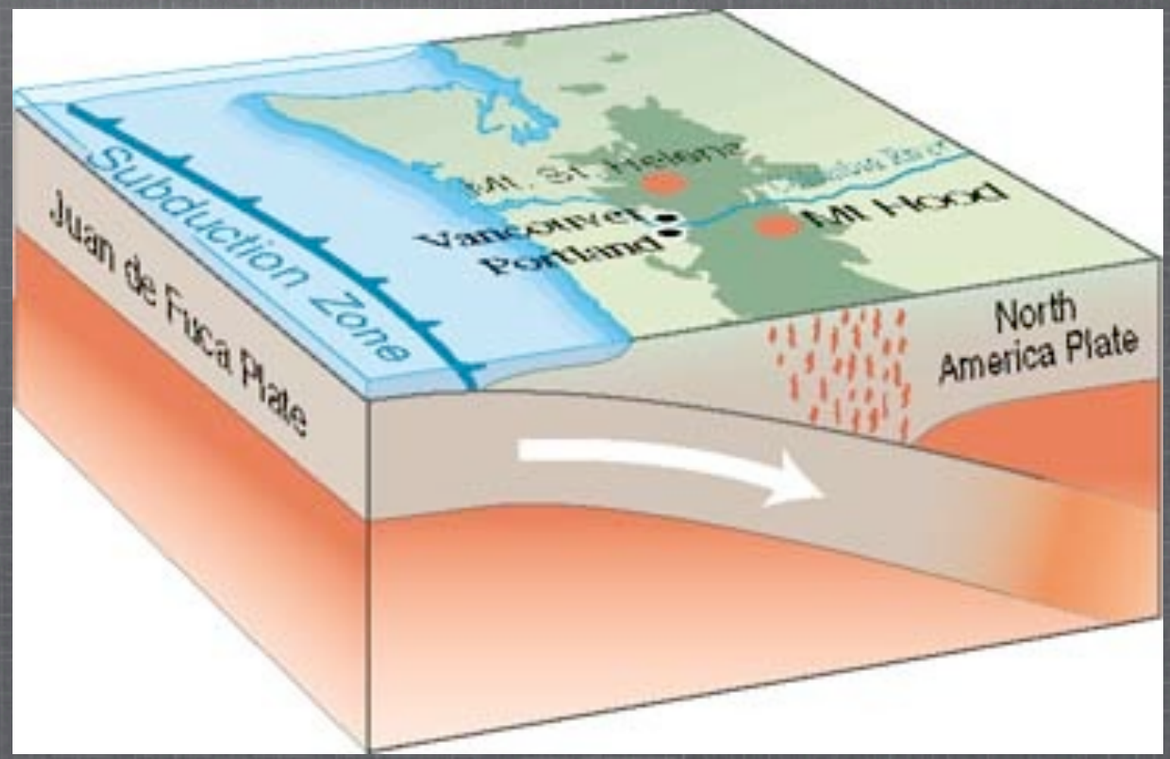
Nobody yet knows whether the next Cascadia subduction zone quake will occur in the next 3 minutes or 350 years from now. On average they have occurred every 350 years or so, and we are at year 313.

THE ACCIDENT WILL HAPPEN

An Earthquake

Most affected counties
in a Cascadia Subduction Earthquake:

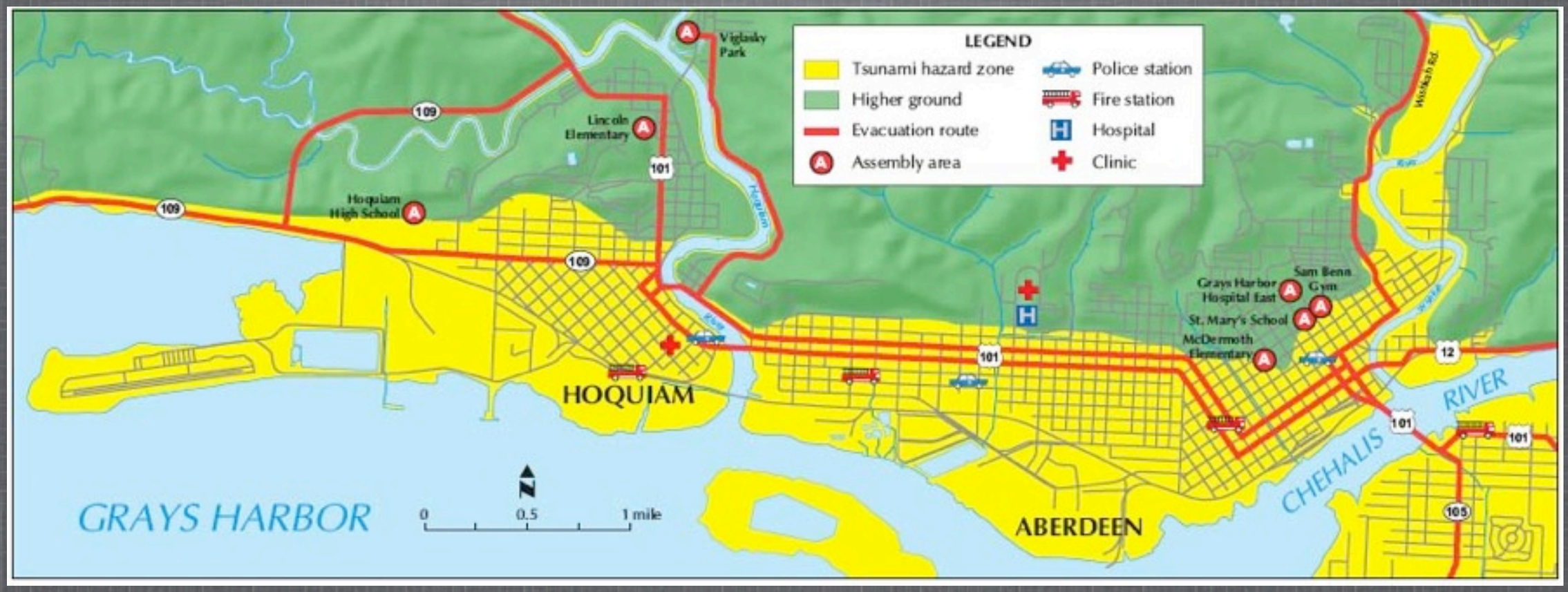
- **Clallam**
- **Grays Harbor**
- **Jefferson**
- **King**
- **Mason**
- **Pacific**
- **Pierce**



Seafloor spreading drives the Juan de Fuca Plate under the North American Plate, stressing the Juan de Fuca Plate, and lifting the North America Plate. If the entire 1100 kM plate boundary ruptures, it would cause a M9 quake, rivaling the 2011 Sendai Quake in Japan, and duplicating the January 1700 quake that dropped the land level 2 meters at Copalis (as shown in the Ghost Forest).

THE ACCIDENT WILL HAPPEN

Tsunami inundation



Source: Washington Department of Natural Resources

The Washington DNR tsunami map shows the areas that would be affected include Port Terminals 1, 2, 3, & 4, as well as the sites where all the three proponents storage tanks are to be located. All these sites are located at elevations from 15 to 20 Ft. The Ground elevation might sink up to 2 meters (6.5 ft), making them even more vulnerable to tsunamis. The ship shown here is from the Fukishima quake, as a result of the tsunami.

THE PROJECTS

Westway Terminals Company, LLC

- **Present terminal is four storage tanks totaling 13,440,975 gallons**

- **Began operations on the Harbor in 2008**

- **Primary product handled is currently methanol (wood alcohol)**

- **No Westway Terminal currently handles crude oil**

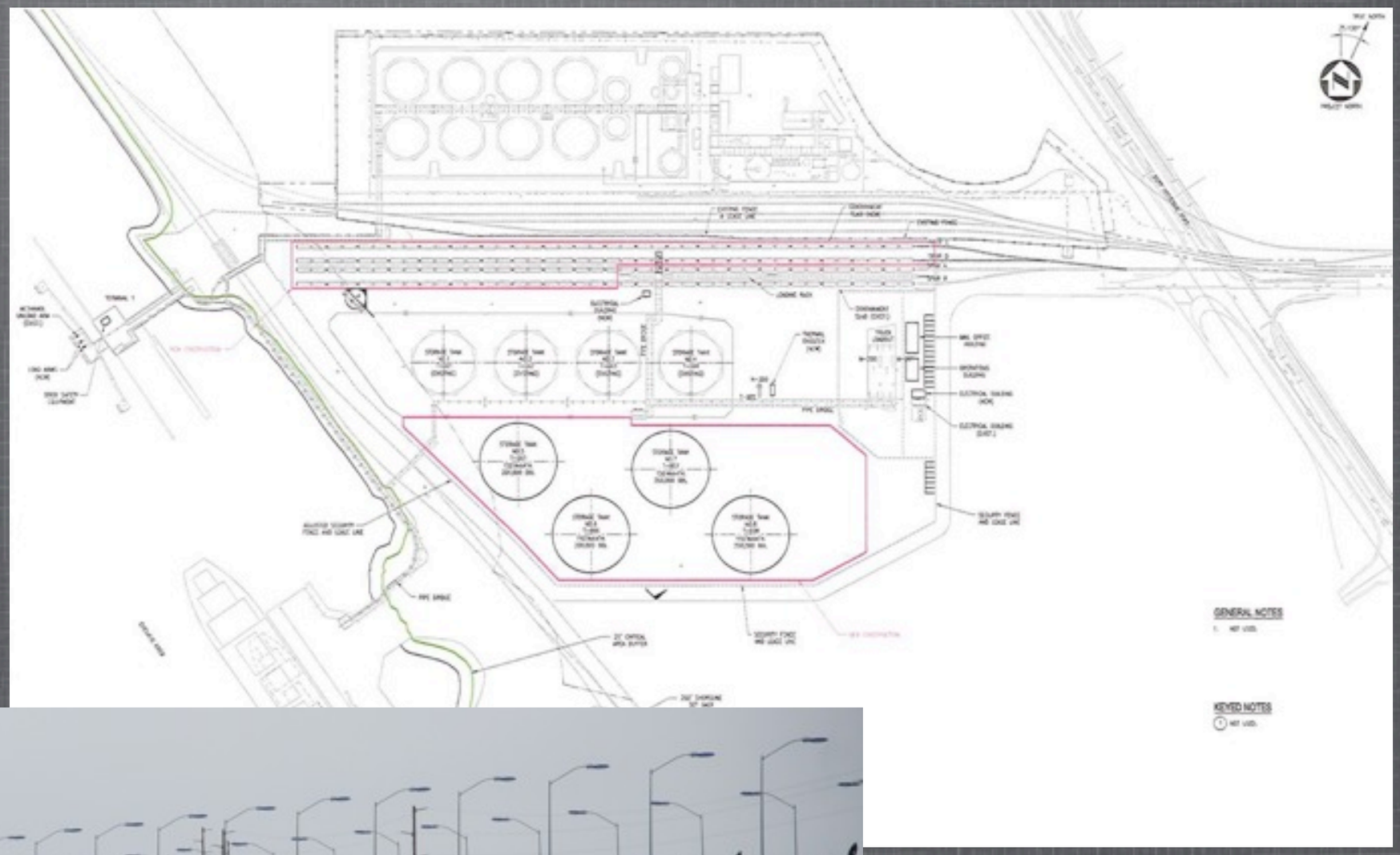
THE PROJECTS

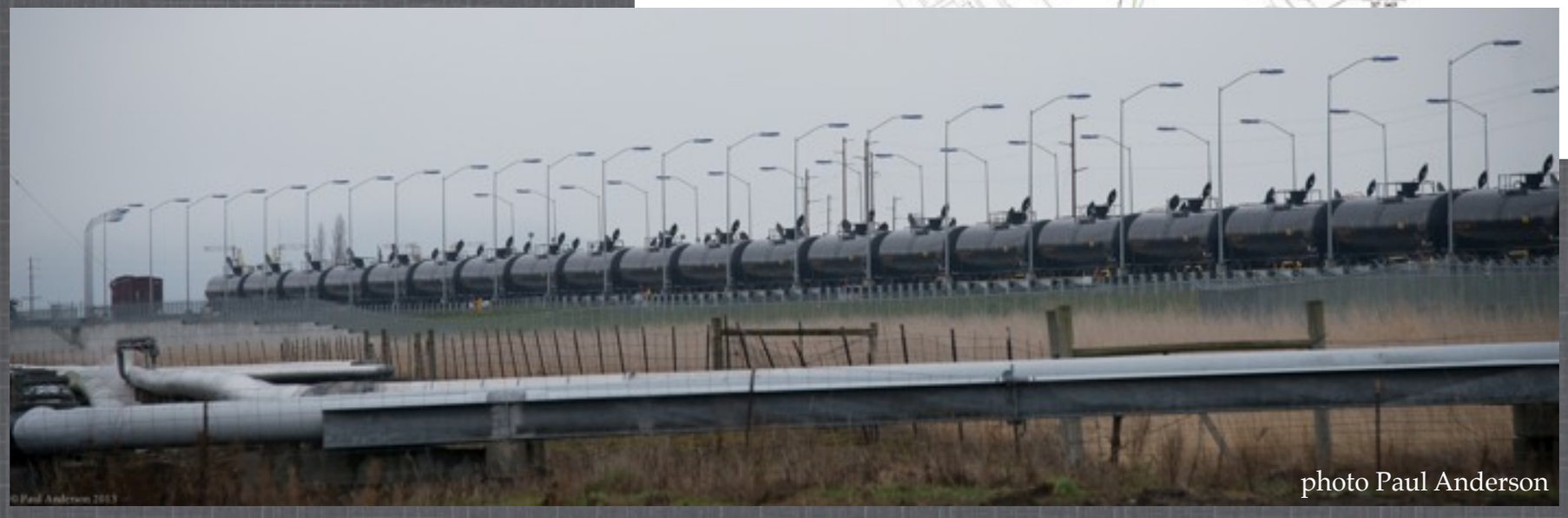
Westway Existing Site

THE PROJECTS

Westway Terminals

- **Adding four tanks 200,000 barrels each**
- **A total addition of 33,600,000 gallons, but this will all be crude oil**
- **Shipments to be made via articulated tug & barge units 6,384,000 gallon capacity**





The 4 new tanks are shown inside the proposed containment berm, which would hold 110% of the volume of one of the tanks plus a 6” rainfall, The bottom picture shows a tankcar unloading station serving 20 cars on each side of an overhead walkway.

THE PROJECTS

Imperium Existing Site

“It's not just fuel we're working on. We founded this company with a goal of fundamentally changing how we power our vehicles by creating a fuel that would reduce global warming and our dependence on the dwindling supply of petroleum, while at the same time providing a renewable source of energy for generations to come.”

from their 2012 website http://imperiumrenewables.com/about.html

THE PROJECTS

Imperium "Renewables" Proposed

Image of proposed Imperium Grays Harbor facility with additional tank storage and rail spur.

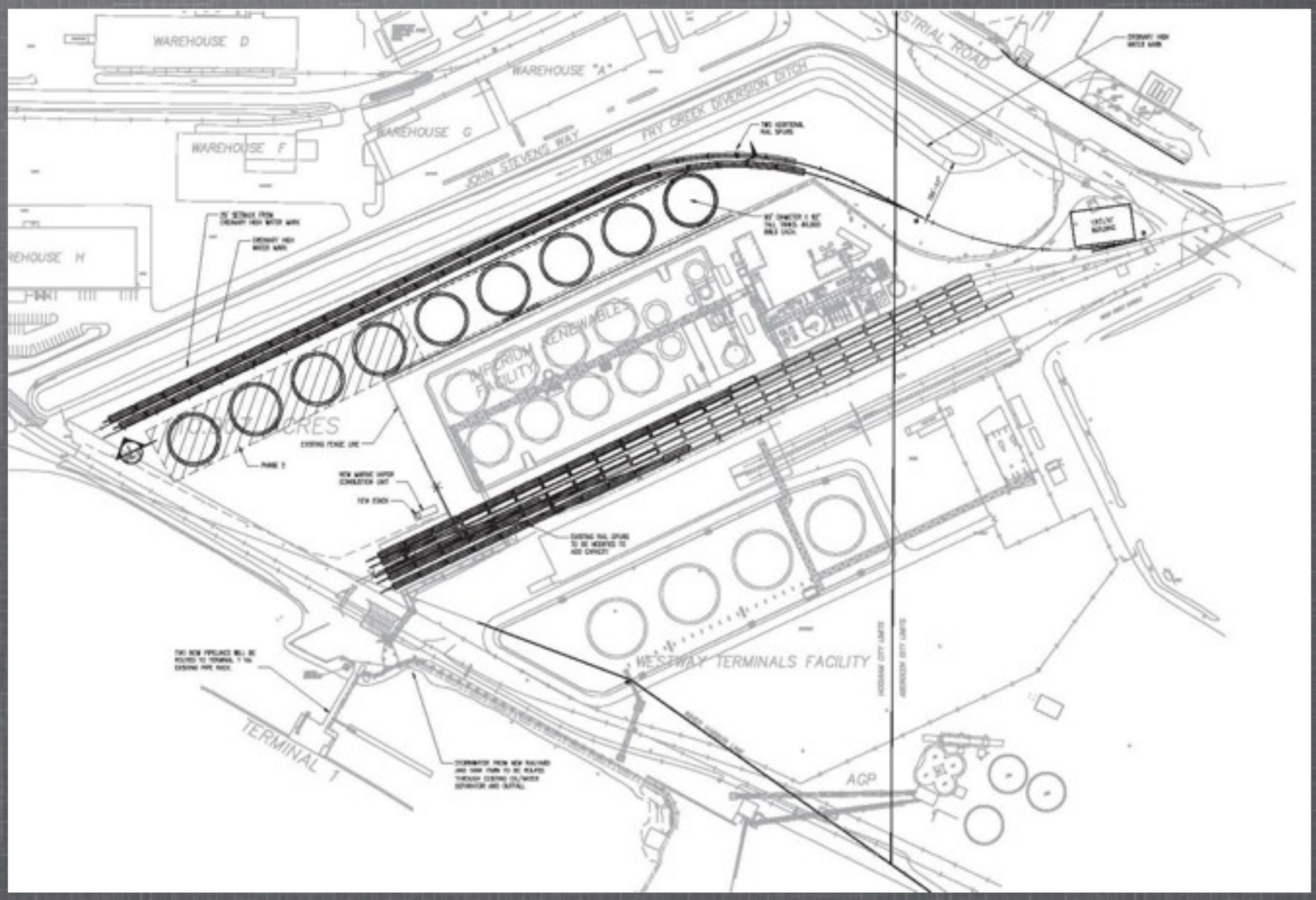
THE PROJECTS

Imperium "Renewables"

- **Proposal is to establish 5 tanks as Phase I and an additional 4 tanks as part of Phase II. These would be to store crude oil, a non-renewable fossil fuel**

- **Each tank is 95 feet diameter by 64 feet tall**

- **Each holds 80,000 barrels with a total of 720,000 barrels for all nine. (30.24 million gallons)**



Note that the tankcar unloading station is approximately 25 feet from Fry Creek, a stream that is again having salmon passages since the Harbor water quality has improved. Also, there is little room around the tanks for oil flow in the event of a tank rupture – all the tanks are in a straight line, there will great obstruction to flow from the increase and decrease of available flow area.

THE PROJECTS

US Development, LLC

- **Brand new crude oil tank farm at Terminal 3**

- **Willis chipping operation remains**

Show Terminal 3 and dock & Willis Chipping plant.
Show GHNWR. Bowerman Basin is important to shorebirds because it fills last at high tide and drains first on falling tide – providing feeding area for the birds
Show site of proposed GHNWR Nature Center. Show Port property,
Show wetlands connected from Port Property to the refuge. Show current end of RR tracks


GHNWR
US Development
Willis Enterprises
Wetland B
Wetland C
Wetland D
Wetland E
Wetland A
Wetland A extends east (outside of Project Site)
Railroad Track
Ditch A
Ditch B
Ditch C
Ditch D
Ditch E
Ditch F
Ditch G
Ditch H
Ditch I
Ditch J
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THE PROJECTS

US Development LLC

- Add 8 new tanks each holding 100,000 barrels or 33.6 million gallons

- Establishes a new "tail track" on the west side of Paulson Road directly adjacent to the Grays Harbor National Wildlife Refuge

- Approximately one unit train every two days

- 3 Panamax vessels per month

Tail Track is on the abandoned railbed of the train to Moclips, bordering the refuge and SR109
The final design for the US Development terminal is not yet decided, but this is very nearly what was shown at the Log Pavilion on Jan 30th, 2013
Their printed information stated that they would have a unit train every 2 days, but if this is correct, why do they need 800,000 to 1,000,000 barrels storage?
The rest of our calculations are based on US Development receiving 1 unit train per day, the same as the Imperium SEPA documents show for Imperium's 720,000 barrel storage tanks.

SUMMARY

What's new?

- Westway SEPA document says Port of Grays Harbor can handle 12 ship movements/month at Terminals 1, 2 & 4

- Westway proposal: 5
  Imperium proposal: + 6
  11 movements/month

- This does NOT include the current 7 ships/month from Pasha, AGP, Dkoram, Cosmo Specialties or existing Westway & Imperium shipments

- It also doesn't include ship movements from the proposed US Development tank farm or Willis Enterprise at Terminal 3

SUMMARY

What's new?

- Addition of 21 new tanks totalling 2,320,000 barrels of crude oil

- Storage of 97.44 million gallons of crude at the edge of the estuary. This would total over 2 billion gallons flowing through the Estuary each year.

- 25+ additional unit trains per week block access from Elma to Hoquiam. This means 7.17 hours blockage at the Olympic Gateway Mall and elsewhere, each week

- 8+ Panamax sized ships make 16+ crossings of the Westport bar per month. Westway Terminals will add an additional 5 barges per month (10 bar crossings)

The Exxon Valdez spilled 11 million gallons, a Panamax holds 228 times that amount and an ATB holds 91 times that amount. One unit train holds 3.5 million gallons and there will be 25+ trains per week which is 87.5 million gallons moving through our community.

ECONOMY IN THE BALANCE

What are the trade offs?

Crude Oil Jobs Promised

- 100 unidentified jobs on site
- 20 longshore jobs
- 5 - 15 rail, pilots, tugs

Economy Threatened by Crude Oil Pollution

- Existing and other port industries & jobs
- Retail along the rail corridor
- Real estate along the rail corridor
- Coastal real property damage
- Fisheries
- Tourism
- Recreation
- Long-term health of natural resources
- Agriculture
- Public health & safety
- Future economic growth
- Sea level rise impacts
- Climate impacts
- Wetlands
- Individual economic loss
- Seafood compensation
- Vessel physical damage
- Charter and commercial fleet damage
- 700+ Tribal jobs
- 31% of Grays Harbor workforce are marine resource dependent jobs

Marine resource dependent jobs account for up to 36% of the available workforce in the counties along the coast. GH 31%; Pacific 36%; Jefferson 26%; Clallam 22%; Wahkiakum 26%.

SUMMARY

What is Next?

What are the cumulative effects of these projects?

We need to insist on a rigorous EIS (environmental impact statement) to analyze the impacts from the three projects including the impacts of capacity of rail and shipping.


We do not inherit the earth
from our parents
We borrow it from our
children
Chief Sealth

Don’t talk crude, we can do better

Citizens for a Clean Harbor

Thank you for joining us this evening

www.cleanharbor.org

PO Box 35 Hoquiam, 98550

SEND COMMENTS TO

Comments concerning MDNS and other permits

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