9) Response to Follow-up to Questions from Earth Justice

From:	Irene Gutierrez
To:	DL - City Council; City Clerk; Cole, Doug; Cappio, Claudia; Schaaf, Libby
Cc:	Jessica Yarnall Loarie (jessica.yarnall@sierraclub.org)
Subject:	Public Comments Following September 21, 2015 Public Health and Safety Hearing - Part 2
Date:	Tuesday, October 06, 2015 2:56:52 PM
Attachments:	Joint Letter to City Administrator (10-06-2015).pdf Att 3 - December 2013 Oakland Global Newsletter.pdf Att 4 - CTC Letter.pdf Att 5 - Oakland City Council Presentation.pdf Att 6 - Sahu Expert Report.pdf Att 7 - APR-D-15-00036_accepted_jaffe.pdf

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Dear Mr. Cole –

Please see the attached comment letter following up to points raised during the September 21, 2015 public health and safety hearing and to points raised by the Assistant City Administrator on September 28, 2015.

This email attaches the comment letter and exhibits 3-7 out of 7.

Should you have any questions, please do not hesitate to contact me or Jessica Yarnall Loarie.

Best regards,
Irene

Irene Gutierrez
Associate Attorney
Earthjustice
50 California Street, Suite 500
San Francisco, CA 94111
Telephone 415 217 2000
Fax 415 217 2040
www.earthjustice.org

September 14, 2015

Via Overnight Mail

Oakland City Administrator
1 Frank Ogawa Plaza, 3rd Floor
Oakland, CA 94612

Re: Proposed Oakland Coal Export Terminal

To the Oakland City Administrator:

On September 1, 2015, the Sierra Club, West Oakland Environmental Indicators Project, San Francisco Baykeeper, and Communities for a Better Environment submitted comments to the City Administrator's office objecting to the proposed development of California's largest coal export terminal at the former Oakland Army Base, now known as the Oakland Global Trade and Logistics Center ("Oakland Global"). That letter provided community advocates' reasons for objecting to the coal export terminal, including information about the various health, safety, and environmental implications of exporting coal.

This letter supplements the September 1, 2015 letter by providing additional information on the health, safety and environmental harms created by operating a marine coal export terminal on the Oakland waterfront. This letter provides information about the effects of comparable coal export terminals in the Pacific Northwest, specifically:

1. May 3, 2012 and January 8, 2013 comment letters submitted by Columbia Riverkeeper, the Sierra Club and other organizations on the proposed Morrow Pacific coal terminal, a comparable coal terminal located in Oregon. Those comment letters and supporting exhibits are contained within **Disk A – Coyote Islands** on the DVD enclosed with this letter.

2. A January 21, 2013 comment letter submitted by Columbia Riverkeeper, the Sierra Club and other organizations on the proposed Gateway Pacific coal terminal and Custer Spur rail expansion project located in

Washington state. That comment letter and supporting exhibits are contained within **Disk B – Pacific Coal** on the DVD enclosed with this letter.

3. A November 15, 2013 comment letter prepared by Earthjustice on the proposed Millennium Bulk Terminals – Longview Shipping Facility, a comparable coal export terminal located in Washington State. That comment letter and supporting exhibits are contained within **Disk C – Millenium Bulk 1** and **Disk D – Millenium Bulk 2** on the DVD enclosed with this letter.

These proposed facilities are similar to the proposed Oakland coal export facility. Thus, the analysis of the effects of these terminals will instructive in understanding the potential effects of the Oakland coal export facility.

Thank you for your consideration of these comments. As you are aware, community groups are greatly concerned about the serious health and safety consequences of allowing coal exports to pass through Oakland. The City of Oakland has the chance to act as a local and national leader in committing to protect its residents from a dangerous fossil fuel and should act now to prevent the development of the proposed coal export terminal.

Sincerely,

Irene Gutierrez, Attorney
Earthjustice

On behalf of:
Sierra Club, West Oakland Environmental Indicators Project, Communities For A Better Environment, and San Francisco Baykeeper

Encl. (DVD)

cc: City of Oakland
Port of Oakland

February 20, 2013

via Facsimile and Email

City's Clerks Office
Public Records Request
City of Oakland
1 Frank Ogawa Plaza, Room 101
Oakland, CA 94612
Fax: 510-238-2228
Email: records@oaklandnet.com

Dear Public Records Clerk:

Pursuant to the California Public Records Act (CPRA), Govt. Code §§ 6250-6270, Sierra Club is writing to request the documents described below.

Sierra Club is the nation's oldest grassroots organization. It has nearly 600,000 members nationwide, including more than 141,000 members in California. Sierra Club is dedicated to the protection and preservation of the natural and human environment. Sierra Club's purpose is to explore, enjoy and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments.

One of Sierra Club's priority national conservation campaigns involves promoting smart energy solutions. Sierra Club is particularly interested in ensuring that coal mines and ports comply fully with all applicable statutes and regulations. This campaign organizes individuals regionally and nationwide to work on coal-related issues and educates the public on these issues, including the impacts of coal on air and water quality.

Sierra Club hereby requests copies of the following materials:

- All records[1] relating to <u>any</u> proposal to export, store, or use coal at the Port of Oakland, including, but not limited to:

[1] For the purposes of this request, the term "records" means information of any kind, including writings (handwritten, types, electronic, or otherwise produced, reproduced, or stored), letters, memoranda, correspondence, notes, applications, completed forms, studies, reports, reviews, guidance documents, policies, telephone conversations, telefaxes, e-mails, documents, databases, drawings, graphs, charts, photographs, minutes of meetings, electronic and magnetic recordings of meetings, and any other compilation of data from which information can be

a. any records related to coal exports and/or storage at the Oakland Army Base Redevelopment Project, hereafter ("OARB")[2]; including, but not limited to coal exports and/or storage at the proposed Oakland Bulk and Oversized Terminal, also known as the West Gateway Break Bulk Terminal project, hereafter ("West Gateway Project"); and
b. any records, related to rail improvements to facilitate coal exports and/or storage at the Port of Oakland, OARB or the West Gateway Project; and
c. any records related to coal storage, export, or handling at an existing or proposed facility; and
d. any and all emails, minutes, and/or notes from meetings between the City, City staff, the Port of Oakland, prospective developers, prospective lessees, which address potential or pending proposals to export, store, or use coal at the Port of Oakland, OARB or the West Gateway Project; and
e. any and all communications (letters, emails, applications) between the City, City staff, Port Commissioners, state or federal agencies, and/or others which discuss potential or pending proposals to export, store, or use coal at the Port of Oakland, OARB and the West Gateway Project; and
f. any applications for coal export terminals or multi-commodity terminals that include coal exports, or proposals to use or store coal at the Port of Oakland, OARB and the West Gateway Project.

Exempt Records

There is no basis for claiming that the records requested herein are exempt from immediate disclosure under the CPRA. Each of these records falls within Govt. Code §§ 6250-6270 as information an agency is required to make available to the public. If, however, it is your position that any portion of the requested records is exempt from disclosure, we request that pursuant to Govt. Code § 6255(a) ("the agency shall justify withholding any record by demonstrating that the record in question is exempt under express provisions of this chapter...and…the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record") that you provide us with a detailed explanation of why you consider each portion exempt.

In the event that some portions of the requested documents are properly exempt from disclosure as required by Govt. Code § 6253(a), the agency always bears the burden of justifying nondisclosure, and ("any reasonably segregable portion…shall be available for inspection…after deletion of the portions which are exempt.", please redact the exempt portions and provide the remainder of the record to Sierra Club at the address listed below. If it is your position that a document contains non-exempt segments but that those non-exempt segments are so dispersed throughout the document as to make segregation impossible, please state what portion of the

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obtained. Without limitation, the records requested include records relating to the topics described below at any stage of development, whether proposed, draft, pending, interim, final, or otherwise. All the foregoing are included in this request if they are in the possession of or otherwise under the control of the City of Oakland.

[2] Plan to develop Oakland Army Base coming into focus, January 10, 2012, found at: http://www.contracostatimes.com/news/ci_19709014?source=rss.

document is non-exempt and how the material is dispersed throughout the document. If a request is denied in whole, please state specifically that it is not reasonable to segregate portions of the record for release.

Fee Waiver Request

We respectfully request that any fee for the processing, production, or replication of the requested documents be waived pursuant to Public Records Act § 6253. *See N. County Parents Organization v. Dep't of Educ.*, 23 Cal.App.4th 144, 148 (1994) (public agencies have the power to waive fees related to record requests by nonprofit organizations pursuant to Cal. Govt. Code § 6253.1, which is now located at Cal. Govt. Code § 6253(e)). A waiver is appropriate in this case for the following reasons:

1. Sierra Club is a nonprofit, public interest organization of limited resources; paying significant fees would pose a hardship on the Club. Additionally, this information will not be used for commercial purposes.

2. The waiver of fees for Sierra Club is in the public interest because furnishing the requested documents primarily benefits the general public. Sierra Club represents 141,000 members throughout the State of California. A fee waiver will enable Californians and local residents concerned about, and directly impacted by, pollution from the handling, export, storage, transport, or use of coal, to become aware of and understand such operations. The information will also facilitate an understanding of how the public shoreline is utilized and any potential environmental impacts associated with these operations. Further, it will raise awareness about how public monies are being spent on the OARB; thus, the waiver of fees in this case is in the public interest.

If for any reason the City of Oakland does not waive the fees, please notify us immediately with the reasons for the denial and the costs that would be involved prior to any copying of the documents. Nothing in this request is to constitute any waiver of Sierra Club's right to seek administrative or judicial review of any denial of its fee waiver request and/or rejection of its fee category assertion.

Records Delivery

We request that the City of Oakland comply with all relevant deadlines and other obligations set forth in the CPRA. Please respond to this request promptly, as required by Govt. Code § 6253(c), which states, that "within 10 days from receipt of the request...the agency…shall *promptly* notify the person making the request of the determination and the reasons therefor."

If you have any questions about this request or foresee problems in fully releasing the requested records promptly, please contact me by phone at (415) 977-5636 or by email at jessica.yarnall@sierraclub.org within that time period. We appreciate your cooperation and would be happy to clarify this request or otherwise simplify your efforts to comply. Additionally, to facilitate delivery, please email electronic copies of the requested documents to this email address. If an electronic version is unavailable, please send copies to my attention at the mailing address below. Thank you for your assistance.

Sincerely,

Jessica Yarnall Loarie
Associate Attorney
Sierra Club
Environmental Law Program
85 Second St, Second Floor
San Francisco, CA 94105

February 20, 2013

via Facsimile and Email

Public Information Officer
John Betterton
Port of Oakland
530 Water Street
Oakland, CA 94607
Fax: (510) 839-5104
Email: jbetterton@portoakland.com

Dear Mr. Betterton,

Pursuant to the California Public Records Act (CPRA), Govt. Code §§ 6250-6270, Sierra Club is writing to request the documents described below.

Sierra Club is the nation's oldest grassroots organization. It has nearly 600,000 members nationwide, including more than 141,000 members in California. Sierra Club is dedicated to the protection and preservation of the natural and human environment. Sierra Club's purpose is to explore, enjoy and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments.

One of Sierra Club's priority national conservation campaigns involves promoting smart energy solutions. Sierra Club is particularly interested in ensuring that coal mines and ports comply fully with all applicable statutes and regulations. This campaign organizes individuals regionally and nationwide to work on coal-related issues and educates the public on these issues, including the impacts of coal on air and water quality.

Sierra Club hereby requests copies of the following records:

- All records[1] relating to <u>any</u> proposal to export, store, or use coal at the Port of Oakland, including, but not limited to:

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a. any records related to coal exports and/or storage at the Oakland Army Base Redevelopment Project, hereafter ("OARB")[2]; including, but not limited to coal exports and/or storage at the proposed Oakland Bulk and Oversized Terminal, also known as the West Gateway Break Bulk Terminal project, hereafter ("West Gateway Project"); and
b. any records, related to rail improvements to facilitate coal exports and/or storage at the Port of Oakland, OARB or the West Gateway Project; and
c. any records related to coal storage, export or handling at the Port of Oakland; and
d. any and all emails, minutes, and/or notes from meetings between the Port of Oakland and prospective or current lessees, prospective developers, prospective rail service providers[3] which address potential or pending proposals to export, store, or use coal at the Port of Oakland, OARB or the West Gateway Project; and
e. any and all communications (letters, emails, applications) between Port of Oakland's staff, commissioners, city agencies, state agencies, and/or others which discuss potential or pending proposals to export, store, or use coal at the Port of Oakland, OARB or the West Gateway Project; and
f. any applications for coal export terminals or multi-commodity terminals that include coal exports, or proposals to use or store coal at the Port of Oakland, OARB and the West Gateway Project.

Exempt Records

There is no basis for claiming that the records requested herein are exempt from immediate disclosure under the CPRA. Each of these records falls within Govt. Code §§ 6250-6270 as information an agency is required to make available to the public. If, however, it is your position that any portion of the requested records is exempt from disclosure, we request that pursuant to Govt. Code § 6255(a) ("the agency shall justify withholding any record by demonstrating that the record in question is exempt under express provisions of this chapter...and…the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record") that you provide us with a detailed explanation of why you consider each portion exempt.

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[2] Plan to develop Oakland Army Base coming into focus, January 10, 2012, found at: http://www.contracostatimes.com/news/ci_19709014?source=rss.

[3] *See* Special Meeting of the Board of Port Commissioners, January 10, 2013 at pp. 33 – 36, found at: http://www.portofoakland.com/pdf/boar_shee_130110.pdf (noting that Anacostia had experience managing bulk terminal operations in Southern California involving coal, pet coke and ash that would be similar to the Oakland proposal.)

deletion of the portions which are exempt.", please redact the exempt portions and provide the remainder of the record to Sierra Club at the address listed below. If it is your position that a document contains non-exempt segments but that those non-exempt segments are so dispersed throughout the document as to make segregation impossible, please state what portion of the document is non-exempt and how the material is dispersed throughout the document. If a request is denied in whole, please state specifically that it is not reasonable to segregate portions of the record for release.

Fee Waiver Request

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1. Sierra Club is a nonprofit, public interest organization of limited resources. Paying significant fees would pose a hardship on the Club. This information will not be used for commercial purposes and will be distributed to the public.

2. The waiver of fees for Sierra Club is in the public interest because furnishing the requested documents primarily benefits the general public. Sierra Club represents 141,000 members throughout the State of California. A fee waiver will enable Californians and local residents concerned about, and directly impacted by, pollution from the handling, export, storage, transport, or use of coal, to become aware of and understand such operations. The information will also facilitate an understanding of how the public shoreline is utilized and any potential environmental impacts associated with these operations. Further, it will raise awareness about how public monies are being spent on the OARB; thus, the waiver of fees in this case is in the public interest.

If for any reason the Port of Oakland does not waive the fees, please notify us immediately with the reasons for the denial and the costs that would be involved prior to any copying of the documents. Nothing in this request is to constitute any waiver of Sierra Club's right to seek administrative or judicial review of any denial of its fee waiver request and/or rejection of its fee category assertion.

Records Delivery

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would be happy to clarify this request or otherwise simplify your efforts to comply. Additionally, to facilitate delivery, please email electronic copies of the requested documents to this email address. If an electronic version is unavailable, please send copies to my attention at the mailing address below. Thank you for your assistance.

Sincerely,

Jessica Yarnall Loarie
Associate Attorney
Sierra Club
Environmental Law Program
85 Second St, Second Floor
San Francisco, CA 94105

Jessica Yarnall Loarie <jessica.yarnall@sierraclub.org>

Fwd: FW: Public Records Request re coal at OAB

2 messages

David Abell <david.abell@sierraclub.org> Wed, Mar 27, 2013 at 1:46 PM
To: Jessica Yarnall Loarie <Jessica.Yarnall@sierraclub.org>

fyi - yeah, they have you has Jessica Varnall (hence why did not receive this)

---------- Forwarded message ----------
From: **Bondi, James** <JBondi@oaklandnet.com>
Date: Tue, Mar 26, 2013 at 1:54 PM
Subject: FW: Public Records Request re coal at OAB
To: jessica.varnall@sierraclub.org, david.abell@sierraclub.org
Cc: "Flores-Medina, Arlette" <AFlores@oaklandcityattorney.org>

To Whom It May Concern,

I was informed yesterday by staff with the Office of the City Attorney that your agency is claiming not to have received any response from the City to a records request you made in February, 2013.

Please see the message below, originally sent to your organization on February 25, 2013, informing you that the City of Oakland has no records which are responsive to your request. The City will continue to consider your request closed. As noted previously, please be aware that the Port of Oakland is a legally distinct governmental body over which the City of Oakland has no authority, and any request for records from the Port would have to be made to them directly.

Sincerely,

James A. Bondi

City Administrator Analyst

Office of the City Administrator

510-238-6654

From: Wang, Hui
Sent: Monday, February 25, 2013 4:32 PM
To: 'jessica.varnall@sierraclub.org'
Cc: Cole, Doug; Bondi, James
Subject: Public Records Request re coal at OAB

Dear Ms. Varnall

The City has no record of any proposal, communications, or notes from meetings that relate to the export, storage, or use of coal in the OARB. Nor have we received any applications for coal export terminals or multi-commodity terminals that include coal exports at the OARB.

Please note the Port of Oakland's operations are separate from the City's and we have no access to their records. The Port of Oakland did not discuss coal export when we worked together on preparing the Army Base Infrastructure Master Plan and associated CEQA analysis, so to our knowledge that commodity is not part of the Army Base project. You would need to confirm directly with the Port whether or not it has received any proposals or is in discussions with prospective developers regarding the export or use of coal at the Port of Oakland.

Hui Wang

Office of Neighborhood Investment

250 Frank H. Ogawa Plaza, Suite 5313

Oakland, CA 94612

t: 510.238.7693

f: 510.238.3691

Jessica Yarnall Loarie <jessica.yarnall@sierraclub.org> Wed, Mar 27, 2013 at 2:06 PM
To: JBondi@oaklandnet.com
Cc: AFlores@oaklandcityattorney.org, David Abell <david.abell@sierraclub.org>

Mr. Bondi,

Thank you for your response. It appears that you spelled my email address wrong (Yarnall, not Varnall) which is why I did not get this response--I only received it now via my colleague, David Abell. We have also sent a similar request to the Port of Oakland.

Best,

Jessica Yarnall Loarie
Associate Attorney
Sierra Club Environmental Law Program
85 Second St, 2nd Floor
San Francisco, CA 94105
Tel: (415) 977-5636
Fax: (415) 977-5793
jessica.yarnall@sierraclub.org

CONFIDENTIAL LEGAL COMMUNICATION/WORK PRODUCT
This email may contain privileged and confidential communications and/or confidential attorney work product. If you receive this email

inadvertently, please reply and notify the sender and delete all versions from your system. Thank You.

[Quoted text hidden]

Bulk Rail Terminal Feasibility Study

Port of Oakland
Oakland, California

September 7, 2012

Prepared For:

PORT OF OAKLAND

Port of Oakland
530 Water Street, 2nd Floor
Oakland, CA 94607
Phone: (510) 627-1100
Fax: (510) 272-9329

Prepared By:

TranSystems
EXPERIENCE | Transportation

TranSystems
505 14th Street, Suite 1000
Oakland, CA 94612
Phone: (510) 835-2761
Fax: (510) 835-9839

TranSystems
505 14th Street
Suite 1000
Oakland, CA 94612
Tel 510 835 2761
Fax 510 835 9839

September 7, 2012

Port of Oakland - Bulk Rail Terminal Feasibility Review

Summary:

The Port of Oakland is interested in exploring the feasibility of developing a bulk rail terminal to handle iron ore or other similar bulk products for export to Asia, at three potential locations at the Port. The three rail-to-vessel transload facility locations considered were:

- Berth 33;
- Roundhouse property (former UP auto facility), located between Schnitzer Steel and the APL Terminal; and
- Howard Terminal.

Rail service to any of these locations would make use of rail car storage at the future Outer Harbor Intermodal Terminal (OHIT) support tracks, if possible.

TranSystems' scope of work included:

- Developing conceptual drawings and supporting documents to assess physical layout feasibility. Associated with each conceptual layout, cost estimates were made and cost estimate assumptions were documented. A summary of criteria and advantages/disadvantages relating to the layouts was prepared.
- Through discussions with the Port and with a potential user/operator, TranSystems developed variations on the original three alternatives based upon comments received.

This document compiles the various work products prepared in the course of TranSystems' conceptual level work. The preferred site plans developed are included in *Appendix A* of this document. Each site includes 6 warehouses with a yard track configuration to accommodate one unit train. The Berth 33 option shown in *Exhibit 8* appears to be the most favorable for several reasons. The Berth 33 location allows unit trains to be spotted at the future OHIT yard and shuttled to the bulk terminal with less added rail congestion in the Port area. The other two of the preferred site plans involved more potential impact to Union Pacific Railroad at their intermodal yard.

Advantages and disadvantages of each of the proposed sites are included in this document. Capacity analysis for the sites has shown that if the site were able to be served by 4 unit trains per week this would equate to a throughput of about 2.5M to 3.5M metric tons annually. The cost for such a facility, included in *Appendix B*, was estimated to be around $90 million.

Ideally, a bulk terminal would have adequate space for loop track operations, however given the available sites and their size constraints, a loop track would only work if it had very tight track curvature, which is not recommended. The feasibility of providing loop tracks with acceptable curvature was explored but deemed infeasible. Options that were considered but deemed infeasible are included in *Appendix D – Site Plans Withdrawn from Consideration*.

Next Steps:

Additional steps to further defining bulk terminal options could include:

- Economic/ market study to assess potential market and revenue generation for the Port.
- Resolve property and tenant impacts including preliminary discussions with adjacent Port tenants.
- Obtain Union Pacific Railroad comment on rail transportation issues.
- Discussions with prospective bulk terminal operators for assessments of interest, operating costs, development costs, potential for development partnerships, etc.
- Preliminary engineering studies and site investigations.

Port of Oakland

Bulk Rail Terminal Feasibility Study

Rail layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland

Table of Contents:

- Description of Facilities and Operations
    - General Planning Parameters
    - Facility Operations
- Evaluation of Alternatives: Summary of Advantages and Disadvantages
    - Exhibit 1: Roundhouse Property- Yard Option
    - Exhibit 2: Roundhouse Property- Loop Option (withdrawn from consideration)
    - Exhibit 3: Berth 33 - Yard Option (withdrawn from consideration)
    - Exhibit 4: Berth 33 - Loop Option (withdrawn from consideration)
    - Exhibit 5: Howard Terminal- Diagonal Yard Option
    - Exhibit 6: Howard Terminal- Wharfside Yard Option (withdrawn from consideration)
    - Exhibit 7: Roundhouse / APL Loop (withdrawn from consideration)
    - Exhibit 8: Berth 33 – Yard Option 2
- Appendix A – Preferred Site Plans
- Appendix B – Cost Estimates
- Appendix C – Capacity Model
- Appendix D – Site Plans Withdrawn from Consideration

Description of Facilities and Operations

General Planning Parameters

- A variety of bulk products would be handled on site and could include iron ore, soda ash, pet coke, sulfur or similar products stored in covered warehouses (versus outdoor stacks, for environmental protection). It is assumed that coal would not be handled at the terminal. Grain product(s) in silos are also shown as an option that could be handled on site as a possible later stage of development.
- For planning purposes, unit trains of 100 cars are used; each car is 53' centerline coupling-to-centerline coupling. (Unit trains in Stockton are 84 car trains, with 3 to 4 trains per week, equivalent to a total throughput of 1,100,000 metric tons per year.)
- The amount of covered warehouse /silo storage space would depend on site configuration and space; on number and type of products, volume anticipated and throughput. For comparative cost estimating, the cost associated with approximately 6 warehouses (approximately132,600 square feet of warehouse space) has been used in all cost estimates. (As an example, MetroPorts facility at Pier G in Long Beach uses 135,000 square feet of warehouses, which are peaked roof and have wall height of about 32'. Each of these warehouses stores 175,000 metric tons of coal. Stored volume of density varies based on product type.)
- 50' dredge depth for vessels is ideal for 70 -80 ton Panamax vessels. Loading in Oakland, making a single stop, would be desirable over loading in Stockton (35' depth is limiting) and topping off in Richmond. A Panamax vessel would be approximately 740' long; and would need a berth of about 850' long to have space for tie-off. Vessel capacity would be approximately 78,000 metric tons. A two berth facility would provide more flexibility for the operator and more potential for growth than a facility that was limited to only one vessel. Of the three sites, Howard Terminal has space for two vessels.
- A single shiploader at one berth would be assumed for the first phase of development.
- Approximately 25 acres would be needed at a minimum; up to approximately 50 acres would be ideal.
- A loop track layout would be operationally preferred over a yard layout, if space allows. Space constraints at the candidate sites do not allow a loop track option. (Even if a significant impact into the APL terminal were allowed, then a loop track configuration of the tightest curvature desired by UP (7 degrees, 30 minutes) could not be accommodated.)
- While material would be conveyed to top load the vessel without particular distance limitation, cost of conveyance (approximately $2500/LF) can be reduced of the to the extent lengths of conveyor linking pit- to - warehouse/silo and warehouse/silo – to - vessel can be minimized.
- Facility/ utility needs at terminal:
    - Significant power need (for conveyor system). Associated monthly power usage and peak demand are variable based upon terminal design and planned conveyance distance.
    - Water (for dust suppression, fire protection, service to small operations buildings).

    - Storm drainage, with consideration for water quality due to proximity to bay.
    - Single entrance gate.
    - Perimeter fence.
    - Small/modular building for operator; second small/modular building for ILWU.
- Assume facility would be unit train-to –vessel only, not unit train- to –truck; and would therefore not have provision for bulk products handled by truck.
- Port revenue could include:
    - Approximately $1.50/ton handled.
    - Approximately$30/rail car fee.
    - Lease revenue.
    - Berth/dock revenue.
- Shipper might anticipate having 4 unit trains in total running between the point of origin to the Port, with two heading westbound and two heading eastbound at any time.

Facility Operations

- If space allowed, the full unit train would be brought into the facility and unloaded. However, the candidate sites do not have sufficient space for a train arrival/departure track or loop. Therefore, the unit train would need to be brought into the closest yard location possible (UP yard or OHIT) and groups of cars would be switched in from the location to the bulk terminal.) UP would probably be reluctant to use track in its yards for this purpose, but a meeting between the Port of Oakland and UP was to be held in early August to discuss concepts.
- Railcars bottom-dump into pits as they move. The net volume unloaded could be up to approximately 120 cars unloaded to the pits in 3 hours. The pits would be located on tangent track. Where space allows, the length of pit would accommodate 3 railcars unloading at once.
- Material is moved via covered conveyor to load into the top of covered warehouses (for iron ore, for example) or to silos (for grain). Conveyors would operate at approximately 1200 feet per minute. Space within warehouses is segregated by product type. Product is only envisioned to dwell long enough to hold the unit train's product till vessel call.
- Material is moved via covered conveyor from warehouse/silo to vessel. Loading rate into vessel: approximately 30,000 metric tons in three 8-hour shifts. Ship loader rate is approximately 1250 metric toner per hour. Vessel may need to be berthed for 48 hours.
- Conveyance system would also need to allow product to load directly from train to shiploader, so operator would have flexibility to gain some efficiency loading the vessel if timing of train arrival and ship call coincide closely.
- Fewer than around 10 personnel would be expected to work at the facility. It is assumed that the terminal would operate two shifts per day (16 hours total), with net efficiency of about 14 hours/day from the two shifts.
- Conveyors could be used for different products, but would need to be cleaned between uses for differing products, if products are disparate.

Evaluation of Alternatives: Summary of Advantages and Disadvantages

Exhibit 1: Roundhouse Property- Yard Option

- Depth at berth is 42': adequate for Panamax vessels.
- Layout impacts rail use needs at the Schnitzer Steel property, require diamond crossing, however, access to Schnitzer and wye track maintained.
- Coordination between bulk terminal switching and Schnitzer switching may be challenging.
- APL terminal vessel berth would be used; and would need to be negotiated /coordinated with APL. Should container terminal needs increase in the future, could be competition for this berth.
- Full unit train could be positioned at the yard, but full train could not arrive at yard and would rely on use of UP track, which might not be acceptable to UP.

Exhibit 2: Roundhouse Property- Loop Option (withdrawn from consideration)

- Depth at berth is 42': adequate for Panamax vessels. APL terminal vessel berth would be used; and would need to be negotiated /coordinated with APL.
- Loop track facility would be seen as advantageous to terminal operator, but the tightness of the curve (11 degrees, 45 if expanded onto the edge of the APL property and about 12 degrees, 30 if limited to the footprint of the Roundhouse property) that would be required to fit on site is overly tight. Approximately 7 degree curve would be typical, more ideal criteria. The existing track curvature at Schnitzer is about 15 degrees: even tighter.
- Layout impacts rail use needs at the Schnitzer Steel property.
- Existing track condition to be verified if adequate for re-use.
- **Even with some infringement onto the APL property, the loop option is not recommended due to overly tight track curvature.**

Exhibit 3: Berth 33 - Yard Option (withdrawn from consideration)

- Depth at berth is 50', but limited in vicinity of BART.
- Warehousing siting – and possibly ends of tracks - constrained by location of BART.
- Unit train staging could make use of OHIT and OTR could switch to the site. The short /limited onsite tracks would require more frequent moves: less operationally efficient for terminal operator.
- Track clipping corner of Trapac property may not be feasible.
- Train movement across 7th Street (on curve, at oblique angle) introduces traffic blockage with frequency and safety concern. Previously removed track crossing would need to be re-instated. Road/rail crossings at 7th Street and 7th Street Intersection could cause unmitigatable traffic impacts, or require costly grade separations so as not to impede truck traffic.
- Layout would require removal of existing stockpiles of potentially contaminated material.
- Limited tangent space for unloading pit. Single pit for this concept could be a constraint to terminal throughput.
- Switching operations and more frequent train movements adjacent to park creates an impact, safety risk for park users.

Exhibit 4: Berth 33 - Loop Option (withdrawn from consideration)

- Depth at berth is 50', but limited in vicinity of BART.
- Loop track facility would be seen as advantageous to bulk handler, but the tightness of the curve (12 degrees, 30) that would be required to fit on site is overly tight. Approximately 7 degree curve would be typical criteria. Clipping corner of Trapac property may not be feasible.
- Limited property size and irregular shape creates less efficient layout; however this would an issue with any other proposed use.
- Previously removed track crossing would need to be re-instated. Road/rail crossings at 7th Street and 7th Street Intersection could cause unmitigatable traffic impacts, or require costly grade separations so as not to impede truck traffic.
- Unit train staging could make use of OHIT and OTR could switch to the site. On-site car moving could be by operator.
- **This loop option is not recommended due to overly tight track curvature.**

Exhibit 5: Howard Terminal- Diagonal Yard Option

- Depth at berth is 42': adequate for Panamax vessels. Two berths available would be desirable for terminal operator.
- Possible utility constraints and contaminated soil issues (DTSC site) could drive higher development costs.
- Site has adequate space for future addition of tracks.
- Layout impacts access to Schnitzer property, but less impact on Schnitzer rail switching than Exhibit 1- Roundhouse Option.
- Closer proximity to commercial uses could give rise to complaints about impacts (line of sight impacts, aesthetics, noise, etc.)
- Offices could be moved closer to water with some additional street-side portions of the property leased to others. (Acreage may be more than needed.) Alternatively, offices could be housed in existing buildings.
- Concept shown involves UP switching cars via intermodal facility. Alternatively a new track could be added to switch directly from UP south Oakland yard, but with impacts to existing facilities. This would rely on use of UP track, which might not be acceptable to UP.

Exhibit 6: Howard Terminal- Wharfside Yard Option (withdrawn from consideration)

- Depth at berth is 42': adequate for Panamax vessels. Two berths available would be desirable for terminal operator.
- Tight curvature (12 degrees, 30) needed to clear Schnitzer Steel's property; with adverse geometry exacerbated by reversing curve to dockside yard track.
- Possible utility constraints and contaminated soil issues (DTSC site) could drive higher development costs.
- Layout could impact access to Schnitzer property.
- Yard track lengths, being relatively short will require additional switching.
- Closer proximity to commercial uses could give rise to complaints about impacts (line of sight impacts, aesthetics, noise, etc.)

- Offices could be moved closer to water with some additional street-side portions of the property leased to others. (Acreage may be more than needed.) Alternatively, office could be housed in existing buildings.
- Concept shown involves UP switching cars via intermodal facility. Alternatively a new track could be added to switch directly from UP south Oakland yard, but with impacts to existing facilities.
- **This option is not recommended due to overly tight track curvature and short yard tracks.**

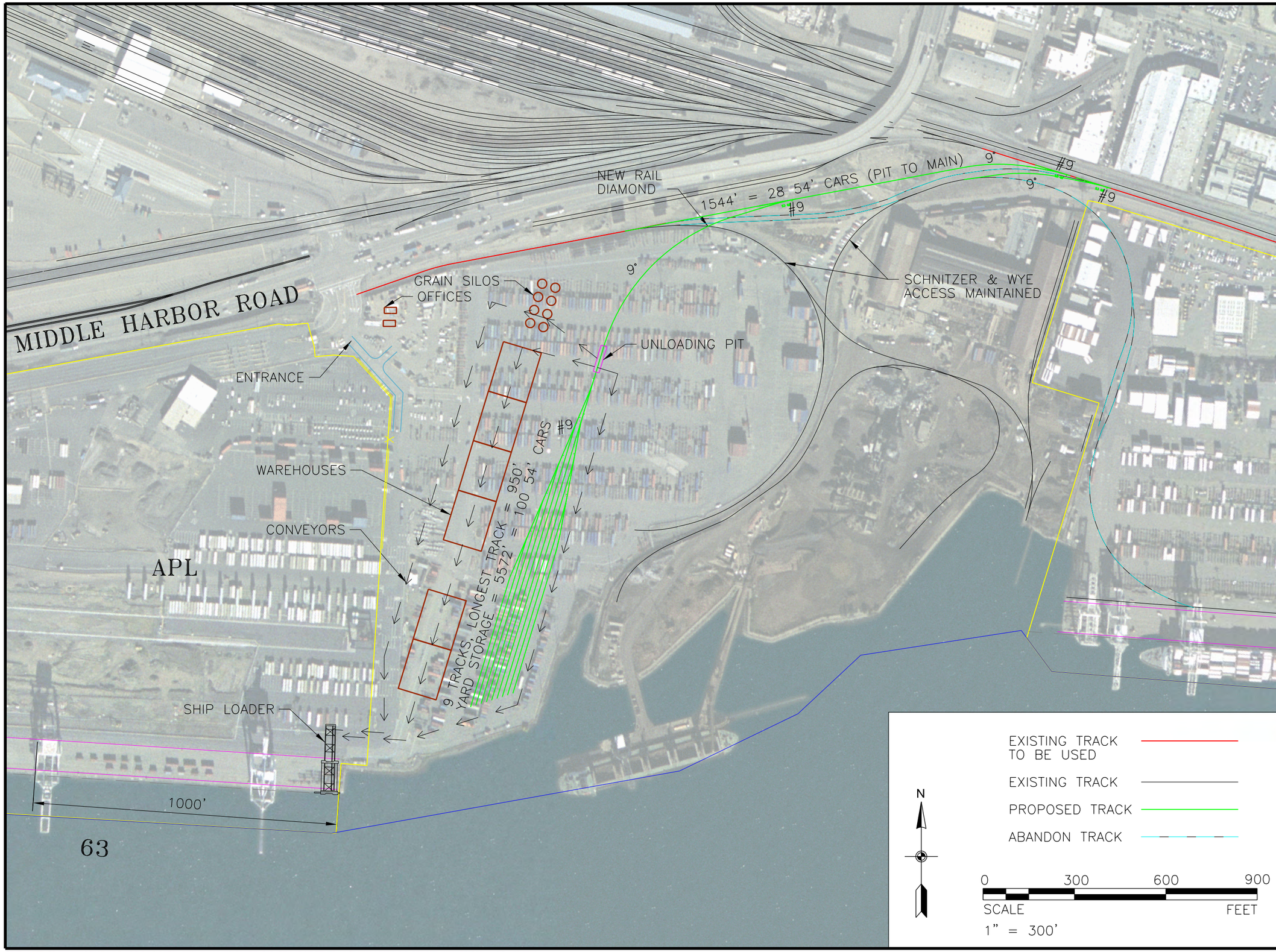
Exhibit 7: Roundhouse / APL Loop (withdrawn from consideration)

- Depth at berth is 42': adequate for Panamax vessels. APL terminal vessel berth would be used.
- Significant amount of APL terminal, presently outfitted as container terminal, would be impacted such that past investment could not be recouped due to change in use.
- Limited tangent length for unloading pit could be a throughput constraint.
- Existing buildings could be used for offices
- Loop track option would be preferred by terminal operator but would be a curvature tighter than UP desired minimum. Space constraints allow about 9 degree curvature. Approximately 7 degree curve would be typical, more ideal criteria. UP would not want to see track tighter than 7 degrees, 30 minutes.
- With large acreage of terminal, having only one berth would be a constraint. Size of facility could be larger than required, maximizing land to be leased, but with less revenue production per acre.

Exhibit 8: Berth 33 – Yard Option 2

- Depth at berth is 50', but limited in vicinity of BART.
- Warehousing siting – and possibly ends of tracks - constrained by location of BART.
- Improve land use as compared to the Exhibit 3 Yard Option. Minimal curvature is beneficial for operations.
- Unit train staging could make use of OHIT and OTR could switch to the site. The short /limited onsite tracks would require more frequent moves: less operationally efficient for terminal operator.
- Train movement across 7th Street (on curve, at oblique angle) introduces traffic blockage with frequency and safety concern. Previously removed track crossing would need to be re-instated. Road/rail crossings at 7th Street and 7th Street Intersection could cause unmitigatable traffic impacts, or require costly grade separations so as not to impede truck traffic.
- Layout would require removal of existing stockpiles of material. Per Port, this material is not contaminated.
- Switching operations and more frequent train movements adjacent to park creates an impact, safety risk for park users.
- Siting bulk terminal use at westernmost site might be more desirable in terms of traffic impact at 7th Street; but this option has not been considered at this time.

Appendix A – Preferred Site Plans



TranSystems
505 14TH STREET
SUITE 1000
OAKLAND CA 94612
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CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/20/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

ROUNDHOUSE YARD OPTION

EXHIBIT 1
PORT 023

alimburg
7/20/2012 - 2:58:21 PM - G:\OK12\0041\Rail\Exhibits\EX-1 Roundhouse Area.dgn

MIDDLE HARBOR ROAD

1750' TAIL LENGTH

9°

#9

UNLOADING PIT

MARKET STREET

BRUSH STREET

OFFICES

ENTRANCE

MLK WAY

EMBARCADERO

SCHNITZER & WYE ACCESS MAINTAINED

POSSIBLE ALTERNATIVE SCHNITZER ACCESS AROUND TAIL TRACK

ROUNDHOUSE PROPERTY

GRAIN SILOS

4 TRACKS, LONGEST TRACK = 1668'

YARD STORAGE = 5800' = 110 54' CARS

6°

CONVEYORS

WAREHOUSES

SHIP LOADER

1000'

67

X_{DEPTH} = −42'

1000'

68

X_{DEPTH} = −50'

EXISTING TRACK TO BE USED

EXISTING TRACK

PROPOSED TRACK

ABANDON TRACK

N

0 300 600 900

SCALE FEET

1" = 300'

TranSystems

505 14TH STREET
SUITE 1000
OAKLAND CA 94612
PHONE: 510-835-2761
FAX: 510-835-9839

CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY

OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/20/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

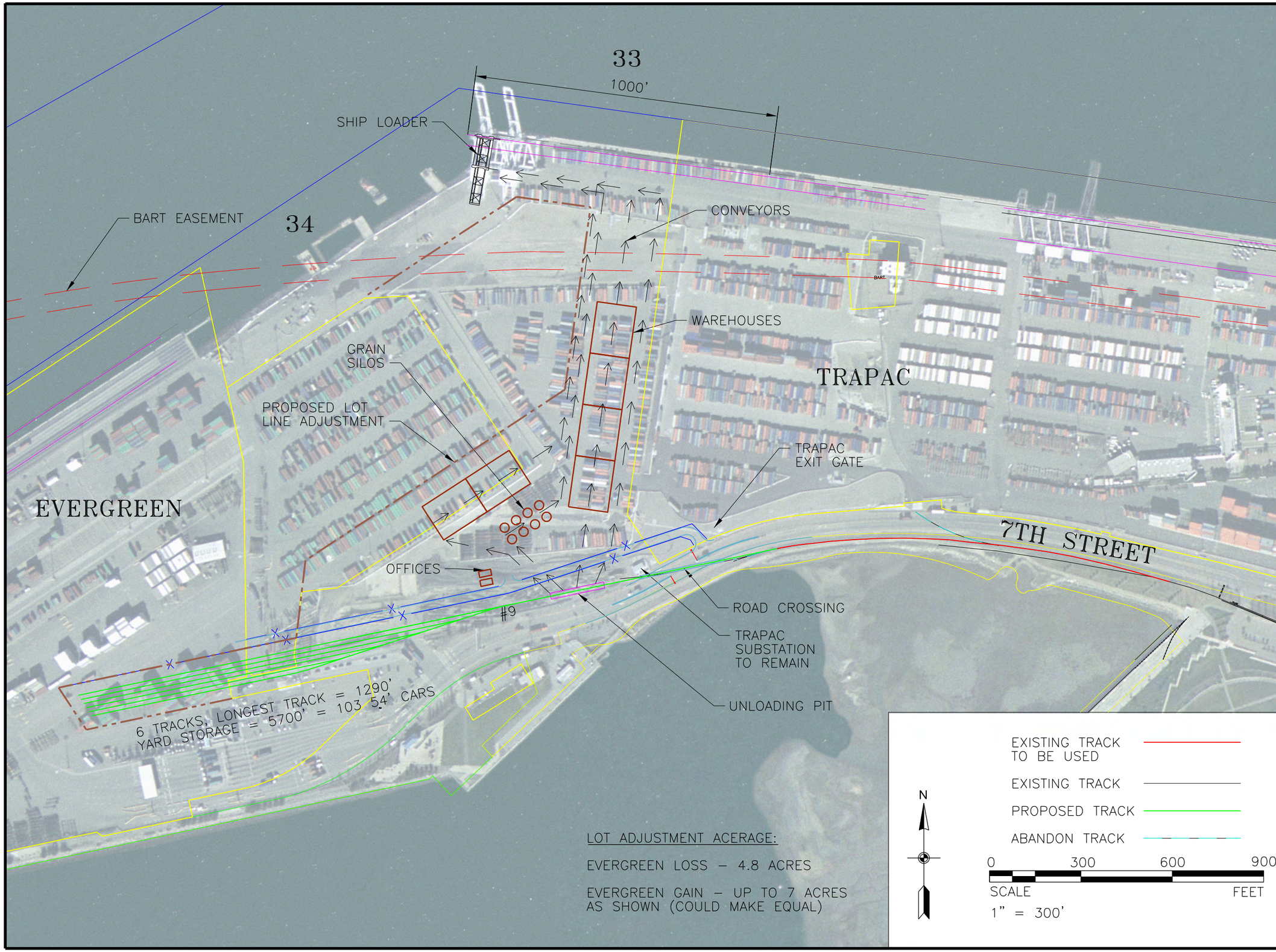
SHEET TITLE

HOWARD TERMINAL

EXHIBIT 5

PORT 024

alimburg
7/20/2012 - 2:29:23 PM - G:\OK12\0041\Rail\Exhibits\EX-5 Howard Terminal-2.dgn



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CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/20/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: AML

SHEET TITLE

BERTH 33
YARD OPTION 2

EXHIBIT 8
PORT 025

alimburg
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Appendix B – Cost Estimates

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations
Oakland, California

Prepared by: TranSystems
Date: Aug 6, 2012
Project Number: P501120044
File Number: g:/501/12/0044/ProjMgmt/5Design/Cost Est/ 12-07-10Roundhouse Yard Cost Est.xlsx

Budget Cost Estimate: Roundhouse - Yard Option (39 acres)

See attached Budget Cost Estimate Assumptions which provide the basis for this estimate.

Item No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Subtotal
1.0	**Site Preparation and Demolition**					
1.1	Layout Staking	1	LS	$ 50,000	$ 50,000	
1.2	Demolition / Site Clearing	1	LS	$ 100,000	$ 100,000	
1.3	Track Removal	1700	TF	$ 50	$ 85,000	
1.4	Turnout Removal	2	EA	$ 20,000	$ 40,000	
1.5	Asphalt Removal (800' x 50' wide) + (200' x 1100')	260,000	SF	$ 4	$ 1,040,000	
	Subtotal					$ 1,315,000
2.0	**Earthwork - Grading**					
2.1	Earthwork ((260,000 x 3' deep)/27)	28,890	CY	$ 20	$ 577,800	
2.2	Cement/Line Treatment of Soils	260,000	SF	$ 2	$ 520,000	
2.3	Erosion Control	1	LS	$ 150,000	$ 150,000	
	Subtotal					$ 1,247,800
3.0	**Trackwork**					
3.1	Relocated Track	0	TF	$ 80	$ -	
3.2	New Track	8850	TF	$ 125	$ 1,106,250	
3.3	RelocatedTurnouts	0	EA	$ 20,000	$ -	
3.4	New Turnouts	10	EA	$ 80,000	$ 800,000	
3.5	Derails	1	EA	$ 40,000	$ 40,000	
3.6	Diamond Crossings	1	EA	$ 750,000	$ 750,000	
3.7	Bumping Posts	9	EA	$ 2,500	$ 22,500	
3.8	Unloading Pit	1	LS	$ 500,000	$ 500,000	
3.9	Covered Conveyor Systems	7400	LF	$ 2,500	$ 18,500,000	
	Subtotal					$ 21,718,750
4.0	**Utilities and Miscellaneous Sitework**					
4.1	Track Drainage	8850	LF	$ 100	$ 885,000	
4.2	Utility Crossing Casings - allowance	1	LS	$ 200,000	$ 200,000	
4.3	On-site Utility Upgrades - allowance	39	AC	$ 85,000	$ 3,315,000	
4.4	Chain Link Fence & Gates - assume no additional needed	0	LF	$ 20	$ -	
4.5	Pavement / Striping Rehabilitation- allowance	39	AC	$ 85,000	$ 3,315,000	
4.6	Concrete Grade Crossing	0	TF	$ 500	$ -	
4.7	Asphalt Pavement	260000	SF	$ 15	$ 3,900,000	
	Subtotal					$ 11,615,000
5.0	**Structures**					
5.1	Materials Storage Buildings (6 products x 22,100 s.f.)- space for more, but to keep consistent among estimates	132,600	SF	$ 150	$ 19,890,000	
5.2	Office Buildings (modular)	6,000	SF	$ 120	$ 720,000	
5.2	Silos	8	EA	$ 800,000	$ 6,400,000	
	Subtotal					$ 27,010,000
	Subtotal					$ 62,906,550.00
	Design/Construction Management	6%				$ 3,774,393.00
	Permits	6%				$ 3,774,393.00
	Subtotal					$ 70,455,336.00
	Contingency	25%				$ 17,613,834.00
	Total					$ 88,069,170.00

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland
Oakland, California

Prepared by: TranSystems
Date: Aug 6, 2012
Project Number: P501120044
File Number: g:/501/12/0044/ProjMgmt/5Design/Cost Est/ 12-07-10Roundhouse Yard Cost Est.xlsx

Budget Cost Estimate: Howard Terminal - Diagonal Yard Option (50 acres)

See attached Budget Cost Estimate Assumptions which provide the basis for this estimate.

Item No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Subtotal
1.0	**Site Preparation and Demolition**					
1.1	Layout Staking	1	LS	$ 50,000	$ 50,000	
1.2	Demolition / Site Clearing	1	LS	$ 100,000	$ 100,000	
1.3	Track Removal - leave on-terminal track & wharfside track as-is	1500	TF	$ 50	$ 75,000	
1.4	Turnout Removal	2	EA	$ 20,000	$ 40,000	
1.5	Asphalt Removal (800' x 50' wide) + (100' x 1700')	210,000	SF	$ 4	$ 840,000	
	Subtotal					$ 1,105,000
2.0	**Earthwork - Grading**					
2.1	Earthwork ((210,000 x 3' deep)/27)	23,340	CY	$ 20	$ 466,800	
2.2	Cement/Line Treatment of Soils	210,000	SF	$ 2	$ 420,000	
2.3	Erosion Control	1	LS	$ 150,000	$ 150,000	
	Subtotal					$ 1,036,800
3.0	**Trackwork**					
3.1	Relocated Track	0	TF	$ 80	$ -	
3.2	New Track	8050	TF	$ 125	$ 1,006,250	
3.3	RelocatedTurnouts	0	EA	$ 20,000	$ -	
3.4	New Turnouts	6	EA	$ 80,000	$ 480,000	
3.5	Derails	1	EA	$ 40,000	$ 40,000	
3.6	Diamond Crossings	0	EA	$ 750,000	$ -	
3.7	Bumping Posts	4	EA	$ 2,500	$ 10,000	
3.8	Unloading Pit	1	LS	$ 500,000	$ 500,000	
3.9	Covered Conveyor Systems	8300	LF	$ 2,500	$ 20,750,000	
	Subtotal					$ 22,786,250
4.0	**Utilities and Miscellaneous Sitework**					
4.1	Track Drainage	7650	LF	$ 100	$ 765,000	
4.2	Utility Crossing Casings - allowance	1	LS	$ 200,000	$ 200,000	
4.3	On-site Utility Upgrades - allowance	50	AC	$ 85,000	$ 4,250,000	
4.4	Chain Link Fence & Gates - assume no additional needed	0	LF	$ 20	$ -	
4.5	Pavement / Striping Rehabilitation- allowance	50	AC	$ 85,000	$ 4,250,000	
4.6	Concrete Grade Crossing	0	TF	$ 500	$ -	
4.7	Asphalt Pavement	210,000	SF	$ 15	$ 3,150,000	
	Subtotal					$ 12,615,000
5.0	**Structures**					
5.1	Materials Storage Buildings (6 products x 22,100 s.f.)- space for more, but to keep consistent among estimates	132,600	SF	$ 150	$ 19,890,000	
5.2	Office Buildings (modular)	6,000	SF	$ 120	$ 720,000	
5.3	Silos	8	EA	$ 800,000	$ 6,400,000	
	Subtotal					$ 27,010,000
	Subtotal					$ 64,553,050.00
	Design/Construction Management	6%				$ 3,873,183.00
	Permits	6%				$ 3,873,183.00
	Subtotal					$ 72,299,416.00
	Contingency	25%				$ 18,074,854.00
	Total					$ 90,374,270.00

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland
Oakland, California

Prepared by: TranSystems
Date: Aug 6, 2012
Project Number: P501120044
File Number: g:/501/12/0044/ProjMgmt/5Design/Cost Est/ 12-07-10Roundhouse Yard Cost Est.xlsx

Budget Cost Estimate: Berth 33 - Yard Option 2 (33 acres)

See attached Budget Cost Estimate Assumptions which provide the basis for this estimate.

Item No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Subtotal
1.0	**Site Preparation and Demolition**					
1.1	Layout Staking	1	LS	$ 50,000	$ 50,000	
1.2	Demolition / Site Clearing	1	LS	$ 100,000	$ 100,000	
1.3	Track Removal	0	TF	$ 50	$ -	
1.4	Turnout Removal	0	EA	$ 20,000	$ -	
1.5	Asphalt Removal (800' x 50' wide) + (1450' x 150 ')	221,500	SF	$ 4	$ 886,000	
	Subtotal					$ 1,036,000
2.0	**Earthwork - Grading**					
2.1	Earthwork ((221,500 x 3' deep)/27)	24,600	CY	$ 20	$ 492,000	
2.2	Cement/Line Treatment of Soils	221,500	SF	$ 2	$ 443,000	
2.3	Erosion Control	1	LS	$ 150,000	$ 150,000	
	Subtotal					$ 1,085,000
3.0	**Trackwork**					
3.1	Relocated Track	0	TF	$ 80	$ -	
3.2	New Track	7550	TF	$ 125	$ 943,750	
3.3	RelocatedTurnouts	0	EA	$ 20,000	$ -	
3.4	New Turnouts	5	EA	$ 80,000	$ 400,000	
3.5	Derails	1	EA	$ 40,000	$ 40,000	
3.6	Diamond Crossings	0	EA	$ 750,000	$ -	
3.7	Bumping Posts	6	EA	$ 2,500	$ 15,000	
3.8	Unloading Pit	1	LS	$ 166,667	$ 166,667	
3.9	Covered Conveyor Systems	9100	LF	$ 2,500	$ 22,750,000	
	Subtotal					$ 24,315,417
4.0	**Utilities and Miscellaneous Sitework**					
4.1	Track Drainage	4400	LF	$ 100	$ 440,000	
4.2	Utility Crossing Casings - allowance	1	LS	$ 200,000	$ 200,000	
4.3	On-site Utility Upgrades - allowance	33	AC	$ 85,000	$ 2,805,000	
4.4	Chain Link Fence & Gates - assume no additional needed	0	LF	$ 20	$ -	
4.5	Pavement / Striping Rehabilitation- allowance	33	AC	$ 85,000	$ 2,805,000	
4.6	Concrete Grade Crossing	200	TF	$ 500	$ 100,000	
4.7	Asphalt Pavement	221,500	SF	$ 15	$ 3,322,500	
	Subtotal					$ 9,672,500
5.0	**Structures**					
5.1	Materials Storage Buildings (6 products x 22,100 s.f.)- space for more, but to keep consistent among estimates	132,600	SF	$ 150	$ 19,890,000	
5.2	Office Buildings (modular)	6,000	SF	$ 120	$ 720,000	
5.3	Silos	8	EA	$ 800,000	$ 6,400,000	
	Subtotal					$ 27,010,000
	Subtotal					$ 63,118,916.67
	Design/Construction Management	6%				$ 3,787,135.00
	Permits	6%				$ 3,787,135.00
	Subtotal					$ 70,693,186.67
	Contingency	25%				$ 17,673,296.67
	Total					$ 88,366,483.33

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland
Oakland, California

Prepared by: TranSystems
Date: Aug 6, 2012
Project Number: P501120044
File Number: g/OK501/12/0044/ProjMgmt/1Client/Meetings/12-08-07CostEstAssumptions.xls

Budget Cost Estimate - ASSUMPTIONS

This construction budget estimate is provided for reference only and represents a professional opinion based on available information. Actual construction costs may vary significantly from the budget estimate depending upon timing of construction, changed conditions, availability of materials and other factors beyond the control of the author. This budget estimate is not a guaranteed maximum figure. In preparing the attached budget estimate, the following assumptions have been made:

This estimate relates to TranSystems rail conceptual layout drawings dated 7/20/12.
This estimate is based on a conceptual engineering level of design.
A 25% contingency is included.
Unit prices used are subject to verification. As shown, they will serve to provide a relative comparison of costs among the various options.
Contractor's general conditions, mobilization, overhead and profit are included in unit costs.
This estimate is based on 2012 dollars.
Costs for design/construction management fees have been included as a percentage of construction cost.
Costs for governmental agency/jurisdiction/other agency fees and permit fees have been included as a percentage of construction cost.
Hazardous material and asbestos abatement and disposal costs are not included.
Maintenance fees and cost for owner's special warranties and bonds are not included.
Costs are assumed as if all modifications would be made by a single contractor, with a single mobilization. The construction site would be assumed not to be under on-going operations/use at the time of construction.
Costs associated with regular facility maintenance are not included.
Costs for special studies such as hazardous materials, noise, air quality or environmental studies of the site are not included.
This estimate does not include property acquisition costs, negotiation costs, nor costs to create easements / adjust property lines.
Pump stations, water quality treatment facilities, special storm water detention facilities, on-site lighting are assumed not to be required. Existing on-site utilities will be used except where local reconfiguration is needed to serve the new facilities.
For purposes of this estimate, it is assumed that the existing available utility infrastructure is adequate to meet facility needs without upgrades outside the limits of the property.

Appendix C – Capacity Model

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland
Oakland, California
SUMMARY CAPABILITY ESTIMATES

Prepared by: TranSystems
Last Revised: Aug 6, 2012
Project Number: P501120044

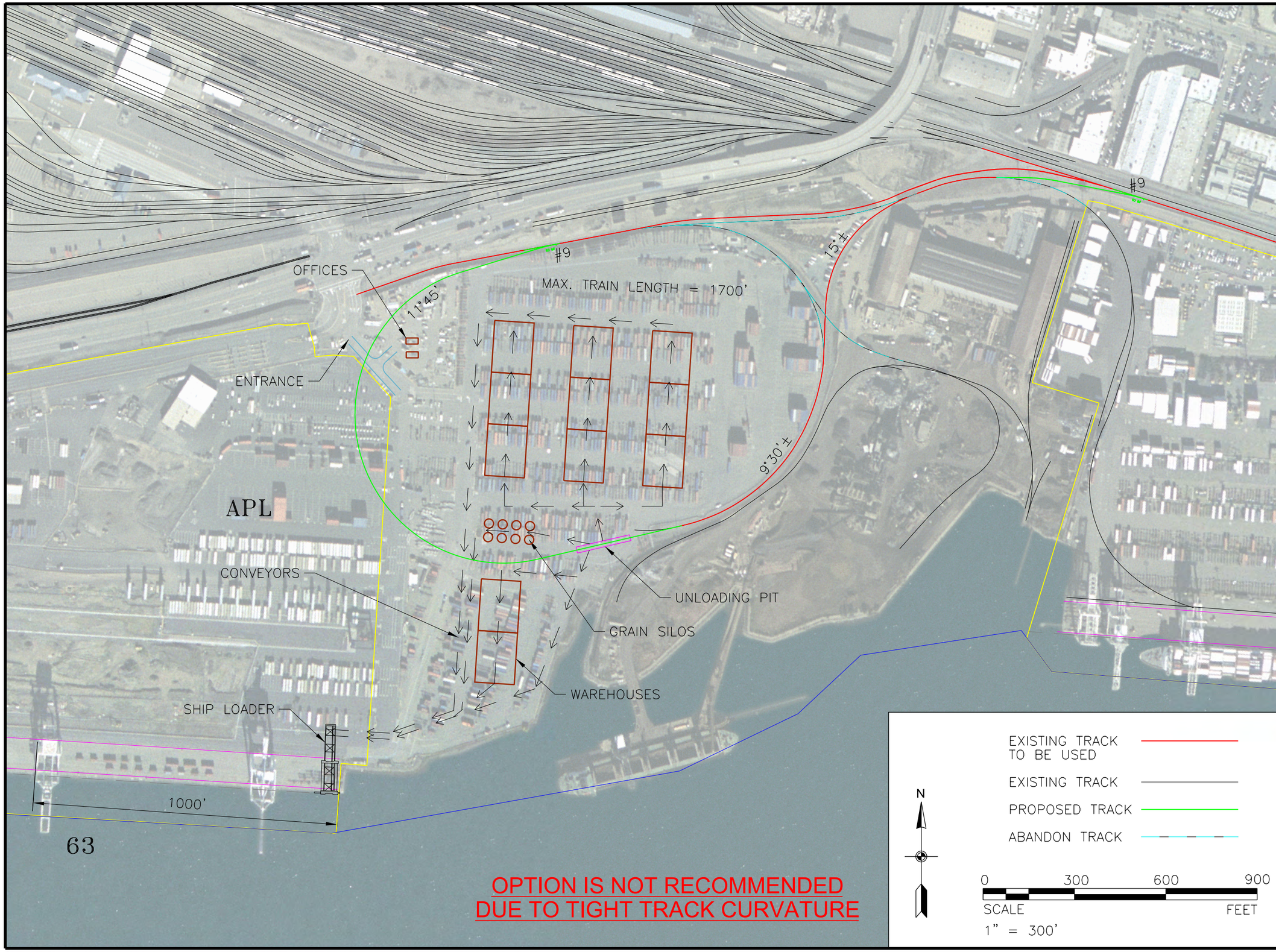
Throughput Capability By Terminal Componant (Tons/Yr)	ST	MT	Sq. Ft
Maximum Practical Annual Berth Occupancy Hrs - Assumes 14 Hours Operations at Berth			
Assumes Unscheduled Ship Calls (25% Max. Practical Berth Occupancy)			
Component 1: Ship and Berth Activities	3,237,682	2,937,225	
Component 2: Ship To Storage Transfer	3,468,465	3,146,591	
Component 4: Storage	9,360,000	8,491,392	
Sq. Feet of Warehouse Storage			*180,000*
Sq. Feet of Warehouse Storage to Approx. Equal Berth Capacity			*65,000*
Component 5: Inland Transfer	19,423,581	17,621,073	
Maximum Practical Throughput Capacity Estimate	**3,237,682**	**2,937,225**	
Sustainable Practical Throughput Capacity Estimate (75%)	**2,428,261**	**2,202,919**	
Assumes Scheduled Ship Calls (40% Max. Practical Berth Occupancy)			
Component 1: Ship and Berth Activities	5,180,291	4,699,560	
Component 2: Ship To Storage Transfer	5,549,544	5,034,546	
Component 4: Storage	9,360,000	8,491,392	
Sq. Feet of Warehouse Storage			*180,000*
Sq. Feet of Warehouse Storage to Approx. Equal Berth Capacity			*100,000*
Component 5: Inland Transfer	19,423,581	17,621,073	
Maximum Practical Throughput Capacity Estimate	**5,180,291**	**4,699,560**	
Sustainable Practical Throughput Capacity Estimate (75%)	**3,885,218**	**3,524,670**	

Throughput Capability By Terminal Componant (Tons/Yr)	ST	MT	Sq. Ft
Maximum Practical Annual Berth Occupancy Hrs - Assumes Berth Available 24 Hours per Day			
Assumes Unscheduled Ship Calls (25% Max. Practical Berth Occupancy)			
Component 1: Ship and Berth Activities	5,565,560	5,049,076	
Component 2: Ship To Storage Transfer	5,962,275	5,408,976	
Component 4: Storage	9,360,000	8,491,392	
Sq. Feet of Warehouse Storage			*180,000*
Sq. Feet of Warehouse Storage to Approx. Equal Berth Capacity			*108,000*
Component 5: Inland Transfer	19,423,581	17,621,073	
Maximum Practical Throughput Capacity Estimate	**5,565,560**	**5,049,076**	
Sustainable Practical Throughput Capacity Estimate (75%)	**4,174,170**	**3,786,807**	
Assumes Scheduled Ship Calls (40% Max. Practical Berth Occupancy)			
Component 1: Ship and Berth Activities	8,904,896	8,078,522	
Component 2: Ship To Storage Transfer	9,539,640	8,654,361	
Component 4: Storage	9,360,000	8,491,392	
Sq. Feet of Warehouse Storage			*180,000*
Sq. Feet of Warehouse Storage to Approx. Equal Berth Capacity			*172,000*
Component 5: Inland Transfer	19,423,581	17,621,073	
Maximum Practical Throughput Capacity Estimate	**8,904,896**	**8,078,522**	
Sustainable Practical Throughput Capacity Estimate (75%)	**6,678,672**	**6,058,891**	

THROUGHPUT CAPABILITY BASE ASSUMPTIONS:

Bulk Carrier	MT	ST	Feet	Hours
Ship LOA			750.0	
Ship Draft			39.5	
Ship Size DWT	80,000	88,183		
Cargo Size	70,000	77,160		
Ship Loader / Hr	2,500	2,756		
Cargo / Rail Car	110	121		
Train @ 84 cars	9,240	10,185		
Unload Hrs / Train				3.0
Train Unloader / Hr	3,080	3,395		
Operating Hours				14.0

Appendix D – Site Plans Withdrawn from Consideration



TranSystems
505 14TH STREET
SUITE 1000
OAKLAND CA 94612
PHONE: 510-835-2761
FAX: 510-835-9839

CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

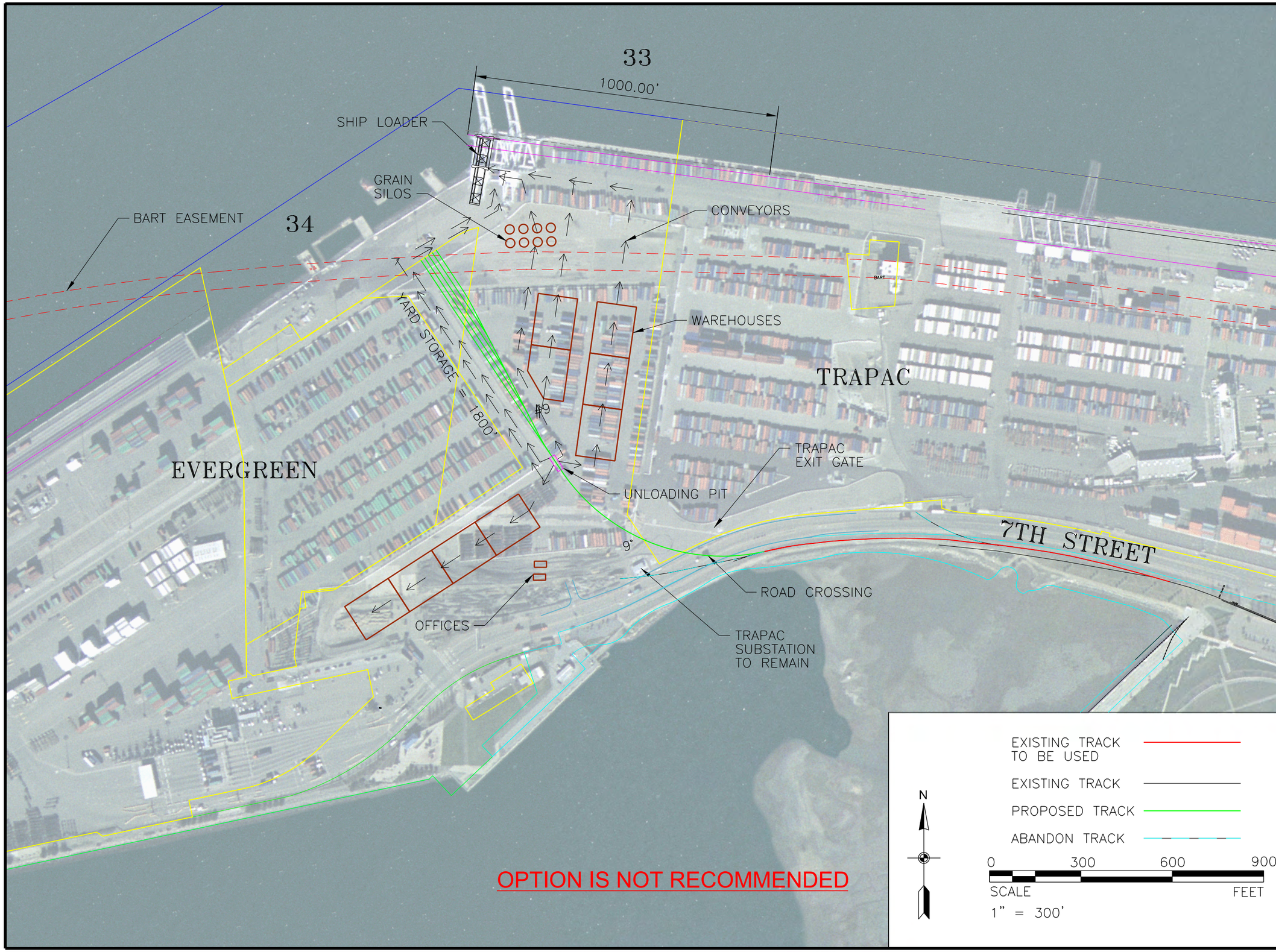
PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/9/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

ROUNDHOUSE LOOP OPTION

EXHIBIT 2
PORT 035

alimburg
7/9/2012 - 4:52:38 PM - G:\OK12\0041\Rail\Exhibits\EX-2 Roundhouse Area-loop.dgn



TranSystems
505 14TH STREET
SUITE 1000
OAKLAND CA 94612
PHONE: 510-835-2761
FAX: 510-835-9839

CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 9/7/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: AML

SHEET TITLE

BERTH 33
YARD OPTION

EXHIBIT 3
PORT 036

alimburg
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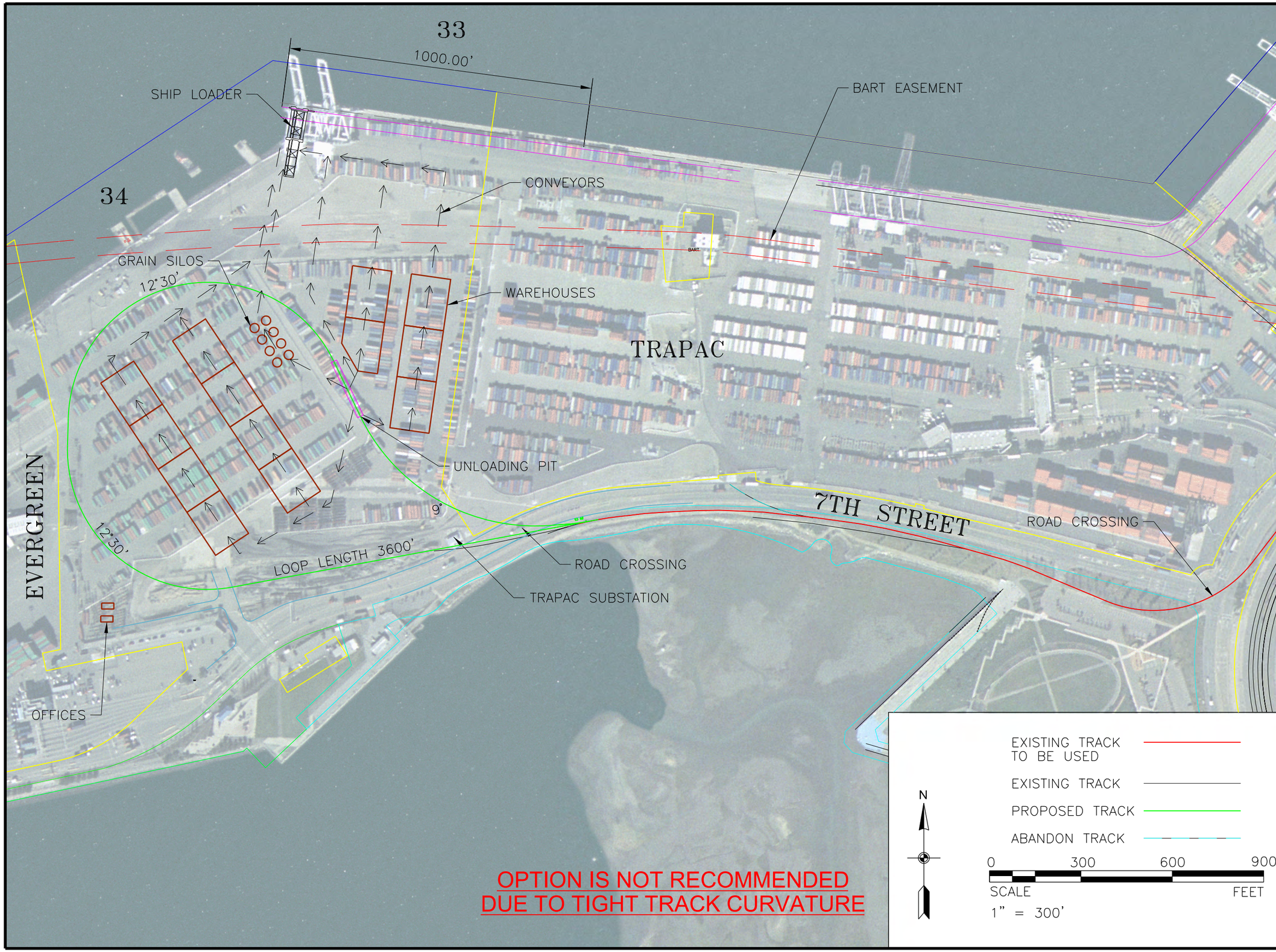


TranSystems
505 14TH STREET
SUITE 1000
OAKLAND CA 94612
PHONE: 510-835-2761
FAX: 510-835-9839

CONSULTANTS

RAIL BULK
TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

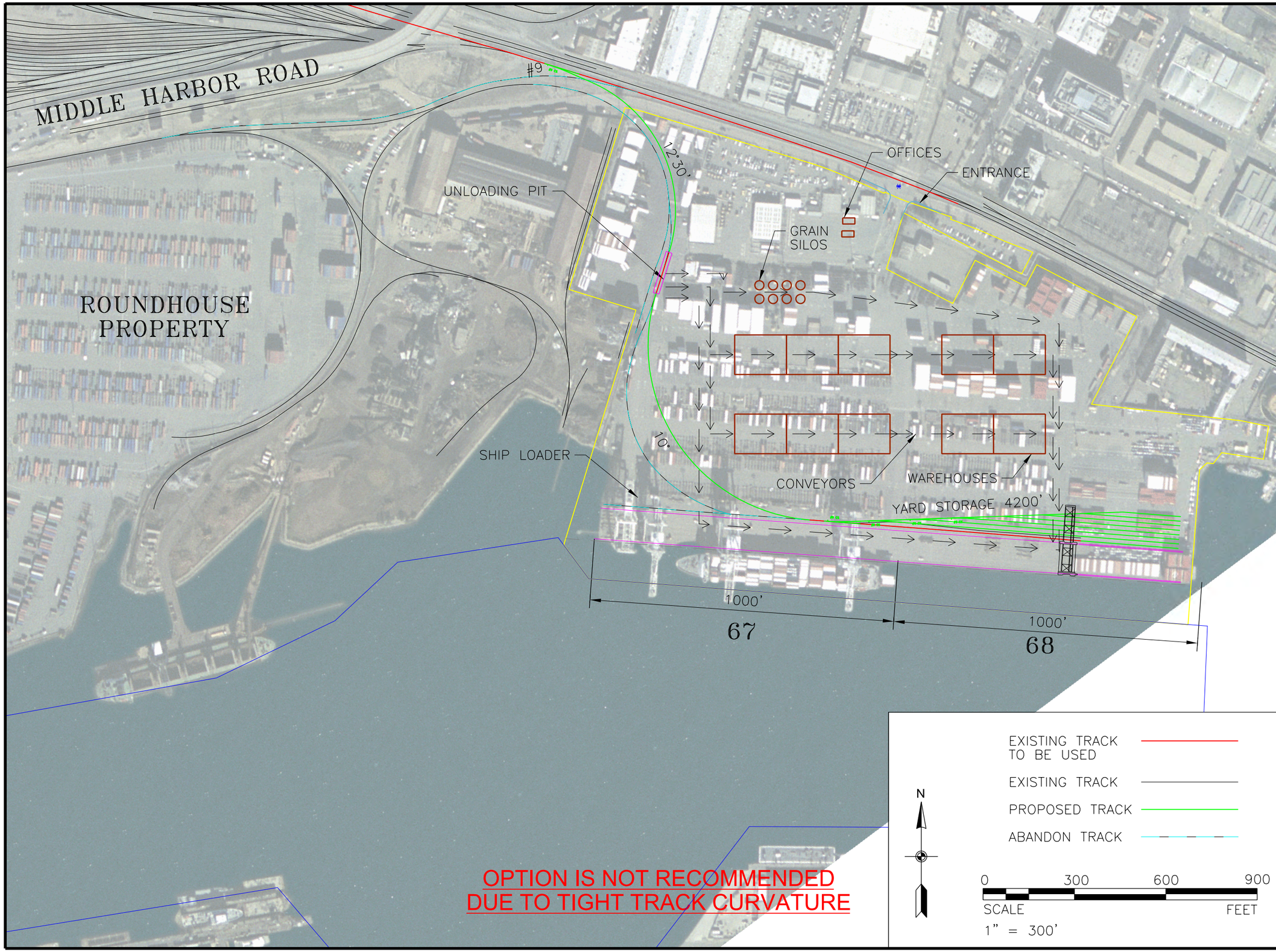
PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/9/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

BERTH 33
LOOP OPTION

EXHIBIT 4
PORT 037

alimburg
7/9/2012 - 4:57:30 PM - G:\OK12\0041\Rail\Exhibits\EX-4 Berth 33-loop.dgn



TranSystems
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PHONE: 510-835-2761
FAX: 510-835-9839

CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

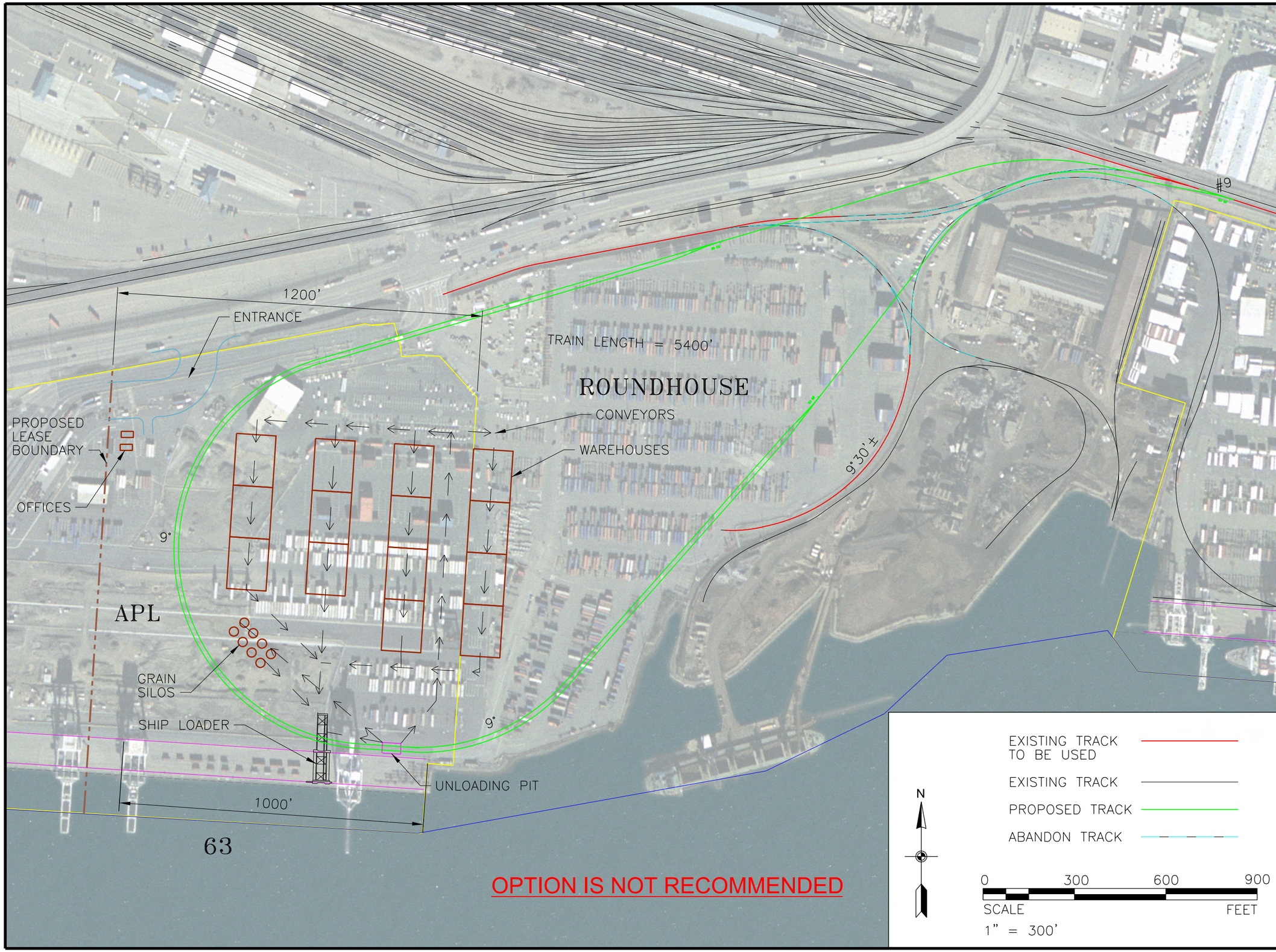
PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/9/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

HOWARD TERMINAL

EXHIBIT 6
PORT 038

alimburg
7/9/2012 - 5:16:09 PM - G:\OK12\00411\Rail\Exhibits\EX-6 Howard Terminal.dgn



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OAKLAND CA 94612
PHONE: 510-835-2761
FAX: 510-835-9839

CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY

OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 9/7/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

ROUNDHOUSE/ APL LOOP

EXHIBIT 7
PORT 039

allmburg
9/7/2012 - 3:39:51 PM - G:\OK12\0044\Rail\Exhibits\EX-7 APL&Roundhouse Loop.dgn

From: Matthew Davis <mdavis@portoakland.com>
Sent: Wednesday, January 16, 2013 4:11 PM
To: Mark Erickson
Cc: Joanne Karchmer
Subject: RE: coal

Like you, I don't know if there is much utility in "advising" Phil at this stage. However, I think it is fair to say that: 1) I do not concur with his assessment; and 2) it could pose substantial risk to our operations, certainly when you have winners of the Nobel Peace Prize laying down in front of trains in British Columbia to protest coal exports through Canada.

At this early point I would let him advance this dialogue, although as any goods that are going to move through his state-funded bulk port will first have to pass through a state and federally funded rail development…….you can complete the rest of the sentence.

From: Mark Erickson
Sent: Wednesday, January 16, 2013 4:05 PM
To: Matthew Davis
Cc: Joanne Karchmer
Subject: Re: coal

Jean, Deb and I met with Phil and his team last Monday when they hosted UP and invited us along. Phil explicitly mentioned coal as one of their prospects. I'm not sure how real it is, but I, like you, was surprised to hear that he believes he has all the necessary approvals to move coal. Deb was concerned as well. Do we concur with his assessment? What risk does that pose for us as partner? I need to discuss further with Anne / legal regarding how broad their options are.

I have been hesitant to advise Phil in any capacity, really. As you know he has a knack for moving seemingly immovable impediments. I think he enjoys jumping into the lions den. I wonder what the City would do if substantial opposition came forward, as it may.
Mark

----- Reply message -----
From: "Matthew Davis" <mdavis@portoakland.com>
To: "Mark Erickson" <merickson@portoakland.com>
Cc: "Joanne Karchmer" <jkarchmer@portoakland.com>
Subject: coal
Date: Tue, Jan 15, 2013 4:45 pm

Mark,

Sorry if I misspoke a week or so ago during the briefing with Lynette Gibson McElhaney about any intentions that CCIG/OGRE might have about some of the materials they are trying to attract to the proposed Berth 7 bulk handling facility (i.e. "no coal"). While I know the development of these export commodities will be their burden to bear, if they are not already aware of some of the politics around coal exports they may want to familiarize themselves with some recent developments. I've attached a couple of links.

The first is a joint resolution passed by the CA state legislature last session asking for the Congress and the President to essentially restrict any new coal export handling facility along the West Coast (focused most intensely on some recent proposals in Oregon and Washington). This is a non-binding resolution, but the sentiment is pretty clear.

http://leginfo.ca.gov/pub/11-12/bill/asm/ab_0001-0050/ajr_35_bill_20120918_chaptered.html

Related to this bill is also a news article about the same developments up in WA that led in part to the Assembly resolution:

http://www.nytimes.com/2011/02/15/us/15coal.html?_r=0

Anyway, for what it's worth…this may not be the most productive business line for them to pursue….

Matt

Manager of Governmental Affairs
Port of Oakland
530 Water Street
Oakland, CA 94607
510-627-1430 (w)
510-715-8538 (m)
mdavis@portoakland.com

From: Chris Peterson <cpeterson@portoakland.com>
Sent: Friday, May 11, 2012 8:47 AM
To: James Kwon; Mark Erickson; Lawrence Dunnigan
Subject: RE: Confidential Coal Terminal Project

Understood James. They are talking about a state of the art facility that would completely contain any product, but there are issues with coal terminals based on entities like CARB, so it likely would create more headaches than revenue.

Chris Peterson
Chief Wharfinger
Port of Oakland
Off: 510-627-1308
Cell: 510-719-8024

-----Original Message-----
From: James Kwon
Sent: Thursday, May 10, 2012 11:19 PM
To: Mark Erickson; Lawrence Dunnigan
Cc: Chris Peterson
Subject: RE: Confidential Coal Terminal Project

We should evaluate all other options available on bulk business before any one commodity group is picked, especially if it happens to be 'coal'. Thanks!

From: Mark Erickson
Sent: Wednesday, May 09, 2012 11:42 AM
To: Lawrence Dunnigan
Cc: Chris Peterson; James Kwon
Subject: RE: Confidential Coal Terminal Project

I think we're on the same page Lawrence, sorry if I came off as smug:) Part of my frustration is that I haven't been able to spend as much time working on this as I'd like. I think you're right about coal however, that may not be the right target commodity for Oakland due to dust and global warming issues. Metro Ports had indicated that coal and iron ore were the two strongest commodities looking for USWC gateways. Talking with Chris Stotka yesterday though, it sounds like there is plenty of bulk demand right now.

Mark

From: Lawrence Dunnigan
Sent: Tuesday, May 08, 2012 9:33 PM
To: Mark Erickson
Cc: Chris Peterson; James Kwon
Subject: Re: Confidential Coal Terminal Project

Sure. If the incremental costs are not too significant it would be nice to have some general bulk terminal plans especially for APL/Roundhouse. I didn't mean to insinuate that we not take it seriously. I am just not so optimistic about this particular one, but worth exploring further. Coal will be more problematic than other types of bulk..

Best Regards,

Lawrence Dunnigan

Sent from my iPhone

On May 8, 2012, at 9:15 PM, "Mark Erickson" <MErickson@portoakland.com<mailto:MErickson@portoakland.com>> wrote:
To me, all this shows that we need to come up with a preliminary layout for a bulk operation at 33 and 62-63. Engineering just completed its consultant selection for OAB. Perhaps we could bring the 2nd place team on board to help us with a plan that we could shop around to stevedores, shipping lines, and cargo interests. Kinder Morgan mentioned today that the berth 7 investment will be over $100 million in the facility. We should take this pretty seriously.
Mark

Sent from my Verizon Wireless 4GLTE smartphone
----- Reply message -----
From: "Lawrence Dunnigan" <LDunnigan@portoakland.com<mailto:LDunnigan@portoakland.com>>
To: "Chris Peterson" <cpeterson@portoakland.com<mailto:cpeterson@portoakland.com>>, "Mark Erickson" <MErickson@portoakland.com<mailto:MErickson@portoakland.com>>
Cc: "James Kwon" <JKwon@portoakland.com<mailto:JKwon@portoakland.com>>
Subject: Confidential Coal Terminal Project
Date: Tue, May 8, 2012 7:25 pm

Chris,

Ricky did speak with him but I think there are many hurdles on this one, especially being coal. It can't hurt to speak with him further and hear him out but let's also keep in mind that Trapac may want to occupy Berth 33 sooner rather than later should the APL business land there. It seems that they (the coal company) are seeking -50ft depth so unfortunately the Roundhouse/APL terminal would not suffice.

Best regards,
Lawrence Dunnigan
Manager, Business Development & International Marketing Port of Oakland
530 Water Street, 6th Floor
Oakland, CA 94607
Tel. (510) 627-1834
www.portofoakland.com<http://www.portofoakland.com>

<image003.jpg>
Please consider the environment before printing this email.

From: Chris Peterson
Sent: Tuesday, May 08, 2012 3:35 PM
To: Lawrence Dunnigan; Mark Erickson
Cc: James Kwon
Subject: FW: Confidential Coal Terminal Project

Lawrence, I think Ricky and Jahan might have already talked to this guy, but he chatted with me for a bit yesterday and he'd like to sit down with us and discuss the potential of Berth 33 for a coal facility. I know getting rail to 33 is problematic, but it's not impossible, and this company is willing to make all the investment required to get this operation up and running. Take a look and lets discuss.

Chris Peterson
Chief Wharfinger
Port of Oakland
Off: 510-627-1308
Cell: 510-719-8024

From: KDS [mailto:kdswope@gmail.com]<mailto:[mailto:kdswope@gmail.com]>
Sent: Tuesday, May 08, 2012 3:27 PM
To: Chris Peterson
Subject: Confidential Coal Terminal Project

Chris:

It was indeed a pleasure speaking with you yesterday. I have attached some preliminary information regarding the client seeking to establish the West Coast port terminal. The company estimates it will handle 2 to 3 million tons of export coal annually. It is my understanding the company would like to be able to fully load a Panamax ship to 75-80K tons. Rail access to the terminal is also important as it will result in additional congestion of approximately one additional train per day.

As I mentioned, this client if fully-prepared to duplicate Koch Carbon LLC's award winning design in Pittsburgh, CA to help mitigate any possible environmental hurdles associated with building/operating such a coal terminal. That said, the client is in the position to lease the required land to build this terminal.

Please notify me of your satisfactory receipt of this email and attachment. Once you've had an opportunity to review the material I would like to arrange a site visit at your earliest convenience.

Regards,
Kevin Swope
702-524-8240

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****
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Brought to you by the Oakland Global Trade & Logistics Center and California Capital & Investment Group

OAKLAND GLOBAL NEWS

Monthly Updates on the Oakland Global Trade & Logistics Center Project

Issue 4

IN THIS ISSUE

Project Updates

OBOT

Employment

Photos!

QUICK LINKS

Oakland Global Website

Oakland Global News, December 2013

Dear Reader,

Happy Holidays! Oakland Global News is a monthly newsletter for readers with an interest in staying current as the Oakland Global Trade & Logistics Center (former Oakland Army Base) project evolves. This week OG News includes stories about the Oakland Bulk and Oversized Terminal and several other topics. Enjoy and Happy New Year!

Project Updates

Following the Oakland Global groundbreaking event on November 1, actual construction work has started at the former Oakland Army Base. The project also has made significant contributions to its surroundings on the former base.

- Demolition: Lead and asbestos abatement is on-going at several warehouses scheduled for imminent demolition. Nine large buildings will ultimately be demolished as part of the early construction work, but a preliminary step is disconnecting utilities, and segregating and disposing lead and asbestos-laden debris. Following the abatement process, valuable wood will be preserved for reuse and resale.

- Construction operations center: Ten trailers housing approximately 25 offices and several conference rooms have been installed on the Oakland Global project site to serve as construction headquarters for the next 54 months. Office occupants number approximately 25 and include representatives from CCIG, the City of Oakland and the project construction joint venture team, which includes the Tuner, Top Grade and Flatiron companies.The construction operations center trailers are located near the intersection of 11th Street and Maritime Street and occupy a five-acre parcel. The offices are open 7 a.m. to 3:30 p.m. Monday through Friday.

- Bike Path Port-a-potties: Two port-a-potties have been added to the Bay Bridge pedestrian / bike path parking lot created in a joint effort between Caltrans, the City of Oakland and Oakland Global developer CCIG. Caltrans built the new path as part of the new Bay Bridge, but did not provide additional parking. The lot, which is at the intersection of Burma Road and

Maritime Street, opened in November. Given the length of the trip to the end of the path and back, the port-a-potties are a welcome improvement for visitors.

Oakland Bulk and Oversized Terminal

A new service for the Oakland waterfront

Bulk commodity ship

Transforming the former Oakland Army Base into a modern trade and logistics center is central to the Oakland Global plan. That work will include replacing 1940s infrastructure with modern utilities, roads and buildings designed to move goods efficiently to and from Oakland. But, a lesser-known aspect of the project is a new marine break-bulk commodity terminal on the westernmost section of the base.

The Oakland Bulk and Oversized Terminal (OBOT) is expected to capture some of the business that Oakland loses to other West Coast ports, which feature bulk terminals. OBOT will take advantage of the city's direct ocean path to China and railroad tracks that stretch to agricultural products in California's Central Valley.

When running to full capacity, OBOT is expected to move approximately 2 million metric tons of bulk products that would otherwise be shipped through other West Coast ports. The commodities typically are transported on land to and from ports in boxcars or rail cars designed to carry a specific product. Ocean-going

vessels commonly carry bulk goods in their hulls rather than in containers.

"The Port of Oakland relies heavily on cargo that moves primarily by truck. That limits Oakland's potential as a national gateway," said Phil Tagami, CEO of California Capital & Investment Group, which is the majority partner in OBOT. Creating a marine terminal opens a new pathway for the Oakland waterfront - one serviced by rail."

Given California's wealth of natural resources, it's not surprising that CCIG would contemplate moving agricultural products through OBOT, such as corn, soybeans, flour and dehydrated garlic. But the list of potential products is much longer, including iron ore, pot ash, soda ash, building materials and steel products.

One bulk material OBOT does not plan to export or import is coal. CCIG and Port of Oakland officials have been asked about potential coal shipments as part of Oakland Global and OBOT. Coal is not in the plans, according to Tagami.

"It has come to my attention that there are community concerns about a purported plan to develop a coal plant or coal distribution facility as part of the Oakland Global project," Tagami said. "This is simply untrue. The individuals spreading this notion are misinformed. CCIG is publicly on record as having no interest or involvement in the pursuit of coal-related operations at the former Oakland Army Base."

Ex-Offender Employment Support Survey

To ensure that the Oakland Global project is doing everything possible to hire Oakland resident ex-offenders reentering the workforce, CCIG is currently sponsoring a survey of East Bay non-profit organizations that work with the reentry population.

The 15-question survey is intended to gather information about services currently available to East Bay employers seeking to hire reentry job applicants. The goal is to use the information to create partnerships between the project and groups with similar hiring goals.

CCIG mailed and emailedthe survey on December 2 to 27 organizations, many of which are located in Alameda County. The organizations include the Oakland Private Industry Council, the Unity

Council, Allen Temple Housing and Economic Development Corp. and Youth Uprising. So far, only six organizations have responded to the survey. They are as follows:

- Oakland Private Industry Council
- Law Family Community Development Inc.
- Society of St. Vincent de Paul of Alameda County
- Michael Chavez Center
- Tri-Valley Regional Occupational Program
- C.U.R.A. Inc.

In January, CCIG will be following up with calls to the organizations that have not responded to the survey.

Oakland Global's job policies were created as part of a lengthy dialogue with community and labor groups. The policies strongly emphasize hiring union laborers and local residents. Specifically, the policies dictate that each contractor involved in Oakland Global construction meet the following requirements: At least 50 percent of project work hours be performed by Oakland residents; a minimum of 25 percent of apprentice work hours be performed by disadvantaged workers; and 20 percent of project work be performed by apprentices.

Disadvantaged workers include ex-offenders, and with limited exceptions, the jobs policies prohibit contractors from inquiring about applicants' history of involvement with the criminal justice system.

CCIG welcomes any information regarding services available to employers seeking to hire reentry workers. Contact: Chrissy Becker at 510-355-0128 x 113 or at Chrissy@rojeconsulting.com.

Army Base Photography

As a recurring feature, the Oakland Global News presents photography from the Army Base.The photos and captions below are by Dan Nourse.

Worker atop recycled aggregate in the North Gateway.

Recycled asphalt closeup

Dan Nourse is a project manager for the Oakland Army Base focusing on environmental remediation, site elevation increase and site surcharging. Dan was instrumental in the redevelopment of Emeryville and West Oakland. He is a self taught photographer and uses photography to capture the progress of redevelopment projects as well as producing artful images along the way.

In addition to his project manager duties, Dan is the head coach of Cal Men's Lacrosse Team.

Stay informed

Thank you for taking the time to learn more about the Oakland Global Trade & Logistics Center development. I believe that the Oakland Global Newsletter will prove to be a useful tool for staying informed and current on this important project going forward.

Sincerely,
Phil Tagami

Forward this email

SafeUnsubscribe

Trusted Email from Constant Contact
Try it FREE today.

This email was sent to mmorodomi@californiagroup.com by robert@rojeconsulting.com | Update Profile/Email Address | Instant removal with SafeUnsubscribe™ | Privacy Policy.

Roje Consulting | 300 Frank H. Ogawa Plaza | Suite 385 | Oakland | CA | 94612

September 24, 2015

Ms. Lucetta Dunn
Chair
California Transportation Commission
1120 N Street, MS-52
Sacramento, CA 95814

RE: Improper Use of Proposition 1B Trade Corridor Improvement Funds for coal export facility project at Oakland Army Base Redevelopment

Dear Chairwoman Dunn:

The undersigned groups—Sierra Club, Earthjustice, West Oakland Environmental Indicators Project, San Francisco Baykeeper, and Communities for a Better Environment—are writing to oppose the use of Proposition 1B Trade Corridor Improvement Funds (TCIF) to build a new coal export facility and associated infrastructure at the Oakland Army Base Redevelopment. Using public funds in this manner has never been discussed in any application for funding to the California Transportation Commission (CTC) or in any environmental review document for this project. Further, using TCIF funds to develop a project which negatively impacts local air quality and otherwise threatens public health and safety frustrates the intended purpose of Proposition 1B to allocate funding for "mobility, safety, and air quality improvements."

As such, our groups request that the CTC refuse to disburse funds to any part of the Army Base project involving coal or fossil fuel exports.

To be clear, the undersigned organizations support the overall redevelopment of the Oakland Army Base, but using public monies to subsidize polluting fossil fuel exports is not in line with TCIF goals or public values.

I. Proposition 1B Background and Purpose

In 2006, California Voters approved Proposition 1B, which allocated almost $20 billion in bonds to advance infrastructure projects and air quality improvements throughout the state. As part of these funds, $2 billion was included for TCIF projects. As part of that mandate, the CTC has stated it will "place[] emphasis on projects that improve trade corridor mobility while reducing emissions of diesel

particulate and other pollutant emissions."[1] In addition, voters placed the following two conditions on the allocation of funds, in addition to others: Projects must (1) "address[] the state's most urgent needs" and (2) "place[] emphasis on projects that improve trade corridor mobility while reducing emissions of diesel particulate and other pollutant emissions."[2] Moreover, the Goods Movement Action Plan (GMAP) issued by the State of California, which serves as the framework for developing state freight transportation policy, promised to "[u]ndertake simultaneous and continuous improvement in infrastructure and environmental mitigation."[3]

Transparency is a vital part of the TCIF program. Consequently, applicants for TCIF funding must provide "[a] description of the transportation corridor and the function of the proposed project within the corridor."[4] This ensures that the State and the public who voted to approve Proposition 1B completely understand the scope of the funding its providing to project proponents.

II. Oakland Army Base (Oakland Global Trade and Logistics Center) and Community of West Oakland.

There are now proposals to transport large amounts of fossil fuels like coal through the former Oakland Army Base, now known as the Oakland Global Trade and Logistics Center. It is our understanding that the project proponents did not disclose that coal would be shipped through this facility. The former Oakland Army Base, which resides on both City and Port of Oakland land, is being developed by California Capital and Investment Group (CCIG), Prologis, and now Terminal Logistics Solutions with largely public money.

Given the public nature of the Oakland Global project, it is imperative that any California Transportation Commission Proposition 1B funding should not be used to do more harm to residents along the fenceline of this project by building a coal export facility. Rather, these funds should only be used for their intended purpose—improving the health and welfare of communities already impacted by goods movement. Many of our groups participated in discussions about the TCIF program, and funding a coal export terminal would betray our trust and the trust of California voters.

The community of West Oakland is one that is already heavily impacted by goods movement. West Oakland residents breathe air containing three times the amount of diesel particulate matter than air in other parts of the Bay Area , which translates into a 2.5 times greater risk of cancer.[5] Children in West Oakland suffer from ailments like asthma at higher rates than children in other neighborhoods.[6]

---

[1] TCIF Guidelines, *available at* http://www.dot.ca.gov/hq/transprog/ibond/tcif_guidelines_112707.pdf.
[2] Cal. Govt. Code § 8879.23(c)(1)(B).
[3] Letter from Dale Bonner, Secretary of Business Transportation & Housing, to Mr. James Ghielmetti, Chairman California Transportation Commission, October 10, 2007 *available at* http://calsta.ca.gov/res/docs/pdfs/2007/101007_tcif.pdf
[4] TCIF Guidelines, at ¶ 7.
[5] Alameda County Dept of Public Health, Life and Death from Unnatural Causes, Air Quality, 2008 http://www.acphd.org/data-reports/reports-by-topic/social-and-health-equity/life-and-death-from-unnatural-causes.aspx
[6] See, e.g., High Asthma rates for kids in west Oakland. https://www.youtube.com/watch?t=13&v=GrKwTm5jldE.

West Oakland Residents are two times as likely to go to the emergency room with asthma as people in other parts of Alameda County and are also more likely to die of illnesses linked to air pollution like cancer, heart disease and other ailments. As described above, fossil fuel movement poses even more health and safety issues. West Oakland residents are already impacted by goods movement, and do not deserve to bear the brunt of the health impacts to line the pocketbooks of fossil fuel companies and developers.

Apart from health concerns, community transparency is another key element missing from this proposal. In the case of the bulk terminal at the Oakland Army Base project, community groups were assured by the developer, Phil Tagami and CCIG that no fossil fuels like coal would be exported through this terminal.[7] The City of Oakland also claimed no knowledge of fossil fuel exports and even passed a resolution against the movement of coal and other fossil fuels through Oakland.[8] And now the developer and his company CCIG, and their sub-lessee Terminal Logistics Solutions, are reversing their stance and have sought a $53 million investment from the state of Utah in exchange for Utah's ability to export 4-5 million tons of coal, or 49% of the completed export facility's capacity.[9] There was no discussion of any fossil fuel exports in any of the applications for TCIF or any other public funds, or in any of the state or federal environmental review documents pertaining to this project.

III. Oakland Army Base Project Funding from the California Transportation Commission

The former Oakland Army Base being redeveloped by the City of Oakland, the Port of Oakland and CCIG, is set to receive hundreds of millions in public funding and $242 in TCIF funds from the CTC. These funds will be used for the site preparation on the city side of the project (over $176 million) and for rail access improvements (over $65 million) both of which are related to the development of a bulk export facility that will now contain coal.[10] Additional city, port, public and private funds will be needed to complete the Army Base projects.

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[7] See *Oakland Mayor, Port Developer in Dispute over Plan to Ship Coal,* KQED July 22, 2015 quoting CCIG's December 2013 newsletter. http://ww2.kqed.org/news/2015/07/06/oakland-mayor-port-developer-in-dispute-over-plan-to-ship-coal ("CCIG is publicly on record as having no interest or involvement in the pursuit of coal-related operations at the former Oakland Army Base.")

[8] *Oakland Votes to Keep Coal and Oil Trains Away*, Grist, June 18, 2014, http://grist.org/news/oakland-votes-to-keep-coal-and-oil-trains-away/

[9] Unlikely Partners: Utah investing $53 mil to export coal through Oakland Port, San Jose Mercury News, April 24, 2015, http://www.mercurynews.com/my-town/ci_27981682/unlikely-partners-utah-investing-53-million-export-coal; See also http://www.deseretnews.com/article/865627254/Utah-invests-53-million-in-California-port-for-coal-other-exports.html?pg=all (citing Laura Nelson from the State Office for Energy Development as saying 4-5 Million Tons of Utah coal would move through Oakland.)

[10] *See* Attachment 20 to the Lease Deposition and Development Agreement , Amended TCIF Baseline Agreement, August 22, 2012, at p. 2 of Exh b. Accessed: http://www2.oaklandnet.com/Government/o/CityAdministration/d/NeighborhoodInvestment/OAK038485

A. History of the CTC Funding for the Oakland Army Base

By way of background, in 2012, several amendments were made to the original CTC grants given to the Oakland Army Base Redevelopment project. The original Project Baseline Agreement for the Oakland Harbor Intermodal Terminals agreement was signed on December 10, 2009, and included only the CTC and Port of Oakland.

The revisions added the City of Oakland to the agreement and additional funding to the overall deal. On August 22, 2012, the CTC passed Resolution P.1213-03B to amend the TCIP program and revise the scope of their funding for this project to add $110 million in additional funds, and to add the City of Oakland as a party and signatory to the Baseline Agreement.[11] The Amendment divided the funding into several sub-projects: the Oakland Harbor Intermodal Terminals (OHIT) rail project, 7th St Grade Separation Project, OHIT Phase 1 Remediation, OHIT rail access improvements and manifest yard "to accommodate projected growth in unit bulk, transload, and intermodal rail business", OHIT site prep and backbone infrastructure, OHIT recycling facilities, OHIT logistics facilities and Marine Terminal ("berth 7 would be converted to a modern bulk cargo terminal for movement of commodities such as iron ore, corn and other products brought in to the terminal by rail."); and OHIT unit train support yard.

B. The Harms Caused by Fossil Fuel Transportation

Increasingly, rail is being utilized to ship coal and oil across the country to West Coast ports, to then be burned abroad. Fossil fuel transportation –including coal, oil, and petcoke—creates the same air quality and safety problems associated with general goods movement, as well as more serious hazards. These projects also impose additional health and safety concerns associated with the shipment of these highly volatile products. Namely, coal is shipped in mile-long trains of 120+ open top railcars that emit massive amounts of coal dust into the water, air, and land near the railroad tracks. Coal dust contains arsenic, lead, mercury, chromium, nickel, selenium and other heavy metals.[12] Prolonged, direct exposure to coal dust has been linked to health issues such as chronic bronchitis, decreased lung function, emphysema, and cancer.[13] This fine coal dust can also contribute to train derailments when it rests in the railroad ballast.[14] Apart from rail impacts, communities near the Port are also impacted. Coal is commonly stored in large, uncovered piles near the ports where wind and rain can carry coal dust particles into nearby neighborhoods. By way of one example, in a community near a large coal terminal

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[11] See LDDA Exh 20, Trade Corridor Improvement Fund Project Baseline Agreement Amendment #1 at 1 Accessed: http://www2.oaklandnet.com/Government/o/CityAdministration/d/NeighborhoodInvestment/OAK038485

[12] Aneja, Viney, "Characterization of Particulate Matter (PM10) in Roda, Virginia," 2008. http://www.sierraclub.org/coal/downloads/2009-VA-particulates.pdf Executive summary iv.

[13] "Criteria For a Recommended Standard: Occupational Exposure to Respirable Coal Mine Dust" U.S. Department of Health and Human Services, September 1995, pages 52-116. http://www.cdc.gov/niosh/docs/95-106/pdfs/95106.pdf

[14] Surface Transportation Board Decision, "Arkansas Electric Cooperative Corporation - Petition for Declaratory Order," Docket No. FD 35305, Mar 2011.

in Virginia, the number of residents suffering from asthma was found to be more than twice the city and state average.[15]

In addition to coal, petroleum coke, a byproduct of oil refining, is also being produced and shipped by rail, truck and barge in larger quantities due to the refining of more heavy oil in the United States. Petroleum coke (or petcoke) looks visually similar to coal and is also commonly stored in large open piles at ports. Petcoke can cause serious respiratory problems, particularly for individuals suffering from heart and lung disease and asthma.[16] Health experts have found that petcoke is equivalent to coal for lung disease potential.[17]

Apart from the significant health impacts, local businesses near rail and fossil fuel export facilities can suffer negative visual, aesthetic, and noise impacts from coal dust and increased rail traffic. This can equate to lost business and property values, which can also mean reduced property tax revenues for local communities. One study conservatively estimates losses from a new coal export facility to be at least $265 million in property values—equating to more than $2.6 million in community tax losses.[18]

In addition to all of the localized impacts from transportation of these fuels, when coal and petcoke are burned they emit greenhouse gases that cause climate change. The communities that would bear the brunt of the impacts from fossil fuel transport and export are also ironically the same communities that would be most vulnerable to climate disruption impacts like sea level rise, drought, flooding, and fires.

IV. TCIF Funds Must not be Used for a Coal Export Facility.

California voters approved Proposition 1B with the understanding that funding would be disbursed to projects meeting two key criteria: (1) such projects would meet the state's "most urgent needs"; and (2) such projects would "improve trade corridor mobility while reducing emissions of diesel particulate and other pollutant emissions."

This proposed Oakland coal export facility violates these two main criteria, in addition to the important public disclosure requirements the CTC has imposed on itself.

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[15] Health Needs Assessment of the Southeast Community City of Newport News 2005," Peninsula Health District, Virginia Department of Health.

[16] Madigan, Lisa, Illinois Attorney General. "Madigan files suit against petroleum coke site for air pollution." November 4, 2013. http://www.illinoisattorneygeneral.gov/pressroom/2013_11/20131104.html

[17] Paulman, Ken. "Documentary: 'Petcoke: Toxic waste in the Windy City.'" February 28, 2014. http://www.midwestenergynews.com/2014/02/28/video-toxic-waste-in-the-windy-city/

[18] See Eastman Property Value Study, October 12, 2012, http://www.coaltrainfacts.org/docs/Eastman-Study.pdf. Study assumed a conservative 1% value loss for all structures within 600 ft of the rail tracks where coal would be shipped.

i. A Coal Export Facility is Clearly Not an "Urgent Need" for California.

California voters passed this ballot initiative under the auspices that only the most urgent freight projects would be funded. Adding a new coal export facility is clearly not an urgent need for California. In fact, the California Senate, Assembly and Governor have weighed in on this exact issue. In Assembly Joint Resolution 35, these three bodies noted their deep concerns with the environmental and health implications of coal-fired power plants, as well as the expansion of coal export facilities along the West Coast.[19] These bodies urged the President of the United States to restrict coal exports overseas, and urged the Governors of Oregon and Washington to consider the serious health consequences of coal terminal expansion in the Pacific Northwest.[20] There is no reason to believe the State Legislature would be hypocritical enough to encourage Washington and Oregon to push back against coal exports, but identify it as an urgent need in California. Since building a new coal export facility is clearly not an "urgent need" for California, CTC should withhold funding if this project continues to be part of the Oakland Global development.

ii. A Coal Export Facility Does not Relive Mobility while Reducing Emissions of Diesel Particulate and Other Pollutant Emissions.

The proposed coal export terminal will not serve Proposition 1B's goal of improving transit corridor mobility while reducing freight pollution. In Assembly Joint Resolution 35, California's Executive and Legislative Branch listed the various harms of coal exports, including the pollution generated by coal-fired power:

> Hazardous emissions from coal-fired power plants threaten health locally and at great distances; and
>
> [] Coal exports from United States ports to Asia have risen by almost 240 percent from 3.8 million tons in 2009 to over 13 million tons in 2010; and
>
> [] The environmental consequences of massive coal exports to Asia are severe, including the burning of millions of tons of coal that releases hazardous air emissions into the atmosphere and increased mountaintop removal projects; and
>
> [] Burning coal for electricity generation worldwide is the main cause of greenhouse gas emissions and the planetary climate crisis; and
>
> [], Coal burning has contributed to significant human health risks in all age groups through the emissions of ozone, sulfur dioxide (SO2), particulate matter, nitrogen oxides (NOx), mercury, and carbon dioxide (CO2).[21]

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[19] Assembly Joint Resolution 35 (September 18, 2012); *available at http://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_0001-0050/ajr_35_bill_20120918_chaptered.html*
[20] *Ibid.*
[21] *Ibid.*

This unequivocal statement from all of California's elected branches of governments on the harms associated with coal exports and use of these fuels make clear that this Project does not serve Proposition 1B's goal of reducing emissions of diesel particulate and other pollutant emissions.

These TCIF Amended Baseline Agreement documents indicate that there is some sort of cost savings and reduced truck trips associated with building a bulk/break-bulk facility at the Port of Oakland. However, this conclusion is unfounded – because there is no bulk export facility now it is certainly unclear how there would be fewer truck trips. Coal is not currently being shipped out of Oakland or between Oakland and Stockton. [22] If anything, these TCIF funds would be use to subsidize and newly expand coal movement out of California, thus increasing emissions from trains, and their open top cars carrying coal. Open top rail cars lose an average of 500-2000 lbs of coal in the form of dust per car, with an average coal train being composed of at least 120 cars, equating to staggering coal losses upwards of 60,000 pounds per train between the mine and the Port.[23]

Further, the cost-benefit analysis also indicates that there would be reductions in carbon dioxide emissions. Apart from the flawed truck trip analysis, shipping 10 million tons of coal/year would lead to a massive net increase in carbon dioxide emissions since 10 million tons of coal is the equivalent of 7 average size (500 MW) powerplants, or at least 26 million tons of carbon dioxide emissions per year.[24] Considering California is a state without coal-fired power plants, state funding to facilitate this massive amount of coal export is especially significant. Finally, this funding would stand in direct contrast to Governor Jerry Brown's commitment to reduce California's greenhouse gas emissions (including carbon dioxide) to 40% below 1990 levels by 2030. [25] Overall, there is no colorable argument that the construction of a coal export facility reduces emissions of diesel particulates or other pollutants. In fact, this Project will only increase these emissions as California warned of other similar projects in Washington and Oregon.

iii. TCIF Application and the Amended Baseline Agreement issues in light of Coal Export plan revelation

Neither coal nor any other fossil fuel like petroleum coke was mentioned in the TCIF application, or in any environmental review document pertaining to the Army Base Redevelopment project. The funding application, in mentioning the Berth 7 bulk export facility, describes the project as one that would be "converted to a modern bulk cargo marine terminal for movement of commodities **such as iron ore, corn** and other products brought in to the terminal by rail….the terminal would also

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[22] See June 8, 2012 Benefit-Cost Analysis for the Port of Oakland's Outer Harbor Intermodal Terminal TCIF Application.

[23] See Surface Transportation Board, Arkansas Electric Power, July 29, 2010, Hearing Transcript at 102:9-103:7, accessed: http://www.stb.dot.gov/TransAndStatements.nsf/8740c718e33d774e85256dd500572ae5/9e49ebf2fea431f1852578460066c5cb?OpenDocument. *See also* BNSF website, cached copy, accessed: http://www.coaltrainfacts.org/docs/BNSF-Coal-Dust-FAQs1.pdf.

[24] Union of Concerned Scientists, http://www.uscusa.org/clean_energy/coalvswinde/brief_coal.html3bf-toc-0. A 500 MW plant emits 3.7 mil tons of carbon dioxide and burns 1,430,000 tons of coal.

[25] Exec. Order B.-30.15

accommodate project cargo such as **windmills, steel coils and oversized goods."**[26] Coal was not mentioned as a potential commodity and is hardly the equivalent of goods like corn or windmills/turbines.

The omission of coal from the funding application documents was likely intentional. According to documents from a Utah public records requests in conjunction with the funding requested from the 4 counties in Utah, "We've had an unfortunate article appear on the terminal project…If anything needs to be said**, the script was to downplay coal, and discuss bulk products and a bulk terminal.** The terminal operator is TLS, not Bowie. **Bowie is known for coal…Phil Tagami had been pleased at the low profile that was bumping along to date on the terminal and it looked for a few days like it would just roll into production with no serious discussion."**[27] As you probably know, Phil Tagami, the CEO of CCIG, is the developer of this project, and he is also a former commissioner of this body.

This change in use violates TCIF Guidelines requiring disclosure of "the function of the proposed project within the corridor."[28] Unfortunately, the use of this facility as a coal export facility has been done in secret, and this has generated significant controversy. This type of bait and switch is not what voters approved in Proposition 1B, and is a deceitful and potentially fraudulent use of funding that was allocated for a facility applying to handle goods like wind turbines.

Further, according to the funding application and baseline agreement documents, the City Logistics and Bulk and Oversize Terminal is supposed to cost around $99 million to build.[29] And now sources are reporting that the developers, CCIG and TLS, are claiming that the Bulk and Oversize terminal will cost $250 million to build in order to ship coal.[30] According to TCIF funding guidelines, when project costs exceed the approved budget this must be reported in the quarterly CTC reports and in the semi-annual audit. Funding applicants must then provide a plan to the CTC to downsize the project to keep within budget or identify alternative sources of funding.[31] It is unclear whether any of these things have occurred. We will also note that if shipping coal would more than double the cost of the proposed City Bulk and Oversize Terminal, that may be another independent reason why shipping coal should not be funded—it is a very costly prospect, not just for public health, but also for the City and California taxpayers. It is especially harmful given the poor prospects for US coal in the international market and the history of failure for West Coast coal export projects.

iv. Conclusion

Public money, especially in the amount $242 million, should not be used to build a coal export facility at the former Oakland Army Base. While the general Oakland Army Base project has many

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[26] Amendment, Exh B at 5.
[27] Email from Jeff Holt to various Utah officials re; Press about Utah investment in Oakland terminal project, April 8, 2015, at p. 1, attached hereto as **Exh. A.**
[28] TCIF Guidelines, at ¶ 7.
[29] See April 24, 2012 City Council Special Community Economic Development Meeting Agenda report at 3 Table 1, accessed: https://oakland.legistar.com/LegislationDetail.aspx?ID=1109666&GUID=007669A9-58B0-46A8-B21D-B38A91C68313&Options=&Search=
[30] Project Could Transform Local Coal Market to International, Richfield Reaper, April 7, 2015, accessed: http://www.richfieldreaper.com/news/local/article_e13121f0-dd67-11e4-b956-3ff480cc1929.html
[31] TCIF Funding Guidelines at ¶14, 18.

laudable goals that the undersigned organizations support, the export of coal has no place in this project on public land funded by California residents for a use that is inconsistent with its funding application. Allowing this fossil fuel facility to be built would breach the trust of California voters who took a chance on Proposition 1B under the auspices of the CTC funding only important projects that actually improve the conditions near freight hubs. To allow this facility to ship fossil fuels when the funding application explicitly discussed other non-controversial (and non-climate change-inducing goods) would be a fraudulent use of public money.

In order to be fully clear, our undersigned organizations fully support the redevelopment goals of the Oakland Army Base and would like this project and a facility on this parcel to move forward.

As such we request that the CTC: 1) halt all future disbursements of funding to this project until a full CEQA and/or NEPA analysis considering coal, petcoke and other fossil fuel shipments is complete; 2) place a clear no coal or fossil fuel handling condition tied to any portion of the project on which CTC funds have been disbursed and spent ; 3) require full repayment of public TCIF funds for the bulk terminal and associated rail infrastructure if fossil fuels are shipped from it; or 4) consider granting the City of Oakland an extension on any sort of matching funds timeline such that it is not "forced" to take any funds involving coal or fossil fuel shipment .

We appreciate your consideration of these comments, and please do not hesitate to contact us if you would like to discuss this matter further.

Sincerely,

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On behalf of Sierra Club, Earthjustice, West Oakland Environmental Indicators Project, San Francisco Baykeeper, and Communities for a Better Environment

enclosures

cc

Honorable Commissioners, California Transportation Commission

Will Kempton, Executive Director, California Transportation Commission

Honorable Mayor Libby Schaaf, City of Oakland

Honorable Members, Oakland City Council

Port of Oakland

Ken Alex, Governor's Office of Planning and Research

Kamala Harris, Attorney General

Chair Mary Nichols and Cynthia Marvin, California Air Resources Board

Secretary Matthew Rodriquez, CalEPA

Assemblymember Rob Bonta

Assemblymember Tony Thurmond

Senator Loni Hancock

Senator Bob Wieckowski

Congresswoman Barbara Lee

Appendix

Funding Matrix in the TCIF Funding application for Oakland Army Base[32]

Table 1*

Development Elements	Total Cost	Port	City	City Private Match	TCIF
Remediation	11.4	5.7	5.7	-	-
Port Rail Terminal	79.6	10	[illegible]	-	65.8
Site Prep on City Lands/Backbone Infrastructure	247.2	-	[illegible]	25.9 -	176.30
Recycling Facilities	46.6	-	-	46.6 -	-
City Logistics & Oakland Bulk and Oversized Terminal	99.4	-	-	99.4	-
TOTAL	484.2	15.7	54.5	171.9	242.1

* Sources shown in top horizontal row to the right of "Total Cost," and Uses are shown in the column under Development Elements.

[32] See Table 1, April 24, 2012 City Council Agenda report at 3.

Project Schedule Baseline Summary						
(Schedule Changes and Variances in Months)	Adopted Program (06/07/07) a	Approved Changes (mm/dd/yyyy) b	Current Approved (06/30/2015) c	% Complete (06/30/2015) d	Schedule Forecast (06/30/2015) e	Schedule Variance (months) f=c-e
Begin Environmental Phase	01/01/2002		01/01/2002	100		0
End Environmental Phase	06/30/2009	08/22/2012	07/31/2012		07/31/2012	0
Begin Design (PS&E) Phase	09/01/2007	08/22/2012	08/01/2009	65		0
End Design (PS&E) Phase	06/30/2010	08/22/2012	09/30/2013		07/30/2016	-34
Begin Right of Way Phase	06/30/2008	08/22/2012	08/01/2009	100		0
End Right of Way Phase	12/01/2009	08/22/2012	03/31/2013		03/31/2013	0
Begin Construction Phase	03/01/2011	08/22/2012	01/01/2010	48	01/01/2010	0
End Construction Phase	12/31/2013	08/22/2012	12/31/2019		12/31/2019	0
Begin Closeout Phase	12/31/2013	08/22/2012	08/01/2015	0	10/01/2014	10
End Closeout Phase	06/30/2014		06/30/2020		06/30/2020	0

[33]**Source: Project Bond Accountability**

[33] Outer Harbor Intermodal Terminal, Bond Accountability, data as of June 30, 2015, accessed: http://www.bondaccountability.dot.ca.gov/bondacc/ProjectDetailsPreActionPublic.do?%3E&bondId=3

Comments on the Air Quality (Chapter 4) and Coal Dust (Chapter 6) Sections of the Draft EIS for the Proposed Tongue River Railroad Company, Inc. Rail Construction and Operation in Custer, Powder River and Rosebud Counties, Docket No. FD 30186, Surface Transportation Board (STB), Office of Environmental Analysis (OEA)

By

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Introduction

The Draft EIS attempts to analyze the potential environmental impacts of the Tongue River Railroad Company's (TRRC) October 2012 revised application to the STB requesting authority to construct and operate a rail line in southeast Montana. In TRRC's December 2012 supplemental application, TRRC identified its preferred route for the proposed Tongue River Railroad as the 42-mile Colstrip Alternative, which would travel between Colstrip, Montana, and the Ashland/Otter Creek areas of Montana. The Draft EIS purportedly analyzes the environmental impacts of the proposed rail line and alternatives, including the No-Action Alternative.

These comments specifically focus only on the Air Quality and Coal Dust impacts of the proposed action and on how these impacts affect the interests of the Northern Cheyenne Tribe (hereafter "Tribe"). As the Draft EIS notes, "[T]he Northern Cheyenne Indian Reservation borders the west side of the Tongue River in the project area near Ashland."[2] In addition, the mines that would be the source of coal for the proposed action would also be located very close to the Tribe's western boundaries.[3]

[1] Resume provided in Attachment A.

[2] See file _Introductory_Material.pdf, p. 28.

[3] See file _Introductory_Material.pdf, p. 36 (S-10, Figure 2).

As detailed below, there are numerous flaws and unsupported assumptions in the STB's analysis of the potential adverse air quality impacts in the project area. As a result, it appears that the STB has seriously understated the potential impacts to air quality on the Northern Cheyenne Reservation, which is a Class 1 airshed.

General Comments

[A] The Draft EIS Improperly Characterizes the Impacts from Air Quality and Coal Dust Due to the Project

In the Abstract, describing the proposed action, the STB states that:

> "TRRC proposes to construct and operate a 42-mile rail line (the Colstrip Alternative) between Colstrip, Montana and the Ashland and Otter Creek areas of Montana. The Board's Office of Environmental Analysis (OEA) and the cooperating agencies have prepared this Draft Environmental Impact Statement (EIS), which analyzes the environmental impacts that could occur if TRRC were to construct and operate the proposed rail line. This Draft EIS analyzes the environmental impacts of ten build alternatives and the No-Action Alternative. Any of the build alternatives could have minor to highly adverse impacts on the following resources: transportation, greenhouse gases and climate change, noise, biological resources, water resources, visual resources, cultural and historical resources, land resources, geology and soils, socioeconomics, and environmental justice. All other resources would experience negligible impacts. OEA has included draft recommended mitigation measures in this Draft EIS. These mitigation measures will be considered by the Board as potential conditions if the Board decides to grant TRRC authority to construct and operate the rail line."[4]

We note that the Abstract quoted above, by not including "Air Quality" or "Coal Dust" among the resources that could have "minor to highly adverse" impacts, indicates that these would have "negligible" impacts. As detailed below, this characterization of both the Air Quality and the Coal Dust impacts due to the project as "negligible" is based on numerous unsupported and optimistic assumptions in the analysis by the STB/OEA.[5] Specifically, the STB has not properly

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[4] *Ibid.*

[5] I recognize that, all of its flaws notwithstanding, the Draft EIS does admit that air quality impacts from its cumulative assessment (i.e., including the project and the identified 18 or so other projects whose impacts would likely coincide in time/space) are not negligible:

> "OEA determined that the cumulative impacts of the proposed rail line and the other projects that OEA identified <u>could affect</u> grade-crossing safety, grade-crossing delay, <u>air quality</u>, greenhouse gases and climate change, biological resources, water resources, visual resources, cultural resources, geology and soils, paleontological resources, land use and recreation, energy resources, and socioeconomics." (emphasis added) See file _Introductory_Material.pdf, p. 24-25 (Q&A-14/15).

assessed air quality impacts to lands and resources (including agriculture, water quality, recreation, etc.) belonging to and affecting the Tribe.[6]

[B] The Entire Air Quality Analysis in the Draft EIS is Inappropriately Censored by Reliance on the Board's "Thresholds"

In the Draft EIS, the STB discusses the impacts from trains that will be transporting coal as a result of this proposed action and states that:

> "OEA used a computer model to predict where the trains from the proposed rail line would travel and to identify rail lines that would experience an increase in rail traffic. The model identified segments of rail where the volume of traffic could increase beyond the Board's thresholds for environmental analysis (an increase of eight trains per day or more for areas in compliance with national air quality standards and an increase of three trains per day or more for areas not in compliance with national air quality standards). OEA analyzed the potential environmental impacts that could occur on these rail segments due to increased rail traffic."[7]

I note that the Draft EIS does not include any discussion or support (that I could find) which justifies the Board's threshold (i.e., an increase of eight trains per day or more for areas in compliance with national ambient air quality standards (NAAQS) and an increase of three trains per day or more for areas not in compliance with NAAQS). It is not clear how these thresholds were established. Specifically, it is not clear which of the several NAAQS were controlling in establishing these thresholds – i.e., the PM2.5 NAAQS, the PM10 NAAQS, the CO NAAQS, the NOx NAAQS, or some other NAAQS. Clearly, assumptions on the emissions of pollutants (from the locomotives) as well as from coal dust, brake wear dust and re-entrained track-side dust would be fundamental to and foundational to establishing these thresholds.

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[6] In fact, the analysis misleads in its likely impacts on the Tribe. For example, in Chapter 4, page 4-8, the Draft EIS states that "[N]one of the build alternatives would pass through Lame Deer or the Northern Cheyenne Reservation." While that may be true as a factual matter, in context, it appears to imply that therefore there should not be air quality impacts on the Tribe. This is highly misleading. Several of the route alignments are located immediately adjacent to the Tribe's boundaries; as such, there are likely to be significant adverse air quality impacts on the Reservation, both during construction and operation of the project.

[7] See file _Introductory_Material.pdf, p. 14 (Q&A-4)

The entire analysis in the Draft EIS is flawed because of reliance on these unsupported "thresholds." As the Draft EIS states:

> "OEA assessed the potential environmental impacts that could occur because of increased rail traffic on rail lines that would experience an increase beyond the Board's thresholds for environmental analysis. This Draft EIS does not consider impacts on rail lines that would not experience a net increase in rail traffic because of construction and operation of the proposed rail line or that <u>would experience an increase less than the Board's thresholds for environmental analysis</u>."[8] (emphasis added).

Thus, since the Draft EIS clearly relies on these "thresholds," and only considers those rail alternative routes/volumes that exceeded these "thresholds," the manner in which these "thresholds" were established, along with all supporting details, including all calculations and assumptions should be provided for public review. As it stands, by not providing this basic detail, the Draft EIS lacks adequate transparency.

[C] The Analysis is Not Transparent Due To Its Reliance on the Integrated Planning Model

Further, on this point, the Draft EIS relies on the Integrated Planning Model (IPM)[9] to determine the various rail route alternatives and volumes[10] (before censoring them as discussed above).

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[8] See file _Introductory_Material.pdf, p. 22 (Q&A-12)

[9] See, for example, file _Introductory_Material.pdf, p. 21 (Q&A-11), as follows:

> "[B]ecause there were so many variables that needed to be considered to determine where the trains would move, OEA used a computer model called the Integrated Planning Model (IPM). The model determines the least overall cost for meeting U.S. electric demand. In determining the least cost solution, IPM identifies where each coal plant obtains the coal that it consumes and how much it will consume. The model determines the amount of coal and thus the number of trains needed to transport the coal. <u>Inputs to the model included coal production and transportation costs, national and international coal distribution patterns, and economic and regulatory uncertainties such as low natural gas prices and carbon dioxide emission regulations that could affect coal markets in the future</u>." (emphasis added)

[10] For example, the Draft EIS notes that:

> "[T]he estimated coal dust emission rates were based on the maximum estimated train traffic for any scenario to provide a conservative estimate (high production scenario, southern alternatives, 26.7 trains per day…" (internal citations omitted). See Appendix G, p. G-11.

Yet, there is no discussion in the Draft EIS regarding this model and whether the myriad assumptions made in its implementation are appropriate or reliable. For example, there is little discussion on any calibration or back-testing that may indicate or shed light on the reliability of the IPM results.

Therefore, all of the general and specific issues discussed below relating to Air Quality and Coal Dust impacts to the Tribe are underpinned by these two basic and unsupported assumptions – namely on the use of the IPM model with no discussion as to its reliability in the current context; and the further censoring of the IPM output routes/volumes using the unsupported Board's "thresholds." The validity of Draft EIS is significantly compromised due to the lack of discussion and transparency on these two issues. The STB should consider reissuing the Draft EIS, correcting these major deficiencies.

The above notwithstanding, we provide the following additional general comments.

[D] The Overall Assessment of Air Quality Impacts is Simplistic

Summarizing the results of its Air Quality analysis (excluding climate change impacts), the Draft EIS states that:

> "OEA modeled the potential effects of the proposed rail line on air quality in the project area. OEA found that construction and operation of the proposed rail line would not cause the concentrations of nitrogen dioxide, carbon monoxide, lead, particulate matter, or sulfur dioxide in the air to exceed the national standards for air quality. The addition of the project-related trains to existing rail traffic could adversely affect air quality along some existing rail lines outside of the project area, but would not cause concentrations of pollutants in the air to exceed national standards."[11]

I note that the air quality impacts on the resources of the Tribe were not specifically addressed in the DEIS – which seems to focus entirely on NAAQS compliance in the "project area" as the only end point of the air quality analysis.

This estimate of 26.7 trains per day, which is noted to be "conservative" and is widely used as such as a basic input in estimating "maximum" impacts is itself simply an output of the IPM, including all of its assumptions and uncertainties.

[11] See file _Introductory_Material.pdf, p. 15-16 (Q&A-5-6)

For reasons that are discussed below, this is a major (and likely fatal) shortcoming of the entire analytical framework of the DEIS – affecting all of the impacts analyses and not just that for Air Quality. By assessing the Air Quality impacts "in the project area" but not specifically on the resources of the Tribe, in effect, the analysis assumes that impacts throughout the "project area" are of equal importance.

This (implicit) assumption is false. Impacts are not the same everywhere in the "project area." That is, the same level of predicted air quality (i.e., concentrations of specific pollutants derived from modeling) even assuming the stated modeling was done correctly from a technical standpoint (which we specifically do not believe or concede) can have different impacts at different locations. We note that the Tribe's lands are designated as a Class I area, deserving of special protection for numerous air quality related values, including visibility, haze, and deposition.

As an example, let's say that the predicted (i.e., modeled) maximum concentration of PM10 adjacent to a certain build alternative is X ug/m3. Let us further assume that X is smaller than the NAAQS for PM10 in this instance. One possible conclusion from this analysis is that the impact is therefore "negligible" (from a NAAQS compliance standpoint). Yet, the predicted concentration of PM10 (and its constituents, say toxic metals) could be deposited into the Tongue River, which is adjacent to certain of the build alternatives. And, as a result, this deposition could adversely affect the ability to fish, swim, or recreate in the river. From this latter standpoint, the predicted PM10 concentration is no longer a "negligible" impact. Thus, context matters. NAAQS is not the only attribute that is appropriate for the air quality assessment. And, specific locations within the "project area" matter. The air quality analysis presented in the Draft EIS does not distinguish or consider such distinctions. As a result, it draws simplistic and incorrect conclusions.

[E] The Coal Dust Impacts Analysis is Not Reliable Since the Input Source Term Quantifying Coal Dust Emissions Is Not Reliable

With regards to coal dust and its effect on human health, the Draft EIS states that:

> "OEA analyzed the risks of airborne coal dust and determined that exposure would be within applicable standards and guidelines. The aggregate concentration of all types of particulate matter, including airborne coal dust, would be below air quality standards for particulate matter. OEA also analyzed how coal dust could affect human health if it were to be ingested by humans or to make its way into soil or water. OEA found that the concentrations of all of the chemical components of coal dust would be below the screening levels for human exposure in soil, dust, water, and fish. OEA concluded that coal dust from rail cars on the proposed rail line would not affect human health."[12]

I disagree with this analysis and conclusion. The entire coal dust analysis is dependent on a correct assessment of the source(s) of the coal dust due to the project – i.e., the coal dust that is not only directly emitted from the rail cars themselves (and which can become airborne and then disperse and deposit not just adjacent to but throughout the project area) but also that which is re-entrained as a result of the passage of trains affecting trackside dust which will accumulate over time. I have significant concerns with how each of these "source" terms has been handled in the analysis. For example, as discussed below, re-entrainment of coal dust is not analyzed at all.[13] Based on my concerns, I do not believe that the analysis is appropriate. Thus, I do not believe that the conclusions of the analysis can or should be relied upon.

The Draft EIS also states as follows, with regards to coal dust and its impacts on surface waters:

> "OEA analyzed the potential effect of coal dust from rail cars on the proposed rail line that could make its way into surface waters. OEA found that coal dust constituents in surface water would be below screening levels for ecological exposure, except for barium. The conservative analysis assumptions overestimate the amount of barium that would actually be found in surface waters such that actual barium concentrations would be lower and below screening levels."[14]

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[12] See file _Introductory_Material.pdf, p. 16 (Q&A-6)

[13] See Chapter 4, p. 4-14.

[14] See file _Introductory_Material.pdf, p. 17 (Q&A-7)

Again, as with the impacts on human health from coal dust, as discussed above – the key driver of the surface water impact analysis is the proper assessment of the "sources" of coal dust. In this regard, I show that the analysis falls short – thereby making any conclusions unreliable.

[F] The Draft EIS Improperly Attempts to Dismiss Predicted Significant Impacts

As a general flaw, at times when the predicted impacts are above corresponding thresholds and thus inconvenient, the Draft EIS minimizes such results of significance by claiming, without support or discussion, that the underlying analysis "overestimates" these impacts and that actual impacts would be lower. I provide two such examples.

First, in discussion the level of barium (present in coal dust) impacts to surface waters, the Draft EIS states:

> "OEA also found that estimated concentrations of coal dust in soil, sediment, and surface water would be below screening levels for ecological exposure, with the exception of barium in surface water. OEA's analysis, however, overestimated the amount of barium that would actually be found in surface waters so that actual barium concentrations resulting from the proposed rail line would be lower and below screening levels."[15]

Second, in relation to the impacts of NO2, which even the STB's analysis in the Draft EIS shows will result in an exceedance of the NAAQS, the Draft EIS states:

> "The modeling results indicate that the 1-hour NO2 standard also would be exceeded for the medium production scenario in 2023 (for the northern and southern alternatives) and the high production scenario in 2037 (for the southern alternatives only). The AERMOD model has been documented in a number of studies to over-predict the highest 1-hour NO2 concentration from 1.7 to 2 times the observed concentration (RTP Environmental Associates 2013, American Petroleum Institute 2012, Golder 2011). Therefore, anticipated maximum 1-hour NO2 concentrations would be expected to be less than the modeled levels. The maximum modeled 1-hour NO2 concentrations would not exceed the NAAQS in any analysis year with a downward adjustment for this model bias."[16] (internal citations omitted)

[15] See file _Introductory_Material.pdf, p. 39 (S-13).

[16] See Chapter 4, p. 4-17 through 4-18.

These are misleading characterizations and should be struck from the Draft EIS. If the STB/OEA believes that its analysis overestimates a predicted impact, it should provide specifics of how and why this overestimate occurred rather than vague and unquantified references to overestimation and bias.

The STB should then correct or not include such overestimate. Or, the STB should provide its analysis of what it believes the "actual" (as opposed to the overpredicted) impact will be. But, in reality, no one – not even the STB – can provide an analysis of the "actual" future impact. That is why analyses rely on predictions. And, predictions can include, with good reason, conservative assumptions. That is not because the goal is to inflate a future impact – it is simply a prudent practice in order to accommodate the many unknowns inherent in a predictive analysis that can result in underestimating impacts.

For example, as the STB notes and as I discuss above, much is unknown and unknowable about how the various rail alternatives were developed in the first place. Models used at every stage of the analysis rely on myriad assumptions – not all of which are "conservative" leading to only high levels of impacts.

In the first example above the analysis in the Draft EIS does not include the quantitative impacts of train derailments and the resultant spillage or vast quantities of coal directly into the Tongue River or into its feeder streams or near its banks and thence to the waters of the river. Should that occur, it is certain that not only barium but most other dust/metal impacts to water (and sediments) would be large, persiatent and therefore significant – directly affecting the Tribe in a most adverse manner. Nor can the STB assure that such derailments will never occur in the future. No one can. For example, well publicized derailments in the Powder River Basin have occurred in the recent pass and there cannot be guaranteed assurances by anyone, much less the STB, that they will not occur in the past.

In the second example above, the Draft EIS notes overestimation by AERMOD but does not discuss underestimation of the emission rates used. For example, actual emissions rates from locomotive and other equipment are affected by deterioration of the underlying equipment. It is not unheard of that equipment sometimes do not meet respective standards. This is especially

true of mobile equipment. Therefore, by using emission rates corresponding to the standard, the analysis assumes 100% compliance with standards, which is not a conservative assumption.[17] Use of higher non-compliant emission rates, such as may occur in practice, will result in higher, not lower impacts.

And, in addition, the analysis for NO2 compares the estimated concentrations to the NAAQS today. NAAQS are subject to change (and have generally been subject to downward revisions). If in the future, the NAAQS becomes lower then the predicted impacts would be even greater on a relative basis.

For all of these reasons, the STB should, at the very least, not mischaracterize the results of its own analysis. The public is entitled to a straightforward, transparent, assessment and interpretation of impacts – not a qualitative, backdoor, misleading, revisionist interpretation of the analysis – when the results are inconvenient.

[G] Conclusion

As detailed above, there are significant basic flaws with the overall analytical framework for the air quality analysis in the Draft EIS. Unless corrected or properly supported, any additional "analyses" which rest on these basic framework assumptions cannot lead to reliable conclusions. Nonetheless, I point out some of the additional issues and technical shortcomings in the Air Quality and Coal Dust analyses as presented in the Draft EIS.

[17] The analysis does not contain any information regarding the level of compliance of the many current locomotive in the BNSF fleet with applicable standards. It is therefore an implicit and unsupported non-conservative assumption that all of the locomotives in the fleet are and will comply with their respective standards at all times.

Specific Comments on Air Quality

In addition to the General Comments above, I provide the following specific comments on the Air Quality analysis presented in the Draft EIS in this section.

[A] Construction Impacts Are Not Temporary And Are Not Demonstrated To Be Negligible

The Draft EIS's own estimates of construction fugitive dust (i.e., PM10, as an example), as shown in Tables 4-11 or 4-12 show that emissions of PM10 will be thousands of tons per year, depending on the alternative considered. For the Decker alternative, using 12 month construction schedule, for example, emissions are 2,583 tons per year.

Yet, the Draft EIS concludes that:

> "In summary, air pollutant emissions during construction would be temporary and at any given time would occur only where construction is occurring or along roads traveled by construction vehicles. Pollutant concentrations during construction are expected to remain within applicable air quality standards…. OEA concludes that construction and operation impacts would be negligible."[18]

I believe that characterizing construction emissions as "temporary" is misleading when, in fact, depending on the build alternative/production scenario, construction could last for 3 to 6 years, the former on a year round basis.[19] While this may be "temporary" only in the sense that it will not last for decades, anything that lasts for multiple years is hardly "temporary." I suggest the Draft EIS remove references to "temporary" in this context due to its erroneous implication.

I also disagree with the STB's statement that "concentrations during construction are expected to remain within applicable air quality standards." Here again, the truth of that statement depends on when and where the NAAQS or MAAQS assessments are conducted. It is clear that ambient air will be affected adversely by construction activities. Even though the most significant impacts will occur within and adjacent to the railroad right-of-way and along roads supporting

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[18] See Chapter 4, p. 4-1. See also Section 4.5.1.1, p. 4-13.

[19] See Appendix E, Table E.1-104.

construction, many of the NAAQS and MAAQS have very short averaging times,[20] such as the hourly MAAQS for NO2, ozone, sulfur dioxide, and hydrogen sulfide; hourly NAAQS for ozone; 3-hour average NAAQS for sulfur dioxide; 8-hour average NAAQS for carbon monoxide and ozone; 8-hour average MAAQS for carbon monoxide; 24-hour average NAAQS for sulfur dioxide, PM10, and PM2.5; and 24-hour average MAAQS for sulfur dioxide and PM10.

The emission calculations presented in the Draft EIS simply do not provide enough details for each of the pollutant emissions on very short-term basis so that the short term NAAQS and MAAQS can be properly assessed. Construction emissions are discussed in Section E.1.5 in Appendix E of the Draft EIS.[21] However, none of the emissions summary Tables E.1-109 through E.1-128 show the maximum hourly construction emissions for any of the alternatives. While Tables E.1-120, E.1-121, and E.1-123 show the estimated daily emissions, that is not sufficient to analyze impacts on a still-smaller time scale.

Thus, based on a lack of emission estimates, coupled with similar lack of modeling for short term impacts, there is no basis to conclude that all construction impacts will be "negligible" even when the assessment is purely limited to that of NAAQS and MAAQS compliance.

In addition, I disagree with the STB's suggestion that the only meaningful impact of construction impacts is comparison with NAAQS and MAAQS. I am particularly concerned with the impacts on the Tribe's lands and the Tongue River (which is a critical resource for the Tribe) due to deposition of emissions from the construction phase on many of the potential alternatives such as portions of the Decker, Tongue River, and even Colstrip alignments. I did not see any specific assessment of such impacts on the Tribe in the Air Quality section.[22]

Finally I note that construction impacts will be occurring along with many other projects as discussed in the cumulative analysis. These will be additive and further exacerbate impacts on

[20] See Chapter 4, Table 4-2, p. 4-7.

[21] I note that many of the Tables in this section reference "Table E.1-177" which does not exist . See, for example, FN1 to Tables E.1-89. E.1-90, E.1-91, E.1-92, E.1-93, and E.1-94.

[22] In fact, a search of the words 'Tribe" or "Cheyenne" for the entire Air Quality section Appendix E, where the details of the analysis are presented, did not result in a single instance of these words. Thus, the Air Quality analysis is deficient since it did not conduct any specific and particular analysis of impacts on the Tribe's resources.

the Tribe's resources. These cumulative impacts during construction have not been properly quantified or assessed.

[B] Construction Impacts Rely on Information Provided By TRRC That Are Unverifiable

Construction air quality impacts for all alternatives other than Colstrip rely on ratios such as those listed in Appendix E, Table E.1-105 (which, in turn appear to be based on earthwork volumes listed in Table E.1-106), which were provided by TRRC. However, no details as to how these earthwork volumes were estimated or calculated and the underlying assumptions that were made in arriving at these ratios are not provided anywhere in the Draft EIS.

Even assuming that the details provided by TRRC relating to the Colstrip alternative are correct[23] – and this too is unveriable as presented in the Draft EIS – the assessment of construction impacts for all of the other alternatives rests on the ratios of these unverifiable earthwork volumes from TRRC.

Thus, using these unverifiable earthwork volumes constitutes an act of faith. The Draft EIS should provide the underlying cut/fill drawings along each alignment and similar documention which presumably provide the basis of the earthwork estimates received from TRRC.

[C] The Air Quality Analysis Improperly Limits the Study Area

Addressing the study area, the Draft EIS states that:

> "Potential impacts on *criteria pollutant* concentrations relative to the National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards (Montana AAQS) would be negligible beyond the immediate vicinity (less than 1 kilometer) of the rail line right-of-way, so detailed air quality modeling for the NAAQS assessment is limited to this smaller portion of the study area."[24]

[23] See, for example, details provided in Appendix E, Tables E.1-89, E.1-103, E.1-92, E.1-108, etc. showing the list of equipment that will be required,equipment sizes, equipment fuel consumption rates, and the expected annual hours of operation of the each type of equipment.

[24] See Chapter 4, p 4-2.

I know of no empirical reasons or any laws of nature that would justify constraining the study area for the entire air quality analysis to just the immediate vicinity – i.e., less than 1 km of the rail line right of way. I note again that the impact of air quality is not just felt in its effect on the NAAQS and MAAQS; additional impacts will occur due to deposition and transport of pollutants away from this immediate area during construction and during actual operation. For example, emissions of PM2.5 will likely travel far from just the vicinity of the rail line. So will emissions from gaseous pollutants such as NOx. Of course, any deposition onto adjacent roads and/or the Tongue River can be further dispersed and transported away from the immediate vicinity via secondary processes. Thus, there is no justification to handicap the entire analysis by severly constraining the study area as noted above. This conceptually unsupported assumption is a fatal flaw.

[D] Fugitive Dust Control Levels Are Unsupported

Appendix E, Table E.1-107 shows uncontrolled and controlled emission factors for fugitive dust for PM10 and PM2.5. In each case, the control efficiency based on 'watering" is assumed to be 50%. However, no basis is provided for this assumption.

Dust control via watering is subject to many variables, not limited to: the quantity of water used; the manner in which the water is applied to the activity causing the dust, including proximity of the watering equipment; the type of atomization used; the size distribution of the water droplets; and the training of the operators.

Thus, a control efficiency of 50% is not automatically guaranteed without much more detail. The Draft EIS does not provide any support for assuming the 50% control efficiency used in its emission estimates. Thus, the estimated emissions, just from this standpoint alone, are unsupported and too high.

[E] The Use of Wind Speeds From The Birney Station May Not Be Conservative

The Draft EIS states that:

> "[T]he average wind speed at Birney (2.3 meters per second, about 5.1 mph) is lower than at Miles City (4.4 meters per second, about 9.9 mph). Use of the lower

> wind speed at Birney results in a more conservative analysis (higher pollutant concentrations) than the higher wind speed at Miles City. Accordingly, OEA used the data from the Birney station for the air quality analysis."[25]

While the use of the lower wind speed may result in a more conservative analysis from a dispersion modeling standpoint, these lower wind speeds, if used for the emissions calculations from various sources of fugitive dust will not result in conservative emissions estimates. Since emissions estimates are critical inputs to the dispersion modeling analysis, in addition to the meteorological data such as wind speeds, the overall impact of using lower wind speeds – both for emission estimates and for dispersion modeling – cannot be discerned. The Draft EIS should fully clarify this issue.

[F] The Analysis Does Not Use Appropriate Coal Particle Size Distributions

The particle size distribution of the coal that will be emitted as dust, and also from spillage and reentrainment of previously deposited dust is an obviously critical parameter in the air quality impacts analysis. Since large particles are expected to deposit closer to the source or activity while smaller particles will travel much farther, it is important to establish the proper size distributions for the coal particles.

Additionally, PRB coal is known to be highly friable,[26] subject to breakage under many factors. Thus, the particle size distribution of PRB coal in the rail cars, which is subject to vibration, settling, abrasion, etc., is an important aspect of the inputs to the analysis.

However, the entire Draft EIS analysis relies on unsupported particle size distribution data not from the PRB but from Australia – with no discussion whatsoever as to why the characteristics of Australian coals are relevant to the current analysis. In Table E.1-42, the PM10 and PM2.5 fractions of coal are assumed to be 45% and 8.6% of TSP, respectively, referencing work from Australia. Although there is additional discussion of this in Appendix E, Section E.2.3.2, that discussion provides even less assurance for this assumption. In fact, the additional discussion in

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[25] See Chapter 4, p. 4-6.

[26] See, for example, http://krtcommodities.com/files/PRB%20COAL%20DEGRADATION.pdf.

Section E.2.3.2 provides no comfort that the assumed size fractions have any resemblance to that from PRB coals:

> "Ideally, the characterization of the particle size distribution for the proposed rail line could be improved by matching the coal characteristics of the coal that TRRC would haul with one of the 11 coals assessed in the Katestone Scientific (2000) study (Table E.2-1). <u>However, the coal characterization information on these 11 coal types is not available</u>."[27] (emphasis added)

As to the larger sized particles, whose dispersion was not modeled, the Draft EIS states:

> "The majority of the coal dust particles are large (greater than 250 microns) and deposit quickly after being lifted from the moving train, and therefore, would be deposited within 5 meters (16 feet) of the rail line and would not contribute to nuisance impacts beyond the right-of-way. OEA estimated that these large coal dust particles would account for about 62 percent of the total mass of coal dust emitted from rail line operation."[28]

The analysis provides no citations or support for any of the assumptions excerpted above – such as the fact that "majority of the coal dust particles are large (greater than 250 microns)," that these particles would be "deposited within 16 feet of the rail line,"[29] or that these particles "account for about 62 percent of the total mass of coal dust." Without supporting documentation for these assumptions, there is no basis to assess the accuracy of the coal dust dispersion analysis in the Draft EIS.

In summary, the particle size distributions assumed in the analysis – both for the larger fractions and for the smaller fractions – are simply unsupported.

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[27] See Appendix E, p. E-133.

[28] See Chapter 4, p. 4-18.

[29] If, as the Draft EIS contends that no particles greater than 250 microns have been ever found more than 16 feet of a rail line in the PRB, it should provide documentary proof of this patently absurd assumption.

Specific Comments on Coal Dust

[A] Coal Dust Emissions Are Significantly Underestimated

OEA has concluded that coal dust from trains on the proposed rail line would not harm human health or the environment.[30] This is not supported by the analysis presented. As presented, the total TSP, PM10, and PM2.5 emissions due to coal dust, even for the high production scenario range from several hundred tons per year (depending on route alternative) for TSP to several tens of tons per year for PM2.5.[31] For the Decker alternative in this high production scenario, which I will use as an example, this table shows TSP emissions of 168.3 tons/year due to wind driven emissions from the tops of the loaded rail cars.

I note that these emission estimates appear to be quite low. For example, in a presentation to members of the STB Board in 2009, BNSF indicated that coal dust emissions from the tops of rail cars are 600 pounds per car over a 400 mile route.[32] Thus, for the Decker alternative (distance 51.1 miles[33]), the per car emissions from the top should be around 76 pounds. Using the Draft EIS assumption of 125 cars per train,[34] the coal dust emissions from the top would be 4.79 tons per train. Per the Draft EIS, in the high production scenario this southern alternative would have 26.7 trains per day.[35] Thus, the daily emissions of coal dust from the loaded car tops should be 26.7 times 4.79 or 127.9 tons per day. Annually, therefore, emissions for Decker/High Production should be 46,687 tons per year. Compare this to the 168.3 tons/year used in the analysis.[36] The value used in the analysis is 277 times smaller.

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[30] See Chapter 6, p. 6-1.

[31] See Chapter 4, Table 4-19.

[32] http://www.scribd.com/doc/129350651/Surface-TransMinutes-9-10-09-1

[33] See _Introductory_Material.pdf, Table 1, p. S-6.

[34] See Appendix E, Table E.1-1.

[35] See Appendix E, Table E.1-5.

[36] Even if I make the assumption that BNSF's statement to the STB Board in 2009 referred to uncontrolled emissions (i.e., before the use of any load shaping and application of topper agents) and using the BNSF-claimed 85% reduction as a result of these mitigations, I arrive at an annual emissions estimate for the Decker/High Production alternative of 46,687*(1-0.85) or 7003 tons/year – which is over 41 times the value used in the analysis.

This analysis indicates that that the calculated estimates for the coal dust projected to be emitted in the Draft EIS are grossly inaccurate. If the estimated emissions are hundreds of times smaller than what BNSF itself has reported, then the rest of the impact analysis is, plainly, wrong.

Moreover, I note that the Draft EIS estimates for coal dust are riddled with several critical assumptions – none of which are supported or even properly discussed in the Draft EIS. For example:

- On page E-43, the emission factor equation for coal dust used in the analysis is shown. It includes, as an important input variable, the train speed in km/hr. While the Draft EIS "anticipates that average operating speeds would range from 29.7 to 39.5 miles per hour, depending on the build alternative and whether the train is loaded or empty…,"[37] the specific assumed speed(s) used in the calculations for each build alternative/line are not stated further in this section or anywhere else the Draft EIS to the best of our knowledge.

- Again, with regards to the the emission factor equation for coal dust noted above, it is attributed to Connell Hatch 2008, Witt et al. 1999, and Ferreira et al. 2003. As far as I could determine, none of these studies involved PRB coal. In fact, as the Draft EIS explicitly states, "[M]uch of the basis for the coal dust emissions is based on research conducted in Australia by government agencies, academics, and the Australian Rail Track Corporation over the past 10 years."[38] It is therefore unclear why this equation, based on Australian coals, without any further adjustments, is relevant or representative of coal dust emissions from trains and rail cars carrying PRB coal. This is a critical assumption, used without any discussion at all in the analysis.

I understand that BNSF has claimed to be studying coal dust emissions (albeit for ballast related issues and not environmental impacts, per se) for the last decade.[39] Therefore, it is not clear why

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[37] Draft EIS, Chapter 2, Section 2.3.

[38] See Appendix E, p. E-130. See also, discussion in Section E.2.3.1, beginning on p. E-132.

[39] On its website, BNSF states that

> "[S]ince 2005, BNSF has been at the forefront of extensive research regarding the impacts of coal dust escaping from loaded coal cars on rail lines in the Powder River Basin (PRB), which is located in Wyoming and Montana. From these studies, BNSF has determined that coal dust poses a serious threat to the stability of the track structure and the operational integrity of our lines in,

actual data on PRB coals (including properties, dust emissions, etc.) from these BNSF studies themselves were not used in the analysis to estimate the source term in the coal dust analysis. The analysis does not critique the prior BNSF work in order to justify its rejection and use of the Australian-coal based data.

While ignoring any PRB-related data developed by BNSF as a starting point, the analysis freely uses the BNSF-based control efficiency of 85% (a combination of 50% due to coal shaping in the rail car and an additional 70% due to the use of BNSF-approved topper agents) to reduce its estimate of predicted emissions. See Table E.1-42. However, the public record does not contain any details or underlying data as basis for any of these control efficiency assumptions. Other than a brief public summary by BNSF simply reporting the results but none of the underlying data, these critical control efficiency assumptions are not documented anywhere in the Draft EIS.

[B] Coal Dust Emissions Calculations Do Not Include Reentrainment Emissions

In addition to the significant underestimation noted above, the emissions calculations (and later modeling) for coal dust do not seem to account for re-entrainment of coal dust previously deposited trackside or in adjacent right-of-ways.[40] Smaller sized particles including PM10 and fine particulate matter including PM2.5 are readily resuspended when a train passes; thus these emissions should have been included in the emissions calculations. As a result of their omission, the estimated emissions (which are also then used in the modeling analysis) are underestimated. This should be corrected.

[C] Impacts Analyses Contain No Uncertainty Analyses

In Appendix G, neither the human impacts analysis nor the ecological impacts analysis contains a discussion of the uncertainties inherent in these analyses. It is customary to include a discussion of such uncertainties in any health or ecological risk assessment. Given the numerous

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> and close to, the mines in the PRB. The STB, our regulating agency, has confirmed that coal dust is a harmful contaminant of rail ballast. Tests have shown that dusting events from untreated cars occur with the most frequency close to the mine loading points in the PRB and materially decrease as the railcars move further from the PRB."

See http://www.bnsf.com/customers/what-can-i-ship/coal/coal-dust.html.

[40] See Appendix E, Section E.2.1, p. E-131.

assumptions and unknowns associated with human and ecological risk assessments in general, results of such assessments are accompanies by a discussion of uncertainties in order to provide appropriate context to the reader. Without the discussion on uncertainties, readers can often misinterpret the results (i.e., the predicted risks) of such assessments. The Draft EIS should therefore include such uncertainty analyses.

[D] Estimation of Trace Element Concentrations in Coal Dust Are Improper

In Appendix G, Section G.2.1, the Draft EIS states that:

> "OEA included in the exposure assessment each of the trace elements that had measured values in the composite data. To obtain a single concentration value for each trace element, OEA averaged the concentrations of each chemical in each workbook. Then, if the element was reported in both workbooks, OEA averaged the two averages into an overall average concentration (Table G-1)."

The Draft EIS should disclose why the STB used averaging (or even double averaging, as discussed above) instead of the more customary use of maximum values, particularly given the "screening" nature of the overall assessment and the fact that the underlying coal properties database is not discussed other than the results were from 2004.[41] The Appendix does not discuss where the samples originated from (i.e., from just the Otter Creek Mine area, the other mines that could also be developed as a result of this project, or elsewhere); how the samples were obtained; or how representative the samples were in relation to the coal seams at the likely mines.

In view of these many questions, it is improper to simply use averages as the starting point of the analysis. Gven the fundamental flaw in this basic input, none of the subsequent "results" of the analysis, both for human as well as ecological impacts, are reliable.

[E] Composition of Most of the Topper Agents is Unknown

It is clear from the discussion of the topper agents in Appendix G that much is unknown as far as the composition of almost all of the "approved" agents. For example, the Draft EIS states:

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[41] See Appendix G, p. G-2.

> "The MSDS include wide ranges for the concentrations of some the constituents (e.g., 5 to 50 percent). In other cases, the MSDS identify some constituents as "proprietary" and provide no further information."[42]
>
> "Given that the actual chain length is not specified, the environmental fate of this topper agent is uncertain."[43]
>
> "The purpose of Soil-Sement® is to bind to soils, making it likely that the copolymer of acrylic and polyvinyl acetate will preferentially bind to soils, although given the limited information available on the composition of the product and mobility characteristics of the constituents, this is uncertain."[44]
>
> "The MSDS for AKJ CTS-100 does not provide information on ecotoxicity or chronic impacts…..The MSDS does not describe the environmental mobility of the product in air, water, and soil/sediment, but the MSDS notes that accidentally released product should not be flushed into sewers."[45]
>
> "The MSDS does not describe the environmental mobility of AKJ CTS-100C in air, water, and soil/sediment, nor does it provide information on ecotoxicity."[46]
>
> "No additional information is provided in the MSDS on the chemical components in Min Topper S+0150."[47]

Given this level of lack of knowledge of these topper agents, it is not clear why the present "analysis" is, in fact, useful at all. Unless the STB can obtain meaningful data on the constituents in these agents, it has no basis to present is findings as some sort of impact analysis. Coupled with the lack of any uncertainty analyses as noted earlier, the entire analysis is misleading and unreliable.

[F] Additional Assumptions Relating to Topper Agent Emissions are Unsupported

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[42] See Appendix G, p. G-4.

[43] See Appendix G, p. G-6. Pertaining to Nalco Dustbind Plus.

[44] See Appendix G, p. G-7. Pertaining to Midwest Soil-Sement.

[45] See Appendix G, p. G-7. Pertaining to AKJ CTS-100. In addition, this topper agent contains an unknown proprietary addition (See Table G-2).

[46] See Appendix G, p. G-8. Pertaining to AKJ CTS-100C. In addition, this topper agent contains an unknown proprietary addition (See Table G-2).

[47] See Appendix G, p. G-9. Pertaining to Mintech Min Topper S+0150. In fact, nothing useful is known about this topper agent (See Table G-2).

Continuing further, the Draft EIS states that:

> "Assuming a railcar is 480 square feet in surface area or 4,603 cubic feet in volume (BNSF Railway Company 2013) and assuming that the topper agent penetrates the top 4 inches of the coal in the railcar, the topper agent would penetrate 160 cubic feet of coal, corresponding to approximately 3.5 percent of the coal in the railcar."[48]

This statement raises numerous questions that are not addressed in the Draft EIS, including the following:

> What is the basis of the surface area of each railcar as noted above?
>
> Are all railcars assumed to have the same surface area?
>
> What is the basis of the volume of each railcar as noted above?
>
> Are all railcars assumed to have the same volume?
>
> What is the basis for assuming that any of the topper agents "penetrates the top 4 inches of the coal" as assumed above?
>
> What is the basis for assuming that any of the topper agents fully covers the <u>entire</u> exposed surface area of <u>each</u> railcar in an unit train?

Without addressing these questions with further detailed discussion of how these agents are actually applied in practice, the various assumptions above are unsupported.

[G] Coal Deposition Modeling is Fatally Compromised

With regards to coal dust deposition modeling, the Draft EIS states that:

> "OEA modeled wet, dry, and total coal dust deposition rates based on estimated rail car coal dust emissions, adjusted for the use of load profiling and topper agents for coal dust emission reduction. OEA estimated deposition rates at 10-meter intervals from the center of the rail line to a distance of 300 meters on each

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[48] See Appendix G, p. G-9.

> side of the rail line, or 60 locations (receptors). OEA evaluated particle size categories of less than 60 microns in diameter, 60 to 250 microns in diameter, and the sum of the two (i.e., all particles up to 250 microns in diameter)."[49]

It is not at all clear why the Draft EIS included as its smallest size fraction, particle size of "less than 60 microns in diameter." It is obvious that the particle sizes of concern include much smaller sizes such as PM10 and PM2.5 (for which there are NAAQS) and which are capable for being inhaled, resulting in adverse health outcomes. It is also clear that these much smaller size particles could travel much father than the assumed 300 meters distance on each side of the rail line. Unless the STB can demonstrate that none of the (very friable PRB coal dust) particles are or can be less than 10 microns or 2.5 microns, simply assuming that even the smallest particles will not travel beyond 300 meters is an unsupported assumption. Thus, I believe that the results of these deposition modeling are unreliable and should be set aside.

[49] See Appendix G, p. G-11.

Conclusions

As discussed in detail in these comments, the Draft EIS contains significant deficiencies in both the air quality and the coal dust emissions analyses.

A major and unexplained flaw that affects both sections is the apparent significant underestimation of coal dust emissions from railcars. The coal dust emissions estimates provided in the Draft EIS – relying on Australian work with no discussion as to relevance to the PRB coals that will be transported – do not approach the levels of emissions publicly stated by BNSF, the operator of the proposed project in statements to the STB. Also, the coal dust emissions estimates omit assessment of re-entrainment emissions of dust previously deposited. Since the coal dust emissions estimates are foundational inputs that feed into the air quality analyses, the results of all the air quality analyses that rely on these vastly underestimated coal dust emissions are also therefore underestimated and cannot be relied upon.

As discussed above, the air quality analysis is significantly compromised in other aspects as well, including the following: it suffers from a lack of transparency with no support for numerous assumptions including the use of the IPM Model; it improperly relies on improper and unsupported Board thresholds to censor the analysis at the outset; it does not distinguish between the Tribe's Class I area and its need for special protections versus other impacted areas; and it improperly relies on the NAAQS and MAAQS as the only appropriate comparison standards.

Based on this review, I conclude that the coal dust and air quality emissions assessments in the Tongue River Railroad Draft EIS are deeply flawed and fail to provide a reliable evaluation of the potential environmental and human health impacts from emissions of coal dust and other air pollutants.

ATTACHMENT A - RESUME

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CONSULTANT, ENVIRONMENTAL AND ENERGY ISSUES

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EXPERIENCE SUMMARY

Dr. Sahu has over twenty three years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment for a wide range of emissions sources; soils and groundwater remediation including landfills as remedy; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

He has over twenty one years of project management experience and has successfully managed and executed numerous projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public.

He has provided consulting services to numerous private sector, public sector and public interest group clients. His major clients over the past twenty three years include various steel mills, petroleum refineries, cement companies, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, and various entities in the public sector including EPA, the US Dept. of Justice, California DTSC, various municipalities, etc.). Dr. Sahu has performed projects in over 44 states, numerous local jurisdictions and internationally.

In addition to consulting, Dr. Sahu has taught numerous courses in several Southern California universities including UCLA (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management) for the past seventeen years. In this time period he has also taught at Caltech, his alma mater (various engineering courses), at the University of Southern California (air pollution controls) and at California State University, Fullerton (transportation and air quality).

Dr. Sahu has and continues to provide expert witness services in a number of environmental areas discussed above in both state and Federal courts as well as before administrative bodies (please see Annex A).

EXPERIENCE RECORD

2000-present **Independent Consultant.** Providing a variety of private sector (industrial companies, land development companies, law firms, etc.) public sector (such as the US Department of Justice) and

public interest group clients with project management, air quality consulting, waste remediation and management consulting, as well as regulatory and engineering support consulting services.

1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for** Air Quality/Geosciences/Hazardous Waste Groups, Pasadena. Responsible for the management of a group of approximately 24 air quality and environmental professionals, 15 geoscience, and 10 hazardous waste professionals providing full-service consulting, project management, regulatory compliance and A/E design assistance in all areas.

Parsons ES, **Manager for Air Source Testing Services**. Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.

1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department. Responsibilities included multimedia regulatory compliance and permitting (including hazardous and nuclear materials), air pollution engineering (emissions from stationary and mobile sources, control of criteria and air toxics, dispersion modeling, risk assessment, visibility analysis, odor analysis), supervisory functions and project management.

1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department. Responsibilities included permitting, tracking regulatory issues, technical analysis, and supervisory functions on numerous air, water, and hazardous waste projects. Responsibilities also include client and agency interfacing, project cost and schedule control, and reporting to internal and external upper management regarding project status.

1989-1990 Kinetics Technology International, Corp. **Development Engineer.** Involved in thermal engineering R&D and project work related to low-NOx ceramic radiant burners, fired heater NOx reduction, SCR design, and fired heater retrofitting.

1988-1989 Heat Transfer Research, Inc. **Research Engineer**. Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

EDUCATION

1984-1988 Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.

1984 M. S., Mechanical Engineering, Caltech, Pasadena, CA.

1978-1983 B. Tech (Honors), Mechanical Engineering, Indian Institute of Technology (IIT) Kharagpur, India

TEACHING EXPERIENCE

Caltech

"Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.

"Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.

"Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.

"Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.

“Thermodynamics and Heat Transfer,” Fall and Winter Terms of 1996-1997.

U.C. Riverside, Extension

"Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Various years since 1992.

"Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Various years since 1992.

"Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.

"Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.

"Process Safety Management," University of California Extension Program, Riverside, California. Various years since 1992-2010.

"Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.

"Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.

"Advanced Hazardous Waste Management" University of California Extension Program, Riverside, California. 2005.

Loyola Marymount University

"Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1993.

"Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.

"Environmental Risk Assessment," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1998.

"Hazardous Waste Remediation" Loyola Marymount University, Dept. of Civil Engineering. Various years since 2006.

University of Southern California

"Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.

"Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

University of California, Los Angeles

"Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000, Spring 2003, Spring 2006, Spring 2007, Spring 2008, Spring 2009.

International Programs

"Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.

"Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.

"Air Pollution Planning and Management," IEP, UCR, Spring 1996.

"Environmental Issues and Air Pollution," IEP, UCR, October 1996.

PROFESSIONAL AFFILIATIONS AND HONORS

President of India Gold Medal, IIT Kharagpur, India, 1983.

Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992-present.

American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-present.

Air and Waste Management Association, West Coast Section, 1989-present.

PROFESSIONAL CERTIFICATIONS

EIT, California (# XE088305), 1993.

REA I, California (#07438), 2000.

Certified Permitting Professional, South Coast AQMD (#C8320), since 1993.

QEP, Institute of Professional Environmental Practice, since 2000.

CEM, State of Nevada (#EM-1699). Expiration 10/07/2011.

PUBLICATIONS (PARTIAL LIST)

"Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).

"Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).

"On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).

"Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).

"Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C.Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).

"A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).

"Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R.Gavalas, *Combust. Flame*, **77**, 337-346 (1989).

"Particle Measurements in Coal Combustion," with R.C. Flagan, in "**Combustion Measurements**" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).

"Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.

"Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).

"HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NOx Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

“From Puchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada,” with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

"The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants," with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

Annex A

Expert Litigation Support

1. Occasions where Dr. Sahu has provided Written or Oral testimony before Congress:

(a) In July 2012, provided expert written and oral testimony to the House Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology at a Hearing entitled "Hitting the Ethanol Blend Wall – Examining the Science on E15."

2. Matters for which Dr. Sahu has have provided affidavits and expert reports include:

(b) Affidavit for Rocky Mountain Steel Mills, Inc. located in Pueblo Colorado – dealing with the technical uncertainties associated with night-time opacity measurements in general and at this steel mini-mill.

(c) Expert reports and depositions (2/28/2002 and 3/1/2002; 12/2/2003 and 12/3/2003; 5/24/2004) on behalf of the United States in connection with the Ohio Edison NSR Cases. *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

(d) Expert reports and depositions (5/23/2002 and 5/24/2002) on behalf of the United States in connection with the Illinois Power NSR Case. *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

(e) Expert reports and depositions (11/25/2002 and 11/26/2002) on behalf of the United States in connection with the Duke Power NSR Case. *United States, et al. v. Duke Energy Corp.*, 1:00-CV-1262 (Middle District of North Carolina).

(f) Expert reports and depositions (10/6/2004 and 10/7/2004; 7/10/2006) on behalf of the United States in connection with the American Electric Power NSR Cases. *United States, et al. v. American Electric Power Service Corp., et al.*, C2-99-1182, C2-99-1250 (Southern District of Ohio).

(g) Affidavit (March 2005) on behalf of the Minnesota Center for Environmental Advocacy and others in the matter of the Application of Heron Lake BioEnergy LLC to construct and operate an ethanol production facility – submitted to the Minnesota Pollution Control Agency.

(h) Expert Report and Deposition (10/31/2005 and 11/1/2005) on behalf of the United States in connection with the East Kentucky Power Cooperative NSR Case. *United States v. East Kentucky Power Cooperative, Inc*., 5:04-cv-00034-KSF (Eastern District of Kentucky).

(i) Affidavits and deposition on behalf of Basic Management Inc. (BMI) Companies in connection with the BMI vs. USA remediation cost recovery Case.

(j) Expert Report on behalf of Penn Future and others in the Cambria Coke plant permit challenge in Pennsylvania.

(k) Expert Report on behalf of the Appalachian Center for the Economy and the Environment and others in the Western Greenbrier permit challenge in West Virginia.

(l) Expert Report, deposition (via telephone on January 26, 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) in the Thompson River Cogeneration LLC Permit No. 3175-04 challenge.

(m) Expert Report and deposition (2/2/07) on behalf of the Texas Clean Air Cities Coalition at the Texas State Office of Administrative Hearings (SOAH) in the matter of the permit challenges to TXU Project Apollo's eight new proposed PRB-fired PC boilers located at seven TX sites.

(n) Expert Testimony (July 2007) on behalf of the Izaak Walton League of America and others in connection with the acquisition of power by Xcel Energy from the proposed Gascoyne Power Plant – at the State of Minnesota, Office of Administrative Hearings for the Minnesota PUC (MPUC No. E002/CN-06-1518; OAH No. 12-2500-17857-2).

(o) Affidavit (July 2007) Comments on the Big Cajun I Draft Permit on behalf of the Sierra Club – submitted to the Louisiana DEQ.

(p) Expert Report and Deposition (12/13/2007) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case. *Plaintiffs v. Allegheny Energy Inc., et al.*, 2:05cv0885 (Western District of Pennsylvania).

(q) Expert Reports and Pre-filed Testimony before the Utah Air Quality Board on behalf of Sierra Club in the Sevier Power Plant permit challenge.

(r) Expert Report and Deposition (October 2007) on behalf of MTD Products Inc., in connection with General Power Products, LLC v MTD Products Inc., 1:06 CVA 0143 (Southern District of Ohio, Western Division)

(s) Experts Report and Deposition (June 2008) on behalf of Sierra Club and others in the matter of permit challenges (Title V: 28.0801-29 and PSD: 28.0803-PSD) for the Big Stone II unit, proposed to be located near Milbank, South Dakota.

(t) Expert Reports, Affidavit, and Deposition (August 15, 2008) on behalf of Earthjustice in the matter of air permit challenge (CT-4631) for the Basin Electric Dry Fork station, under construction near Gillette, Wyoming before the Environmental Quality Council of the State of Wyoming.

(u) Affidavits (May 2010/June 2010 in the Office of Administrative Hearings))/Declaration and Expert Report (November 2009 in the Office of Administrative Hearings) on behalf of NRDC and the Southern Environmental Law Center in the matter of the air permit challenge for Duke Cliffside Unit 6. Office of Administrative Hearing Matters 08 EHR 0771, 0835 and 0836 and 09 HER 3102, 3174, and 3176 (consolidated).

(v) Declaration (August 2008), Expert Report (January 2009), and Declaration (May 2009) on behalf of Southern Alliance for Clean Energy et al., v Duke Energy Carolinas, LLC. in the matter of the air permit challenge for Duke Cliffside Unit 6. *Southern Alliance for Clean Energy et al., v. Duke Energy Carolinas, LLC*, Case No. 1:08-cv-00318-LHT-DLH (Western District of North Carolina, Asheville Division).

(w) Declaration (August 2008) on behalf of the Sierra Club in the matter of Dominion Wise County plant MACT.

(x) Expert Report (June 2008) on behalf of Sierra Club for the Green Energy Resource Recovery Project, MACT Analysis.

(y) Expert Report (February 2009) on behalf of Sierra Club and the Environmental Integrity Project in the matter of the air permit challenge for NRG Limestone's proposed Unit 3 in Texas.

(z) Expert Report (June 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*

(aa) Expert Report (August 2009) on behalf of Sierra Club and the Southern Environmental Law Center in the matter of the air permit challenge for Santee Cooper's proposed Pee Dee plant in South Carolina).

(bb) Statements (May 2008 and September 2009) on behalf of the Minnesota Center for Environmental Advocacy to the Minnesota Pollution Control Agency in the matter of the Minnesota Haze State Implementation Plans.

(cc) Expert Report (August 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(dd) Expert Report and Rebuttal Report (September 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(ee) Expert Report (December 2009) and Rebuttal reports (May 2010 and June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(ff) Pre-filed Testimony (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(gg) Pre-filed Testimony (July 2010) and Written Rebuttal Testimony (August 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(hh) Expert Report (August 2010) and Rebuttal Expert Report (October 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Liability Phase.

(ii) Declaration (August 2010), Reply Declaration (November 2010), Expert Report (April 2011), Supplemental and Rebuttal Expert Report (July 2011) on behalf of the United States in the matter of DTE Energy Company and Detroit Edison Company (Monroe Unit 2). *United States of America v. DTE Energy Company and Detroit Edison Company*, Civil Action No. 2:10-cv-13101-BAF-RSW (US District Court for the Eastern District of Michigan).

(jj) Expert Report and Deposition (August 2010) as well as Affidavit (September 2010) on behalf of Kentucky Waterways Alliance, Sierra Club, and Valley Watch in the matter of challenges to the NPDES permit issued for the Trimble County power plant by the Kentucky Energy and Environment Cabinet to Louisville Gas and Electric, File No. DOW-41106-047.

(kk) Expert Report (August 2010), Rebuttal Expert Report (September 2010), Supplemental Expert Report (September 2011), and Declaration (November 2011) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(ll) Written Direct Expert Testimony (August 2010) and Affidavit (February 2012) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(mm) Deposition (August 2010) on behalf of Environmental Defense, in the matter of the remanded permit challenge to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(nn) Expert Report, Supplemental/Rebuttal Expert Report, and Declarations (October 2010, November 2010, September 2012) on behalf of New Mexico Environment Department (Plaintiff-Intervenor), Grand Canyon Trust and Sierra Club (Plaintiffs) in the matter of Plaintiffs v. Public Service Company of New Mexico (PNM), Civil No. 1:02-CV-0552 BB/ATC (ACE). (US District Court for the District of New Mexico).

(oo) Expert Report (October 2010) and Rebuttal Expert Report (November 2010) (BART Determinations for PSCo Hayden and CSU Martin Drake units) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(pp) Expert Report (November 2010) (BART Determinations for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(qq) Declaration (November 2010) on behalf of the Sierra Club in connection with the Martin Lake Station Units 1, 2, and 3. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Case No. 5:10-cv-00156-DF-CMC (US District Court for the Eastern District of Texas, Texarkana Division).

(rr) Pre-Filed Testimony (January 2011) and Declaration (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

(ss) Declaration (February 2011) in the matter of the Draft Title V Permit for RRI Energy MidAtlantic Power Holdings LLC Shawville Generating Station (Pennsylvania), ID No. 17-00001 on behalf of the Sierra Club.

(tt) Expert Report (March 2011), Rebuttal Expert Report (Jue 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (US District Court for the District of Colorado).

(uu) Declaration (April 2011) and Expert Report (July 16, 2012) in the matter of the Lower Colorado River Authority (LCRA)'s Fayette (Sam Seymour) Power Plant on behalf of the Texas Campaign for the Environment. *Texas Campaign for the Environment v. Lower Colorado River Authority*, Civil Action No. 4:11-cv-00791 (US District Court for the Southern District of Texas, Houston Division).

(vv) Declaration (June 2011) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

(ww) Expert Report (June 2011) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

(xx) Declaration (August 2011) in the matter of the Sandy Creek Energy Associates L.P. Sandy Creek Power Plant on behalf of Sierra Club and Public Citizen. *Sierra Club, Inc. and Public Citizen, Inc. v. Sandy Creek Energy Associates, L.P.*, Civil Action No. A-08-CA-648-LY (US District Court for the Western District of Texas, Austin Division).

(yy) Expert Report (October 2011) on behalf of the Defendants in the matter of *John Quiles and Jeanette Quiles et al. v. Bradford-White Corporation, MTD Products, Inc., Kohler Co., et al.*, Case No. 3:10-cv-747 (TJM/DEP) (US District Court for the Northern District of New York).

(zz) Declaration (February 2012) and Second Declaration (February 2012) in the matter of *Washington Environmental Council and Sierra Club Washington State Chapter v. Washington State Department of Ecology and Western States Petroleum Association,* Case No. 11-417-MJP (US District Court for the Western District of Washington).

(aaa) Expert Report (March 2012) and Supplemental Expert Report (November 2013) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.,* Civil Action No. 4:10-cv-4969 (US District Court for the Southern District of Texas, Houston Division).

(bbb) Declaration (March 2012) in the matter of *Center for Biological Diversity, et al. v. United States Environmental Protection Agency,* Case No. 11-1101 (consolidated with 11-1285, 11-1328 and 11-1336) (US Court of Appeals for the District of Columbia Circuit).

(ccc) Declaration (March 2012) in the matter of *Sierra Club v. The Kansas Department of Health and Environment*, Case No. 11-105,493-AS (Holcomb power plant) (Supreme Court of the State of Kansas).

(ddd) Declaration (March 2012) in the matter of the Las Brisas Energy Center *Environmental Defense Fund et al., v. Texas Commission on Environmental Quality,* Cause No. D-1-GN-11-001364 (District Court of Travis County, Texas, 261st Judicial District).

(eee) Expert Report (April 2012), Supplemental and Rebuttal Expert Report (July 2012), and Supplemental Rebuttal Expert Report (August 2012) on behalf of the states of New Jersey and Connecticut in the matter of the Portland Power plant *State of New Jersey and State of Connecticut (Intervenor-Plaintiff) v. RRI Energy Mid-Atlantic Power Holdings et al.,* Civil Action No. 07-CV-5298 (JKG) (US District Court for the Eastern District of Pennsylvania).

(fff) Declaration (April 2012) in the matter of the EPA's EGU MATS Rule, on behalf of the Environmental Integrity Project

(ggg) Expert Report (August 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Harm Phase.

(hhh) Declaration (September 2012) in the Matter of the Application of *Energy Answers Incinerator, Inc.* for a Certificate of Public Convenience and Necessity to Construct a 120 MW Generating Facility in Baltimore City, Maryland, before the Public Service Commission of Maryland, Case No. 9199.

(iii) Expert Report (October 2012) on behalf of the Appellants (Robert Concilus and Leah Humes) in the matter of Robert Concilus and Leah Humes v. Commonwealth of Pennsylvania Department of Environmental Protection and Crawford Renewable Energy, before the Commonwealth of Pennsylvania Environmental Hearing Board, Docket No. 2011-167-R.

(jjj) Expert Report (October 2012), Supplemental Expert Report (January 2013), and Affidavit (June 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

(kkk) Pre-filed Testimony (October 2012) on behalf of No-Sag in the matter of the North Springfield Sustainable Energy Project before the State of Vermont, Public Service Board.

(lll) Pre-filed Testimony (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

(mmm) Expert Report (February 2013) on behalf of Petitioners in the matter of Credence Crematory, Cause No. 12-A-J-4538 before the Indiana Office of Environmental Adjudication.

(nnn) Expert Report (April 2013), Rebuttal report (July 2013), and Declarations (October 2013, November 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(ooo) Expert Report (May 2013) and Rebuttal Expert Report (July 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

(ppp) Declaration (August 2013) on behalf of A. J. Acosta Company, Inc., in the matter of A. J. Acosta Company, Inc., v. County of San Bernardino, Case No. CIVSS803651.

(qqq) Comments (October 2013) on behalf of the Washington Environmental Council and the Sierra Club in the matter of the Washington State Oil Refinery RACT (for Greenhouse Gases), submitted to the Washington State Department of Ecology, the Northwest Clean Air Agency, and the Puget Sound Clean Air Agency.

(rrr) Statement (November 2013) on behalf of various Environmental Organizations in the matter of the Boswell Energy Center (BEC) Unit 4 Environmental Retrofit Project, to the Minnesota Public Utilities Commission, Docket No. E-015/M-12-920.

(sss) Expert Report (December 2013) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

(ttt) Expert Testimony (December 2013) on behalf of the Sierra Club in the matter of Public Service Company of New Hampshire Merrimack Station Scrubber Project and Cost Recovery, Docket No. DE 11-250, to the State of New Hampshire Public Utilities Commission.

(uuu) Expert Report (January 2014) on behalf of Baja, Inc., in Baja, Inc., v. Automotive Testing and Development Services, Inc. et. al, Civil Action No. 8:13-CV-02057-GRA (District of South Carolina, Anderson/Greenwood Division).

(vvv) Declaration (March 2014) on behalf of the Center for International Environmental Law, Chesapeake Climate Action Network, Friends of the Earth, Pacific Environment, and the Sierra Club (Plaintiffs) in the matter of Plaintiffs v. the Export-Import Bank (Ex-Im Bank) of the United States, Civil Action No. 13-1820 RC (United States District Court for the District of Columbia).

(www) Direct Prefiled Testimony (June 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17319 (Michigan Public Service Commission).

(xxx) Expert Report (June 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).

(yyy) Declaration (July 2014) on behalf of Public Health Intervenors in the matter of EME Homer City Generation v. US EPA (Case No. 11-1302 and consolidated cases) relating to the lifting of the stay entered by the Court on December 30, 2011 (US Court of Appeals for the District of Columbia).

3. Occasions where Dr. Sahu has provided oral testimony <u>in depositions, at trial or in similar proceedings</u> include the following:

(zzz) Deposition on behalf of Rocky Mountain Steel Mills, Inc. located in Pueblo, Colorado – dealing with the manufacture of steel in mini-mills including methods of air pollution control and BACT in steel mini-mills and opacity issues at this steel mini-mill.

(aaaa) Trial Testimony (February 2002) on behalf of Rocky Mountain Steel Mills, Inc. in Denver District Court.

(bbbb) Trial Testimony (February 2003) on behalf of the United States in the Ohio Edison NSR Cases, *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

(cccc) Trial Testimony (June 2003) on behalf of the United States in the Illinois Power NSR Case, *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

(dddd) Deposition (10/20/2005) on behalf of the United States in connection with the Cinergy NSR Case. *United States, et* al. *v. Cinergy Corp., et al.*, IP 99-1693-C-M/S (Southern District of Indiana).

(eeee) Oral Testimony (August 2006) on behalf of the Appalachian Center for the Economy and the Environment re. the Western Greenbrier plant, WV before the West Virginia DEP.

(ffff) Oral Testimony (May 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) re. the Thompson River Cogeneration plant before the Montana Board of Environmental Review.

(gggg) Oral Testimony (October 2007) on behalf of the Sierra Club re. the Sevier Power Plant before the Utah Air Quality Board.

(hhhh) Oral Testimony (August 2008) on behalf of the Sierra Club and Clean Water re. Big Stone Unit II before the South Dakota Board of Minerals and the Environment.

(iiii) Oral Testimony (February 2009) on behalf of the Sierra Club and the Southern Environmental Law Center re. Santee Cooper Pee Dee units before the South Carolina Board of Health and Environmental Control.

(jjjj) Oral Testimony (February 2009) on behalf of the Sierra Club and the Environmental Integrity Project re. NRG Limestone Unit 3 before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(kkkk) Deposition (July 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al*.

(llll) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Coleto Creek coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(mmmm) Deposition (October 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(nnnn) Deposition (October 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(oooo) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Tenaska coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (April 2010).

(pppp) Oral Testimony (November 2009) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(qqqq) Deposition (December 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(rrrr) Oral Testimony (February 2010) on behalf of the Environmental Defense Fund re. the White Stallion Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(ssss) Deposition (June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(tttt) Trial Testimony (September 2010) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, State of Maryland, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case in US District Court in the Western District of Pennsylvania. *Plaintiffs v. Allegheny Energy Inc., et al.,* 2:05cv0885 (Western District of Pennsylvania).

(uuuu) Oral Direct and Rebuttal Testimony (September 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(vvvv) Oral Testimony (September 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(wwww) Oral Testimony (October 2010) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(xxxx) Oral Testimony (November 2010) regarding BART for PSCo Hayden, CSU Martin Drake units before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(yyyy) Oral Testimony (December 2010) regarding BART for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(zzzz) Deposition (December 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(aaaaa) Deposition (February 2011 and January 2012) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(bbbbb) Oral Testimony (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

(ccccc) Deposition (August 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (US District Court for the District of Colorado).

(ddddd) Deposition (July 2011) and Oral Testimony at Hearing (February 2012) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of

Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

(eeeee) Oral Testimony at Hearing (March 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(fffff) Oral Testimony at Hearing (April 2012) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

(ggggg) Oral Testimony at Hearing (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

(hhhhh) Deposition (March 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

(iiiii) Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(jjjjj) Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

(kkkkk) Deposition (February 2014) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

(lllll) Trial Testimony (February 2014) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.*, Civil Action No. 4:10-cv-4969 (US District Court for the Southern District of Texas, Houston Division).

(mmmmm) Trial Testimony (February 2014) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(nnnnn) Deposition (June 2014) and Trial (August 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).

Atmospheric Pollution Research

Diesel Particulate Matter and Coal Dust from Trains in the Columbia River Gorge, Washington State, USA

--Manuscript Draft--

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Abstract:	We examined the emissions of diesel particulate matter (DPM) and coal dust from trains in the Columbia River Gorge (CRG) in Washington State by measuring PM1, PM2.5, CO2, and black carbon (BC) during the summer of 2014. We also used video cameras to identify the train type and speed. During the two-month period, we identified 293 freight trains and 74 coal trains that gave a PM2.5 enhancement of more than 3.0 µg/m3. We found an average PM2.5 enhancements of 8.8 and 16.7 µg/m3, respectively, for freight and coal trains. For most freight trains (52%), and a smaller fraction of coal trains (11%), we found a good correlation between PM2.5 and CO2. Using this correlation, we calculated a mean DPM emission factor (EF) of 1.2 gm/kg fuel consumed, with an uncertainty of 20%. For four coal trains, the videos revealed large plumes of coal dust emanating from the uncovered coal cars. These trains also had the highest peak PM2.5 concentrations recorded during our study (53-232 µg/m3). Trains with visible coal dust were observed for 5.4% of all coal trains, but 10.3% when the effective wind speed was greater than 90 km/h. We also found that nearly all coal trains emit coal dust based on (1) statistically higher PM2.5 enhancements from coal trains compared to freight trains; (2) the fact that most coal trains showed a weak correlation between PM2.5 and CO2,

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	whereas most freight trains showed a strong relationship; (3) a statistically lower BC/PM2.5 enhancement ratio for coal trains compared to freight trains; and (4) a statistically lower PM1/PM2.5 enhancement ratio for coal trains compared to freight trains. Our results demonstrate that, on average, passage of a diesel powered open-top coal train result in nearly twice as much respirable PM2.5 compared to passage of a diesel-powered freight train.
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Diesel Particulate Matter and Coal Dust from Trains in the Columbia River Gorge, Washington State, USA

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Abstract

We examined the emissions of diesel particulate matter (DPM) and coal dust from trains in the Columbia River Gorge (CRG) in Washington State by measuring PM_1, $PM_{2.5}$, CO_2, and black carbon (BC) during the summer of 2014. We also used video cameras to identify the train type and speed.

During the two-month period, we identified 293 freight trains and 74 coal trains that gave a $PM_{2.5}$ enhancement of more than 3.0 μg/m^3. We found an average $PM_{2.5}$ enhancements of 8.8 and 16.7 μg/m^3, respectively, for freight and coal trains. For most freight trains (52%), and a smaller fraction of coal trains (11%), we found a good correlation between $PM_{2.5}$ and CO_2. Using this correlation, we calculated a mean DPM emission factor (EF) of 1.2 gm/kg fuel consumed, with an uncertainty of 20%.

For four coal trains, the videos revealed large plumes of coal dust emanating from the uncovered coal cars. These trains also had the highest peak $PM_{2.5}$ concentrations recorded during our study (53–232 μg/m^3). Trains with visible coal dust were observed for 5.4% of all coal trains, but 10.3% when the effective wind speed was greater than 90 km/h. We also found that nearly all coal trains emit coal dust based on (1) statistically higher $PM_{2.5}$ enhancements from coal trains compared to freight trains; (2) the fact that most coal trains showed a weak correlation between $PM_{2.5}$ and CO_2, whereas most freight trains showed a strong relationship; (3) a statistically lower BC/$PM_{2.5}$ enhancement ratio for coal trains compared to freight trains; and (4) a statistically lower PM_1/$PM_{2.5}$ enhancement ratio for coal trains compared to freight trains. Our results demonstrate that, on average, passage of a diesel powered open-top coal train result in nearly twice as much respirable $PM_{2.5}$ compared to passage of a diesel-powered freight train.

Keywords

Diesel particulate matter, coal dust, air pollution from trains, air pollution from rail.

1. Introduction

Rail locomotives powered by diesel fuel travel through the Columbia River Gorge National Scenic Area as well as many urban areas in Washington State. Evaluating the air quality impacts from rail traffic for people living near rail lines is hampered by a lack of data. Several plans that would expand coal shipments by rail through Washington and Oregon to coastal ports for export to Asia have been proposed. New export facilities have been proposed for Longview and Bellingham, Washington. One proposed port near Bellingham would have the capacity to ship up to 54 million metric tons of coal annually (WA DOE, 2013).

The U.S. Department of Health and Human Services states that diesel particulate matter (DPM) is "reasonably anticipated to be a human carcinogen" (U.S. DHHS, 2014). The World Health Organization also categorizes DPM as "carcinogenic to humans" (WHO, 2012). In urban areas, including Seattle, the most significant "air toxic" is DPM, contributing over 80% of the cancer risk for air toxics (Keill and Maykut, 2003; PSCAA, 2005). DPM sources consist of rail locomotives, ships and diesel trucks, both on road and off road. Average DPM concentrations for the Seattle area are 1.4–1.9 μg/m^3, based on monitoring and a chemical mass balance model (Keill and Maykut, 2003; Maykut et al., 2003). These DPM concentrations make up 15–20% of the mass of total particulate matter with diameters less than 2.5 μm ($PM_{2.5}$).

Emission standards for new and remanufactured locomotives, developed by the U.S. Environmental Protection Agency (EPA) (40 CFR part 1033) have decreased steadily over the past several decades. For diesel locomotives various standards apply based on the date of manufacture: Tier 0, 1973–2001; Tier 1, 2002–2004; Tier 2, 2005–2010; Tier 3, 2011–2014; and Tier 4, after 2015 (U.S. EPA, 2013). Tier 4 locomotives must comply with a PM_{10} standard of 0.03 g/bhp-hr, which is about 0.19 g of PM_{10} per kg of fuel consumed (U.S. EPA, 2009).

Previous studies looked at rail yards as air pollutant sources. They determined that the primary source of $PM_{2.5}$ at these sites was diesel fuel combustion. One study investigated the impact of DPM emissions on $PM_{2.5}$ concentrations at an Atlanta area rail yard (Galvis et al., 2013). Using measurements collected upwind and downwind of the rail yard, they found the average "neighborhood" contribution to $PM_{2.5}$ was 1.7 μg/m^3. The emission factors (EFs) per kg of diesel fuel burned were calculated to be 0.4–2.3 grams DPM. The EFs were not determined from individual train measurements but were calculated using three different methods, each based on differing assumptions. Two studies of a Roseville, California, rail yard also found

significant enhancements in $PM_{2.5}$ from the yard. Using measurements from upwind and downwind, Cahill et al. (2011) found an average $PM_{2.5}$ enhancement of 4.6 μg/m^3, and Campbell and Fujita (2006) found even larger contributions (7.2–12.2 μg/m^3). Cahill et al. (2011) also demonstrated that particles with diameters below 1 μm are the major contributor to $PM_{2.5}$ aerosol mass from diesel exhaust. Abbasi et al. (2013) studied concentrations in the interior of trains and close to rail lines and found significantly elevated $PM_{2.5}$ and PM_{10} concentrations, particularly in stations that were underground. Gehrig et al. (2007) looked at electric trains in Switzerland and examined the influence of dust from these trains on PM_{10} concentrations. Several studies investigated the EFs of on-road diesel trucks and buses (Jamriska et al., 2004; Zhu et al., 2005; Cheng et al., 2006; Park et al., 2011; Dallmann et al., 2012), but we have found no similar studies on diesel rail.

Trains that carry coal in uncovered rail cars may also release coal dust, in addition to DPM, into the atmosphere. The BNSF railway requires that a surfactant be applied over the top of coal being transported by rail (see BNSF Railway, 2013). However, we are unaware of any studies reported in the scientific literature that evaluate the efficacy of this or the impact of coal dust on air quality. By examining the PM by train type, we can examine whether there is respirable coal dust ($PM_{2.5}$) as part of the emissions from coal trains. We will also examine the particle size distribution because combustion-related particles and coal dust, which is mechanically generated, are associated with particles of different sizes (Seinfeld, 1986).

A substantial amount (44–60%) of the diesel engine $PM_{2.5}$ mass is black carbon (BC) (Bond et al., 2004; Kirchstetter and Novakov, 2007; Ramanathan and Carmichael, 2008). Because radiative forcing due to BC is the major light-absorbing species in atmospheric aerosol, it is significant both globally and regionally (Jacobson, 2001; Ramanathan and Carmichael,

2008). In addition, because of BC's surface properties, it is possible for polyaromatic hydrocarbons (PAHs) and other semi-volatile compounds to be adsorbed and transported by BC (Dachs and Eisenreich, 2000). Health organizations are also taking a hard look at BC because of its contribution to the harmful effects caused by $PM_{2.5}$, including cardiopulmonary and respiratory disease (Jansen et al., 2005; Janssen et al., 2011; U.S. EPA, 2012).

Because of the lack of information on $PM_{2.5}$ concentrations and the exposure to humans from diesel trains, the debate over coal dust and the scarcity of information on diesel train EFs, we sought to measure these air quality effects by answering the following questions:

1. What are the DPM emission factors for locomotives in Washington State and how do these compare with published values?
2. Do open-top coal-carrying trains emit respirable coal dust ($PM_{2.5}$) into the air? If so, can we quantify the emissions?

To address these questions we measured PM_1, $PM_{2.5}$, CO_2, black carbon and meteorology at a location in the Columbia River Gorge next to the rail line. Because we wanted to quantify DPM and coal dust exposure and quantify the EFs from each train, we collected measurements every 10 seconds in order to identify the air quality impacts of individual trains. In a previous study, we measured a similar suite of parameters in 2013 at a site in Seattle, Washington, and (very briefly) at a site in the Columbia River Gorge (Jaffe et al., 2014). In the previous study, we quantified DPM emission factors from diesel trains, evaluated the neighborhood scale exposure to $PM_{2.5}$ from trains and found evidence that suggested emissions of coal dust, based on particle size. In the present analysis, we report new data taken in 2014 that more clearly identifies and quantifies the emissions of DPM and coal dust from coal-carrying trains.

2. Experimental

Measurements were made at a site between the towns of Lyle and Dallesport, Washington, in the Columbia River Gorge (approximately 45.7^{o}N, 121.2^{o}W) between June 7–August 10, 2014. The instruments were housed in a weather-proof enclosure, located about 10 meters above and 20 meters northeast of the rail line. Two video cameras were used; one took video of the trains at a 90° angle to the rail line, and one viewed the trains arriving/departing to the northwest. The rail line travels along the north side of the Columbia River. There were no roads between our site and the river. Our measurement site was approximately 200 meters southwest of Washington Route 14, a state highway with light traffic. The measurement location used in 2014 was in the same general location, but about 300 meters away, from the site we used for our 2013 measurements (Jaffe et al., 2014). At this site the rail line is almost completely flat; there is a maximum grade of 1 meter per km in the next few km in either direction.

We used a DustTrak DRX Aerosol Monitor (Model #8533, TSI, Inc., Shoreview, MN) to measure size-segregated PM. The DustTrak reports 4 size fractions of PM mass concentrations: PM_1, $PM_{2.5}$, PM_{10} and TSP. The instrument uses aerosol scattering to calculate its measurements. Therefore, its measurements are not the same as mass-based measurements (Wang et al., 2009). The DustTrak is calibrated against Arizona road dust (ISO 12103-1) by the manufacturer and so will not correctly reflect the mass concentration for other types of aerosol. This is specifically the case for diesel PM because of the particle size (Park et al., 2011). Obtaining accurate measurements with the DustTrak requires comparing its measurements with a mass-based measurement (Moosmuller et al., 2001). The DustTrak has been used to quickly measure several PM size fractions and determine EFs of individual vehicles in several previous studies (e.g., Park et al., 2011; Dallmann et al., 2012), but usually after using a mass-based method to calibrate the

response factor (Jamriska et al., 2004; Zhu et al., 2005; Cheng et al., 2006; Jaffe et al 2013). In our study, the DustTrak was calibrated against two mass-based measurements—a Tapered Element Oscillating Microbalance (TEOM) and the EPA Federal Reference Method at a routine air quality monitoring station in Seattle, Washington (details below).

The DustTrak inlet was stainless steel tubing (4.8 mm i.d.) facing downward from a height of approximately 2 meters above ground level. The flow rate through the inlet was 3.0 liters per minute. With these conditions, the flow was laminar. To estimate the particle sampling efficiency, we used the methodology and program provided by von der Weiden et al. (2009). The wind speeds during train sampling in the CRG varied between 1–11 meters per second (mps), with an average of 4.5 mps during the sampling period. For particles less than 2.5 µm aerodynamic diameter, we calculated greater than 90% particle transmissions at all wind speeds up to 15 mps. For particles between 3–10 µm aerodynamic diameter, the inlet sampling efficiency would be much less than 1.0 and vary with wind speed (von der Weiden et al., 2009). For this reason, we used only the $PM_{2.5}$ and PM_1 data in this analysis.

We measured CO_2 using a Licor-820 (Licor, Inc., Lincoln, NE) with a small vacuum pump for sampling. The inlet was a 4.8 mm i.d. stainless steel tube (38 mm long) connected to PFA tubing. We zeroed the instrument using CO_2-free air and calibrated it with a 395 ppmv standard from Airgas, Inc. We calibrated the instrument both before and after the deployment; the instrument response varied by less than 1 ppmv between these calibrations. We used DAQFactory on a PC to record data from the DustTrak , the Licor-820 (CO_2, cell temperature and pressure) and the meteorological station. We recorded 10-second averages for PM and CO_2 data.

To identify trains and quantify their speeds, we used two Night Owl cameras (Model CAM-MZ420-425M) that were equipped with infrared (IR) night vision. The cameras were motion activated and operated with iSpy open source camera security software. However, even with the IR capability of the cameras, we were unable to identify the type of trains at night. We considered using an auxiliary light to view the trains at night; however, this was rejected as the Columbia River Gorge is classified as a National Scenic Area, which limits lighting options. Only trains that could positively be identified as freight or coal were used in this analysis, so this excluded all trains passing our site in full darkness.

BC was measured using an aethalometer (Magee Scientific model AE22). BC data were collected at one-minute time resolution at 370 nm and 880 nm. BC loading was determined using infrared attenuation data at 880 nm alone, because at 370 nm, other organic compounds may contribute interference (Wang et al., 2011). The aethalometer determines raw BC concentration (BC_0, ng/m^3) from measured attenuation values (ATN, m^{-1}) via

$$BC_0 = 10^9 \text{ x } ATN/\sigma \quad (1)$$

where σ is the calibrated cross-section (16.6 m^2/g at 880 nm). As in our previous study (Jaffe et al., 2014), we applied a correction to the BC_0 concentrations to account for diminishing transmission as a function of BC loading. Transmission (Tr) is calculated from each attenuation value:

$$Tr = e^{-ATN/100} \quad (2)$$

Following Kirchstetter and Novakov (2007), we calculated the corrected BC mass loading (BC_{corr}, ng/m^3) as:

$$BC_{corr} = BC_0 /(0.88 \text{ x } Tr + 0.12) \quad (3)$$

The DPM EFs are calculated for each passing train in units of DPM emitted per kg of diesel fuel burned using:

$$EF\ (PM_{2.5}) = \frac{\Delta PM_{2.5}}{\Delta CO_2}\ \text{x}\ CF\ \text{x}\ W_c \qquad (4)$$

where the $\Delta PM_{2.5}/\Delta CO_2$ or "enhancement ratio" is calculated from the Reduced Major Axis (RMA) regression slopes of the 10-second CO_2 and $PM_{2.5}$ data for each passing train, in units of $\mu g/m^3$ per ppmv. CF is a conversion factor to convert CO_2 concentrations in ppm to $\mu g\ C/m^3$ units using the ideal gas law at 1 atm and 25°C (1 ppmv CO_2 = 490.7 ugC/m^3). W_C is the mass fraction of carbon in diesel fuel (870 g C/kg fuel) (Lloyd's Register, 1995; Cooper, 2003), which yields overall units on the EF of g $PM_{2.5}$/kg fuel consumed. Yanowitz et al. (2000) showed that over 95% of diesel fuel carbon is released as CO_2.

Enhancement ratios ($\Delta PM_{2.5}/\Delta CO_2$ and $\Delta PM_1/\Delta PM_{2.5}$) were calculated from the 10-second data using the RMA regression method, which considers errors in both the x and y variables (Ayers, 2001; Cantrell, 2008). Absolute enhancements were calculated by subtracting out the PM, BC and CO_2 maximums during train passage from the background concentration measured prior to each trains passage. The RMA regression parameters were calculated for each train passage using a program written in Java utilizing Apache Commons Mathematics Library 3.3. The program first looked for a $PM_{2.5}$ enhancement of at least 3 $\mu g/m^3$ over the median value from the past 17 minutes (100, 10-second data points). The accuracy of the Java program to calculate PM and CO_2 enhancements and the RMA regression parameters were manually verified for approximately 20% of the peaks. All times in this manuscript are given in Pacific Daylight Time (PDT).

3. Results

3.1 Calibration of the DustTrak

We compared the DustTrak $PM_{2.5}$ concentrations with a TEOM and the filter-based Federal Reference Method (FRM) at a routine air quality monitoring site in Seattle, Washington (Beacon Hill), operated by the Puget Sound Clean Air Agency (PSCAA). Comparison data were obtained between April 30–May 20, 2014. TEOM data were continuous and reported on an hourly basis, the filter-based FRM measurements were for 24 hours and conducted every third day only. At this site, the TEOM is a Thermo Fisher Scientific Model 1400AB with 8500C Filter Dynamic Measurement System (FDMS) with the Very Sharp Cut Cyclone (VSCC™) modification (U.S. EPA, 2014). This configuration is designated by the EPA as a Federally Equivalent Method (FEM) for $PM_{2.5}$. The inlet and flow configuration used for the DustTrak at the Beacon Hill site were identical to the configuration used in the Columbia River Gorge.

We found a very good correlations between the TEOM $PM_{2.5}$, the FRM and the DustTrak's reported $PM_{2.5}$. Table 1 shows the regression parameters.

The 95% confidence interval in the slope for the DustTrak-TEOM comparison is +/- 4.5%, whereas it is +/- 32% for the DustTrak-FRM comparison due to the very small sample size. In both cases, the intercepts are insignificantly different from zero (95% confidence interval overlaps zero). Because of this, we corrected all of the DustTrak PM data using the TEOM slope of 0.5577. This slope is 22% greater than the one reported by Jamriska et al. (2004), who reported a slope of 0.458. It also is approximately 14% greater than our earlier DustTrak comparison at a different site, where we reported a slope of 0.491 (Jaffe et al., 2014). These differences may be attributable to different aerosol types at these sites. Given these differences, we estimated the uncertainty in the corrected DustTrak PM_1 and $PM_{2.5}$ values to be ±20%.

3.2 Overview of observations on train emissions in the Columbia River Gorge

As each train passed our observation site, we may detect a peak in PM and CO_2, but this depended on the wind direction and wind speed. If the winds were from the north to northeast directions, our sensors recorded minor peaks only, or no peaks at all, in PM and CO_2. We found that small PM events had a lower correlation between the various parameters. For this reason, we screened out small peaks where the maximum $\Delta PM_{2.5}$ (enhancement above background) was < 3 μg/m^3. If a peak larger than this value was detected and the video confirmed a simultaneous train passage, then we included this peak in our analysis. We included only freight and coal-carrying trains, since these were the dominant types that we observed in the Columbia River Gorge. Trains that carried mixed loads (e.g., freight plus coal), sand or other unidentifiable or uncovered cargo were not included in this analysis. We also observed very few passenger trains during the daytime hours, in contrast to our previous study in Seattle (Jaffe et al., 2014).

During this study, we observed 367 events with $\Delta PM_{2.5}$ > 3 μg/m^3 that were identified by the video cameras as either freight or coal. We refer to each train passage with a detectable PM peak and verified by the video as a "train event." Table 2 shows a summary of the 367 train events, including number and average peak PM_1 and $PM_{2.5}$ enhancement values (over background). The peak PM_1 and $PM_{2.5}$ enhancements (10-second) from coal trains are about double the enhancements seen from freight trains. In addition, there are three extreme events with $PM_{2.5}$ enhancements greater than 75 μg/m^3 that were seen only for the coal trains. The differences between the peak PM enhancements for coal and freight trains are statistically significant (P<.001). The statistically significant difference remains even if these extreme events are excluded from the analysis. For all train events, there is an excellent relationship between the

PM_1 and $PM_{2.5}$ data, although the fraction of $PM_1/PM_{2.5}$ varies by train type. This is discussed in section 3.5 below.

However, only some train events showed a good correlation between $PM_{2.5}$ and CO_2. Figure 1 shows an example of a freight train that passed our site on July 10, 2014. In this case, the $PM_{2.5}$ enhancement is 24 μg/m^3, the CO_2 enhancement is 39 ppmv and the two are very well correlated, indicating that the dominant source of PM is diesel exhaust. Figure 2 shows an example of a coal-carrying train that passed by on July 18, 2014. For this example, the peak $PM_{2.5}$ concentration is more than 6 times the peak shown previously for the freight train, while the CO_2 enhancement is much smaller. In addition, the CO_2 peaks occurred at the start and end of the train passage due to locomotives at the beginning and end of this train, which is typical of the very long coal trains. The height of the CO_2 peak shows no obvious relationship with train type and likely varies mainly with meteorology, which influences the degree to which the combustion exhaust gases reach the measurement site. For the coal train (Figure 2), the dominant source of PM is not diesel exhaust but coal dust. This was confirmed by the video (discussed below). It should be noted that DPM was probably present but is not apparent in the data due to the much larger coal dust peak. In this case, because the PM concentrations were not correlated to CO_2, we were not able to calculate a DPM emission factor. For this reason, we did not include train events in the DPM EF calculation if the $PM_{2.5}$–CO_2 R^2 is less than 0.5. We also excluded train events that had very small CO_2 enhancements ($\Delta CO_2 < 2$ ppmv), as these had erratic behavior.

3.3 DPM emission factors

The $\Delta PM_{2.5}/\Delta CO_2$ was used to derive the DPM emission factors. The average $\Delta PM_{2.5}/\Delta CO_2$ slope for all train events was found to be 6.56 μg/m^3 per ppmv, but this included many trains with a very poor correlation between $PM_{2.5}$ and CO_2. For the DPM emission factor calculation, we restricted our analysis to only those cases with an R^2 for the $PM_{2.5} – CO_2$ relationship of 0.5 or greater and a CO_2 enhancement of at least 2 ppmv. Table 2 shows the number of each train type that was used for the DPM analysis and statistics on the $PM_{2.5} – CO_2$ slope.

The data in Table 2 show that while most freight trains were included in this analysis, the majority of coal trains were not included. This is due to the fact that most of the coal train events show a poor correlation between $PM_{2.5}$ and CO_2 (see Figure 2). One coal train that would otherwise have been included in the DPM calculation had a $PM_{2.5} – CO_2$ slope of 12.0, more than 10x the mean value, and had visible coal dust in the video. Thus the large amount of $PM_{2.5}$ in this case cannot be attributed solely to DPM. This train event was not included in the DPM analysis. With this exclusion, the mean and median slopes for freight and coal trains are rather similar. Using equation 4, we find that the mean and median DPM EFs from our study are 1.2 and 0.99 g/kg fuel consumed, with an overall uncertainty of 20%. Our previous observations in the Pacific Northwest (Jaffe et al., 2014) found an average EF for diesel locomotives of 0.94 g/kg.

Diesel EFs for locomotives have been previously reported from several measurement campaigns. Kean et al. (2000) reported locomotive emission factors of between 1.8–2.1 g/kg using the EPA “NONROAD” model. A 2009 report (U.S. EPA, 2009) estimated that average locomotives EFs are declining about 5% per year, with a 2014 value of 0.98 g/kg. A study by Sierra Research in 2004 (Sierra Research, 2004) forecast a much slower decrease in the EFs of diesel locomotives, compared to U.S. EPA (2009), and for 2014 projected 1.4 g/kg. Our average

measured EF is consistent with those cited in the above literature for the 2014 time frame, within the respective uncertainties.

3.4 Black carbon

We obtained simultaneous BC and $PM_{2.5}$ data on 294 of the trains. Table 3 reports the observed $BC/PM_{2.5}$ and $PM_1/PM_{2.5}$ enhancement ratios (discussed in section 3.5)

These data show that, on average, 43% of the $PM_{2.5}$ was BC for all trains. In our previous study using similar data from 2013 (Jaffe et al., 2014), we found that the BC/PM_1 fraction was 52%, with most of those observations on freight trains. Our new data in 2014 indicates a significant difference ($P<.001$) in the average $BC/PM_{2.5}$ fraction for freight (0.47) and coal trains (0.29). Previous studies have found values that are similar to our freight train values for the BC/PM fraction. A study by Hildemann et al. (1991) found that 55% of diesel emissions were BC, and Watson et al. (1994) reported 45%. An Atlanta study (Galvis et al., 2013) found that diesel trains had BC to $PM_{2.5}$ ratios of 47–52%. The significant difference in the $BC/PM_{2.5}$ between coal and freight trains, shown in Table 3, indicates a significant coal dust component in the PM from the coal trains.

We assume that the coal dust has the same composition as the coal being shipped. This coal, from the Powder River Basin of Wyoming and Montana, has a relatively low carbon content compared to other coal types (ca 50% C), with the remainder of the mass made up of moisture and minerals, such as silicates, iron oxides and calcium oxide (NETL, 2012). While the low carbon content is partly responsible for the low $BC/PM_{2.5}$ fraction, shown in Table 3, our data suggest that other factors may also be involved. This could include a change in the mass absorption cross section for coal dust, as compared to diesel exhaust, which might reflect the

impact of the coal mineral content, the organic matter composition or the size distribution of the particles.

3.5 $PM_1/PM_{2.5}$ fraction

The DustTrak calculates concentrations of PM in four size ranges, but due to the inlet sampling efficiency (discussed in section 2) we considered only data for PM_1 and $PM_{2.5}$. Table 3 gives the statistical parameters on the $PM_1/PM_{2.5}$ enhancement ratio. Coal trains showed a larger mass fraction of particles above 1μm aerodynamic diameter, and this difference is statistically significant. This reflects the significant contribution of coal dust to the $PM_{2.5}$ concentrations during the passage of the coal trains.

3.6 Influence of coal dust on $PM_{2.5}$ concentrations

In four cases, the videos revealed visible coal dust from the open-top coal trains. These visible coal dust plumes were seen in the four train events with the highest peak $PM_{2.5}$ concentrations (Table 4). We call these four train events with the highest $PM_{2.5}$ and visible coal dust "super-dusters." Two of the "super-duster" videos have been archived as part of the supplemental materials for this paper (8/7/2014 and 7/27/2014). Figure 3 shows still images obtained from the video before and after train passage for the "super duster" on 8/7/2014, along with the measured $PM_{2.5}$ concentrations. We found that 4 out of 74 coal trains, or 5.4%, were classified as "super dusters" during our study.

A number of factors could be important in explaining the coal dust emissions of $PM_{2.5}$ from coal trains. These include quality of the surfactant application or factors that may disturb the coal/surfactant surface, such as high train speeds, exposure to high winds or rough handling

during transport. While we have no information on upstream conditions, our data do allow us to examine the influence that train and local wind speed may have played on dust emissions. To do this, we calculated train speeds for each coal train from the videos. We also calculated the vector component of the winds in the direction opposite to the trains' travel. The sum of train speed plus vector wind speed represents the true wind speed across the open-top coal trains. We refer to this as the effective wind speed. During our study, the average train speed was 71.3 km/h and the average vector wind speed was 14.9 km/h.

Figure 4 shows the effective wind speed versus peak $PM_{2.5}$ for each coal train event. The four "super dusters" are shown as large red squares. While no simple relationship emerges from this analysis, the data do suggest that "super dusters" are more likely to occur when the effective wind speed is greater than 80–90 km/h. Above 90 km/h, the fraction of "super dusters" is 10.3% (3 out of 29 trains), compared to 5.4% at all wind speeds. Thus we can view wind speed as one factor that increases the risk of high-level coal dust exposure. However, the fact that many coal trains with effective wind speeds greater than 90 km/h are not "super dusters" indicates that other factors, such as quality of the surfactant applied to the coal surface, must also be important.

4. Conclusions

We measured PM_1, $PM_{2.5}$, BC and CO_2 during 367 train passages (train events) in the Columbia River Gorge. From the data, we calculated a DPM EF average of 1.2 g/kg fuel consumed (±20%) on 163 of those train events that show a good correlation between $PM_{2.5}$ and CO_2 (mostly freight trains). Our data indicate that nearly all open-top coal trains release coal dust, which contributes to enhanced $PM_{2.5}$ in the Columbia River Gorge. In four train events, that we call "super-dusters," the coal dust emissions led to visible dust plumes and the highest $PM_{2.5}$

concentrations observed in our study. But nearly all coal trains generate some degree of coal dust ($PM_{2.5}$) based on the following evidence:

1. Statistically higher peak $PM_{2.5}$ concentrations during passage of coal trains compared to freight trains. The peak $PM_{2.5}$ enhancements during a coal train passage are nearly double, on average, compared to the value during a freight train passage (Table 2);
2. The fact that most freight trains (52%) show a good correlation between $PM_{2.5}$ and CO_2, whereas very few coal trains (15%) show this relationship (Table 2);
3. The BC/$PM_{2.5}$ enhancement ratio is statistically higher for freight trains compared to coal trains (Table 3);
4. The PM_1/ $PM_{2.5}$ enhancement ratio is statistically higher during passage of freight trains compared to coal trains (Table 3).

These four results demonstrate statistically significant differences between freight and coal trains, even if the four super-dusters are excluded from the statistical analysis.

Because our focus was on air quality, we measured the respirable size fractions of PM. Thus it is not possible to relate our observations to any data on bulk loss of coal during transport, since most of this loss will occur as much larger size particles. Because most coal train events show a poor correlation between $PM_{2.5}$ and CO_2, it is not possible to rigorously derive a fuel-based emission factor for the coal dust. Nonetheless, our data provide some guidance to anyone wishing to calculate total $PM_{2.5}$ emissions from the railway sector. Since the peak $PM_{2.5}$ values for coal trains are nearly double those for freight trains, it is reasonable to conclude that the total $PM_{2.5}$ emissions from coal trains are approximately double those of freight trains. This would imply that the coal train $PM_{2.5}$ emissions consist of approximately half DPM and half coal dust.

Though all coal trains appear to generate some degree of dust, the "super-dusters" generate visible plumes and the highest concentrations of $PM_{2.5}$. "Super-dusters" represent 5.4% of all coal trains but 10.3% when the effective wind speed is greater than 90 km/h. This indicates that wind is one factor contributing to the coal dust emissions, but it is not the only explanatory factor.

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Figure captions

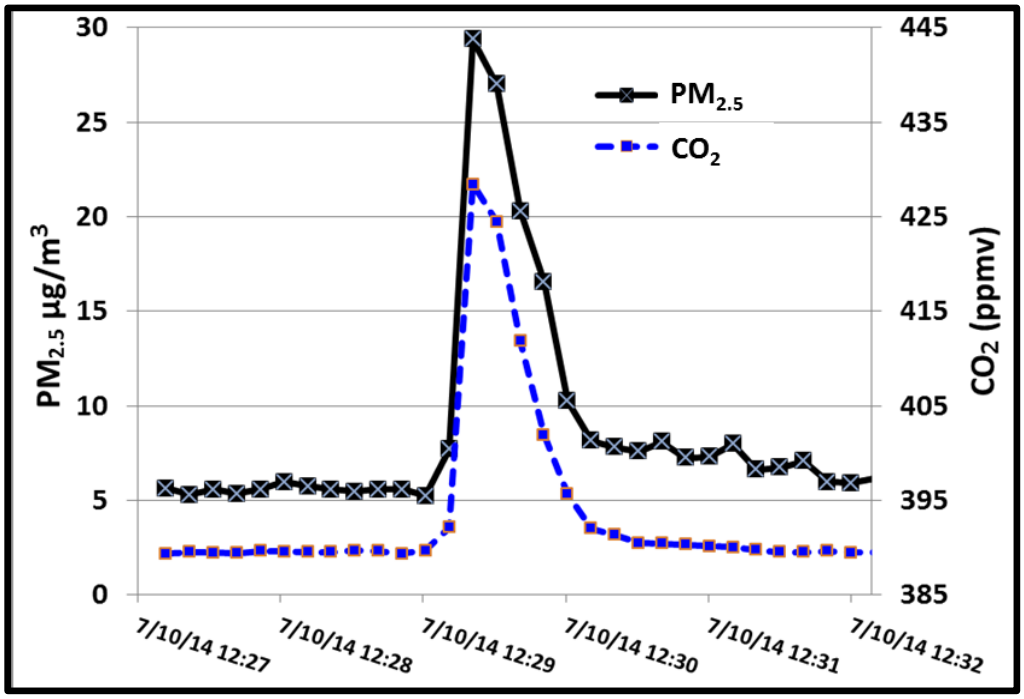
Figure 1. $PM_{2.5}$ and CO_2 during passage of a freight train on 7/10/2014 at 12:29 PDT. The two values show a good correlation with an R^2 of 0.98 and a slope of 0.61 µg/m^3 per ppmv.

Figure 2. $PM_{2.5}$ and CO_2 during passage of a coal train on 7/18/2014 at 4:56 PDT. The two parameters show no correlation during this time period. The train was observed to have locomotives in the front and rear, giving rise to the CO_2 peaks at the beginning and end of this time period.

Figure 3. Images captured from the video camera before and after coal train passage on 8/7/2014 at 17:28 PDT. The full video of this train passage is archived as part of the supplemental materials for this paper. The camera looks to the west, downriver in the Columbia River Gorge. The coal train is visible in the right image and was moving from left to right.

Figure 4. Peak $PM_{2.5}$ enhancement for each coal train passage versus effective wind speed over the top of the train. The effective wind speed is calculated as the train speed plus the vector component of the wind at 180° to the train's movement. The four "super dusters" are shown as large red squares.

Figure 1


30
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PM2.5 µg/m3
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PM2.5
CO2
7/10/14 12:27
7/10/14 12:28
7/10/14 12:29
7/10/14 12:30
7/10/14 12:31
7/10/14 12:32

Figure 2

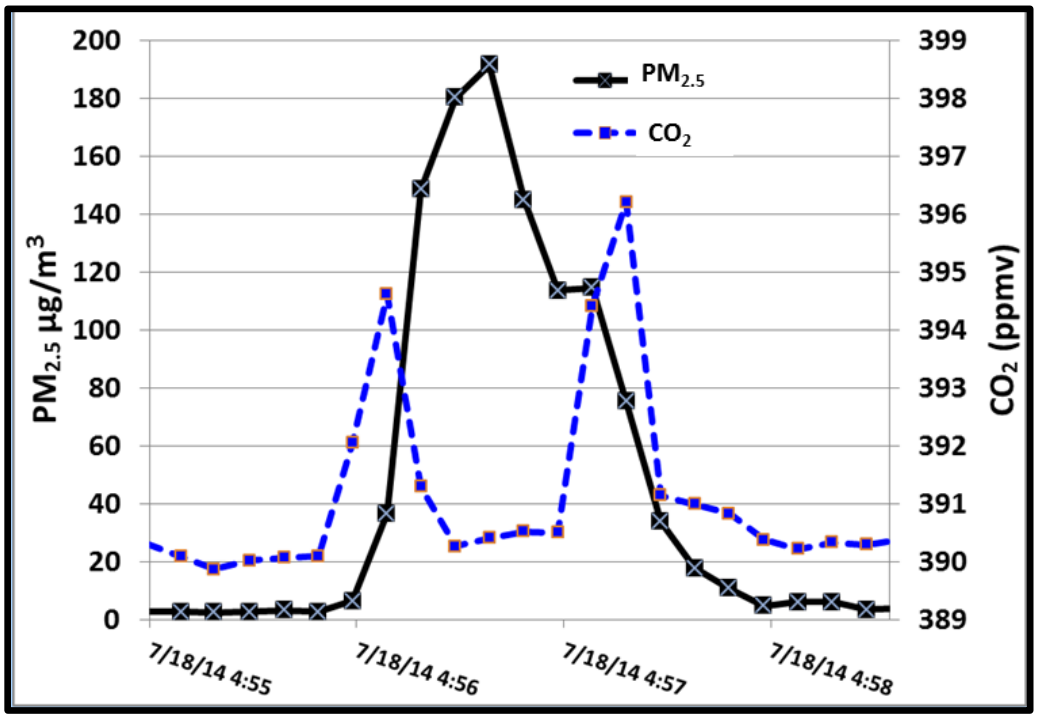
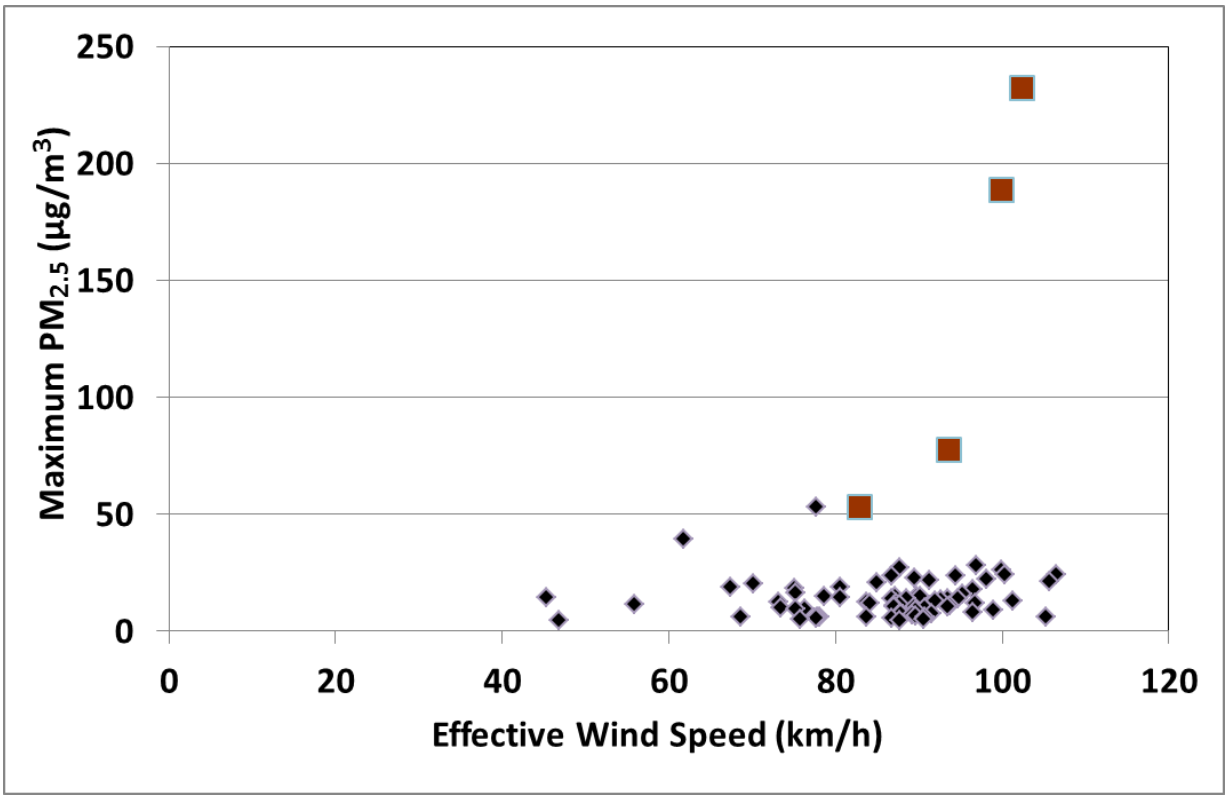

PM2.5
CO2
PM2.5 µg/m3
CO2 (ppmv)
200
180
160
140
120
100
80
60
40
20
0
399
398
397
396
395
394
393
392
391
390
389
7/18/14 4:55
7/18/14 4:56
7/18/14 4:57
7/18/14 4:58

Figure 3

Video
Video
Before train passage $PM_{2.5}$ = 2 µg/m³
After train passage $PM_{2.5}$ = 234 µg/m³

Figure 4


250
200
150
100
50
0
Maximum PM2.5 (µg/m3)
0
20
40
60
80
100
120
Effective Wind Speed (km/h)

Tables

Table 1. Regression parameters for the comparisons between the DustTrak data, the TEOM data and the FRM method at the PSCAA site at Beacon Hill, Seattle, Washington.

Comparison equation (using Reduced Major Axis regression)	R^2	N
TEOM $PM_{2.5}$ ($\mu g/m^3$) = DustTrak x 0.5577 – 0.6977	0.74	485 (hourly averages)
FRM $PM_{2.5}$ = DustTrak x 0.5524 – 0.8433	0.92	7 (24-hour samples)
FRM $PM_{2.5}$ = TEOM x 1.05 – 0.4326	0.96	7 (24-hour samples)

Table 2. PM and CO_2 data for freight and coal trains. Slopes for $\Delta PM_{2.5}/\Delta CO_2$ relationship is reported only for those train events with R^2>0.5 and ΔCO_2 >2 ppmv.[a]

	Freight	**Coal**	**All trains**
Number	293	74	367
Average peak ΔPM_1 (μg/m^3)	11.0	19.7	12.5
Average peak $\Delta PM_{2.5}$ (μg/m^3)	10.7	20.9	13.0
Maximum $\Delta PM_{2.5}$ (μg/m^3)	57.2	232.3	232.3
Number with $PM_{2.5} - CO_2$ R^2 > 0.5 and ΔCO_2>2 ppm	152 (52%)	11 (15%)	163 (44%)
Mean/median $\Delta PM_{2.5}/\Delta CO_2$ slope (μg/m^3/ppmv)	0.70/0.56	0.71/0.56	0.70/.56
Max/Min slope	3.88/0.10	1.64/0.20	3.88/0.10

[a]In addition to the criteria given in the text above, we excluded one additional case with visible coal dust and an extremely high $PM_{2.5}$–CO_2 slope (12.0).

Table 3. $BC/PM_{2.5}$ and $PM_1/PM_{2.5}$ enhancement ratios for freight and coal trains.

	Freight	**Coal**	**All trains**
N (for $BC/PM_{2.5}$ analysis)	233	61	294
Mean/median $BC/PM_{2.5}$ (unitless)	0.47/0.40	0.29/0.20	0.43/0.35/0.27
Standard deviation on $BC/PM_{2.5}$	0.27	0.23	0.27
N (for $PM_1/PM_{2.5}$ analysis)	293	74	367
Mean/median $PM_1/PM_{2.5}$ (unitless)	0.93/0.93	0.96/0.96	0.96/0.96
Standard deviation on $PM_1/PM_{2.5}$	0.03	0.03	0.03

Table 4. The four train events with the highest peak $PM_{2.5}$ concentrations. In each case, a coal train with a visible coal dust plume was confirmed in the video recording.

Date/time (PDT)	Peak $PM_{2.5}$ conc. μg/m^3	Peak BC μg/m^3	BC/$PM_{2.5}$ ratio
8/7/14 17:28	232.3	53.5	0.23
7/18/14 4:57	188.8	88.9	0.47
7/20/14 14:07	77.6	8.86	0.11
7/27/14 21:16	53.1	9.13	0.17

October 6, 2015

Via Electronic Mail
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Re: Proposed Oakland Coal Export Terminal

Dear City Councilmembers and City Administrator:

We are writing on behalf of West Oakland Environmental Indicators Project, Sierra Club, Communities for a Better Environment, San Francisco Baykeeper, and Asian Pacific Environmental Network to follow up on our previously submitted comments and reports dated September 2, 2015 September 14, 2015 and September 21, 2015 pertaining to the significant health and safety problems associated with coal. The letters, testimony from experts and community members, and the scientific studies in the record provide the substantial evidence needed for the Oakland City Council to regulate on this issue. This letter provides: (1) additional information and clarification of points raised during the City Council hearing; and (2) responses to key questions raised by Claudia Cappio of the City Administrator's office.

The record to date already contains examples of analogous coal terminals and the significant health and safety impacts associated therewith, as well as Oakland-specific studies about the air pollution and other pollution burdens faced in the community. This provides the substantial evidence basis for the City to regulate to eliminate coal from the Army Base Redevelopment. Some of the follow-up questions posed by Oakland City Council members and City Administrator are site-specific questions pertaining to the effects of the proposed coal export terminal in the West Gateway development. Specific answers to these questions are not

readily available at this time because the proper environmental review was never conducted to account for the shipment of coal through that area, or indeed, through any part of the former Oakland Army Base. The environmental review required by the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) would provide that site-specific information, should the City Council require such information for its decision-making process.

The project developers[1] repeatedly assured community members and the City itself that they had no intention of shipping coal all while they were engaged in backroom negotiations in Utah to bring coal through Oakland. This violates the community's trust, as well as the letter and spirit of CEQA and NEPA.

Given this background, the City of Oakland should seriously question promises from these developers that the supposed "state-of-the-art" coal terminal will mitigate risks to the community especially when: (1) a full environmental review for this project discussing coal was not conducted; (2) there are no binding mitigation conditions in place to deal with the coal-specific environmental, health and safety problems; (3) the international coal market is in shambles and thus the revenue stream for this project is questionable at best; (4) initial terminal design plans were released only a few weeks ago <u>and even in this short time period have already changed</u>; (5) the terminal operator, Terminal Logistics Solutions (TLS), has never itself operated anything before, let alone a bulk export facility and so has no operations track record; and (6) given the developer's history of making assurances that no coal would be part of this project all while apparently working to secure a coal deal.

The point of environmental review is to have an open and informed discussion about the project and its potential impacts from the outset so that lawmakers and the public have an accurate understanding of the environmental, health and safety concerns associated with a project. CEQA also requires alternatives or mitigation measures to alleviate such impacts where possible.[2] Here there was no discussion about coal export, storage or transportation during the environmental review process for the Army Base redevelopment, and therefore no opportunity to have the necessary public dialogue.

The oral and written testimony presented at the September 21, 2015 Oakland City Council meeting established that there is the huge potential for significant health and safety impacts if the former Oakland Army Base were to ship coal. We believe there is substantial

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[1] California Capital Investment Group (CCIG) and Prologis, through the joint venture entity Prologis CCIG Oakland Global entered into development agreements with the City for the purposes of redeveloping the former Army Base. These entities, or some part thereof, have leased the West Gateway development where the coal export terminal will be located to Terminal Logistics Solutions. Oakland Bulk and Oversized Terminal LLC is also involved with the development of the bulk terminal. These entities are collectively referred to as the "developers."

[2] *See No Oil, Inc. v. City of Los Angeles* (1974) 13 Cal.3d 68, 84. CEQA Guidelines § 15002(a)(2) and (3). *See also Citizens of Goleta Valley v. Board of Supervisors* (1990) 52 Cal.3d 553, 564.

evidence in the record upon which the City of Oakland can regulate to eliminate coal from this project based on the health and safety concerns. To be clear, however, the September 21 hearing is not a substitute for the further environmental review that is needed if the developers do intend to ship coal through Oakland. Further, our groups do not believe that all public health and safety aspects of a coal export terminal could be mitigated.

Although CCIG touts having hundreds of mitigation conditions, not one of those conditions addresses the unique health and safety concerns that coal poses. Further, the design plans from TLS keep changing. In the few weeks from when the initial design plans were submitted to City Council and the September 21 hearing, there are two drastically different pictures of what their coal terminal might look like.

The City already possesses substantial evidence about the harms of transporting coal through Oakland, which would allow it to take action and prevent the use of City lands for coal transportation. Further, given the absence of concrete information about the final terminal design, and the absence of enforceable mitigation measures specific to a coal export terminal, the City should at least require further site-specific environmental review before the project is allowed to proceed. We thus respectfully request the City to take action to prevent a facility that has never been studied, and for which no enforceable mitigations have been developed, from going forward without the appropriate City oversight.

A. Additional Information and Clarification on Points Raised During September 21, 2015 Council Hearing

1. CCIGs's Report form HDR Contains Only Cursory Project Analysis and Makes Several Misstatements.

The report submitted on behalf of CCIG from HDR prior to the September 21, 2015 hearing contains a number of flawed assumptions and misstatements, which we correct below.

A. Emissions from Rail Cars In Oakland Will be Significant, not Negligible.

The HDR report takes the position that coal dust emissions from coal transport and handling will be "minimal"; however, the report makes a number of assumptions that are flawed. First, the HDR report mainly discusses dust control measures like load profiling and surfactants, not physical covers for rail cars which indicates that the coal will most likely be uncovered. *See* HDR at 3-9. Here, the applicant CCIG and TLS have not proposed using surfactants or load profiling. *See* Expert Report of Phyllis Fox ("Fox") at 12, submitted with September 21, 2015 Comments. The HDR report notes that "the port developer will cover the rail cars to prevent any such emissions that could otherwise occur early in the train trips." *See* HDR at 6. However, HDR provides no citation to any evidence or study to back such a claim. Such covers appear to be only in the theoretical design phase since our experts were unable to confirm any company

was currently producing them, and there are no technical papers evaluating their effectiveness. *See* Expert Report of Deb Niemeier ("Niemeier") at 9, submitted with September 21, 2015 Comments.

Second, given the above information, one can assume the coal trains will be uncovered. Uncovered coal cars spew massive amounts of coal dust into communities all along the rail line and to neighbors near the coal export terminal. See Fox report at 13 **(18,200 tons of coal dust per year could be released into the air and waterways near the rail line alone**); Niemeier at 7 **(up to 646 tons of coal dust released on site from rail cars).** Measures like load profiling and surfactant use are only in place for coal originating from the Powder River Basin, not Utah. *See, e.g.,* Niemeier at 7, n. 17. Utah coal has no requirements in place to govern how it is shipped, and it would likely be shipped in the industry standard open top rail cars without any load profiling or surfactants. Indeed, CCIG and TLS have not proposed using surfactants as a mitigation measure. *See* Fox at 12. Still, even assuming surfactant and load profiling are used, surfactants wear off over the course of the train trip. *See* Niemeier at 8 (noting that the crusts formed by topping agents wear off when cars are jostled or exposed to high winds—like mountain passes in the Sierras through which the coal would travel—causing the topping agent to decay and exposing coal to the wind.) Coal also comes out of the bottom of rail cars, which would not be impacted by surfactant use or load profile shaping. *See* Fox at 12, 17.

Contrary to what the HDR report asserts, such coal dust emissions occur not just next to the mines, but also at much later points near the port. *See* Fox at 13 (including accompanying photograph of a train visibly emitting coal dust in the Columbia River Gorge, several hundred miles from any coal mines) ; Jaffe at 2 (studies in Seattle area and Columbia River Gorge found that "nearly all coal trains emit coal dust.")[3] Surfactants wear off the coal loads during the journey, and are indeed pollutants themselves.

The size of coal particles lost during transport varies—some particulate matter will be in larger size than others and much of the data on coal dust loss focuses on what is visibly found next to the tracks and in waterways. The recent Jaffe study looked specifically at air quality in the Columbia River Gorge and "measured the respirable size fractions of PM." Jaffe at 17. This is important for two reasons. First, the study was conducted several hundred miles away from the coal mine sites so shows that coal dust lost occurs at all parts of the rail journey, not just next to the coal mine. And second, using real world data, not simply a predictive model, it shows that the coal dust loss that occurs far from the mine site is the type that can be inhaled by the residents of the communities along the rail lines and next to ports. Coal dust emissions from rail cars are significant, and would be a health and safety problem if the Oakland terminal were to ship coal.

[3] Jaffe, D., et al. "Diesel Particulate Matter and Coal Dust from Trains in the Columbia River Gorge,Washington State, USA" Atmospheric Pollution Research, 2015.

B. Emissions from the Terminal will be significant.

The HDR reports asserts—without a single scientific citation--that the "state-of-the-art controls" for the proposed coal export terminal will mean that coal dust is not an issue. *See* HDR report at 6-9. As previously stated, it is unclear exactly what controls terminal plans since there was never an environmental review of coal handling, and thus none of the mitigation conditions address the problems associated with coal. *See* Fox at 21. There are no binding conditions that require any sort of pollution control technology from the terminal. Already, it appears that the terminal design plans recently released changed from large rectangular metal buildings to multiple dome-shaped buildings. *Compare* Basis of Design Plans posted by TLS at pp. 19-20, *available at* http://www2.oaklandnet.com/w/oak054820; and plans shown at City Council hearing on September 21, 2015 (minute 45:13); *available at* http://oakland.granicus.com/MediaPlayer.php?view_id=2&clip_id=1837&meta_id=106943. The design plans analyzed are a moving target, changing with the developer's whims, and do not provide a firm basis for analyzing the terminal's impacts.

The materials handling equipment—storage domes, sheds, conveyers, loaders and the like—will not be located in an enclosed structure meaning that there will be particulate matter emissions but these cannot be quantified without more specific information. *See* Fox at 6.

HDR admits that "controlling coal dust will also require the use of water sprays and/or foggers." HDR at 6-7. The amount of water required to attempt to control dust is massive—over 79 million gallons or 8 gallons of water per ton of coal. *See* Fox at 7-8. Considering California's current drought, this is a poor use of the City's limited water resources, and puts the health and safety of Oakland residents at risk by using potable water to reduce coal dust that could be used for Oakland residents, soiling such water with polluting coal dust, and using the water to treat coal which will further contribute to climate change and the drought.

C. Oregon Morrow critiques re air quality violations

The HDR report criticizes the reference in our previous comments to the air modeling conducted at the Port of Morrow, Oregon. This Oregon facility is currently on indefinite hold in its construction due to the State of Oregon Department of State Lands' denial of a major project permit on the basis of environmental concerns. That permit denial is currently being litigated, as is the air permit.

The Port of Morrow, Oregon air modeling found major exceedances of both PM and NOx at an enclosed terminal site from open trains, partially enclosed barges, and the idling time of such engines on the site during loading and unloading. There were several different scenarios modeled, and the PM and NOx concerns involve both coal dust and the pollution from the engines idling on the trains and barges during loading and unloading. Pollutant emissions from trains and tug boats are emitted near the ground, with little plume rise. Hence, the maximum pollution impacts occur near the project site. Modeled receptors are placed at the site boundaries

where the public has access to capture these maximum pollution impacts. Even in the Tongue River Railroad modeling that HDR included to supposedly show that there would be no pollution problems, the modeling showed 1 hour NOx standard violations (although underestimated, as described below.)

Because there are no firm design plans, there has been no project-specific environmental review, and CCIG/TLS have not yet applied for an air permit for this facility, there is not enough information to run a full model for the potential air quality impacts at the proposed Oakland Army Base coal export facility. This just again underscores the need for additional information.

With the limited information available, Dr. Niemeier reviewed the particulate matter impacts in two different scenarios for a coal terminal in Oakland and found that there would be between **323-646 tons of coal per year would be emitted during the loading and unloading process at the proposed coal terminal in Oakland.** *See* Niemeier at 5-7.

HDR's following criticisms of the Port of Morrow modeling are inaccurate, as described below:

1) Emission rates are conservative, not erroneous—HDR claims that the wind erosion figured used inaccurate assumptions, that is that wind would be a one time issue. However, the Columbia River Gorge is an extremely windy area where wind is a frequent occurrence and coal trains move on site during loading loading/unloading, meaning that the coal is disturbed which can cause more emissions. *See, e.g.,* Niemeier at 7. Local wind speeds were used in the Oregon modeling, which is the accepted practice. Most waterfront areas are quite windy so it's likely that similar concerns might exist in Oakland. HDR's criticisms are without citation or support.

   Source emissions used in the Port of Morrow modeling were taken mainly from little information provided in the project application. The application only shows total annual emissions and not maximum short-term (1-hour and 24-hour) emissions rates that are required by the modeling. For example, modeled emissions for trains and boats are based on the annual rates divided by the number of hours operating during one year. This can understate the maximum short-term impacts since they are based on average emission rates. For wind erosion, emissions were calculated for the worst day using AP-42 emission factors approved by the US EPA. That is appropriate for modeling 24-hour PM impacts.

2) Mobile source emissions were accurate not misrepresented—Again, HDR seems to misunderstand what exactly was modeled. The modeling looked at scenarios at an enclosed coal export facility accepting coal from open top trains that was then unloaded at a facility where it was loaded onto enclosed barges to complete the journey downriver to be loaded onto larger ships. The time during loading/unloading at the facility is where many of the emissions come from.

Short-term (1-hour and 24-hour) modeling is based on train unloading and barge/ship loading with the assistance of tugboats. In these modeling scenarios, project sources are stationary most of the time and hence it is reasonable to model them as point sources. This is the same approach used by the California Air Resources Board and New Jersey DEP in their port studies (references given in the AMI report). In fact, stack parameters in these studies were used in the AMI modeling. It should be noted that modeling used area sources for wind erosion from railcars.

The situations reviewed were times when loading/unloading of trains and barges, pulled by tugs, would occur in one concentrated location (i.e., at the Port site itself, akin to what is proposed in Oakland.) Some scenarios also excluded trains. While there would also be additional pollution from the tugs pulling barges down river and the open top trains hauling coal from the Powder River Basin to Oregon, these scenarios looked at only onsite emissions during loading/unloading. Those extremely elevated NOx and PM results should be of great concern to the Oakland City Council because that would be the pollution suffered by the residents of West Oakland if the coal terminal is built and trains/ships are onsite doing such loading and unloading of coal multiple times per day, nearly every day of the year.

3) Wind erosion –HDR states that the barges were assumed to be open in the modeling. Again this is inaccurate. Enclosed barges were assumed. The engines on the tugs attached to the barges account for some pollution, as does coal dust from the open top trains. Wind erosion figures were for open trains.

4) Stationary emission points and stack height—HDR states that the emissions points were improperly combined and that the stack height was incorrect in the modeling. However, the pollutant emissions from trains and boats are emitted near the surface, with little plume rise. Hence, their maximum impacts occur near the project site not further away like in an industrial facility with a taller stack. Modeled receptors are placed at the site boundaries where the public has access to capture these maximum impacts. Air agencies do not measure pollutant concentrations at these locations. They often rely on measurements made at air monitoring stations which can be several miles away from the project site and thus would not as accurately predict emissions.

5) Location of the public/receptors—HDR argues that the receptors were placed too close to the site to be realistic. Again, that is an inaccurate criticism. All air agencies including US EPA require that receptors be placed in ambient air where the public has access. It is customary to place receptors at the site boundaries and beyond. As mentioned above, due to low plume rise, maximum project impacts occur near the project site.

It is worth noting that the population of the town of Boardman, the town located near the proposed Port of Morrow facility, is further away than at the proposed coal export facility at the former Oakland Army Base. The residents of West Oakland live and work

in extremely close proximity to the terminal, which again should trigger great concern with the Oakland City Council for potential PM and NOx impacts at this terminal site.

While HDR attempts to criticize one set of the Port of Morrow modeling (several sets were provided) they do without any citation to a scientific paper and they fail to provide their own similar modeling and they do nothing to refuse the NOx and PM concerns flagged. Both pollutants are of significant public health concern.

D. The Surface Transportation Board Dust Analysis for the Tongue River Railroad was flawed

In the HDR report, the consultant borrowed some analysis from a draft Environmental Impact Assessment for the Tongue River Railroad in Montana and claimed that this study proves there are no health effects from coal trains. HDR purports this to be the first analysis of coal dust by a federal agency, notwithstanding the volumes of information produced in hearings by both BNSF and Union Pacific railroads about the problems associated with coal dust before the STB a few years ago in which the STB found coal dust to be a "pernicious ballast foulant" linked to train derailments, among other conclusions.[4]

In sum, STB's analysis fails to disclose the full scope of impacts due to coal dust from trains on the Tongue River Railroad, including impacts to air quality and human health. The principal source of coal dust in areas affected by the Tongue River Railroad is coal "blown from the top of the rail cars by the air moving over the loaded, uncovered rail cars." Tongue River Railroad Draft Environmental Impact Statement (hereafter "DEIS" at 4-14). As Ranajit Sahu, Ph.D., noted in his expert memorandum for the Northern Cheyenne tribe, BNSF estimates that coal loss from the tops of rail cars are 600 pounds per car over a 400 mile route. Sahu Mem. at 18.[5] For a single, 125-car train, this translates to 37.5 tons of coal and coal dust emitted to the air or deposited on the ground and in waterways in just the first 400 miles of the coal's route from Otter Creek to West Coast export terminals. As STB acknowledges, "[w]hen particulate matter is inhaled, larger particles are filtered in the nose or throat by cilia and mucus, but small particles can pass through into the lungs. The smallest particles can enter the circulatory system, where they harden and inflame the arteries. This increases the risk of heart attack and other cardiovascular problems." DEIS at 6-3.

STB underestimated fugitive coal dust emissions and their adverse impacts to air quality and human health. STB modeled dispersion of airborne particulate using EPA's AERMOD air

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[4] Surface Transportation Board Decision, *Arkansas Electric Cooperative Corporation – Petition for Declaratory Order*, Docket No. FD 35305 (Mar. 3, 2011), accessed: http://www.stb.dot.gov/decisions/readingroom.nsf/WebDecisionID/40436?

[5] This letter incorporates by reference the coal dust arguments raised in the Northern Cheyenne Tribe's comments and expert report. Dr. Sahu's report is submitted along with this letter.

dispersion and deposition model. DEIS at G-11. The model incorporates, most critically, assumptions based on estimated rail car coal dust emissions. Id. Several of STB's underlying assumptions, as described in the DEIS, are inappropriate or unsupported as detailed below.

First, STB improperly failed to consider coal dust emissions over the entire rail route. It appears that STB's conservative (i.e., high production) scenarios looked at coal loss from 6.32 trains per day for a daily total of 322.71 train miles—or just over 50 miles per train. DEIS at E-33. Yet fugitive dust from coal trains is known to occur well beyond the first 50 miles of its trip. *See, e.g.,* Fox at 13. Thus, these emissions are "reasonably foreseeable" emissions that must be considered under NEPA or CEQA.[6] In lieu of its truncated analysis in the DEIS, STB must analyze coal dust emissions over the entire route from mine to market.[7]

Second, STB failed to disclose or justify its assumptions regarding particle size distribution from coal lost from trains, a significant factor in calculating overall fugitive dust emissions. While BNSF has provided estimates of coal loss from rail cars, those estimates appear to reference the total volume of coal lost. For purposes of evaluating coal dust emissions, STB considered only a fraction of this total volume, assuming that particles larger than 50 microns would be deposited immediately adjacent to the railway and not become airborne. In its analysis, STB estimated the total suspended particulate ("TSP"), defined as particles less than 50 microns, emitted from loaded rail cars for each build scenario. DEIS at E-45. TSP includes particles smaller than 50 microns and includes PM10 and PM2.5. Id. at 6-4. Based on examinations of other coal types, STB assumed a particle size distribution of 45% PM10 and 8.6% PM 2.5 relative to TSP. Id. at E-44. However, STB fails to disclose or justify its assumptions regarding the particle distribution of TSP relative to total coal lost from rail cars. STB's analysis cannot be supported without such information.

Third, STB also failed to demonstrate the efficacy of coal dust mitigation measures. In particular, "much is unknown as far as the composition of almost all of the 'approved' [topper] agents." Sahu Mem. at 21-22. As described in the separate comments of Northern Cheyenne Tribe, STB has refused to make available documents regarding the efficacy of coal dust mitigation measures, undermining the public's ability to meaningfully evaluate STB's assumptions and leaving STB without the requisite support for its claim that such measures will reduce fugitive coal dust emissions by 85%. Without such support, STB's estimates of coal dust emissions that incorporate its mitigation assumptions are arbitrary.

Dr. Sahu's independent analysis yielded far higher projections of coal dust emissions than those estimated by STB. Sahu Mem. at 18. **Even applying STB's assumed 85%**

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[6] See, e.g., Petition of Arkansas Electric Cooperative Corporation for a Declaratory Order, STB Finance Docket 35305, BNSF PowerPoint, at 3-10 (Nov. 17, 2010. 40 C.F.R. § 1508.8.

[7] At a minimum, STB must consider coal dust emissions for the first 400 miles of train routes based on coal loss data that is readily available from BNSF.

reduction in emissions due to dust suppression measures, Dr. Sahu estimated 41 times higher emissions than the estimate provided by the STB. Id. at 18 n.36. Based on this analysis, we agree with Dr. Sahu's conclusion that the STB's estimates for coal dust emissions from the TRR are "grossly inaccurate." Id. at 19.

STB's flawed coal dust emissions calculations in turn corrupted the agency's modeled air quality impacts from coal dust. STB's modeling showed that airborne dust will not cause exceedances of air quality standards except for the 1-hour standard for nitrogen oxide (NOx) concentrations. DEIS at 4-17. However, because STB underestimated a fundamental input to its model—coal dust emissions—its modeling results are fatally flawed and form an illegitimate basis for STB's conclusion that air quality impacts are not significant. *See e.g., Silverton Snowmobile Club*, 433 F.3d 782 (NEPA requires analysis to "ha[ve] a rational basis and t[ake] into consideration the relevant factors").

Even with STB's unsupportably low emissions estimates, their modeling demonstrated that NOx emissions will exceed the 1-hour standard. DEIS at 4-17. In 2010, EPA promulgated the 1-hour standard for ambient NOx concentrations at the level it deemed necessary to protect human health after finding that even short-term exposures to high NOx levels can cause severe respiratory impacts.[8]

For reference, Nitrogen oxides ("NOx") are highly reactive gases emitted primarily from the combustion of fossil fuels in mobile and stationary sources. NOx can cause respiratory problems such as asthma attacks, respiratory tract symptoms, bronchitis, and decreased lung function. NOx emissions result in nitrogen deposition, which may cause "significant adverse changes" in terrestrial ecosystems such as soil acidification, increases in soil and plant susceptibility to natural stresses, and alteration of natural plant species balances. Nitrogen deposition can also adversely affect aquatic ecosystems through acidification or eutrophication, both of which cause a reduction of water quality, and can leave the waterbody unfit for many aquatic organisms and/or human consumption. In addition, NOx emissions contribute to visibility impairment, global warming, acid rain, formation of ground-level ozone and formation of toxic chemicals. NOx is also a precursor chemical to fine particulate matter. Deposition of pollutants also has profound negative impacts on ecosystems. Studies demonstrate that in the Western United States, some aquatic and terrestrial plant and microbial communities are significantly altered by nitrogen deposition.[9]

While the NOx emissions threshold is set at 188 $\mu g/m^3$ for a 1-hour period, NOx emissions attributable to the Tongue River Railroad are modeled to reach 297 $\mu g/m^3$. DEIS at 4-

[8] Final Rule, Primary National Ambient Air Quality Standards for Nitrogen Dioxide, 75 Fed. Reg. 6,474, 6,483 (Feb. 9, 2010).

[9] See Mark E. Fenn, et al, Ecological Effects of Nitrogen Deposition in the Western United States, BioScience Vol. 53:4, Apr. 2003, available at http://www.bioone.org/doi/abs/10.1641/0006-3568(2003)053%5B0404:EEONDI%5D2.0.CO%3B2.

17. STB attempts to dismiss these modeled impacts. Citing a 2012 study by the American Petroleum Institute among others, STB claims that EPA's AERMOD model "has been documented in a number of studies to over-predict the highest 1-hour NO2 concentration from 1.7 to 2 times the observed concentration." Id. at 4-17–18. Accordingly, STB reduced predicted NOx concentrations to account for this "model bias." Id. at 4-18. While STB states that EPA is "aware" of the purported model bias, EPA has not conceded a bias of 1.7 to 2 times in its approved model, and has not sanctioned any post-modeling reductions in modeled values.[10] Moreover, STB's analysis relied on a version of AERMOD (13350) that modified earlier versions to incorporate a "Tier 2 ambient ratio method for the 1-hour NO2 NAAQS" in order to partially address industry's critique of the models' treatment of NOx. Id.; see DEIS at E-135 (specifying use of AERMOD 13350). STB has failed to justify its post-modeling reduction of projected NOx impacts in the DEIS.

In addition to Dr. Sahu's criticisms of the STB's modeling, recently published studies of coal trains in Washington also conclude that coal trains are still emitting significant amounts of particulate matter far from the mine origins even when topping agents are used. Professor Dan Jaffee's studies have examined respirable particulate matter emitted from coal trains in the Northwest.[11] His research, based on real world empirical observations, not simply modeling, indicate that the type of respirable particulate matter that causes health impacts is emitted by coal trains.

For all of these reasons, STB's analysis of air quality and human health impacts due to fugitive coal dust emissions is arbitrary and unsupported.

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[10] See Revision to the Guideline on Air Quality Models: Enhancements to the AERMOD Dispersion Modeling System and Incorporation of Approaches to Address Ozone and Fine Particulate Matter, 80 Fed. Reg. 45,340, 45,342-43 (July 29, 2015); see also R. Chris Owen and R. Brode, Clarification on the Use of AERMOD Dispersion Modeling for Demonstrating Compliance with the N02 National Ambient Air Quality Standard (Sept. 30, 2014.

[11] Jaffe, D., et al. Atmospheric Pollution Research, 5 (2014), 344---351, available at http://www.atmospolres.com/articles/Volume5/issue2/APR-14-040.pdf and Jaffe, D., et al. "Diesel Particulate Matter and Coal Dust from Trains in the Columbia River Gorge,Washington State, USA" Atmospheric Pollution Research, 2015.

B. Responses to Questions Raised by City Administrator

The following section addresses key questions put forth by the Assistant City Administrator in her letter of September 28, 2015.

Question 1--How to define "project" and "adjacent neighbor."

The section of the Development Agreement dated July 16, 2013, provides in pertinent part:

> 3.4.2 Regulation for Health and Safety. Notwithstanding any other provision of this Agreement to the contrary, City shall have the right to apply City Regulations adopted by City after the Adoption Date, if such application (a) is otherwise permissible pursuant to Laws (other than the Development Agreement Legislation), and (b) *City determines based on substantial evidence and after a public hearing that a failure to do so would place existing or future occupants or users of the Project, adjacent neighbors, or any portion thereof, or all of them, in a condition substantially dangerous to their health or safety*. The Parties agree that the foregoing exception to Developer's vested rights under this Agreement is in no way intended to allow City to impose additional fees or exactions on the Project, beyond the City Fees described below in Section 3.4.5, that are for the purpose of general capital improvements or general services (except in the event of a City-wide emergency).

Project, as defined in the agreement, encompasses at least the West, East and Central Gateway Development areas and Billboard sites.[12]

"Adjacent Neighbors" is not a defined term of the Development Agreement. We believe the term includes all of West Oakland at minimum, and all of Oakland if given broader meaning since with the presence of section 3.4.2 the City intended to reserve for itself the power to regulate health and safety hazards at the Project for all of its citizens, not just a limited subset of them. Moreover, as set forth in our earlier comment letters, due to the effects of coal transportation, storage and combustion, communities outside of the immediate Project vicinity will be exposed to coal dust. Thus, the term "adjacent neighbors" should not be construed too narrowly.

Question 2--Health and safety impacts for Project Occupants and Adjacent Neighbors

The numerous health and safety impacts associated with this project have been discussed at length in our previous comments and expert reports**.** The response below provides a reference to where information on the following topics can be found:

Public health

Air:

--Coal dust pollution of air—*See, e.g.,* Fox at 12-13; Niemeier 7, 9-11.

--Elevated rail and barge traffic polluting air—*See e.g.,* Fox at 19.

[12] *See, e.g.,* Agreement Definitions of Project, which include Exhibits D-1 and D-2 (noting East, Central, West Gateway and Billboard portions of the project.)

--Health impacts linked to air by particulate matter include respiratory illness, cardio pulmonary mortality, and stroke among other problems. – *See e.g.*, Niemeier at 9-10,
--Pollution crossover to California from burning coal in Asia (soot, fine dust, mercury, ozone.)—*See e.g.*, Niemeier at 11-12.

Water:
--Coal dust pollution of water. *See e.g.*, Fox at 7-8.
--Discharge of coal-laden waste water to the Bay would have detrimental impacts on aquatic life. *See e.g.*, Fox at 8-9
--Significant water use to keep coal dust controlled in drought-ridden California. *See e.g.*, Fox at 7-8.

Worker Safety:
--Utah coal has elevated silica which poses an elevated health risk to workers of cancer and other respiratory ailments. *See* Fox at 16

Cumulative public health impacts on an already overburdened community—West Oakland already disproportionately impacted by pollution (e.g, elevated asthma rates, significant harm to children/the elderly/low-income/minority populations) which would only worsen with a coal terminal—Niemeier at 9-11; Fox at 19

Climate:
--the amount of coal to be exported by the Oakland terminal is the equivalent of 30 million tons of CO2 each year, the equivalent of 7 average size power plants in a state that currently has no coal planst. *See* Niemeier at 12-13.
--Climate change poses special harm to Oakland in terms of sea level rise and drought. *See e.g.*, Niemeier at 12-13, Fox at 7-8.

Soil
--coal dust causes soil contamination with pollutants like arsenic. *See* Fox at 16-17.

Public safety

Fire—coal is dusty, explosive and has high fire risk., *See e.g.*, Fox at 18.
Derailments
—coal dust emitted from trains contributes to train derailments, which is especially concerning in light of more oil train movement throughout the Bay Area. *See e.g.*, Fox at 10-11,18.
--coal trains are heavier than other types of trains like passenger rail or freight which can pose stress to the rail ballast and also increase derailment risk. *See* Fox at 10/
Emergency Response-mile-long trains could reduce emergency response times, and increase collision risks. *See* Fox at 18-19.

Questions 3, 4, 5, 18 – The City's Ability to Regulate and/or Require Further Environmental Review

The Oakland City Council maintains the clear legal authority to regulate land owned by the City of Oakland. This legal authority includes zoning, enacting prohibitions, or other conditions on the use of such lands. As we have stated in our previous comments, municipalities in California have long had the power to impose conditions on the conduct of industrial operations within their bounds where necessary to protect public health and safety.[13] Consistent with this authority, Oakland can use its zoning and police powers to prohibit use of city lands for coal exports. Many other municipalities in California and beyond have used their zoning and police powers to regulate similar industries.[14]

As our previous comments state, the rail preemption arguments raised by developers and their counsel are not fully accurate and should not concern the City here. First, as set forth above, the City has the inherent ability to regulate the use of its lands. This power is separate from the matter of whether the City has the ability to directly regulate the rail lines running through the City, and as shown by the examples of other municipalities referenced above, there is no conflict with the regulatory bodies with oversight over rail transportation. Second, even if some of the City's regulatory powers were preempted by the federal authorities governing rail lines, the City retains some regulatory powers over rail lines in order to protect community health and safety, and could regulate in that manner to protect the public.[15]

Finally, as noted in prior comment letters submitted to the City on September 1, 2015 and September 21, 2015 there has never been any environmental review of the proposed coal export terminal. Indeed, there was no opportunity to conduct additional environmental review given that, until April 2015, lawmakers and the public were left in the dark about whether the Army

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[13] *See* September 1, 2015 Comment Letter at p. 15, *citing Marblehead Land Co. v. City of Los Angeles,* 47 F.2d 528, 531 (9th Cir. 1931)(upholding city authority to use zoning ordinances to protect residents from fire hazard and noxious gases resulting from oil drilling operations); *see also, Friel v. Los Angeles County*, 172 Cal.App.2d 142, 157 (1959); *Hermosa Beach Stop Oil Coalition v. City of Hermosa Beach*, 86 Cal.App.4th 534, 555 (2001).

[14] For example, San Benito, Santa Cruz and Mendocino Counties have all passed ordinances prohibiting the conduct of "fracking" on county lands, due to the health and safety risks posed by such activity. Jurisdictions outside of California, like Dryden, New York, have also enacted fracking bans. The town of South Portland, Maine has enacted a zoning ordinance prohibiting the loading of crude oil on marine tanker vessels. *See* Appendix A to September 1, 2015 Letter for a more comprehensive list of towns using zoning and police powers to restrict risky activities on City lands.

[15] *See* September 21, 2015 Comment Letter, *citing Flynn v. Burlington Northern Santa Fe Corp.*, 98 F.Supp.2d 1186 (E.D. Wash. 2000); *CFNR Operating Co. v. City of American Canyon*, 282 F.Supp.2d 1114 (N.D. Cal. 2003); *Borough of Riverdale, Petition for Declaratory Order The New Susquehanna & Western Railway Cop.*, 1999 WL 715272, STB Finance Docket No. 33466 at 8-9 (09/9/1999); *see also, Union Pacific Railroad v. California Public Utilities Commission*, 346 F.3d 851, 860 (9th Cir. 2003)

Base development would involve a committed coal terminal.[16] The California Environmental Quality Act requires additional environmental review of project where there are substantial changes in the nature of the project, the circumstances under which a project is undertaken, or new information arises after the environmental review of a project is completed. (*See* Public Resources Code §21166.) All of these conditions are present here, since the public did not know and could not have known about the proposed coal export terminal until April 2015, and further, the proposed coal export terminal represents a significant departure from oversized bulk terminal that the public was expecting.

Question 7--If coal is not exported from Oakland, what will happen to that coal and why?

If coal is not exported from Oakland, it is likely that most of that coal will stay in the ground. The international export markets for coal are risky and declining, and Bowie Resources, the company behind the Utah investment, is currently supplying coal to U.S. power plants that are slated to convert to other resources like natural gas, or to shut down. Bowie's current total coal production is just over 11 million tons per year.[17] Intermountain Power, the recipient of some of this Bowie coal, is slated to convert to natural gas at the end of 2024.[18] The Bowie coal contracts with 7 and 4.5 million ton minimums expire in 2020 and 2024, meaning that the majority of Bowie's coal is not contracted after this point in time.[19] It is likely that Bowie will not secure additional domestic coal contracts given larger market trends.[20] The Bowie No. 2 mine in Colorado just announced major layoffs again, the second time in only 2 years at this mine on the heels of losing a supply contract with the Tennessee Valley Authority and weak demand for coal.[21]

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[16] As shown by the Public Records Act requests submitted by Sierra Club to the City and Port of Oakland and the responses received, community members made efforts to learn about whether coal export would be a part of the Army Base development. Based on the written responses received from the City and Port, as well as information learned during face-to-face meeting with the developer, community members understood that coal would not be a part of the development. These PRA requests and responses are attached to this letter.

[17] *See* Bowie Resource Partners LP SEC Form S-1 at 2, accessed: http://www.sec.gov/Archives/edgar/data/1631790/000104746915005595/a2225124zs-1.htm (noting coal production in 2014 was just over 11 million tons.)

[18] "LA City Council Votes to Move Away from Coal-fired Energy", LA Times, April 23, 2013, http://articles.latimes.com/2013/apr/23/local/la-me-ln-council-coal-energy-20130423

[19] *See* Bowie Resource Partners LP SEC Form S-1 at 2, accessed http://www.sec.gov/Archives/edgar/data/1631790/000104746915005595/a2225124zs-1.htm.

[20] *See* Tom Sanzillo, Institute for Energy Economics and Financial Analysis, September 21, 2015 written testimony at 15-16 (noting that Utah coal production as a whole is declining, and Western power plants are turning to other non-coal resources).

[21] *See* "More Layoffs Hit Bowie Coal Mine", The Grand Junction Sentinel, September 29, 2015, accessed http://www.gjsentinel.com/news/articles/more-layoffs-hit-bowie-coal-mine (announcing layoffs of nearly 100 workers at Bowie No. 2 mine); KVNF Radio, "Local Reaction to Bowie Coal Mine Layoffs", October 30, 2014, http://kvnf.org/post/local-reaction-bowie-coal-mine-layoffs (announcing

Without domestic demand for coal, Bowie is looking to international markets. However, international coal markets are also in a permanent state of decline. Major investment and financial research firms like Citibank, Goldman Sachs, J.P. Morgan, and Bernstein Research "reflect the consensus that the international coal market is oversupplied, and that global coal producers will continue to face unsustainably low prices and tight margins…[and} that the trend is not likely to reverse itself."[22] China and India's coal use is predicted to sharply decline in coming years.[23] Without international demand for coal, and with declining domestic demand, there is ample support for the proposition that the Utah coal will stay in the ground.

Question 11 – HDR Engineering Air Quality & Human Health & Safety Assessment

Please see above for discussion on the flaws of the HDR Report.

Question 13—Effectiveness of Covered Rail Cars at Reducing Pollution

As a preliminary point, enacting, contracting or enforcing a regulation like covered rail cars that involve movement of trains in an interstate manner is likely not an area that the City of Oakland could regulate without some rail industry or developer challenge. Thus, the developer's promises to provide covered rail cars from mine to port are moot.

To respond to the City Administrator's questions regarding the efficacy of covered rail cars:

A) No, covered rail cars are not currently in use in the U.S. or elsewhere for transporting coal. *See* Niemeier at 9; Fox at 11.

B) We have been unable to uncover any research relating to the use of covered coal cars to transport coal. *See* Niemeier at 9; Fox at 11.

C) The websites show some prototypes for these theoretical covers but the websites do not contain engineering information.

D) The effectiveness of covered coal cars is unknown because there are been no studies done to date that we have been able to uncover. It is unknown how well covers function and their ability to effectively contain coal dust. *See* Niemeier at 9. Health and safety questions about ventilation and fire risk exist. *See* Fox at 18.

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layoffs of 150 workers at Bowie No. 2 mine in in reaction to "the cancelation of a coal supply agreement with the Tennessee Valley Authority and continued weak demand for coal in the region.")

[22] *See* Tom Sanzillo, Institute for Energy Economics and Financial Analysis, September 21, 2015 written testimony at 7.

[23] *See* Tim Buckley, India's New Emissions Target Adds Momentum to Global Coal Transition, Institute for Energy Economics and Financial Analysis, October 5, 2015, http://ieefa.org/indias-new-emissions-target-adds-momentum-to-global-energy-transition/

Questions 14 and 15—Effectiveness of Other Fugitive Dust Control Methods

To respond to the City Administrator's questions regarding the use of other fugitive dust control methods:

A) **Water use—**Water use would be at least 8 gallons per ton of coal handled at the facility for a total of approximately 79.2 million tons of water, or the equivalent of supplying water to 3000 Oakland residents. *See* Fox at 7-8. In the age of longer and more prolonged droughts in Oakland and in California due to climate change, this is an inappropriate use of our limited water resources.[24] This is water use at the terminal site for loading/unloading/handing, and more water would likely be required to load the trains at the mine and possibly to suppress dust along the rail journey. The Basis of Design plans provided by Terminal Logistics do not detail the source of the water, or how it would be disposed. The drawings show "washdown treatment water" discharges directly to the San Francisco Bay. *See* Fox at 8. Coal dust poses a risk to waterways.

B) **Spray/surfactant/topping agent—**CCIG/TLS do not indicate that they will use any sort of topping agent. *See* Fox at 12. There are no railroad requirements forcing Utah coal to be treated with any sort of topping agent. *See* Niemeier at 7-8. Fox at 14. If surfactants were used their efficacy and safety is questionable. First, although use of surfactants in some contexts is common, their efficacy and safety for use on coal-carrying trains is unproven. The claimed 85% control efficiency has been called "junk science" by coal shippers. Topping agents wear off long the route, are themselves pollutants, and can even possibly increase the amount of coal lostdue to saltation.[25] Second, surfactants contain myriad undisclosed chemicals, many of whose biological and ecological effects have not yet been adequately studied. Surfactants could cause a number of potential harms, including: danger to human health during and after application; surface, groundwater, and soil contamination; air pollution; changes in hydrologic characteristics of the soils; and impacts on native flora and fauna populations.[26]

C) **Other measures—load profiling?** CCIG/TLS do not indicate that they will use any sort of load profiling. *See* Fox at 12. There are no railroad requirements forcing Utah coal to be loaded in any particular way. *See* Niemeier at 7-8. Fox at 14. Load profiling does not fully reduce coal dust emissions.

D) **How effective in absolute terms and vs. covered cars?**
There is no public data or research that we have found to compare the use of surfactants, load profiling and covered rail cars to transport coal, likely because covered rail cars have not been commercially deployed. *See* Niemeier at 9; Fox at 11. Nonetheless, even if CCIG/TLS

[24] Professors Noah Diffenbaugh and Christopher Field, "A Wet Winter Won't Save California", New York Times, September 19, 2015, http://www.nytimes.com/2015/09/19/opinion/a-wet-winter-wont-save-california.html
[25] *See* Phyllis Fox, Fugitive Particulate Matter Emissions from Coal Train Staging at the Proposed Coyote Island Terminal, July 19, 2013.
[26] *See* Environmental Protection Agency, Potential Environmental Impacts of Dust Suppressants: Avoiding Another Times Beach § 3 (May 30-31,2002).

were to claim they would use a surfactant or topping agent, it is first questionable who would pay for that treatment and guarantee it would happen. The claims about 85 % efficacy are not well-supported. Such agents wear off during travel and windy conditions as would be experienced along the railroute from Utah to California. Even under perfect conditions, surfactants do not fully contain coal dust. *See* Niemeier 8-9.

Question 16—Emergency Response and Actual Operations

A) Combustion risk of coal

Coal is known to spontaneously combust, in part due to its flammable dust.[27] Even CCIG/TLS basis of design acknowledges that coal is "very dusty, exhibits spontaneous combustion behavior, [and is] potentially explosive."[28]

B) Containment poses risk of fire or explosion?

Coal is a highly combustible material and its transportation, storage and handling pose risks of fire or explosion. Keeping coal confined in enclosed spaces may make fires happen by trapping heat if not properly ventilated. *See* Fox at 18. And of course ventilation means that dust can escape into the environment. *Id.* With frequent mile-long trains traveling to and from the proposed export facility, this also means reduced emergency response times in several East Bay communities, a problem that would certainly hinder any sort of timely response to a fire at the proposed coal terminal in West Oakland. *See* Fox at 18-19.

C) How can ILWU concerns be addressed or mitigated?

The ILWU flagged concerns about worker health and safety for those handling coal on the docks and noted that even wearing masks did not fully alleviate respiratory concerns. During the September 21, 2015 public hearing, ILWU members stated that they do not wish to handle coal, and ILWU Local 10 and 34 have passed resolutions opposing the use of the Army Base development for coal transportation.[29] The project proposed for the Army Base is of special concern that the Utah coals handled and exported from the proposed Oakland facility have elevated levels of silica. Silica levels range from 58.4% to 61.4% at four Bowie mines that may supply the Terminal.[30] Exposure to coal dust with elevated silica can result in silicosis, pulmonary tuberculosis, and lung cancer. *See* Fox at 16. Coal with elevated silica was the subject of recent MSHA coal dust regulations to decrease worker exposure to that type of coal dust in particular.

In sum, even if the developer proposes mitigation conditions, or there are applicable state or federal worker safety standards, we do not believe worker risks can be fully eliminated and thus

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[27] *See The Fire Below: Spontaneous Combustion in Coal*, U.S. Dep't of Energy (May 1993); *available at http://www.coaltrainfacts.org/docs/EH-93-4-The-Fire-Below_-Spontaneous-Combustion-in-Coal.pdf*.

[28] 7/16/15 Basis of Design at Table 5-1.

[29] *Longshore Workers Vote to Oppose Coal Exports in Oakland*, September 18, 2015; *available at https://www.ilwu.org/longshore-workers-vote-to-oppose-coal-exports-in-oakland/*

[30] Sept. 2015 HDR Report, p. 13, citing http://bowieresources.com/skyline/.

do not think that the Oakland facility should handle coal because of its inherent health and safety risks to workers such as ILWU members and to the larger community.

C. Additional Documents Provided With This Letter

With this letter, we are also submitting these additional documents to provide the City Council with further information on the harms of coal transportation through Oakland and the regulatory options available to the City:

1. Attachment 1 – Letter previously submitted to City Administrator attaching 4 CDs worth of studies documenting the health and safety harms caused by coal. These CDs will be submitted again to the City.
2. Attachments 2a through 2d - Sierra Club's public records requests and responses from the City of Oakland and the Port of Oakland as they related to our inquiries about potential coal terminal development.
3. Attachment 3 – December 2013 Oakland Global Newsletter
4. Attachment 4 - A September 24, 2015 letter to the California Transportation Commission expressing concern about the use of Proposition 1B Trade Corridor Improvement Funds to support a coal export terminal when that use was not disclosed in the funding application and is contrary to the intended use of such funds.
5. Attachment 5 - Color copy of powerpoint slides showing the ills of coal transportation.
6. Attachment 6 - Dr. Ranajit Sahu, *Comments on Air Quality and Coal Dust Sections of Draft EIS for the Proposed Tongue River Railroad Company, Inc.*
7. Attachment 7 - Dr. Daniel Jaffee, *Diesel Particulate Matter and Coal Dust From Trains in the Columbia River Gorge*

Sincerely,

Jessica Yarnall Loarie, Staff Attorney,
Sierra Club Environmental Law Program

Irene Gutierrez, Attorney, Earthjustice

September 14, 2015

Via Overnight Mail

Oakland City Administrator
1 Frank Ogawa Plaza, 3rd Floor
Oakland, CA 94612

Re: Proposed Oakland Coal Export Terminal

To the Oakland City Administrator:

On September 1, 2015, the Sierra Club, West Oakland Environmental Indicators Project, San Francisco Baykeeper, and Communities for a Better Environment submitted comments to the City Administrator's office objecting to the proposed development of California's largest coal export terminal at the former Oakland Army Base, now known as the Oakland Global Trade and Logistics Center ("Oakland Global"). That letter provided community advocates' reasons for objecting to the coal export terminal, including information about the various health, safety, and environmental implications of exporting coal.

This letter supplements the September 1, 2015 letter by providing additional information on the health, safety and environmental harms created by operating a marine coal export terminal on the Oakland waterfront. This letter provides information about the effects of comparable coal export terminals in the Pacific Northwest, specifically:

1. May 3, 2012 and January 8, 2013 comment letters submitted by Columbia Riverkeeper, the Sierra Club and other organizations on the proposed Morrow Pacific coal terminal, a comparable coal terminal located in Oregon. Those comment letters and supporting exhibits are contained within **Disk A – Coyote Islands** on the DVD enclosed with this letter.

2. A January 21, 2013 comment letter submitted by Columbia Riverkeeper, the Sierra Club and other organizations on the proposed Gateway Pacific coal terminal and Custer Spur rail expansion project located in

Washington state. That comment letter and supporting exhibits are contained within **Disk B – Pacific Coal** on the DVD enclosed with this letter.

3. A November 15, 2013 comment letter prepared by Earthjustice on the proposed Millennium Bulk Terminals – Longview Shipping Facility, a comparable coal export terminal located in Washington State. That comment letter and supporting exhibits are contained within **Disk C – Millenium Bulk 1** and **Disk D – Millenium Bulk 2** on the DVD enclosed with this letter.

These proposed facilities are similar to the proposed Oakland coal export facility. Thus, the analysis of the effects of these terminals will instructive in understanding the potential effects of the Oakland coal export facility.

Thank you for your consideration of these comments. As you are aware, community groups are greatly concerned about the serious health and safety consequences of allowing coal exports to pass through Oakland. The City of Oakland has the chance to act as a local and national leader in committing to protect its residents from a dangerous fossil fuel and should act now to prevent the development of the proposed coal export terminal.

Sincerely,

Irene Gutierrez, Attorney
Earthjustice

On behalf of:
Sierra Club, West Oakland Environmental Indicators Project, Communities For A Better Environment, and San Francisco Baykeeper

Encl. (DVD)

cc: City of Oakland
Port of Oakland

February 20, 2013

via Facsimile and Email

City's Clerks Office
Public Records Request
City of Oakland
1 Frank Ogawa Plaza, Room 101
Oakland, CA 94612
Fax: 510-238-2228
Email: records@oaklandnet.com

Dear Public Records Clerk:

Pursuant to the California Public Records Act (CPRA), Govt. Code §§ 6250-6270, Sierra Club is writing to request the documents described below.

Sierra Club is the nation's oldest grassroots organization. It has nearly 600,000 members nationwide, including more than 141,000 members in California. Sierra Club is dedicated to the protection and preservation of the natural and human environment. Sierra Club's purpose is to explore, enjoy and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments.

One of Sierra Club's priority national conservation campaigns involves promoting smart energy solutions. Sierra Club is particularly interested in ensuring that coal mines and ports comply fully with all applicable statutes and regulations. This campaign organizes individuals regionally and nationwide to work on coal-related issues and educates the public on these issues, including the impacts of coal on air and water quality.

Sierra Club hereby requests copies of the following materials:

- All records[1] relating to <u>any</u> proposal to export, store, or use coal at the Port of Oakland, including, but not limited to:

[1] For the purposes of this request, the term "records" means information of any kind, including writings (handwritten, types, electronic, or otherwise produced, reproduced, or stored), letters, memoranda, correspondence, notes, applications, completed forms, studies, reports, reviews, guidance documents, policies, telephone conversations, telefaxes, e-mails, documents, databases, drawings, graphs, charts, photographs, minutes of meetings, electronic and magnetic recordings of meetings, and any other compilation of data from which information can be

a. any records related to coal exports and/or storage at the Oakland Army Base Redevelopment Project, hereafter ("OARB")[2]; including, but not limited to coal exports and/or storage at the proposed Oakland Bulk and Oversized Terminal, also known as the West Gateway Break Bulk Terminal project, hereafter ("West Gateway Project"); and
b. any records, related to rail improvements to facilitate coal exports and/or storage at the Port of Oakland, OARB or the West Gateway Project; and
c. any records related to coal storage, export, or handling at an existing or proposed facility; and
d. any and all emails, minutes, and/or notes from meetings between the City, City staff, the Port of Oakland, prospective developers, prospective lessees, which address potential or pending proposals to export, store, or use coal at the Port of Oakland, OARB or the West Gateway Project; and
e. any and all communications (letters, emails, applications) between the City, City staff, Port Commissioners, state or federal agencies, and/or others which discuss potential or pending proposals to export, store, or use coal at the Port of Oakland, OARB and the West Gateway Project; and
f. any applications for coal export terminals or multi-commodity terminals that include coal exports, or proposals to use or store coal at the Port of Oakland, OARB and the West Gateway Project.

Exempt Records

There is no basis for claiming that the records requested herein are exempt from immediate disclosure under the CPRA. Each of these records falls within Govt. Code §§ 6250-6270 as information an agency is required to make available to the public. If, however, it is your position that any portion of the requested records is exempt from disclosure, we request that pursuant to Govt. Code § 6255(a) ("the agency shall justify withholding any record by demonstrating that the record in question is exempt under express provisions of this chapter...and…the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record") that you provide us with a detailed explanation of why you consider each portion exempt.

In the event that some portions of the requested documents are properly exempt from disclosure as required by Govt. Code § 6253(a), the agency always bears the burden of justifying nondisclosure, and ("any reasonably segregable portion…shall be available for inspection…after deletion of the portions which are exempt.", please redact the exempt portions and provide the remainder of the record to Sierra Club at the address listed below. If it is your position that a document contains non-exempt segments but that those non-exempt segments are so dispersed throughout the document as to make segregation impossible, please state what portion of the

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obtained. Without limitation, the records requested include records relating to the topics described below at any stage of development, whether proposed, draft, pending, interim, final, or otherwise. All the foregoing are included in this request if they are in the possession of or otherwise under the control of the City of Oakland.

[2] Plan to develop Oakland Army Base coming into focus, January 10, 2012, found at: http://www.contracostatimes.com/news/ci_19709014?source=rss.

document is non-exempt and how the material is dispersed throughout the document. If a request is denied in whole, please state specifically that it is not reasonable to segregate portions of the record for release.

Fee Waiver Request

We respectfully request that any fee for the processing, production, or replication of the requested documents be waived pursuant to Public Records Act § 6253. *See N. County Parents Organization v. Dep't of Educ.*, 23 Cal.App.4th 144, 148 (1994) (public agencies have the power to waive fees related to record requests by nonprofit organizations pursuant to Cal. Govt. Code § 6253.1, which is now located at Cal. Govt. Code § 6253(e)). A waiver is appropriate in this case for the following reasons:

1. Sierra Club is a nonprofit, public interest organization of limited resources; paying significant fees would pose a hardship on the Club. Additionally, this information will not be used for commercial purposes.

2. The waiver of fees for Sierra Club is in the public interest because furnishing the requested documents primarily benefits the general public. Sierra Club represents 141,000 members throughout the State of California. A fee waiver will enable Californians and local residents concerned about, and directly impacted by, pollution from the handling, export, storage, transport, or use of coal, to become aware of and understand such operations. The information will also facilitate an understanding of how the public shoreline is utilized and any potential environmental impacts associated with these operations. Further, it will raise awareness about how public monies are being spent on the OARB; thus, the waiver of fees in this case is in the public interest.

If for any reason the City of Oakland does not waive the fees, please notify us immediately with the reasons for the denial and the costs that would be involved prior to any copying of the documents. Nothing in this request is to constitute any waiver of Sierra Club's right to seek administrative or judicial review of any denial of its fee waiver request and/or rejection of its fee category assertion.

Records Delivery

We request that the City of Oakland comply with all relevant deadlines and other obligations set forth in the CPRA. Please respond to this request promptly, as required by Govt. Code § 6253(c), which states, that "within 10 days from receipt of the request...the agency…shall *promptly* notify the person making the request of the determination and the reasons therefor."

If you have any questions about this request or foresee problems in fully releasing the requested records promptly, please contact me by phone at (415) 977-5636 or by email at jessica.yarnall@sierraclub.org within that time period. We appreciate your cooperation and would be happy to clarify this request or otherwise simplify your efforts to comply. Additionally, to facilitate delivery, please email electronic copies of the requested documents to this email address. If an electronic version is unavailable, please send copies to my attention at the mailing address below. Thank you for your assistance.

Sincerely,

Jessica Yarnall Loarie
Associate Attorney
Sierra Club
Environmental Law Program
85 Second St, Second Floor
San Francisco, CA 94105

February 20, 2013

via Facsimile and Email

Public Information Officer
John Betterton
Port of Oakland
530 Water Street
Oakland, CA 94607
Fax: (510) 839-5104
Email: jbetterton@portoakland.com

Dear Mr. Betterton,

Pursuant to the California Public Records Act (CPRA), Govt. Code §§ 6250-6270, Sierra Club is writing to request the documents described below.

Sierra Club is the nation's oldest grassroots organization. It has nearly 600,000 members nationwide, including more than 141,000 members in California. Sierra Club is dedicated to the protection and preservation of the natural and human environment. Sierra Club's purpose is to explore, enjoy and protect the wild places of the earth; to practice and promote the responsible use of the earth's ecosystems and resources; and to educate and enlist humanity to protect and restore the quality of the natural and human environments.

One of Sierra Club's priority national conservation campaigns involves promoting smart energy solutions. Sierra Club is particularly interested in ensuring that coal mines and ports comply fully with all applicable statutes and regulations. This campaign organizes individuals regionally and nationwide to work on coal-related issues and educates the public on these issues, including the impacts of coal on air and water quality.

Sierra Club hereby requests copies of the following records:

- All records[1] relating to <u>any</u> proposal to export, store, or use coal at the Port of Oakland, including, but not limited to:

[1] For the purposes of this request, the term "records" means information of any kind, including writings (handwritten, types, electronic, or otherwise produced, reproduced, or stored), letters, memoranda, correspondence, notes, applications, completed forms, studies, reports, reviews, guidance documents, policies, telephone conversations, telefaxes, e-mails, documents, databases, drawings, graphs, charts, photographs, minutes of meetings, electronic and magnetic recordings of meetings, and any other compilation of data from which information can be

a. any records related to coal exports and/or storage at the Oakland Army Base Redevelopment Project, hereafter ("OARB")[2]; including, but not limited to coal exports and/or storage at the proposed Oakland Bulk and Oversized Terminal, also known as the West Gateway Break Bulk Terminal project, hereafter ("West Gateway Project"); and
b. any records, related to rail improvements to facilitate coal exports and/or storage at the Port of Oakland, OARB or the West Gateway Project; and
c. any records related to coal storage, export or handling at the Port of Oakland; and
d. any and all emails, minutes, and/or notes from meetings between the Port of Oakland and prospective or current lessees, prospective developers, prospective rail service providers[3] which address potential or pending proposals to export, store, or use coal at the Port of Oakland, OARB or the West Gateway Project; and
e. any and all communications (letters, emails, applications) between Port of Oakland's staff, commissioners, city agencies, state agencies, and/or others which discuss potential or pending proposals to export, store, or use coal at the Port of Oakland, OARB or the West Gateway Project; and
f. any applications for coal export terminals or multi-commodity terminals that include coal exports, or proposals to use or store coal at the Port of Oakland, OARB and the West Gateway Project.

Exempt Records

There is no basis for claiming that the records requested herein are exempt from immediate disclosure under the CPRA. Each of these records falls within Govt. Code §§ 6250-6270 as information an agency is required to make available to the public. If, however, it is your position that any portion of the requested records is exempt from disclosure, we request that pursuant to Govt. Code § 6255(a) ("the agency shall justify withholding any record by demonstrating that the record in question is exempt under express provisions of this chapter...and…the public interest served by not disclosing the record clearly outweighs the public interest served by disclosure of the record") that you provide us with a detailed explanation of why you consider each portion exempt.

In the event that some portions of the requested documents are properly exempt from disclosure as required by Govt. Code § 6253(a), the agency always bears the burden of justifying nondisclosure, and ("any reasonably segregable portion…shall be available for inspection…after

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obtained. Without limitation, the records requested include records relating to the topics described below at any stage of development, whether proposed, draft, pending, interim, final, or otherwise. All the foregoing are included in this request if they are in the possession of or otherwise under the control of the Port of Oakland.

[2] Plan to develop Oakland Army Base coming into focus, January 10, 2012, found at: http://www.contracostatimes.com/news/ci_19709014?source=rss.

[3] *See* Special Meeting of the Board of Port Commissioners, January 10, 2013 at pp. 33 – 36, found at: http://www.portofoakland.com/pdf/boar_shee_130110.pdf (noting that Anacostia had experience managing bulk terminal operations in Southern California involving coal, pet coke and ash that would be similar to the Oakland proposal.)

deletion of the portions which are exempt.", please redact the exempt portions and provide the remainder of the record to Sierra Club at the address listed below. If it is your position that a document contains non-exempt segments but that those non-exempt segments are so dispersed throughout the document as to make segregation impossible, please state what portion of the document is non-exempt and how the material is dispersed throughout the document. If a request is denied in whole, please state specifically that it is not reasonable to segregate portions of the record for release.

Fee Waiver Request

We respectfully request that any fee for the processing, production, or replication of the requested documents be waived pursuant to Public Records Act § 6253. *See N. County Parents Organization v. Dep't of Educ.*, 23 Cal.App.4th 144, 148 (1994) (public agencies have the power to waive fees related to record requests by nonprofit organizations pursuant to Cal. Govt. Code § 6253.1, which is now located at Cal. Govt. Code § 6253(e)). A waiver is appropriate in this case for the following reasons:

1. Sierra Club is a nonprofit, public interest organization of limited resources. Paying significant fees would pose a hardship on the Club. This information will not be used for commercial purposes and will be distributed to the public.

2. The waiver of fees for Sierra Club is in the public interest because furnishing the requested documents primarily benefits the general public. Sierra Club represents 141,000 members throughout the State of California. A fee waiver will enable Californians and local residents concerned about, and directly impacted by, pollution from the handling, export, storage, transport, or use of coal, to become aware of and understand such operations. The information will also facilitate an understanding of how the public shoreline is utilized and any potential environmental impacts associated with these operations. Further, it will raise awareness about how public monies are being spent on the OARB; thus, the waiver of fees in this case is in the public interest.

If for any reason the Port of Oakland does not waive the fees, please notify us immediately with the reasons for the denial and the costs that would be involved prior to any copying of the documents. Nothing in this request is to constitute any waiver of Sierra Club's right to seek administrative or judicial review of any denial of its fee waiver request and/or rejection of its fee category assertion.

Records Delivery

We request that the Port of Oakland comply with all relevant deadlines and other obligations set forth in the CPRA. Please respond to this request promptly, as required by Govt. Code § 6253(c), which states, that "within 10 days from receipt of the request...the agency…shall *promptly* notify the person making the request of the determination and the reasons therefor."

If you have any questions about this request or foresee problems in fully releasing the requested records promptly, please contact me by phone at (415) 977-5636 or by email at jessica.yarnall@sierraclub.org within that time period. We appreciate your cooperation and

would be happy to clarify this request or otherwise simplify your efforts to comply. Additionally, to facilitate delivery, please email electronic copies of the requested documents to this email address. If an electronic version is unavailable, please send copies to my attention at the mailing address below. Thank you for your assistance.

Sincerely,

Jessica Yarnall Loarie
Associate Attorney
Sierra Club
Environmental Law Program
85 Second St, Second Floor
San Francisco, CA 94105

Jessica Yarnall Loarie <jessica.yarnall@sierraclub.org>

Fwd: FW: Public Records Request re coal at OAB

2 messages

David Abell <david.abell@sierraclub.org> Wed, Mar 27, 2013 at 1:46 PM
To: Jessica Yarnall Loarie <Jessica.Yarnall@sierraclub.org>

fyi - yeah, they have you has Jessica Varnall (hence why did not receive this)

---------- Forwarded message ----------
From: **Bondi, James** <JBondi@oaklandnet.com>
Date: Tue, Mar 26, 2013 at 1:54 PM
Subject: FW: Public Records Request re coal at OAB
To: jessica.varnall@sierraclub.org, david.abell@sierraclub.org
Cc: "Flores-Medina, Arlette" <AFlores@oaklandcityattorney.org>

To Whom It May Concern,

I was informed yesterday by staff with the Office of the City Attorney that your agency is claiming not to have received any response from the City to a records request you made in February, 2013.

Please see the message below, originally sent to your organization on February 25, 2013, informing you that the City of Oakland has no records which are responsive to your request. The City will continue to consider your request closed. As noted previously, please be aware that the Port of Oakland is a legally distinct governmental body over which the City of Oakland has no authority, and any request for records from the Port would have to be made to them directly.

Sincerely,

James A. Bondi

City Administrator Analyst

Office of the City Administrator

510-238-6654

From: Wang, Hui
Sent: Monday, February 25, 2013 4:32 PM
To: 'jessica.varnall@sierraclub.org'
Cc: Cole, Doug; Bondi, James
Subject: Public Records Request re coal at OAB

Dear Ms. Varnall

The City has no record of any proposal, communications, or notes from meetings that relate to the export, storage, or use of coal in the OARB. Nor have we received any applications for coal export terminals or multi-commodity terminals that include coal exports at the OARB.

Please note the Port of Oakland's operations are separate from the City's and we have no access to their records. The Port of Oakland did not discuss coal export when we worked together on preparing the Army Base Infrastructure Master Plan and associated CEQA analysis, so to our knowledge that commodity is not part of the Army Base project. You would need to confirm directly with the Port whether or not it has received any proposals or is in discussions with prospective developers regarding the export or use of coal at the Port of Oakland.

Hui Wang

Office of Neighborhood Investment

250 Frank H. Ogawa Plaza, Suite 5313

Oakland, CA 94612

t: 510.238.7693

f: 510.238.3691

Jessica Yarnall Loarie <jessica.yarnall@sierraclub.org> Wed, Mar 27, 2013 at 2:06 PM
To: JBondi@oaklandnet.com
Cc: AFlores@oaklandcityattorney.org, David Abell <david.abell@sierraclub.org>

Mr. Bondi,

Thank you for your response. It appears that you spelled my email address wrong (Yarnall, not Varnall) which is why I did not get this response--I only received it now via my colleague, David Abell. We have also sent a similar request to the Port of Oakland.

Best,

Jessica Yarnall Loarie
Associate Attorney
Sierra Club Environmental Law Program
85 Second St, 2nd Floor
San Francisco, CA 94105
Tel: (415) 977-5636
Fax: (415) 977-5793
jessica.yarnall@sierraclub.org

CONFIDENTIAL LEGAL COMMUNICATION/WORK PRODUCT
This email may contain privileged and confidential communications and/or confidential attorney work product. If you receive this email

inadvertently, please reply and notify the sender and delete all versions from your system. Thank You.

[Quoted text hidden]

Bulk Rail Terminal Feasibility Study

Port of Oakland
Oakland, California

September 7, 2012

Prepared For:

PORT OF OAKLAND

Port of Oakland
530 Water Street, 2nd Floor
Oakland, CA 94607
Phone: (510) 627-1100
Fax: (510) 272-9329

Prepared By:

TranSystems
EXPERIENCE | Transportation

TranSystems
505 14th Street, Suite 1000
Oakland, CA 94612
Phone: (510) 835-2761
Fax: (510) 835-9839

TranSystems
505 14th Street
Suite 1000
Oakland, CA 94612
Tel 510 835 2761
Fax 510 835 9839

September 7, 2012

Port of Oakland - Bulk Rail Terminal Feasibility Review

Summary:

The Port of Oakland is interested in exploring the feasibility of developing a bulk rail terminal to handle iron ore or other similar bulk products for export to Asia, at three potential locations at the Port. The three rail-to-vessel transload facility locations considered were:

- Berth 33;
- Roundhouse property (former UP auto facility), located between Schnitzer Steel and the APL Terminal; and
- Howard Terminal.

Rail service to any of these locations would make use of rail car storage at the future Outer Harbor Intermodal Terminal (OHIT) support tracks, if possible.

TranSystems' scope of work included:

- Developing conceptual drawings and supporting documents to assess physical layout feasibility. Associated with each conceptual layout, cost estimates were made and cost estimate assumptions were documented. A summary of criteria and advantages/disadvantages relating to the layouts was prepared.
- Through discussions with the Port and with a potential user/operator, TranSystems developed variations on the original three alternatives based upon comments received.

This document compiles the various work products prepared in the course of TranSystems' conceptual level work. The preferred site plans developed are included in *Appendix A* of this document. Each site includes 6 warehouses with a yard track configuration to accommodate one unit train. The Berth 33 option shown in *Exhibit 8* appears to be the most favorable for several reasons. The Berth 33 location allows unit trains to be spotted at the future OHIT yard and shuttled to the bulk terminal with less added rail congestion in the Port area. The other two of the preferred site plans involved more potential impact to Union Pacific Railroad at their intermodal yard.

Advantages and disadvantages of each of the proposed sites are included in this document. Capacity analysis for the sites has shown that if the site were able to be served by 4 unit trains per week this would equate to a throughput of about 2.5M to 3.5M metric tons annually. The cost for such a facility, included in *Appendix B*, was estimated to be around $90 million.

Ideally, a bulk terminal would have adequate space for loop track operations, however given the available sites and their size constraints, a loop track would only work if it had very tight track curvature, which is not recommended. The feasibility of providing loop tracks with acceptable curvature was explored but deemed infeasible. Options that were considered but deemed infeasible are included in *Appendix D – Site Plans Withdrawn from Consideration*.

Next Steps:

Additional steps to further defining bulk terminal options could include:

- Economic/ market study to assess potential market and revenue generation for the Port.
- Resolve property and tenant impacts including preliminary discussions with adjacent Port tenants.
- Obtain Union Pacific Railroad comment on rail transportation issues.
- Discussions with prospective bulk terminal operators for assessments of interest, operating costs, development costs, potential for development partnerships, etc.
- Preliminary engineering studies and site investigations.

Port of Oakland

Bulk Rail Terminal Feasibility Study

Rail layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland

Table of Contents:

- Description of Facilities and Operations
    - General Planning Parameters
    - Facility Operations
- Evaluation of Alternatives: Summary of Advantages and Disadvantages
    - Exhibit 1: Roundhouse Property- Yard Option
    - Exhibit 2: Roundhouse Property- Loop Option (withdrawn from consideration)
    - Exhibit 3: Berth 33 - Yard Option (withdrawn from consideration)
    - Exhibit 4: Berth 33 - Loop Option (withdrawn from consideration)
    - Exhibit 5: Howard Terminal- Diagonal Yard Option
    - Exhibit 6: Howard Terminal- Wharfside Yard Option (withdrawn from consideration)
    - Exhibit 7: Roundhouse / APL Loop (withdrawn from consideration)
    - Exhibit 8: Berth 33 – Yard Option 2
- Appendix A – Preferred Site Plans
- Appendix B – Cost Estimates
- Appendix C – Capacity Model
- Appendix D – Site Plans Withdrawn from Consideration

Description of Facilities and Operations

General Planning Parameters

- A variety of bulk products would be handled on site and could include iron ore, soda ash, pet coke, sulfur or similar products stored in covered warehouses (versus outdoor stacks, for environmental protection). It is assumed that coal would not be handled at the terminal. Grain product(s) in silos are also shown as an option that could be handled on site as a possible later stage of development.
- For planning purposes, unit trains of 100 cars are used; each car is 53' centerline coupling-to-centerline coupling. (Unit trains in Stockton are 84 car trains, with 3 to 4 trains per week, equivalent to a total throughput of 1,100,000 metric tons per year.)
- The amount of covered warehouse /silo storage space would depend on site configuration and space; on number and type of products, volume anticipated and throughput. For comparative cost estimating, the cost associated with approximately 6 warehouses (approximately132,600 square feet of warehouse space) has been used in all cost estimates. (As an example, MetroPorts facility at Pier G in Long Beach uses 135,000 square feet of warehouses, which are peaked roof and have wall height of about 32'. Each of these warehouses stores 175,000 metric tons of coal. Stored volume of density varies based on product type.)
- 50' dredge depth for vessels is ideal for 70 -80 ton Panamax vessels. Loading in Oakland, making a single stop, would be desirable over loading in Stockton (35' depth is limiting) and topping off in Richmond. A Panamax vessel would be approximately 740' long; and would need a berth of about 850' long to have space for tie-off. Vessel capacity would be approximately 78,000 metric tons. A two berth facility would provide more flexibility for the operator and more potential for growth than a facility that was limited to only one vessel. Of the three sites, Howard Terminal has space for two vessels.
- A single shiploader at one berth would be assumed for the first phase of development.
- Approximately 25 acres would be needed at a minimum; up to approximately 50 acres would be ideal.
- A loop track layout would be operationally preferred over a yard layout, if space allows. Space constraints at the candidate sites do not allow a loop track option. (Even if a significant impact into the APL terminal were allowed, then a loop track configuration of the tightest curvature desired by UP (7 degrees, 30 minutes) could not be accommodated.)
- While material would be conveyed to top load the vessel without particular distance limitation, cost of conveyance (approximately $2500/LF) can be reduced of the to the extent lengths of conveyor linking pit- to - warehouse/silo and warehouse/silo – to - vessel can be minimized.
- Facility/ utility needs at terminal:
    - Significant power need (for conveyor system). Associated monthly power usage and peak demand are variable based upon terminal design and planned conveyance distance.
    - Water (for dust suppression, fire protection, service to small operations buildings).

    - Storm drainage, with consideration for water quality due to proximity to bay.
    - Single entrance gate.
    - Perimeter fence.
    - Small/modular building for operator; second small/modular building for ILWU.
- Assume facility would be unit train-to –vessel only, not unit train- to –truck; and would therefore not have provision for bulk products handled by truck.
- Port revenue could include:
    - Approximately $1.50/ton handled.
    - Approximately$30/rail car fee.
    - Lease revenue.
    - Berth/dock revenue.
- Shipper might anticipate having 4 unit trains in total running between the point of origin to the Port, with two heading westbound and two heading eastbound at any time.

Facility Operations

- If space allowed, the full unit train would be brought into the facility and unloaded. However, the candidate sites do not have sufficient space for a train arrival/departure track or loop. Therefore, the unit train would need to be brought into the closest yard location possible (UP yard or OHIT) and groups of cars would be switched in from the location to the bulk terminal.) UP would probably be reluctant to use track in its yards for this purpose, but a meeting between the Port of Oakland and UP was to be held in early August to discuss concepts.
- Railcars bottom-dump into pits as they move. The net volume unloaded could be up to approximately 120 cars unloaded to the pits in 3 hours. The pits would be located on tangent track. Where space allows, the length of pit would accommodate 3 railcars unloading at once.
- Material is moved via covered conveyor to load into the top of covered warehouses (for iron ore, for example) or to silos (for grain). Conveyors would operate at approximately 1200 feet per minute. Space within warehouses is segregated by product type. Product is only envisioned to dwell long enough to hold the unit train's product till vessel call.
- Material is moved via covered conveyor from warehouse/silo to vessel. Loading rate into vessel: approximately 30,000 metric tons in three 8-hour shifts. Ship loader rate is approximately 1250 metric toner per hour. Vessel may need to be berthed for 48 hours.
- Conveyance system would also need to allow product to load directly from train to shiploader, so operator would have flexibility to gain some efficiency loading the vessel if timing of train arrival and ship call coincide closely.
- Fewer than around 10 personnel would be expected to work at the facility. It is assumed that the terminal would operate two shifts per day (16 hours total), with net efficiency of about 14 hours/day from the two shifts.
- Conveyors could be used for different products, but would need to be cleaned between uses for differing products, if products are disparate.

Evaluation of Alternatives: Summary of Advantages and Disadvantages

Exhibit 1: Roundhouse Property- Yard Option

- Depth at berth is 42': adequate for Panamax vessels.
- Layout impacts rail use needs at the Schnitzer Steel property, require diamond crossing, however, access to Schnitzer and wye track maintained.
- Coordination between bulk terminal switching and Schnitzer switching may be challenging.
- APL terminal vessel berth would be used; and would need to be negotiated /coordinated with APL. Should container terminal needs increase in the future, could be competition for this berth.
- Full unit train could be positioned at the yard, but full train could not arrive at yard and would rely on use of UP track, which might not be acceptable to UP.

Exhibit 2: Roundhouse Property- Loop Option (withdrawn from consideration)

- Depth at berth is 42': adequate for Panamax vessels. APL terminal vessel berth would be used; and would need to be negotiated /coordinated with APL.
- Loop track facility would be seen as advantageous to terminal operator, but the tightness of the curve (11 degrees, 45 if expanded onto the edge of the APL property and about 12 degrees, 30 if limited to the footprint of the Roundhouse property) that would be required to fit on site is overly tight. Approximately 7 degree curve would be typical, more ideal criteria. The existing track curvature at Schnitzer is about 15 degrees: even tighter.
- Layout impacts rail use needs at the Schnitzer Steel property.
- Existing track condition to be verified if adequate for re-use.
- **Even with some infringement onto the APL property, the loop option is not recommended due to overly tight track curvature.**

Exhibit 3: Berth 33 - Yard Option (withdrawn from consideration)

- Depth at berth is 50', but limited in vicinity of BART.
- Warehousing siting – and possibly ends of tracks - constrained by location of BART.
- Unit train staging could make use of OHIT and OTR could switch to the site. The short /limited onsite tracks would require more frequent moves: less operationally efficient for terminal operator.
- Track clipping corner of Trapac property may not be feasible.
- Train movement across 7th Street (on curve, at oblique angle) introduces traffic blockage with frequency and safety concern. Previously removed track crossing would need to be re-instated. Road/rail crossings at 7th Street and 7th Street Intersection could cause unmitigatable traffic impacts, or require costly grade separations so as not to impede truck traffic.
- Layout would require removal of existing stockpiles of potentially contaminated material.
- Limited tangent space for unloading pit. Single pit for this concept could be a constraint to terminal throughput.
- Switching operations and more frequent train movements adjacent to park creates an impact, safety risk for park users.

Exhibit 4: Berth 33 - Loop Option (withdrawn from consideration)

- Depth at berth is 50', but limited in vicinity of BART.
- Loop track facility would be seen as advantageous to bulk handler, but the tightness of the curve (12 degrees, 30) that would be required to fit on site is overly tight. Approximately 7 degree curve would be typical criteria. Clipping corner of Trapac property may not be feasible.
- Limited property size and irregular shape creates less efficient layout; however this would an issue with any other proposed use.
- Previously removed track crossing would need to be re-instated. Road/rail crossings at 7th Street and 7th Street Intersection could cause unmitigatable traffic impacts, or require costly grade separations so as not to impede truck traffic.
- Unit train staging could make use of OHIT and OTR could switch to the site. On-site car moving could be by operator.
- **This loop option is not recommended due to overly tight track curvature.**

Exhibit 5: Howard Terminal- Diagonal Yard Option

- Depth at berth is 42': adequate for Panamax vessels. Two berths available would be desirable for terminal operator.
- Possible utility constraints and contaminated soil issues (DTSC site) could drive higher development costs.
- Site has adequate space for future addition of tracks.
- Layout impacts access to Schnitzer property, but less impact on Schnitzer rail switching than Exhibit 1- Roundhouse Option.
- Closer proximity to commercial uses could give rise to complaints about impacts (line of sight impacts, aesthetics, noise, etc.)
- Offices could be moved closer to water with some additional street-side portions of the property leased to others. (Acreage may be more than needed.) Alternatively, offices could be housed in existing buildings.
- Concept shown involves UP switching cars via intermodal facility. Alternatively a new track could be added to switch directly from UP south Oakland yard, but with impacts to existing facilities. This would rely on use of UP track, which might not be acceptable to UP.

Exhibit 6: Howard Terminal- Wharfside Yard Option (withdrawn from consideration)

- Depth at berth is 42': adequate for Panamax vessels. Two berths available would be desirable for terminal operator.
- Tight curvature (12 degrees, 30) needed to clear Schnitzer Steel's property; with adverse geometry exacerbated by reversing curve to dockside yard track.
- Possible utility constraints and contaminated soil issues (DTSC site) could drive higher development costs.
- Layout could impact access to Schnitzer property.
- Yard track lengths, being relatively short will require additional switching.
- Closer proximity to commercial uses could give rise to complaints about impacts (line of sight impacts, aesthetics, noise, etc.)

- Offices could be moved closer to water with some additional street-side portions of the property leased to others. (Acreage may be more than needed.) Alternatively, office could be housed in existing buildings.
- Concept shown involves UP switching cars via intermodal facility. Alternatively a new track could be added to switch directly from UP south Oakland yard, but with impacts to existing facilities.
- **This option is not recommended due to overly tight track curvature and short yard tracks.**

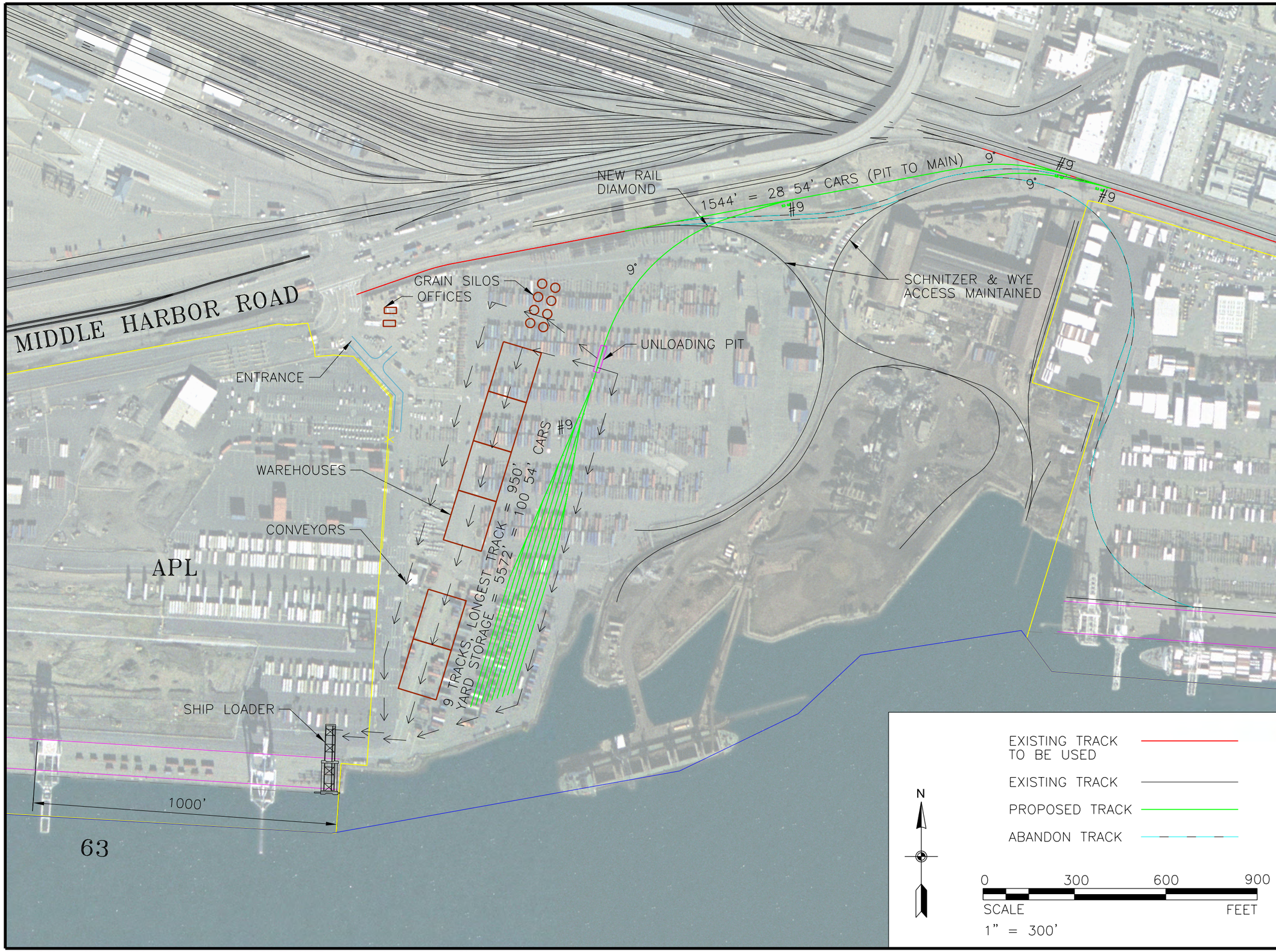
Exhibit 7: Roundhouse / APL Loop (withdrawn from consideration)

- Depth at berth is 42': adequate for Panamax vessels. APL terminal vessel berth would be used.
- Significant amount of APL terminal, presently outfitted as container terminal, would be impacted such that past investment could not be recouped due to change in use.
- Limited tangent length for unloading pit could be a throughput constraint.
- Existing buildings could be used for offices
- Loop track option would be preferred by terminal operator but would be a curvature tighter than UP desired minimum. Space constraints allow about 9 degree curvature. Approximately 7 degree curve would be typical, more ideal criteria. UP would not want to see track tighter than 7 degrees, 30 minutes.
- With large acreage of terminal, having only one berth would be a constraint. Size of facility could be larger than required, maximizing land to be leased, but with less revenue production per acre.

Exhibit 8: Berth 33 – Yard Option 2

- Depth at berth is 50', but limited in vicinity of BART.
- Warehousing siting – and possibly ends of tracks - constrained by location of BART.
- Improve land use as compared to the Exhibit 3 Yard Option. Minimal curvature is beneficial for operations.
- Unit train staging could make use of OHIT and OTR could switch to the site. The short /limited onsite tracks would require more frequent moves: less operationally efficient for terminal operator.
- Train movement across 7th Street (on curve, at oblique angle) introduces traffic blockage with frequency and safety concern. Previously removed track crossing would need to be re-instated. Road/rail crossings at 7th Street and 7th Street Intersection could cause unmitigatable traffic impacts, or require costly grade separations so as not to impede truck traffic.
- Layout would require removal of existing stockpiles of material. Per Port, this material is not contaminated.
- Switching operations and more frequent train movements adjacent to park creates an impact, safety risk for park users.
- Siting bulk terminal use at westernmost site might be more desirable in terms of traffic impact at 7th Street; but this option has not been considered at this time.

Appendix A – Preferred Site Plans



TranSystems
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CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/20/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

ROUNDHOUSE YARD OPTION

EXHIBIT 1
PORT 023

alimburg
7/20/2012 - 2:58:21 PM - G:\OK12\0041\Rail\Exhibits\EX-1 Roundhouse Area.dgn

MIDDLE HARBOR ROAD

1750' TAIL LENGTH

9°

#9

UNLOADING PIT

MARKET STREET

BRUSH STREET

OFFICES

ENTRANCE

MLK WAY

EMBARCADERO

SCHNITZER & WYE ACCESS MAINTAINED

POSSIBLE ALTERNATIVE SCHNITZER ACCESS AROUND TAIL TRACK

ROUNDHOUSE PROPERTY

GRAIN SILOS

4 TRACKS, LONGEST TRACK = 1668'

YARD STORAGE = 5800' = 110 54' CARS

6°

CONVEYORS

WAREHOUSES

SHIP LOADER

1000'

67

X_{DEPTH} = −42'

1000'

68

X_{DEPTH} = −50'

EXISTING TRACK TO BE USED

EXISTING TRACK

PROPOSED TRACK

ABANDON TRACK

N

0 300 600 900

SCALE FEET

1" = 300'

TranSystems

505 14TH STREET
SUITE 1000
OAKLAND CA 94612
PHONE: 510-835-2761
FAX: 510-835-9839

CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY

OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/20/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

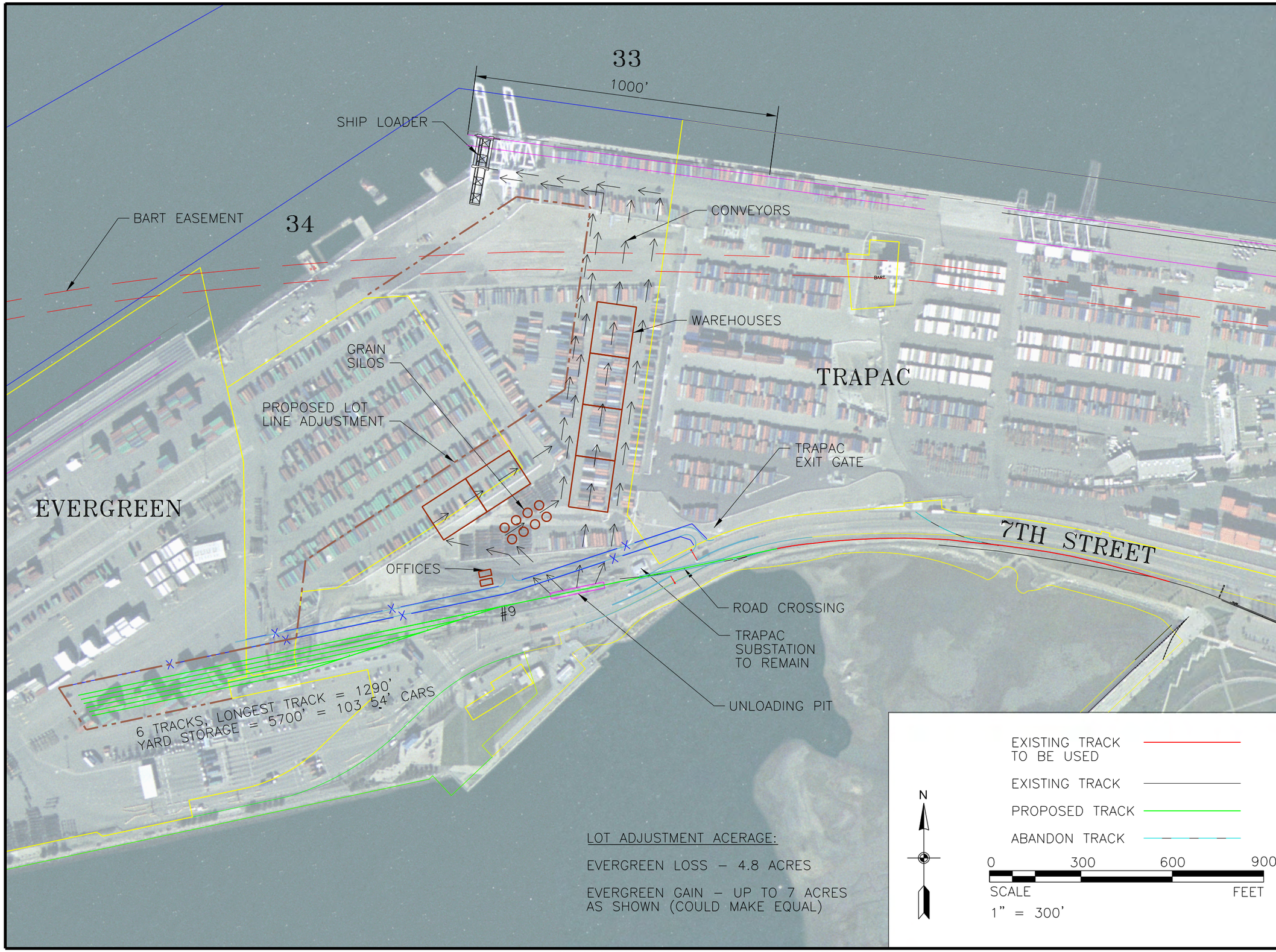
SHEET TITLE

HOWARD TERMINAL

EXHIBIT 5

PORT 024

alimburg
7/20/2012 - 2:29:23 PM - G:\OK12\0041\Rail\Exhibits\EX-5 Howard Terminal-2.dgn



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CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/20/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: AML

SHEET TITLE

BERTH 33
YARD OPTION 2

EXHIBIT 8
PORT 025

alimburg
7/20/2012 - 3:34:06 PM - G:\OK12\0041\Rail\Exhibits\EX-8 Berth 33 Property Line Adusted.dgn

Appendix B – Cost Estimates

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations
Oakland, California

Prepared by: TranSystems
Date: Aug 6, 2012
Project Number: P501120044
File Number: g:/501/12/0044/ProjMgmt/5Design/Cost Est/ 12-07-10Roundhouse Yard Cost Est.xlsx

Budget Cost Estimate: Roundhouse - Yard Option (39 acres)

See attached Budget Cost Estimate Assumptions which provide the basis for this estimate.

Item No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Subtotal
1.0	**Site Preparation and Demolition**					
1.1	Layout Staking	1	LS	$ 50,000	$ 50,000	
1.2	Demolition / Site Clearing	1	LS	$ 100,000	$ 100,000	
1.3	Track Removal	1700	TF	$ 50	$ 85,000	
1.4	Turnout Removal	2	EA	$ 20,000	$ 40,000	
1.5	Asphalt Removal (800' x 50' wide) + (200' x 1100')	260,000	SF	$ 4	$ 1,040,000	
	Subtotal					$ 1,315,000
2.0	**Earthwork - Grading**					
2.1	Earthwork ((260,000 x 3' deep)/27)	28,890	CY	$ 20	$ 577,800	
2.2	Cement/Line Treatment of Soils	260,000	SF	$ 2	$ 520,000	
2.3	Erosion Control	1	LS	$ 150,000	$ 150,000	
	Subtotal					$ 1,247,800
3.0	**Trackwork**					
3.1	Relocated Track	0	TF	$ 80	$ -	
3.2	New Track	8850	TF	$ 125	$ 1,106,250	
3.3	RelocatedTurnouts	0	EA	$ 20,000	$ -	
3.4	New Turnouts	10	EA	$ 80,000	$ 800,000	
3.5	Derails	1	EA	$ 40,000	$ 40,000	
3.6	Diamond Crossings	1	EA	$ 750,000	$ 750,000	
3.7	Bumping Posts	9	EA	$ 2,500	$ 22,500	
3.8	Unloading Pit	1	LS	$ 500,000	$ 500,000	
3.9	Covered Conveyor Systems	7400	LF	$ 2,500	$ 18,500,000	
	Subtotal					$ 21,718,750
4.0	**Utilities and Miscellaneous Sitework**					
4.1	Track Drainage	8850	LF	$ 100	$ 885,000	
4.2	Utility Crossing Casings - allowance	1	LS	$ 200,000	$ 200,000	
4.3	On-site Utility Upgrades - allowance	39	AC	$ 85,000	$ 3,315,000	
4.4	Chain Link Fence & Gates - assume no additional needed	0	LF	$ 20	$ -	
4.5	Pavement / Striping Rehabilitation- allowance	39	AC	$ 85,000	$ 3,315,000	
4.6	Concrete Grade Crossing	0	TF	$ 500	$ -	
4.7	Asphalt Pavement	260000	SF	$ 15	$ 3,900,000	
	Subtotal					$ 11,615,000
5.0	**Structures**					
5.1	Materials Storage Buildings (6 products x 22,100 s.f.)- space for more, but to keep consistent among estimates	132,600	SF	$ 150	$ 19,890,000	
5.2	Office Buildings (modular)	6,000	SF	$ 120	$ 720,000	
5.2	Silos	8	EA	$ 800,000	$ 6,400,000	
	Subtotal					$ 27,010,000
	Subtotal					$ 62,906,550.00
	Design/Construction Management	6%				$ 3,774,393.00
	Permits	6%				$ 3,774,393.00
	Subtotal					$ 70,455,336.00
	Contingency	25%				$ 17,613,834.00
	Total					$ 88,069,170.00

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland
Oakland, California

Prepared by: TranSystems
Date: Aug 6, 2012
Project Number: P501120044
File Number: g:/501/12/0044/ProjMgmt/5Design/Cost Est/ 12-07-10Roundhouse Yard Cost Est.xlsx

Budget Cost Estimate: Howard Terminal - Diagonal Yard Option (50 acres)

See attached Budget Cost Estimate Assumptions which provide the basis for this estimate.

Item No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Subtotal
1.0	**Site Preparation and Demolition**					
1.1	Layout Staking	1	LS	$ 50,000	$ 50,000	
1.2	Demolition / Site Clearing	1	LS	$ 100,000	$ 100,000	
1.3	Track Removal - leave on-terminal track & wharfside track as-is	1500	TF	$ 50	$ 75,000	
1.4	Turnout Removal	2	EA	$ 20,000	$ 40,000	
1.5	Asphalt Removal (800' x 50' wide) + (100' x 1700')	210,000	SF	$ 4	$ 840,000	
	Subtotal					$ 1,105,000
2.0	**Earthwork - Grading**					
2.1	Earthwork ((210,000 x 3' deep)/27)	23,340	CY	$ 20	$ 466,800	
2.2	Cement/Line Treatment of Soils	210,000	SF	$ 2	$ 420,000	
2.3	Erosion Control	1	LS	$ 150,000	$ 150,000	
	Subtotal					$ 1,036,800
3.0	**Trackwork**					
3.1	Relocated Track	0	TF	$ 80	$ -	
3.2	New Track	8050	TF	$ 125	$ 1,006,250	
3.3	RelocatedTurnouts	0	EA	$ 20,000	$ -	
3.4	New Turnouts	6	EA	$ 80,000	$ 480,000	
3.5	Derails	1	EA	$ 40,000	$ 40,000	
3.6	Diamond Crossings	0	EA	$ 750,000	$ -	
3.7	Bumping Posts	4	EA	$ 2,500	$ 10,000	
3.8	Unloading Pit	1	LS	$ 500,000	$ 500,000	
3.9	Covered Conveyor Systems	8300	LF	$ 2,500	$ 20,750,000	
	Subtotal					$ 22,786,250
4.0	**Utilities and Miscellaneous Sitework**					
4.1	Track Drainage	7650	LF	$ 100	$ 765,000	
4.2	Utility Crossing Casings - allowance	1	LS	$ 200,000	$ 200,000	
4.3	On-site Utility Upgrades - allowance	50	AC	$ 85,000	$ 4,250,000	
4.4	Chain Link Fence & Gates - assume no additional needed	0	LF	$ 20	$ -	
4.5	Pavement / Striping Rehabilitation- allowance	50	AC	$ 85,000	$ 4,250,000	
4.6	Concrete Grade Crossing	0	TF	$ 500	$ -	
4.7	Asphalt Pavement	210,000	SF	$ 15	$ 3,150,000	
	Subtotal					$ 12,615,000
5.0	**Structures**					
5.1	Materials Storage Buildings (6 products x 22,100 s.f.)- space for more, but to keep consistent among estimates	132,600	SF	$ 150	$ 19,890,000	
5.2	Office Buildings (modular)	6,000	SF	$ 120	$ 720,000	
5.3	Silos	8	EA	$ 800,000	$ 6,400,000	
	Subtotal					$ 27,010,000
	Subtotal					$ 64,553,050.00
	Design/Construction Management	6%				$ 3,873,183.00
	Permits	6%				$ 3,873,183.00
	Subtotal					$ 72,299,416.00
	Contingency	25%				$ 18,074,854.00
	Total					$ 90,374,270.00

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland
Oakland, California

Prepared by: TranSystems
Date: Aug 6, 2012
Project Number: P501120044
File Number: g:/501/12/0044/ProjMgmt/5Design/Cost Est/ 12-07-10Roundhouse Yard Cost Est.xlsx

Budget Cost Estimate: Berth 33 - Yard Option 2 (33 acres)

See attached Budget Cost Estimate Assumptions which provide the basis for this estimate.

Item No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Subtotal
1.0	**Site Preparation and Demolition**					
1.1	Layout Staking	1	LS	$ 50,000	$ 50,000	
1.2	Demolition / Site Clearing	1	LS	$ 100,000	$ 100,000	
1.3	Track Removal	0	TF	$ 50	$ -	
1.4	Turnout Removal	0	EA	$ 20,000	$ -	
1.5	Asphalt Removal (800' x 50' wide) + (1450' x 150 ')	221,500	SF	$ 4	$ 886,000	
	Subtotal					$ 1,036,000
2.0	**Earthwork - Grading**					
2.1	Earthwork ((221,500 x 3' deep)/27)	24,600	CY	$ 20	$ 492,000	
2.2	Cement/Line Treatment of Soils	221,500	SF	$ 2	$ 443,000	
2.3	Erosion Control	1	LS	$ 150,000	$ 150,000	
	Subtotal					$ 1,085,000
3.0	**Trackwork**					
3.1	Relocated Track	0	TF	$ 80	$ -	
3.2	New Track	7550	TF	$ 125	$ 943,750	
3.3	RelocatedTurnouts	0	EA	$ 20,000	$ -	
3.4	New Turnouts	5	EA	$ 80,000	$ 400,000	
3.5	Derails	1	EA	$ 40,000	$ 40,000	
3.6	Diamond Crossings	0	EA	$ 750,000	$ -	
3.7	Bumping Posts	6	EA	$ 2,500	$ 15,000	
3.8	Unloading Pit	1	LS	$ 166,667	$ 166,667	
3.9	Covered Conveyor Systems	9100	LF	$ 2,500	$ 22,750,000	
	Subtotal					$ 24,315,417
4.0	**Utilities and Miscellaneous Sitework**					
4.1	Track Drainage	4400	LF	$ 100	$ 440,000	
4.2	Utility Crossing Casings - allowance	1	LS	$ 200,000	$ 200,000	
4.3	On-site Utility Upgrades - allowance	33	AC	$ 85,000	$ 2,805,000	
4.4	Chain Link Fence & Gates - assume no additional needed	0	LF	$ 20	$ -	
4.5	Pavement / Striping Rehabilitation- allowance	33	AC	$ 85,000	$ 2,805,000	
4.6	Concrete Grade Crossing	200	TF	$ 500	$ 100,000	
4.7	Asphalt Pavement	221,500	SF	$ 15	$ 3,322,500	
	Subtotal					$ 9,672,500
5.0	**Structures**					
5.1	Materials Storage Buildings (6 products x 22,100 s.f.)- space for more, but to keep consistent among estimates	132,600	SF	$ 150	$ 19,890,000	
5.2	Office Buildings (modular)	6,000	SF	$ 120	$ 720,000	
5.3	Silos	8	EA	$ 800,000	$ 6,400,000	
	Subtotal					$ 27,010,000
	Subtotal					$ 63,118,916.67
	Design/Construction Management	6%				$ 3,787,135.00
	Permits	6%				$ 3,787,135.00
	Subtotal					$ 70,693,186.67
	Contingency	25%				$ 17,673,296.67
	Total					$ 88,366,483.33

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland
Oakland, California

Prepared by: TranSystems
Date: Aug 6, 2012
Project Number: P501120044
File Number: g/OK501/12/0044/ProjMgmt/1Client/Meetings/12-08-07CostEstAssumptions.xls

Budget Cost Estimate - ASSUMPTIONS

This construction budget estimate is provided for reference only and represents a professional opinion based on available information. Actual construction costs may vary significantly from the budget estimate depending upon timing of construction, changed conditions, availability of materials and other factors beyond the control of the author. This budget estimate is not a guaranteed maximum figure. In preparing the attached budget estimate, the following assumptions have been made:

This estimate relates to TranSystems rail conceptual layout drawings dated 7/20/12.
This estimate is based on a conceptual engineering level of design.
A 25% contingency is included.
Unit prices used are subject to verification. As shown, they will serve to provide a relative comparison of costs among the various options.
Contractor's general conditions, mobilization, overhead and profit are included in unit costs.
This estimate is based on 2012 dollars.
Costs for design/construction management fees have been included as a percentage of construction cost.
Costs for governmental agency/jurisdiction/other agency fees and permit fees have been included as a percentage of construction cost.
Hazardous material and asbestos abatement and disposal costs are not included.
Maintenance fees and cost for owner's special warranties and bonds are not included.
Costs are assumed as if all modifications would be made by a single contractor, with a single mobilization. The construction site would be assumed not to be under on-going operations/use at the time of construction.
Costs associated with regular facility maintenance are not included.
Costs for special studies such as hazardous materials, noise, air quality or environmental studies of the site are not included.
This estimate does not include property acquisition costs, negotiation costs, nor costs to create easements / adjust property lines.
Pump stations, water quality treatment facilities, special storm water detention facilities, on-site lighting are assumed not to be required. Existing on-site utilities will be used except where local reconfiguration is needed to serve the new facilities.
For purposes of this estimate, it is assumed that the existing available utility infrastructure is adequate to meet facility needs without upgrades outside the limits of the property.

Appendix C – Capacity Model

Port of Oakland
Rail Layout Concepts for Bulk Product Unit Train Service at Three Alternative Locations at the Port of Oakland
Oakland, California
SUMMARY CAPABILITY ESTIMATES

Prepared by: TranSystems
Last Revised: Aug 6, 2012
Project Number: P501120044

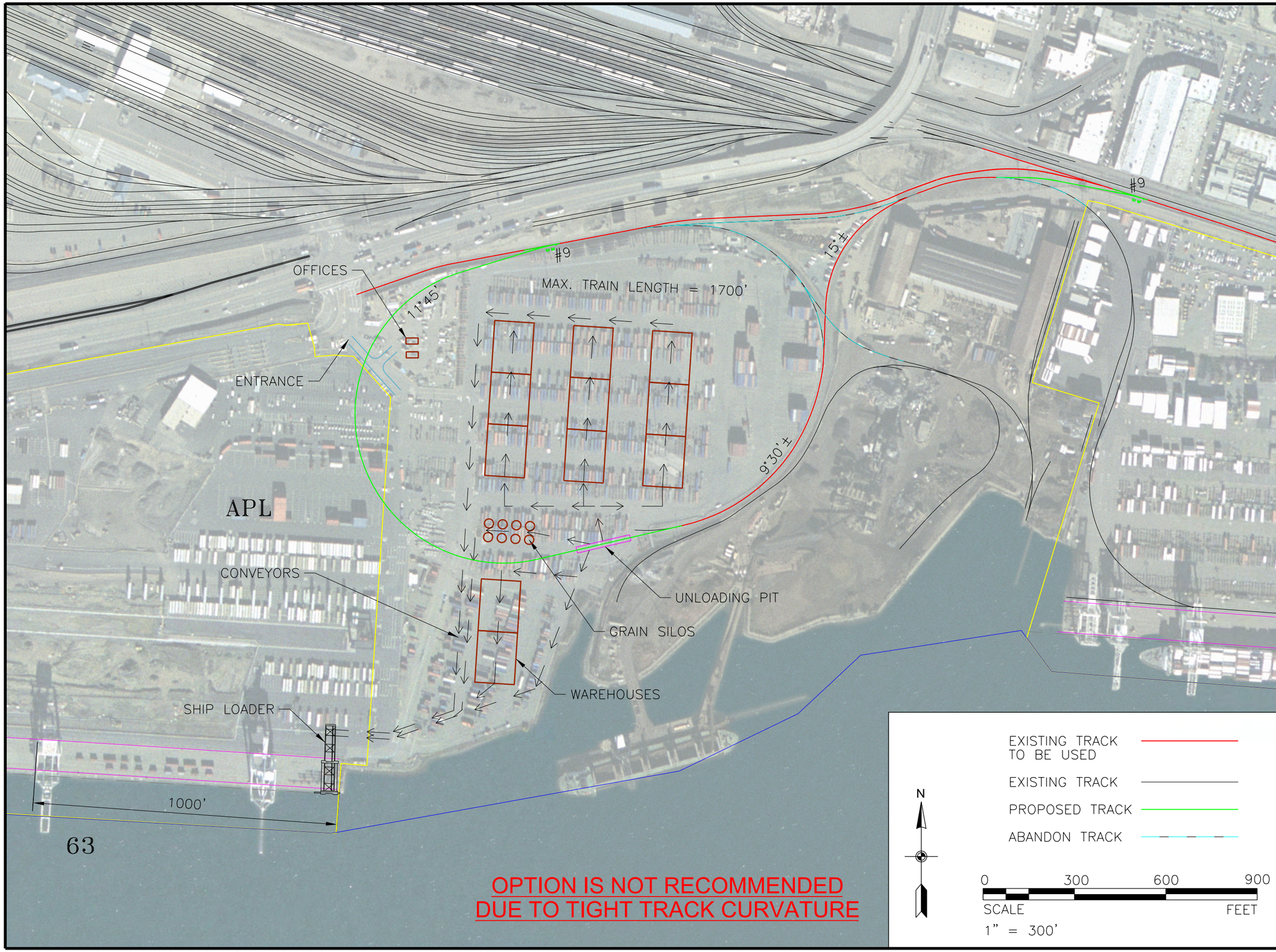
Throughput Capability By Terminal Componant (Tons/Yr)	ST	MT	Sq. Ft
Maximum Practical Annual Berth Occupancy Hrs - Assumes 14 Hours Operations at Berth			
Assumes Unscheduled Ship Calls (25% Max. Practical Berth Occupancy)			
Component 1: Ship and Berth Activities	3,237,682	2,937,225	
Component 2: Ship To Storage Transfer	3,468,465	3,146,591	
Component 4: Storage	9,360,000	8,491,392	
Sq. Feet of Warehouse Storage			*180,000*
Sq. Feet of Warehouse Storage to Approx. Equal Berth Capacity			*65,000*
Component 5: Inland Transfer	19,423,581	17,621,073	
Maximum Practical Throughput Capacity Estimate	**3,237,682**	**2,937,225**	
Sustainable Practical Throughput Capacity Estimate (75%)	**2,428,261**	**2,202,919**	
Assumes Scheduled Ship Calls (40% Max. Practical Berth Occupancy)			
Component 1: Ship and Berth Activities	5,180,291	4,699,560	
Component 2: Ship To Storage Transfer	5,549,544	5,034,546	
Component 4: Storage	9,360,000	8,491,392	
Sq. Feet of Warehouse Storage			*180,000*
Sq. Feet of Warehouse Storage to Approx. Equal Berth Capacity			*100,000*
Component 5: Inland Transfer	19,423,581	17,621,073	
Maximum Practical Throughput Capacity Estimate	**5,180,291**	**4,699,560**	
Sustainable Practical Throughput Capacity Estimate (75%)	**3,885,218**	**3,524,670**	

Throughput Capability By Terminal Componant (Tons/Yr)	ST	MT	Sq. Ft
Maximum Practical Annual Berth Occupancy Hrs - Assumes Berth Available 24 Hours per Day			
Assumes Unscheduled Ship Calls (25% Max. Practical Berth Occupancy)			
Component 1: Ship and Berth Activities	5,565,560	5,049,076	
Component 2: Ship To Storage Transfer	5,962,275	5,408,976	
Component 4: Storage	9,360,000	8,491,392	
Sq. Feet of Warehouse Storage			*180,000*
Sq. Feet of Warehouse Storage to Approx. Equal Berth Capacity			*108,000*
Component 5: Inland Transfer	19,423,581	17,621,073	
Maximum Practical Throughput Capacity Estimate	**5,565,560**	**5,049,076**	
Sustainable Practical Throughput Capacity Estimate (75%)	**4,174,170**	**3,786,807**	
Assumes Scheduled Ship Calls (40% Max. Practical Berth Occupancy)			
Component 1: Ship and Berth Activities	8,904,896	8,078,522	
Component 2: Ship To Storage Transfer	9,539,640	8,654,361	
Component 4: Storage	9,360,000	8,491,392	
Sq. Feet of Warehouse Storage			*180,000*
Sq. Feet of Warehouse Storage to Approx. Equal Berth Capacity			*172,000*
Component 5: Inland Transfer	19,423,581	17,621,073	
Maximum Practical Throughput Capacity Estimate	**8,904,896**	**8,078,522**	
Sustainable Practical Throughput Capacity Estimate (75%)	**6,678,672**	**6,058,891**	

THROUGHPUT CAPABILITY BASE ASSUMPTIONS:

Bulk Carrier	MT	ST	Feet	Hours
Ship LOA			750.0	
Ship Draft			39.5	
Ship Size DWT	80,000	88,183		
Cargo Size	70,000	77,160		
Ship Loader / Hr	2,500	2,756		
Cargo / Rail Car	110	121		
Train @ 84 cars	9,240	10,185		
Unload Hrs / Train				3.0
Train Unloader / Hr	3,080	3,395		
Operating Hours				14.0

Appendix D – Site Plans Withdrawn from Consideration



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CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

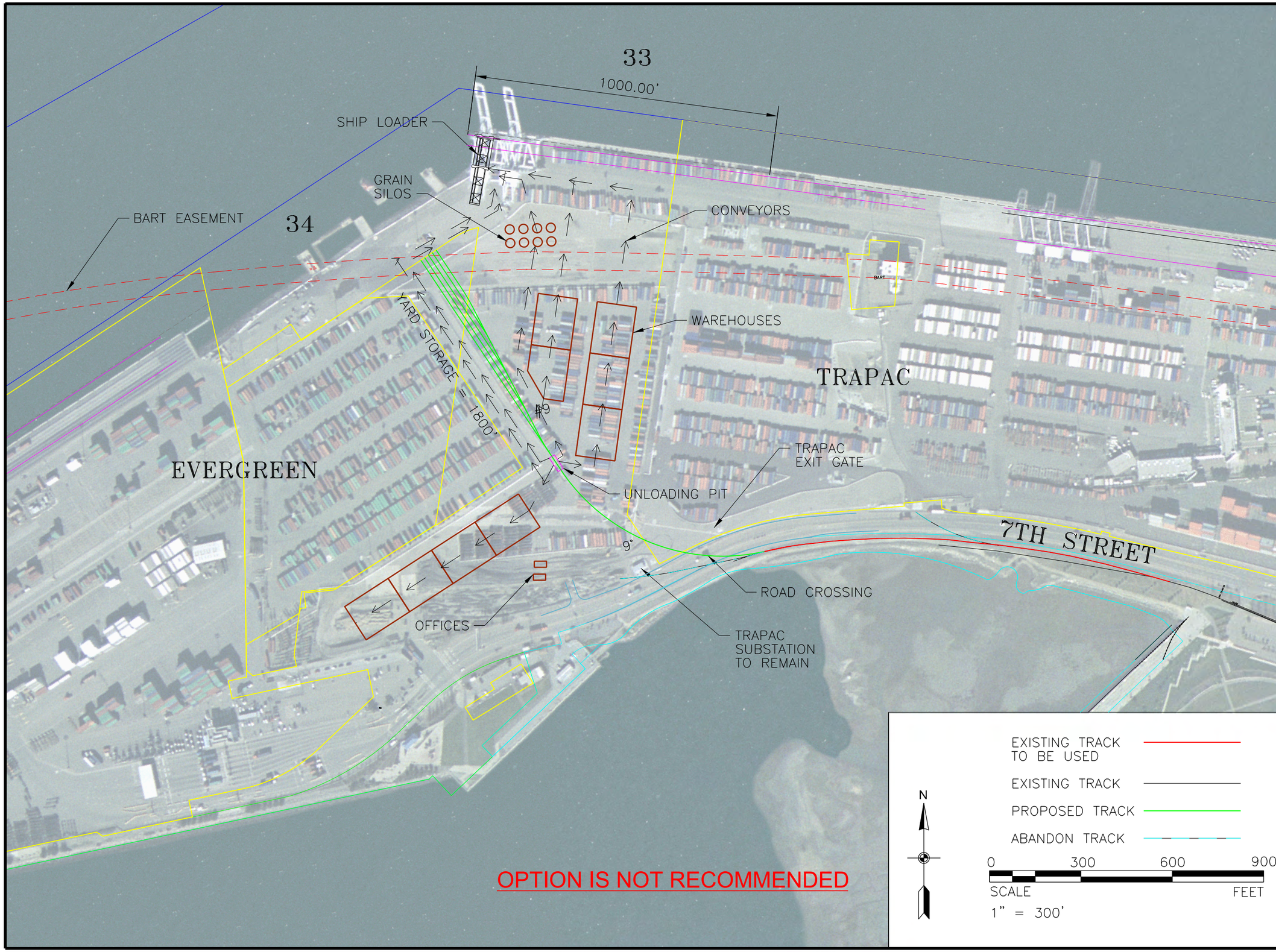
PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/9/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

ROUNDHOUSE LOOP OPTION

EXHIBIT 2
PORT 035

alimburg
7/9/2012 - 4:52:38 PM - G:\OK12\0041\Rail\Exhibits\EX-2 Roundhouse Area-loop.dgn



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CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 9/7/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: AML

SHEET TITLE

BERTH 33
YARD OPTION

EXHIBIT 3
PORT 036

alimburg
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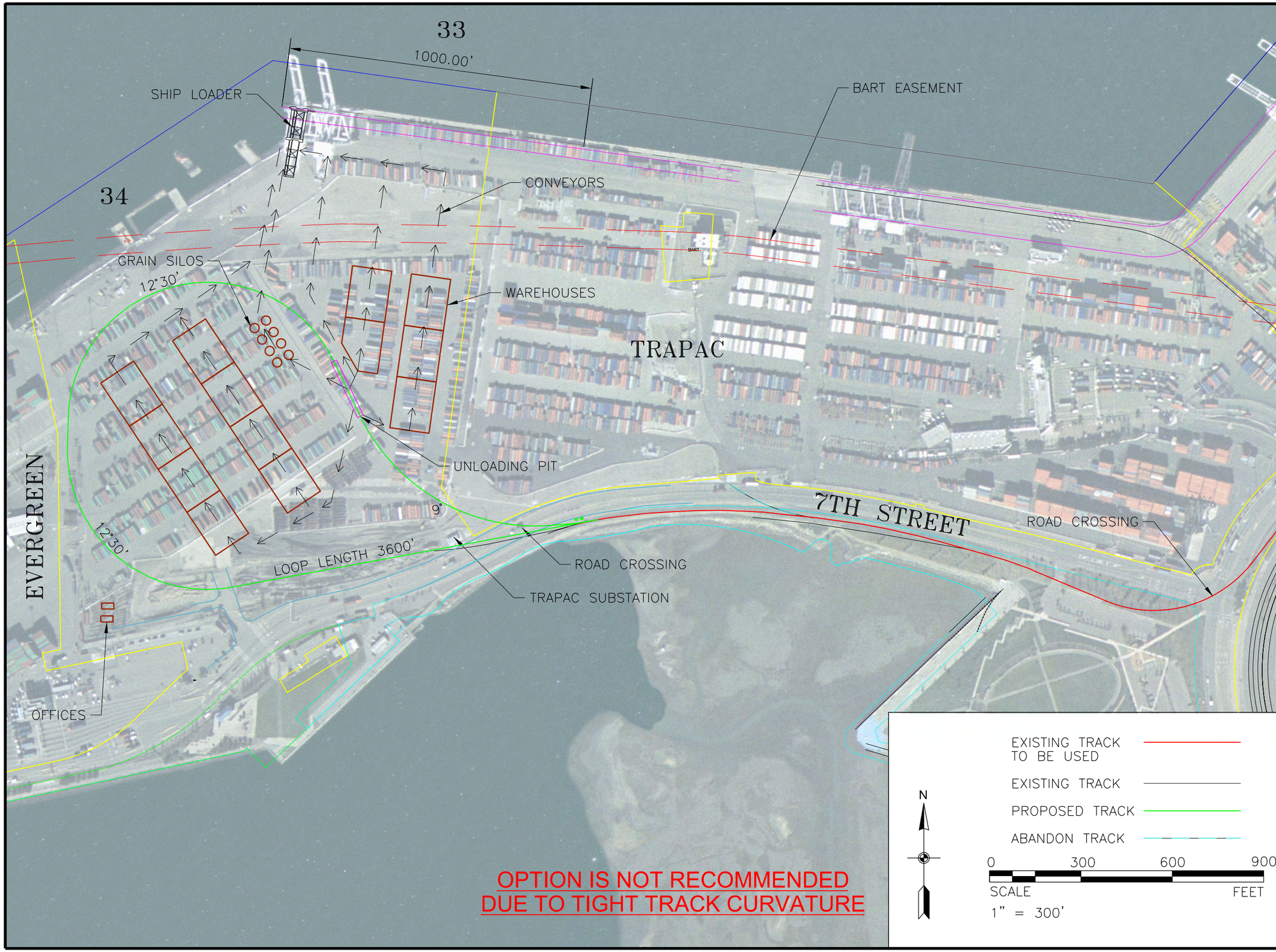

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CONSULTANTS

RAIL BULK
TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

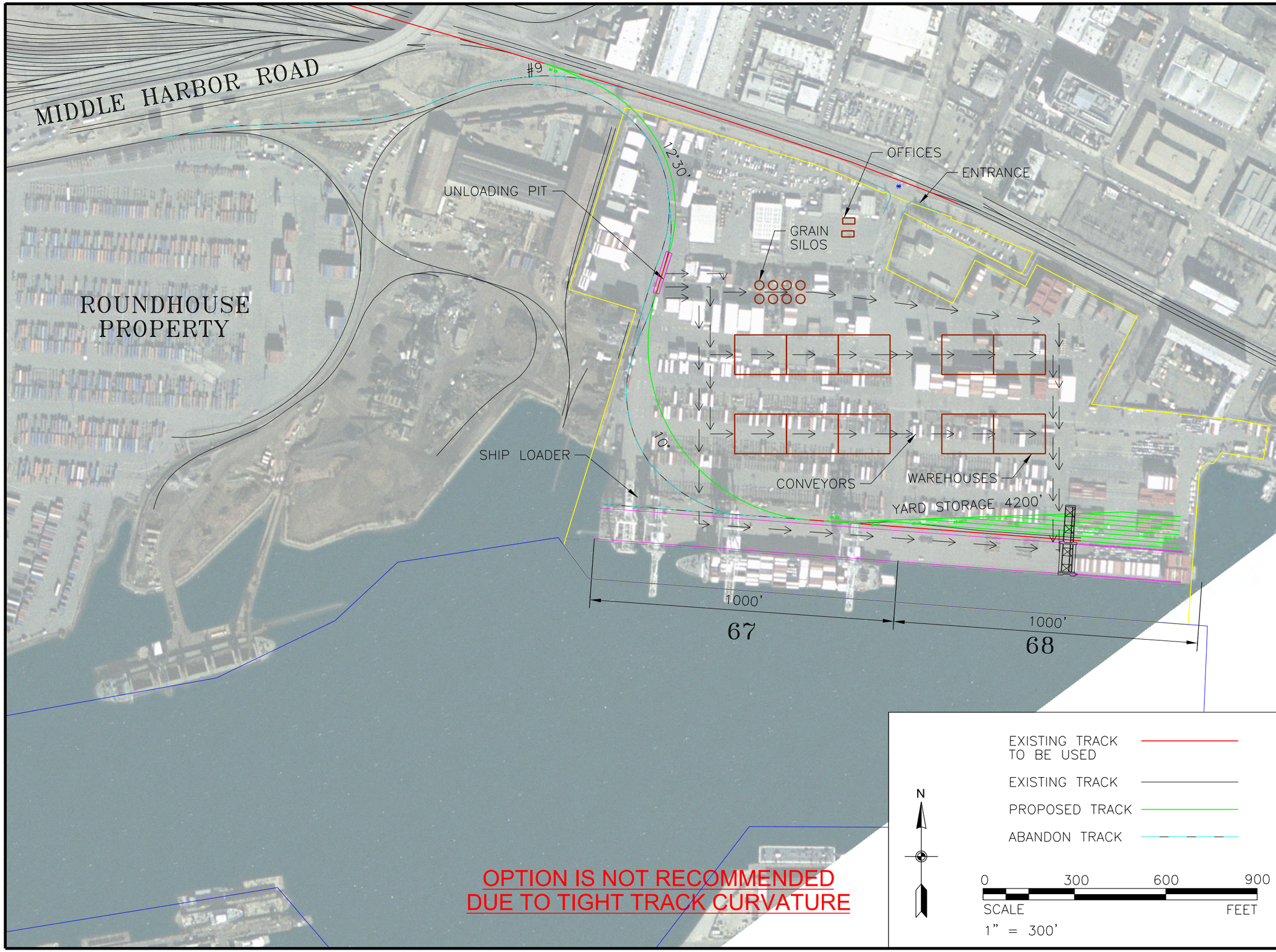
PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/9/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

BERTH 33
LOOP OPTION

EXHIBIT 4
PORT 037

alimburg
7/9/2012 - 4:57:30 PM - G:\OK12\0041\Rail\Exhibits\EX-4 Berth 33-loop.dgn



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CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY
OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

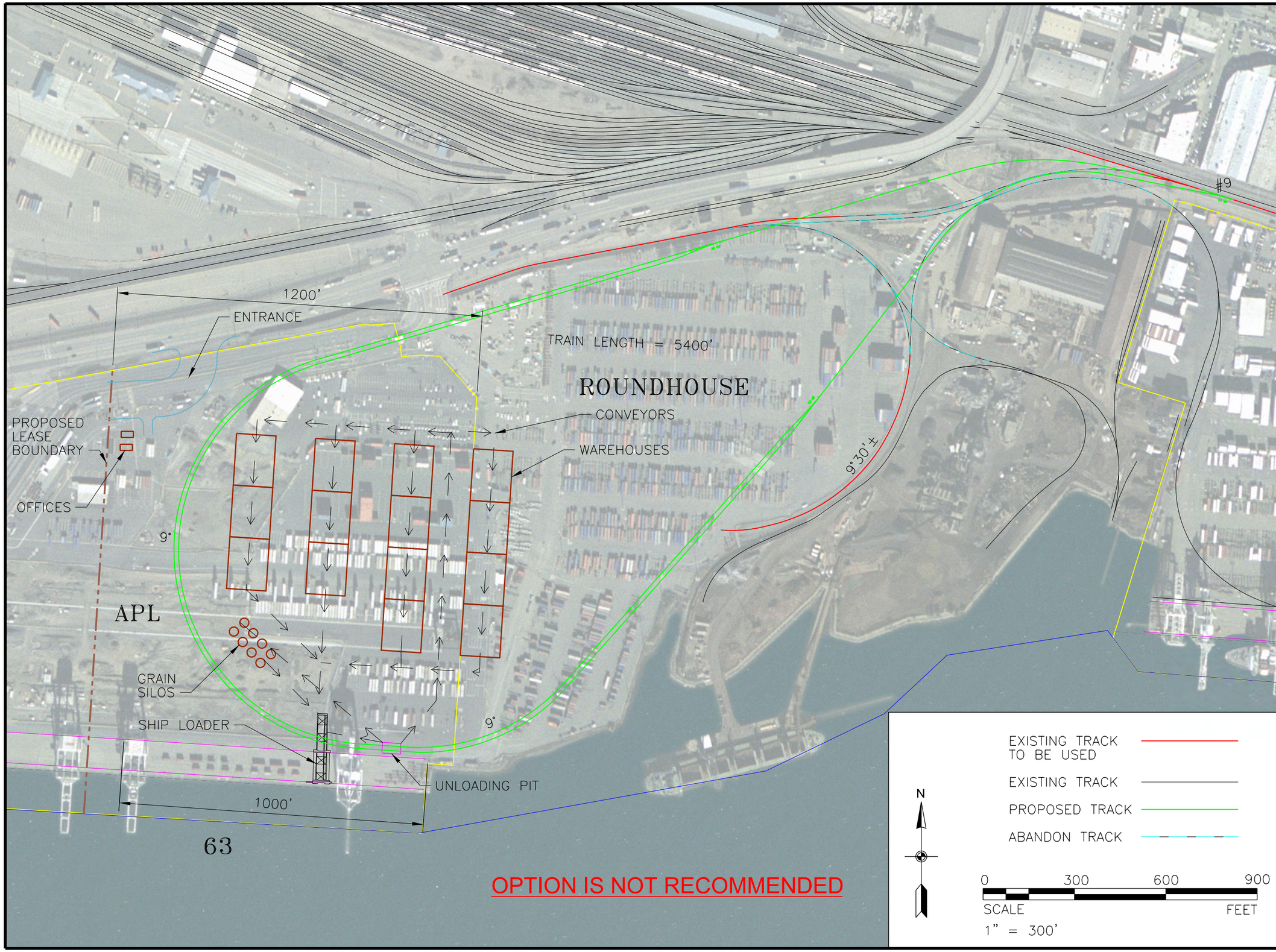
PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 7/9/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

HOWARD TERMINAL

EXHIBIT 6
PORT 038

alimburg
7/9/2012 - 5:16:09 PM - G:\OK12\00411\Rail\Exhibits\EX-6 Howard Terminal.dgn



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CONSULTANTS

RAIL BULK TERMINAL FEASIBILITY

OAKLAND, CA

PORT OF OAKLAND

MARK	DATE	DESCRIPTION

PROJ NO: P501120044
SCALE: 1" = 300'
DATE: 9/7/2012
DESIGNED BY: AML
DRAWN BY: AML
CHECKED BY: MRC

SHEET TITLE

ROUNDHOUSE/ APL LOOP

EXHIBIT 7
PORT 039

allmburg
9/7/2012 - 3:39:51 PM - G:\OK12\0044\Rail\Exhibits\EX-7 APL&Roundhouse Loop.dgn

From: Matthew Davis <mdavis@portoakland.com>
Sent: Wednesday, January 16, 2013 4:11 PM
To: Mark Erickson
Cc: Joanne Karchmer
Subject: RE: coal

Like you, I don't know if there is much utility in "advising" Phil at this stage. However, I think it is fair to say that: 1) I do not concur with his assessment; and 2) it could pose substantial risk to our operations, certainly when you have winners of the Nobel Peace Prize laying down in front of trains in British Columbia to protest coal exports through Canada.

At this early point I would let him advance this dialogue, although as any goods that are going to move through his state-funded bulk port will first have to pass through a state and federally funded rail development…….you can complete the rest of the sentence.

From: Mark Erickson
Sent: Wednesday, January 16, 2013 4:05 PM
To: Matthew Davis
Cc: Joanne Karchmer
Subject: Re: coal

Jean, Deb and I met with Phil and his team last Monday when they hosted UP and invited us along. Phil explicitly mentioned coal as one of their prospects. I'm not sure how real it is, but I, like you, was surprised to hear that he believes he has all the necessary approvals to move coal. Deb was concerned as well. Do we concur with his assessment? What risk does that pose for us as partner? I need to discuss further with Anne / legal regarding how broad their options are.

I have been hesitant to advise Phil in any capacity, really. As you know he has a knack for moving seemingly immovable impediments. I think he enjoys jumping into the lions den. I wonder what the City would do if substantial opposition came forward, as it may.
Mark

----- Reply message -----
From: "Matthew Davis" <mdavis@portoakland.com>
To: "Mark Erickson" <merickson@portoakland.com>
Cc: "Joanne Karchmer" <jkarchmer@portoakland.com>
Subject: coal
Date: Tue, Jan 15, 2013 4:45 pm

Mark,

Sorry if I misspoke a week or so ago during the briefing with Lynette Gibson McElhaney about any intentions that CCIG/OGRE might have about some of the materials they are trying to attract to the proposed Berth 7 bulk handling facility (i.e. "no coal"). While I know the development of these export commodities will be their burden to bear, if they are not already aware of some of the politics around coal exports they may want to familiarize themselves with some recent developments. I've attached a couple of links.

The first is a joint resolution passed by the CA state legislature last session asking for the Congress and the President to essentially restrict any new coal export handling facility along the West Coast (focused most intensely on some recent proposals in Oregon and Washington). This is a non-binding resolution, but the sentiment is pretty clear.

http://leginfo.ca.gov/pub/11-12/bill/asm/ab_0001-0050/ajr_35_bill_20120918_chaptered.html

Related to this bill is also a news article about the same developments up in WA that led in part to the Assembly resolution:

http://www.nytimes.com/2011/02/15/us/15coal.html?_r=0

Anyway, for what it's worth…this may not be the most productive business line for them to pursue….

Matt

Manager of Governmental Affairs
Port of Oakland
530 Water Street
Oakland, CA 94607
510-627-1430 (w)
510-715-8538 (m)
mdavis@portoakland.com

From: Chris Peterson <cpeterson@portoakland.com>
Sent: Friday, May 11, 2012 8:47 AM
To: James Kwon; Mark Erickson; Lawrence Dunnigan
Subject: RE: Confidential Coal Terminal Project

Understood James. They are talking about a state of the art facility that would completely contain any product, but there are issues with coal terminals based on entities like CARB, so it likely would create more headaches than revenue.

Chris Peterson
Chief Wharfinger
Port of Oakland
Off: 510-627-1308
Cell: 510-719-8024

-----Original Message-----
From: James Kwon
Sent: Thursday, May 10, 2012 11:19 PM
To: Mark Erickson; Lawrence Dunnigan
Cc: Chris Peterson
Subject: RE: Confidential Coal Terminal Project

We should evaluate all other options available on bulk business before any one commodity group is picked, especially if it happens to be 'coal'. Thanks!

From: Mark Erickson
Sent: Wednesday, May 09, 2012 11:42 AM
To: Lawrence Dunnigan
Cc: Chris Peterson; James Kwon
Subject: RE: Confidential Coal Terminal Project

I think we're on the same page Lawrence, sorry if I came off as smug:) Part of my frustration is that I haven't been able to spend as much time working on this as I'd like. I think you're right about coal however, that may not be the right target commodity for Oakland due to dust and global warming issues. Metro Ports had indicated that coal and iron ore were the two strongest commodities looking for USWC gateways. Talking with Chris Stotka yesterday though, it sounds like there is plenty of bulk demand right now.

Mark

From: Lawrence Dunnigan
Sent: Tuesday, May 08, 2012 9:33 PM
To: Mark Erickson
Cc: Chris Peterson; James Kwon
Subject: Re: Confidential Coal Terminal Project

Sure. If the incremental costs are not too significant it would be nice to have some general bulk terminal plans especially for APL/Roundhouse. I didn't mean to insinuate that we not take it seriously. I am just not so optimistic about this particular one, but worth exploring further. Coal will be more problematic than other types of bulk..

Best Regards,

Lawrence Dunnigan

Sent from my iPhone

On May 8, 2012, at 9:15 PM, "Mark Erickson" <MErickson@portoakland.com<mailto:MErickson@portoakland.com>> wrote:
To me, all this shows that we need to come up with a preliminary layout for a bulk operation at 33 and 62-63. Engineering just completed its consultant selection for OAB. Perhaps we could bring the 2nd place team on board to help us with a plan that we could shop around to stevedores, shipping lines, and cargo interests. Kinder Morgan mentioned today that the berth 7 investment will be over $100 million in the facility. We should take this pretty seriously.
Mark

Sent from my Verizon Wireless 4GLTE smartphone
----- Reply message -----
From: "Lawrence Dunnigan" <LDunnigan@portoakland.com<mailto:LDunnigan@portoakland.com>>
To: "Chris Peterson" <cpeterson@portoakland.com<mailto:cpeterson@portoakland.com>>, "Mark Erickson" <MErickson@portoakland.com<mailto:MErickson@portoakland.com>>
Cc: "James Kwon" <JKwon@portoakland.com<mailto:JKwon@portoakland.com>>
Subject: Confidential Coal Terminal Project
Date: Tue, May 8, 2012 7:25 pm

Chris,

Ricky did speak with him but I think there are many hurdles on this one, especially being coal. It can't hurt to speak with him further and hear him out but let's also keep in mind that Trapac may want to occupy Berth 33 sooner rather than later should the APL business land there. It seems that they (the coal company) are seeking -50ft depth so unfortunately the Roundhouse/APL terminal would not suffice.

Best regards,
Lawrence Dunnigan
Manager, Business Development & International Marketing Port of Oakland
530 Water Street, 6th Floor
Oakland, CA 94607
Tel. (510) 627-1834
www.portofoakland.com<http://www.portofoakland.com>

<image003.jpg>
Please consider the environment before printing this email.

From: Chris Peterson
Sent: Tuesday, May 08, 2012 3:35 PM
To: Lawrence Dunnigan; Mark Erickson
Cc: James Kwon
Subject: FW: Confidential Coal Terminal Project

Lawrence, I think Ricky and Jahan might have already talked to this guy, but he chatted with me for a bit yesterday and he'd like to sit down with us and discuss the potential of Berth 33 for a coal facility. I know getting rail to 33 is problematic, but it's not impossible, and this company is willing to make all the investment required to get this operation up and running. Take a look and lets discuss.

Chris Peterson
Chief Wharfinger
Port of Oakland
Off: 510-627-1308
Cell: 510-719-8024

From: KDS [mailto:kdswope@gmail.com]<mailto:[mailto:kdswope@gmail.com]>
Sent: Tuesday, May 08, 2012 3:27 PM
To: Chris Peterson
Subject: Confidential Coal Terminal Project

Chris:

It was indeed a pleasure speaking with you yesterday. I have attached some preliminary information regarding the client seeking to establish the West Coast port terminal. The company estimates it will handle 2 to 3 million tons of export coal annually. It is my understanding the company would like to be able to fully load a Panamax ship to 75-80K tons. Rail access to the terminal is also important as it will result in additional congestion of approximately one additional train per day.

As I mentioned, this client if fully-prepared to duplicate Koch Carbon LLC's award winning design in Pittsburgh, CA to help mitigate any possible environmental hurdles associated with building/operating such a coal terminal. That said, the client is in the position to lease the required land to build this terminal.

Please notify me of your satisfactory receipt of this email and attachment. Once you've had an opportunity to review the material I would like to arrange a site visit at your earliest convenience.

Regards,
Kevin Swope
702-524-8240

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OAKLAND GLOBAL NEWS

Monthly Updates on the Oakland Global Trade & Logistics Center Project

Issue 4

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Oakland Global Website

Oakland Global News, December 2013

Dear Reader,

Happy Holidays! Oakland Global News is a monthly newsletter for readers with an interest in staying current as the Oakland Global Trade & Logistics Center (former Oakland Army Base) project evolves. This week OG News includes stories about the Oakland Bulk and Oversized Terminal and several other topics. Enjoy and Happy New Year!

Project Updates

Following the Oakland Global groundbreaking event on November 1, actual construction work has started at the former Oakland Army Base. The project also has made significant contributions to its surroundings on the former base.

- Demolition: Lead and asbestos abatement is on-going at several warehouses scheduled for imminent demolition. Nine large buildings will ultimately be demolished as part of the early construction work, but a preliminary step is disconnecting utilities, and segregating and disposing lead and asbestos-laden debris. Following the abatement process, valuable wood will be preserved for reuse and resale.

- Construction operations center: Ten trailers housing approximately 25 offices and several conference rooms have been installed on the Oakland Global project site to serve as construction headquarters for the next 54 months. Office occupants number approximately 25 and include representatives from CCIG, the City of Oakland and the project construction joint venture team, which includes the Tuner, Top Grade and Flatiron companies.The construction operations center trailers are located near the intersection of 11th Street and Maritime Street and occupy a five-acre parcel. The offices are open 7 a.m. to 3:30 p.m. Monday through Friday.

- Bike Path Port-a-potties: Two port-a-potties have been added to the Bay Bridge pedestrian / bike path parking lot created in a joint effort between Caltrans, the City of Oakland and Oakland Global developer CCIG. Caltrans built the new path as part of the new Bay Bridge, but did not provide additional parking. The lot, which is at the intersection of Burma Road and

Maritime Street, opened in November. Given the length of the trip to the end of the path and back, the port-a-potties are a welcome improvement for visitors.

Oakland Bulk and Oversized Terminal

A new service for the Oakland waterfront

Bulk commodity ship

Transforming the former Oakland Army Base into a modern trade and logistics center is central to the Oakland Global plan. That work will include replacing 1940s infrastructure with modern utilities, roads and buildings designed to move goods efficiently to and from Oakland. But, a lesser-known aspect of the project is a new marine break-bulk commodity terminal on the westernmost section of the base.

The Oakland Bulk and Oversized Terminal (OBOT) is expected to capture some of the business that Oakland loses to other West Coast ports, which feature bulk terminals. OBOT will take advantage of the city's direct ocean path to China and railroad tracks that stretch to agricultural products in California's Central Valley.

When running to full capacity, OBOT is expected to move approximately 2 million metric tons of bulk products that would otherwise be shipped through other West Coast ports. The commodities typically are transported on land to and from ports in boxcars or rail cars designed to carry a specific product. Ocean-going

vessels commonly carry bulk goods in their hulls rather than in containers.

"The Port of Oakland relies heavily on cargo that moves primarily by truck. That limits Oakland's potential as a national gateway," said Phil Tagami, CEO of California Capital & Investment Group, which is the majority partner in OBOT. Creating a marine terminal opens a new pathway for the Oakland waterfront - one serviced by rail."

Given California's wealth of natural resources, it's not surprising that CCIG would contemplate moving agricultural products through OBOT, such as corn, soybeans, flour and dehydrated garlic. But the list of potential products is much longer, including iron ore, pot ash, soda ash, building materials and steel products.

One bulk material OBOT does not plan to export or import is coal. CCIG and Port of Oakland officials have been asked about potential coal shipments as part of Oakland Global and OBOT. Coal is not in the plans, according to Tagami.

"It has come to my attention that there are community concerns about a purported plan to develop a coal plant or coal distribution facility as part of the Oakland Global project," Tagami said. "This is simply untrue. The individuals spreading this notion are misinformed. CCIG is publicly on record as having no interest or involvement in the pursuit of coal-related operations at the former Oakland Army Base."

Ex-Offender Employment Support Survey

To ensure that the Oakland Global project is doing everything possible to hire Oakland resident ex-offenders reentering the workforce, CCIG is currently sponsoring a survey of East Bay non-profit organizations that work with the reentry population.

The 15-question survey is intended to gather information about services currently available to East Bay employers seeking to hire reentry job applicants. The goal is to use the information to create partnerships between the project and groups with similar hiring goals.

CCIG mailed and emailedthe survey on December 2 to 27 organizations, many of which are located in Alameda County. The organizations include the Oakland Private Industry Council, the Unity

Council, Allen Temple Housing and Economic Development Corp. and Youth Uprising. So far, only six organizations have responded to the survey. They are as follows:

- Oakland Private Industry Council
- Law Family Community Development Inc.
- Society of St. Vincent de Paul of Alameda County
- Michael Chavez Center
- Tri-Valley Regional Occupational Program
- C.U.R.A. Inc.

In January, CCIG will be following up with calls to the organizations that have not responded to the survey.

Oakland Global's job policies were created as part of a lengthy dialogue with community and labor groups. The policies strongly emphasize hiring union laborers and local residents. Specifically, the policies dictate that each contractor involved in Oakland Global construction meet the following requirements: At least 50 percent of project work hours be performed by Oakland residents; a minimum of 25 percent of apprentice work hours be performed by disadvantaged workers; and 20 percent of project work be performed by apprentices.

Disadvantaged workers include ex-offenders, and with limited exceptions, the jobs policies prohibit contractors from inquiring about applicants' history of involvement with the criminal justice system.

CCIG welcomes any information regarding services available to employers seeking to hire reentry workers. Contact: Chrissy Becker at 510-355-0128 x 113 or at Chrissy@rojeconsulting.com.

Army Base Photography

As a recurring feature, the Oakland Global News presents photography from the Army Base.The photos and captions below are by Dan Nourse.

Worker atop recycled aggregate in the North Gateway.

Recycled asphalt closeup

Dan Nourse is a project manager for the Oakland Army Base focusing on environmental remediation, site elevation increase and site surcharging. Dan was instrumental in the redevelopment of Emeryville and West Oakland. He is a self taught photographer and uses photography to capture the progress of redevelopment projects as well as producing artful images along the way.

In addition to his project manager duties, Dan is the head coach of Cal Men's Lacrosse Team.

Stay informed

Thank you for taking the time to learn more about the Oakland Global Trade & Logistics Center development. I believe that the Oakland Global Newsletter will prove to be a useful tool for staying informed and current on this important project going forward.

Sincerely,
Phil Tagami

Forward this email

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Roje Consulting | 300 Frank H. Ogawa Plaza | Suite 385 | Oakland | CA | 94612

September 24, 2015

Ms. Lucetta Dunn
Chair
California Transportation Commission
1120 N Street, MS-52
Sacramento, CA 95814

RE: Improper Use of Proposition 1B Trade Corridor Improvement Funds for coal export facility project at Oakland Army Base Redevelopment

Dear Chairwoman Dunn:

The undersigned groups—Sierra Club, Earthjustice, West Oakland Environmental Indicators Project, San Francisco Baykeeper, and Communities for a Better Environment—are writing to oppose the use of Proposition 1B Trade Corridor Improvement Funds (TCIF) to build a new coal export facility and associated infrastructure at the Oakland Army Base Redevelopment. Using public funds in this manner has never been discussed in any application for funding to the California Transportation Commission (CTC) or in any environmental review document for this project. Further, using TCIF funds to develop a project which negatively impacts local air quality and otherwise threatens public health and safety frustrates the intended purpose of Proposition 1B to allocate funding for "mobility, safety, and air quality improvements."

As such, our groups request that the CTC refuse to disburse funds to any part of the Army Base project involving coal or fossil fuel exports.

To be clear, the undersigned organizations support the overall redevelopment of the Oakland Army Base, but using public monies to subsidize polluting fossil fuel exports is not in line with TCIF goals or public values.

I. Proposition 1B Background and Purpose

In 2006, California Voters approved Proposition 1B, which allocated almost $20 billion in bonds to advance infrastructure projects and air quality improvements throughout the state. As part of these funds, $2 billion was included for TCIF projects. As part of that mandate, the CTC has stated it will "place[] emphasis on projects that improve trade corridor mobility while reducing emissions of diesel

particulate and other pollutant emissions."[1] In addition, voters placed the following two conditions on the allocation of funds, in addition to others: Projects must (1) "address[] the state's most urgent needs" and (2) "place[] emphasis on projects that improve trade corridor mobility while reducing emissions of diesel particulate and other pollutant emissions."[2] Moreover, the Goods Movement Action Plan (GMAP) issued by the State of California, which serves as the framework for developing state freight transportation policy, promised to "[u]ndertake simultaneous and continuous improvement in infrastructure and environmental mitigation."[3]

Transparency is a vital part of the TCIF program. Consequently, applicants for TCIF funding must provide "[a] description of the transportation corridor and the function of the proposed project within the corridor."[4] This ensures that the State and the public who voted to approve Proposition 1B completely understand the scope of the funding its providing to project proponents.

II. Oakland Army Base (Oakland Global Trade and Logistics Center) and Community of West Oakland.

There are now proposals to transport large amounts of fossil fuels like coal through the former Oakland Army Base, now known as the Oakland Global Trade and Logistics Center. It is our understanding that the project proponents did not disclose that coal would be shipped through this facility. The former Oakland Army Base, which resides on both City and Port of Oakland land, is being developed by California Capital and Investment Group (CCIG), Prologis, and now Terminal Logistics Solutions with largely public money.

Given the public nature of the Oakland Global project, it is imperative that any California Transportation Commission Proposition 1B funding should not be used to do more harm to residents along the fenceline of this project by building a coal export facility. Rather, these funds should only be used for their intended purpose—improving the health and welfare of communities already impacted by goods movement. Many of our groups participated in discussions about the TCIF program, and funding a coal export terminal would betray our trust and the trust of California voters.

The community of West Oakland is one that is already heavily impacted by goods movement. West Oakland residents breathe air containing three times the amount of diesel particulate matter than air in other parts of the Bay Area , which translates into a 2.5 times greater risk of cancer.[5] Children in West Oakland suffer from ailments like asthma at higher rates than children in other neighborhoods.[6]

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[1] TCIF Guidelines, *available at* http://www.dot.ca.gov/hq/transprog/ibond/tcif_guidelines_112707.pdf.
[2] Cal. Govt. Code § 8879.23(c)(1)(B).
[3] Letter from Dale Bonner, Secretary of Business Transportation & Housing, to Mr. James Ghielmetti, Chairman California Transportation Commission, October 10, 2007 *available at* http://calsta.ca.gov/res/docs/pdfs/2007/101007_tcif.pdf
[4] TCIF Guidelines, at ¶ 7.
[5] Alameda County Dept of Public Health, Life and Death from Unnatural Causes, Air Quality, 2008 http://www.acphd.org/data-reports/reports-by-topic/social-and-health-equity/life-and-death-from-unnatural-causes.aspx
[6] See, e.g., High Asthma rates for kids in west Oakland. https://www.youtube.com/watch?t=13&v=GrKwTm5jldE.

West Oakland Residents are two times as likely to go to the emergency room with asthma as people in other parts of Alameda County and are also more likely to die of illnesses linked to air pollution like cancer, heart disease and other ailments. As described above, fossil fuel movement poses even more health and safety issues. West Oakland residents are already impacted by goods movement, and do not deserve to bear the brunt of the health impacts to line the pocketbooks of fossil fuel companies and developers.

Apart from health concerns, community transparency is another key element missing from this proposal. In the case of the bulk terminal at the Oakland Army Base project, community groups were assured by the developer, Phil Tagami and CCIG that no fossil fuels like coal would be exported through this terminal.[7] The City of Oakland also claimed no knowledge of fossil fuel exports and even passed a resolution against the movement of coal and other fossil fuels through Oakland.[8] And now the developer and his company CCIG, and their sub-lessee Terminal Logistics Solutions, are reversing their stance and have sought a $53 million investment from the state of Utah in exchange for Utah's ability to export 4-5 million tons of coal, or 49% of the completed export facility's capacity.[9] There was no discussion of any fossil fuel exports in any of the applications for TCIF or any other public funds, or in any of the state or federal environmental review documents pertaining to this project.

III. Oakland Army Base Project Funding from the California Transportation Commission

The former Oakland Army Base being redeveloped by the City of Oakland, the Port of Oakland and CCIG, is set to receive hundreds of millions in public funding and $242 in TCIF funds from the CTC. These funds will be used for the site preparation on the city side of the project (over $176 million) and for rail access improvements (over $65 million) both of which are related to the development of a bulk export facility that will now contain coal.[10] Additional city, port, public and private funds will be needed to complete the Army Base projects.

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[7] See *Oakland Mayor, Port Developer in Dispute over Plan to Ship Coal,* KQED July 22, 2015 quoting CCIG's December 2013 newsletter. http://ww2.kqed.org/news/2015/07/06/oakland-mayor-port-developer-in-dispute-over-plan-to-ship-coal ("CCIG is publicly on record as having no interest or involvement in the pursuit of coal-related operations at the former Oakland Army Base.")

[8] *Oakland Votes to Keep Coal and Oil Trains Away*, Grist, June 18, 2014, http://grist.org/news/oakland-votes-to-keep-coal-and-oil-trains-away/

[9] Unlikely Partners: Utah investing $53 mil to export coal through Oakland Port, San Jose Mercury News, April 24, 2015, http://www.mercurynews.com/my-town/ci_27981682/unlikely-partners-utah-investing-53-million-export-coal; See also http://www.deseretnews.com/article/865627254/Utah-invests-53-million-in-California-port-for-coal-other-exports.html?pg=all (citing Laura Nelson from the State Office for Energy Development as saying 4-5 Million Tons of Utah coal would move through Oakland.)

[10] *See* Attachment 20 to the Lease Deposition and Development Agreement , Amended TCIF Baseline Agreement, August 22, 2012, at p. 2 of Exh b. Accessed: http://www2.oaklandnet.com/Government/o/CityAdministration/d/NeighborhoodInvestment/OAK038485

A. History of the CTC Funding for the Oakland Army Base

By way of background, in 2012, several amendments were made to the original CTC grants given to the Oakland Army Base Redevelopment project. The original Project Baseline Agreement for the Oakland Harbor Intermodal Terminals agreement was signed on December 10, 2009, and included only the CTC and Port of Oakland.

The revisions added the City of Oakland to the agreement and additional funding to the overall deal. On August 22, 2012, the CTC passed Resolution P.1213-03B to amend the TCIP program and revise the scope of their funding for this project to add $110 million in additional funds, and to add the City of Oakland as a party and signatory to the Baseline Agreement.[11] The Amendment divided the funding into several sub-projects: the Oakland Harbor Intermodal Terminals (OHIT) rail project, 7th St Grade Separation Project, OHIT Phase 1 Remediation, OHIT rail access improvements and manifest yard "to accommodate projected growth in unit bulk, transload, and intermodal rail business", OHIT site prep and backbone infrastructure, OHIT recycling facilities, OHIT logistics facilities and Marine Terminal ("berth 7 would be converted to a modern bulk cargo terminal for movement of commodities such as iron ore, corn and other products brought in to the terminal by rail."); and OHIT unit train support yard.

B. The Harms Caused by Fossil Fuel Transportation

Increasingly, rail is being utilized to ship coal and oil across the country to West Coast ports, to then be burned abroad. Fossil fuel transportation –including coal, oil, and petcoke—creates the same air quality and safety problems associated with general goods movement, as well as more serious hazards. These projects also impose additional health and safety concerns associated with the shipment of these highly volatile products. Namely, coal is shipped in mile-long trains of 120+ open top railcars that emit massive amounts of coal dust into the water, air, and land near the railroad tracks. Coal dust contains arsenic, lead, mercury, chromium, nickel, selenium and other heavy metals.[12] Prolonged, direct exposure to coal dust has been linked to health issues such as chronic bronchitis, decreased lung function, emphysema, and cancer.[13] This fine coal dust can also contribute to train derailments when it rests in the railroad ballast.[14] Apart from rail impacts, communities near the Port are also impacted. Coal is commonly stored in large, uncovered piles near the ports where wind and rain can carry coal dust particles into nearby neighborhoods. By way of one example, in a community near a large coal terminal

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[11] See LDDA Exh 20, Trade Corridor Improvement Fund Project Baseline Agreement Amendment #1 at 1 Accessed: http://www2.oaklandnet.com/Government/o/CityAdministration/d/NeighborhoodInvestment/OAK038485

[12] Aneja, Viney, "Characterization of Particulate Matter (PM10) in Roda, Virginia," 2008. http://www.sierraclub.org/coal/downloads/2009-VA-particulates.pdf Executive summary iv.

[13] "Criteria For a Recommended Standard: Occupational Exposure to Respirable Coal Mine Dust" U.S. Department of Health and Human Services, September 1995, pages 52-116. http://www.cdc.gov/niosh/docs/95-106/pdfs/95106.pdf

[14] Surface Transportation Board Decision, "Arkansas Electric Cooperative Corporation - Petition for Declaratory Order," Docket No. FD 35305, Mar 2011.

in Virginia, the number of residents suffering from asthma was found to be more than twice the city and state average.[15]

In addition to coal, petroleum coke, a byproduct of oil refining, is also being produced and shipped by rail, truck and barge in larger quantities due to the refining of more heavy oil in the United States. Petroleum coke (or petcoke) looks visually similar to coal and is also commonly stored in large open piles at ports. Petcoke can cause serious respiratory problems, particularly for individuals suffering from heart and lung disease and asthma.[16] Health experts have found that petcoke is equivalent to coal for lung disease potential.[17]

Apart from the significant health impacts, local businesses near rail and fossil fuel export facilities can suffer negative visual, aesthetic, and noise impacts from coal dust and increased rail traffic. This can equate to lost business and property values, which can also mean reduced property tax revenues for local communities. One study conservatively estimates losses from a new coal export facility to be at least $265 million in property values—equating to more than $2.6 million in community tax losses.[18]

In addition to all of the localized impacts from transportation of these fuels, when coal and petcoke are burned they emit greenhouse gases that cause climate change. The communities that would bear the brunt of the impacts from fossil fuel transport and export are also ironically the same communities that would be most vulnerable to climate disruption impacts like sea level rise, drought, flooding, and fires.

IV. TCIF Funds Must not be Used for a Coal Export Facility.

California voters approved Proposition 1B with the understanding that funding would be disbursed to projects meeting two key criteria: (1) such projects would meet the state's "most urgent needs"; and (2) such projects would "improve trade corridor mobility while reducing emissions of diesel particulate and other pollutant emissions."

This proposed Oakland coal export facility violates these two main criteria, in addition to the important public disclosure requirements the CTC has imposed on itself.

---

[15] Health Needs Assessment of the Southeast Community City of Newport News 2005," Peninsula Health District, Virginia Department of Health.

[16] Madigan, Lisa, Illinois Attorney General. "Madigan files suit against petroleum coke site for air pollution." November 4, 2013. http://www.illinoisattorneygeneral.gov/pressroom/2013_11/20131104.html

[17] Paulman, Ken. "Documentary: 'Petcoke: Toxic waste in the Windy City.'" February 28, 2014. http://www.midwestenergynews.com/2014/02/28/video-toxic-waste-in-the-windy-city/

[18] See Eastman Property Value Study, October 12, 2012, http://www.coaltrainfacts.org/docs/Eastman-Study.pdf. Study assumed a conservative 1% value loss for all structures within 600 ft of the rail tracks where coal would be shipped.

i. A Coal Export Facility is Clearly Not an "Urgent Need" for California.

California voters passed this ballot initiative under the auspices that only the most urgent freight projects would be funded. Adding a new coal export facility is clearly not an urgent need for California. In fact, the California Senate, Assembly and Governor have weighed in on this exact issue. In Assembly Joint Resolution 35, these three bodies noted their deep concerns with the environmental and health implications of coal-fired power plants, as well as the expansion of coal export facilities along the West Coast.[19] These bodies urged the President of the United States to restrict coal exports overseas, and urged the Governors of Oregon and Washington to consider the serious health consequences of coal terminal expansion in the Pacific Northwest.[20] There is no reason to believe the State Legislature would be hypocritical enough to encourage Washington and Oregon to push back against coal exports, but identify it as an urgent need in California. Since building a new coal export facility is clearly not an "urgent need" for California, CTC should withhold funding if this project continues to be part of the Oakland Global development.

ii. A Coal Export Facility Does not Relive Mobility while Reducing Emissions of Diesel Particulate and Other Pollutant Emissions.

The proposed coal export terminal will not serve Proposition 1B's goal of improving transit corridor mobility while reducing freight pollution. In Assembly Joint Resolution 35, California's Executive and Legislative Branch listed the various harms of coal exports, including the pollution generated by coal-fired power:

> Hazardous emissions from coal-fired power plants threaten health locally and at great distances; and
>
> [] Coal exports from United States ports to Asia have risen by almost 240 percent from 3.8 million tons in 2009 to over 13 million tons in 2010; and
>
> [] The environmental consequences of massive coal exports to Asia are severe, including the burning of millions of tons of coal that releases hazardous air emissions into the atmosphere and increased mountaintop removal projects; and
>
> [] Burning coal for electricity generation worldwide is the main cause of greenhouse gas emissions and the planetary climate crisis; and
>
> [], Coal burning has contributed to significant human health risks in all age groups through the emissions of ozone, sulfur dioxide (SO2), particulate matter, nitrogen oxides (NOx), mercury, and carbon dioxide (CO2).[21]

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[19] Assembly Joint Resolution 35 (September 18, 2012); *available at http://www.leginfo.ca.gov/pub/11-12/bill/asm/ab_0001-0050/ajr_35_bill_20120918_chaptered.html*
[20] *Ibid.*
[21] *Ibid.*

This unequivocal statement from all of California's elected branches of governments on the harms associated with coal exports and use of these fuels make clear that this Project does not serve Proposition 1B's goal of reducing emissions of diesel particulate and other pollutant emissions.

These TCIF Amended Baseline Agreement documents indicate that there is some sort of cost savings and reduced truck trips associated with building a bulk/break-bulk facility at the Port of Oakland. However, this conclusion is unfounded – because there is no bulk export facility now it is certainly unclear how there would be fewer truck trips. Coal is not currently being shipped out of Oakland or between Oakland and Stockton. [22] If anything, these TCIF funds would be use to subsidize and newly expand coal movement out of California, thus increasing emissions from trains, and their open top cars carrying coal. Open top rail cars lose an average of 500-2000 lbs of coal in the form of dust per car, with an average coal train being composed of at least 120 cars, equating to staggering coal losses upwards of 60,000 pounds per train between the mine and the Port.[23]

Further, the cost-benefit analysis also indicates that there would be reductions in carbon dioxide emissions. Apart from the flawed truck trip analysis, shipping 10 million tons of coal/year would lead to a massive net increase in carbon dioxide emissions since 10 million tons of coal is the equivalent of 7 average size (500 MW) powerplants, or at least 26 million tons of carbon dioxide emissions per year.[24] Considering California is a state without coal-fired power plants, state funding to facilitate this massive amount of coal export is especially significant. Finally, this funding would stand in direct contrast to Governor Jerry Brown's commitment to reduce California's greenhouse gas emissions (including carbon dioxide) to 40% below 1990 levels by 2030. [25] Overall, there is no colorable argument that the construction of a coal export facility reduces emissions of diesel particulates or other pollutants. In fact, this Project will only increase these emissions as California warned of other similar projects in Washington and Oregon.

iii. TCIF Application and the Amended Baseline Agreement issues in light of Coal Export plan revelation

Neither coal nor any other fossil fuel like petroleum coke was mentioned in the TCIF application, or in any environmental review document pertaining to the Army Base Redevelopment project. The funding application, in mentioning the Berth 7 bulk export facility, describes the project as one that would be "converted to a modern bulk cargo marine terminal for movement of commodities **such as iron ore, corn** and other products brought in to the terminal by rail….the terminal would also

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[22] See June 8, 2012 Benefit-Cost Analysis for the Port of Oakland's Outer Harbor Intermodal Terminal TCIF Application.

[23] See Surface Transportation Board, Arkansas Electric Power, July 29, 2010, Hearing Transcript at 102:9-103:7, accessed: http://www.stb.dot.gov/TransAndStatements.nsf/8740c718e33d774e85256dd500572ae5/9e49ebf2fea431f1852578460066c5cb?OpenDocument. *See also* BNSF website, cached copy, accessed: http://www.coaltrainfacts.org/docs/BNSF-Coal-Dust-FAQs1.pdf.

[24] Union of Concerned Scientists, http://www.uscusa.org/clean_energy/coalvswinde/brief_coal.html3bf-toc-0. A 500 MW plant emits 3.7 mil tons of carbon dioxide and burns 1,430,000 tons of coal.

[25] Exec. Order B.-30.15

accommodate project cargo such as **windmills, steel coils and oversized goods."**[26] Coal was not mentioned as a potential commodity and is hardly the equivalent of goods like corn or windmills/turbines.

The omission of coal from the funding application documents was likely intentional. According to documents from a Utah public records requests in conjunction with the funding requested from the 4 counties in Utah, "We've had an unfortunate article appear on the terminal project…If anything needs to be said**, the script was to downplay coal, and discuss bulk products and a bulk terminal.** The terminal operator is TLS, not Bowie. **Bowie is known for coal…Phil Tagami had been pleased at the low profile that was bumping along to date on the terminal and it looked for a few days like it would just roll into production with no serious discussion."**[27] As you probably know, Phil Tagami, the CEO of CCIG, is the developer of this project, and he is also a former commissioner of this body.

This change in use violates TCIF Guidelines requiring disclosure of "the function of the proposed project within the corridor."[28] Unfortunately, the use of this facility as a coal export facility has been done in secret, and this has generated significant controversy. This type of bait and switch is not what voters approved in Proposition 1B, and is a deceitful and potentially fraudulent use of funding that was allocated for a facility applying to handle goods like wind turbines.

Further, according to the funding application and baseline agreement documents, the City Logistics and Bulk and Oversize Terminal is supposed to cost around $99 million to build.[29] And now sources are reporting that the developers, CCIG and TLS, are claiming that the Bulk and Oversize terminal will cost $250 million to build in order to ship coal.[30] According to TCIF funding guidelines, when project costs exceed the approved budget this must be reported in the quarterly CTC reports and in the semi-annual audit. Funding applicants must then provide a plan to the CTC to downsize the project to keep within budget or identify alternative sources of funding.[31] It is unclear whether any of these things have occurred. We will also note that if shipping coal would more than double the cost of the proposed City Bulk and Oversize Terminal, that may be another independent reason why shipping coal should not be funded—it is a very costly prospect, not just for public health, but also for the City and California taxpayers. It is especially harmful given the poor prospects for US coal in the international market and the history of failure for West Coast coal export projects.

iv. Conclusion

Public money, especially in the amount $242 million, should not be used to build a coal export facility at the former Oakland Army Base. While the general Oakland Army Base project has many

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[26] Amendment, Exh B at 5.
[27] Email from Jeff Holt to various Utah officials re; Press about Utah investment in Oakland terminal project, April 8, 2015, at p. 1, attached hereto as **Exh. A.**
[28] TCIF Guidelines, at ¶ 7.
[29] See April 24, 2012 City Council Special Community Economic Development Meeting Agenda report at 3 Table 1, accessed: https://oakland.legistar.com/LegislationDetail.aspx?ID=1109666&GUID=007669A9-58B0-46A8-B21D-B38A91C68313&Options=&Search=
[30] Project Could Transform Local Coal Market to International, Richfield Reaper, April 7, 2015, accessed: http://www.richfieldreaper.com/news/local/article_e13121f0-dd67-11e4-b956-3ff480cc1929.html
[31] TCIF Funding Guidelines at ¶14, 18.

laudable goals that the undersigned organizations support, the export of coal has no place in this project on public land funded by California residents for a use that is inconsistent with its funding application. Allowing this fossil fuel facility to be built would breach the trust of California voters who took a chance on Proposition 1B under the auspices of the CTC funding only important projects that actually improve the conditions near freight hubs. To allow this facility to ship fossil fuels when the funding application explicitly discussed other non-controversial (and non-climate change-inducing goods) would be a fraudulent use of public money.

In order to be fully clear, our undersigned organizations fully support the redevelopment goals of the Oakland Army Base and would like this project and a facility on this parcel to move forward.

As such we request that the CTC: 1) halt all future disbursements of funding to this project until a full CEQA and/or NEPA analysis considering coal, petcoke and other fossil fuel shipments is complete; 2) place a clear no coal or fossil fuel handling condition tied to any portion of the project on which CTC funds have been disbursed and spent ; 3) require full repayment of public TCIF funds for the bulk terminal and associated rail infrastructure if fossil fuels are shipped from it; or 4) consider granting the City of Oakland an extension on any sort of matching funds timeline such that it is not "forced" to take any funds involving coal or fossil fuel shipment .

We appreciate your consideration of these comments, and please do not hesitate to contact us if you would like to discuss this matter further.

Sincerely,

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On behalf of Sierra Club, Earthjustice, West Oakland Environmental Indicators Project, San Francisco Baykeeper, and Communities for a Better Environment

enclosures

cc

Honorable Commissioners, California Transportation Commission

Will Kempton, Executive Director, California Transportation Commission

Honorable Mayor Libby Schaaf, City of Oakland

Honorable Members, Oakland City Council

Port of Oakland

Ken Alex, Governor's Office of Planning and Research

Kamala Harris, Attorney General

Chair Mary Nichols and Cynthia Marvin, California Air Resources Board

Secretary Matthew Rodriquez, CalEPA

Assemblymember Rob Bonta

Assemblymember Tony Thurmond

Senator Loni Hancock

Senator Bob Wieckowski

Congresswoman Barbara Lee

Appendix

Funding Matrix in the TCIF Funding application for Oakland Army Base[32]

Table 1*

Development Elements	Total Cost	Port	City	City Private Match	TCIF
Remediation	11.4	5.7	5.7	-	-
Port Rail Terminal	79.6	10	[illegible]	-	65.8
Site Prep on City Lands/Backbone Infrastructure	247.2	-	[illegible]	25.9 -	176.30
Recycling Facilities	46.6	-	-	46.6 -	-
City Logistics & Oakland Bulk and Oversized Terminal	99.4	-	-	99.4	-
TOTAL	484.2	15.7	54.5	171.9	242.1

* Sources shown in top horizontal row to the right of "Total Cost," and Uses are shown in the column under Development Elements.

[32] See Table 1, April 24, 2012 City Council Agenda report at 3.

Project Schedule Baseline Summary						
(Schedule Changes and Variances in Months)	Adopted Program (06/07/07) a	Approved Changes (mm/dd/yyyy) b	Current Approved (06/30/2015) c	% Complete (06/30/2015) d	Schedule Forecast (06/30/2015) e	Schedule Variance (months) f=c-e
Begin Environmental Phase	01/01/2002		01/01/2002	100		0
End Environmental Phase	06/30/2009	08/22/2012	07/31/2012		07/31/2012	0
Begin Design (PS&E) Phase	09/01/2007	08/22/2012	08/01/2009	65		0
End Design (PS&E) Phase	06/30/2010	08/22/2012	09/30/2013		07/30/2016	-34
Begin Right of Way Phase	06/30/2008	08/22/2012	08/01/2009	100		0
End Right of Way Phase	12/01/2009	08/22/2012	03/31/2013		03/31/2013	0
Begin Construction Phase	03/01/2011	08/22/2012	01/01/2010	48	01/01/2010	0
End Construction Phase	12/31/2013	08/22/2012	12/31/2019		12/31/2019	0
Begin Closeout Phase	12/31/2013	08/22/2012	08/01/2015	0	10/01/2014	10
End Closeout Phase	06/30/2014		06/30/2020		06/30/2020	0

[33]**Source: Project Bond Accountability**

[33] Outer Harbor Intermodal Terminal, Bond Accountability, data as of June 30, 2015, accessed: http://www.bondaccountability.dot.ca.gov/bondacc/ProjectDetailsPreActionPublic.do?%3E&bondId=3

Oakland Coal
Health and Safety Impacts

SIERRA CLUB

OAK 2377

From Mine to Plant to Port, Coal is dirty, dangerous and polluting.

Surface Mine Explosion Wise County, VA

SIERRA CLUB

OAK 2379

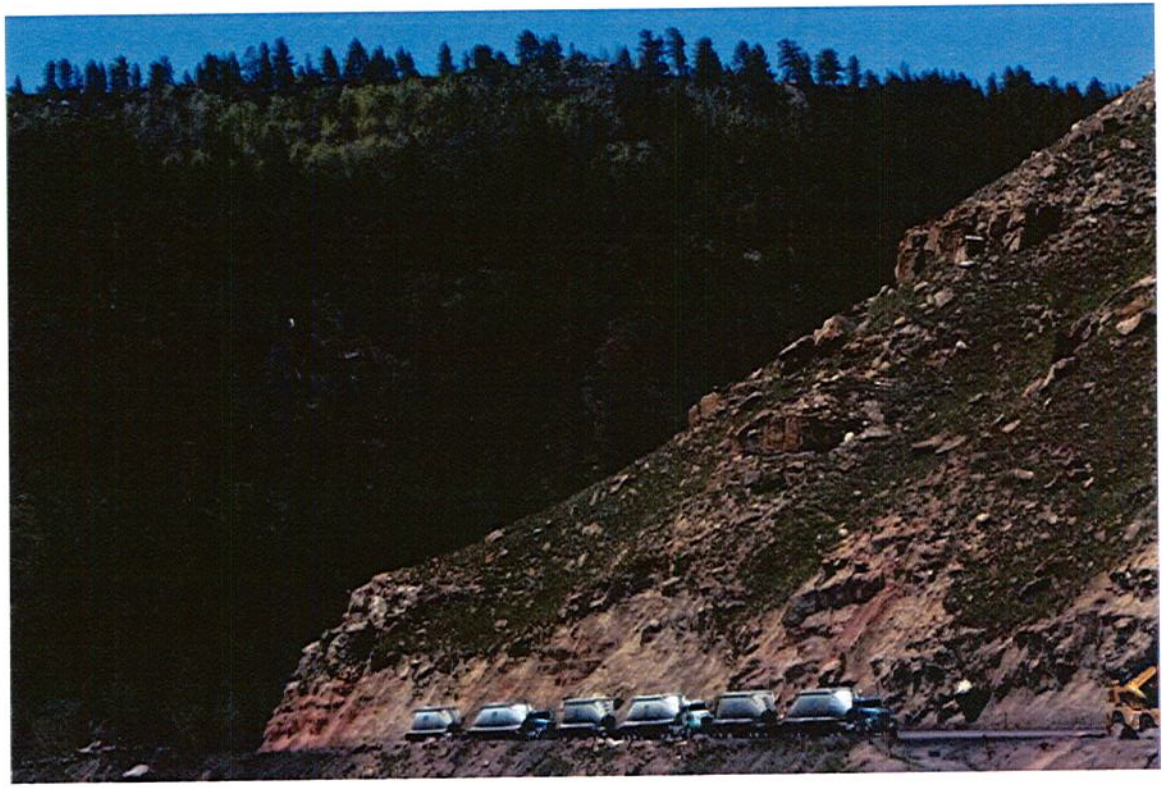
Bear Run Mine Indiana

Photo credit: John Blair

SIERRA CLUB

OAK 2380

Sufco, Utah's oldest coal mine



SIERRA CLUB

OAK 2381

Powder River Basin Coal Mine

SIERRA CLUB

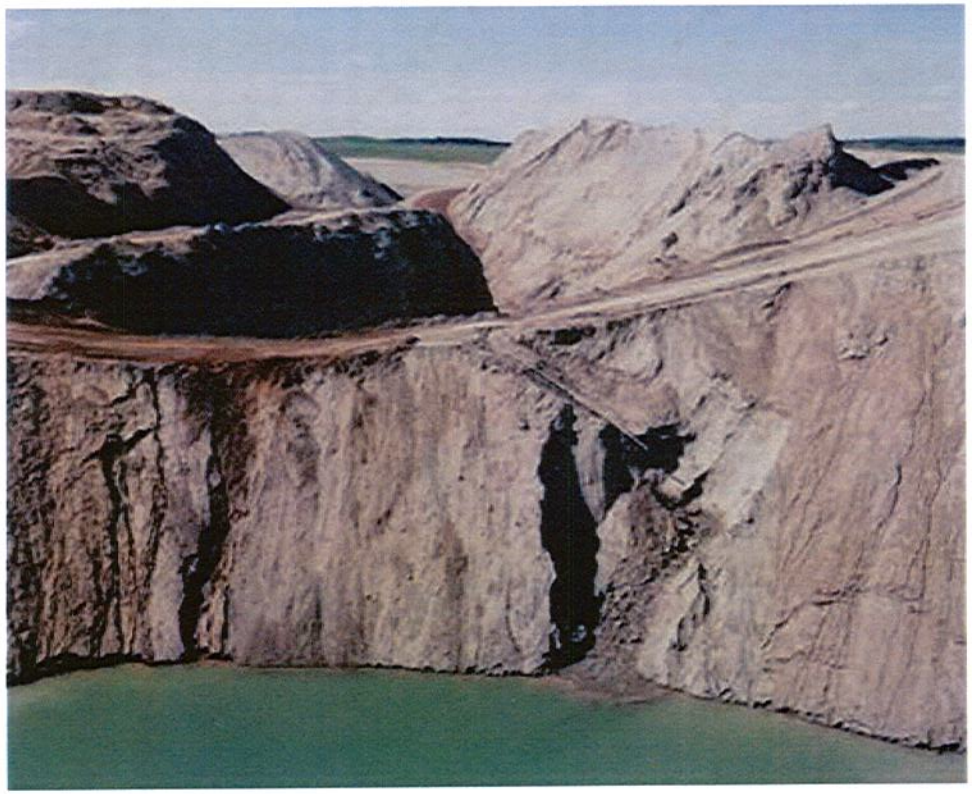
OAK 2332

Reid Gardner Coal Plant NV

SIERRA CLUB

OAK 2383

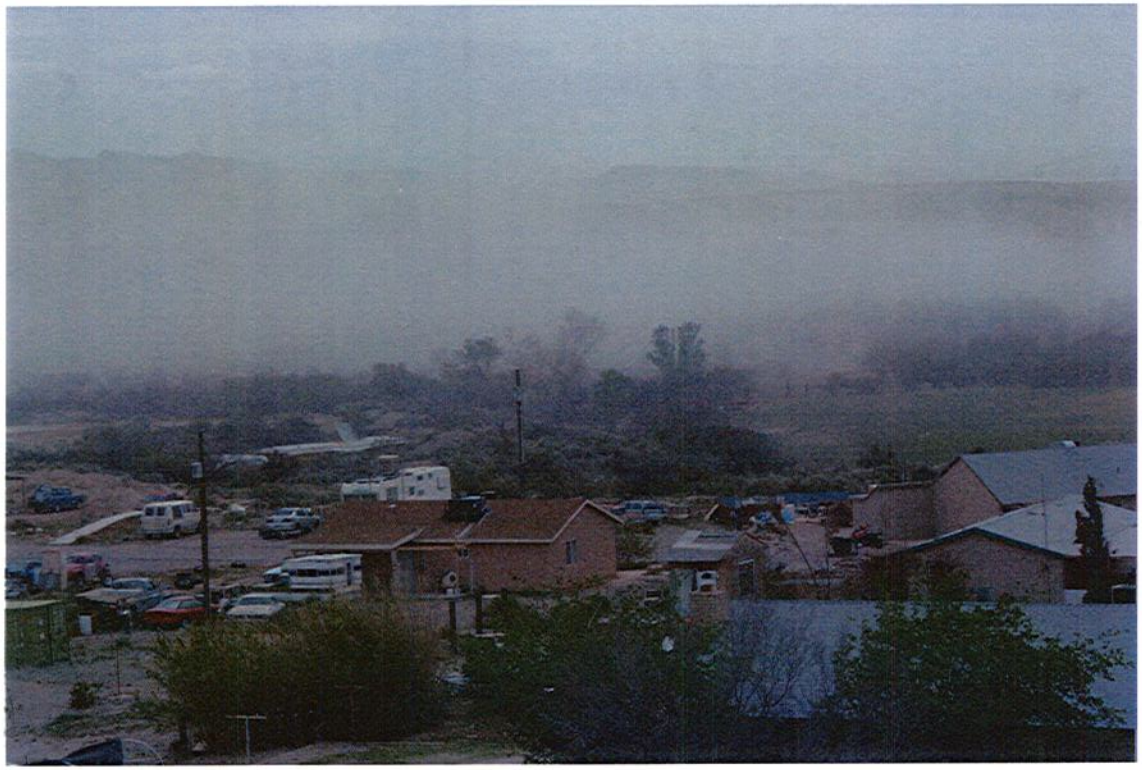
Selenium Pond #1



SIERRA CLUB

OAK 2384

Pollution Reid Gardner Coal Plant NV affects local community



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OAK 2385

Coal in China

SIERRA CLUB

OAK 2386

Inner Mongolia China Coal Pollution

SIERRA CLUB

OAK 2387

Coal pollution in Beijing, China

SIERRA CLUB

OAK 2388

More Coal Pollution in China

SIERRA CLUB

OAK 2389

Oakland's Future with a coal export terminal?

OAK 2390

Westshore Terminal British Columbia

Photo Credit: Paul Anderson

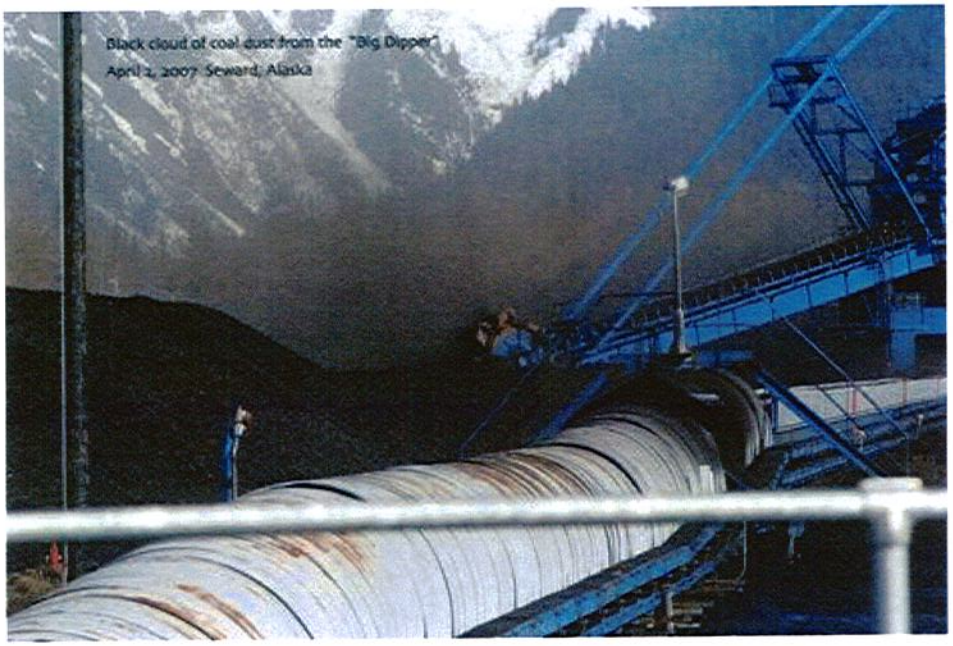
OAK 2391

United Bulk Terminal Louisiana

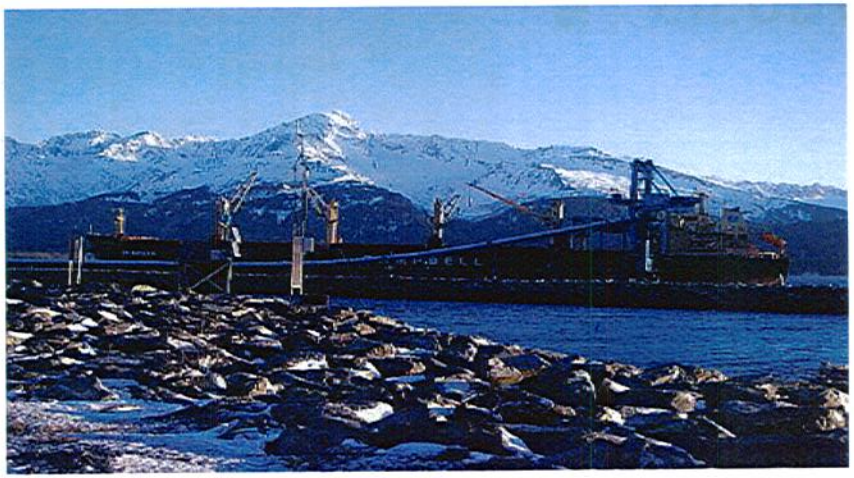
11 MTPA coal exports/year=approximately the same size terminal as proposed in Oakland

SIERRA CLUB

OAK 2392



Coal Dust from "Big Dipper" Seward, AK (04/02/07)



Port of Seward, AK

SIERRA CLUB

OAK 2393

RAM Coal Export terminal

Photo courtesy of southwings.org

SIERRA CLUB

OAK 2394

Coal by Rail

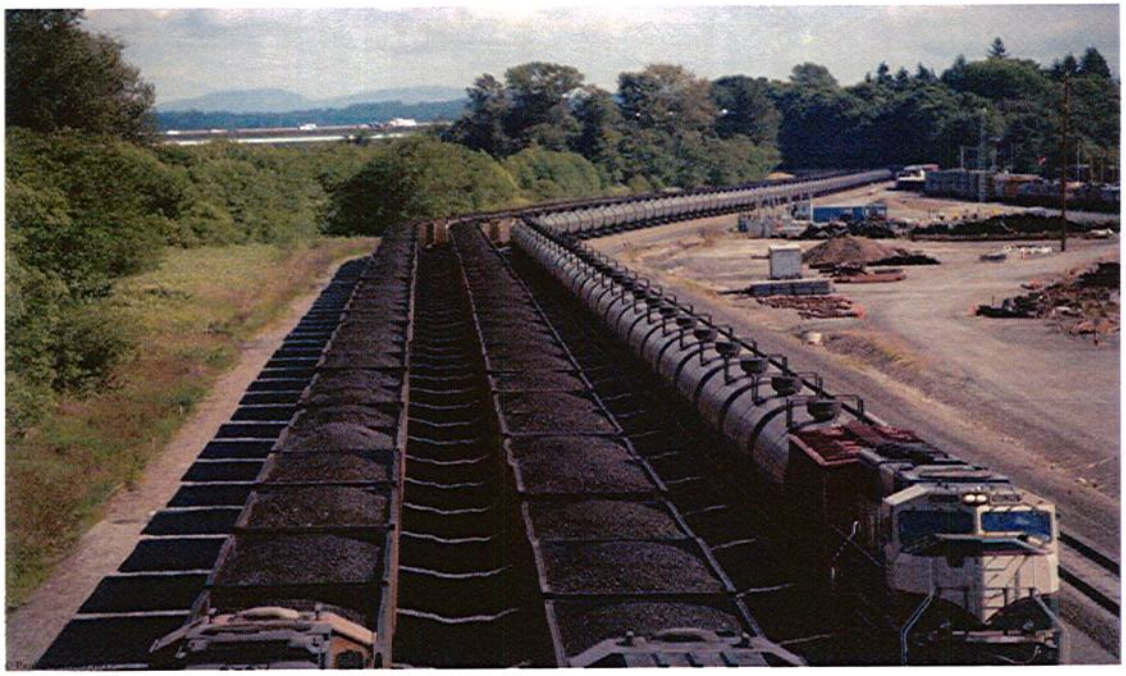
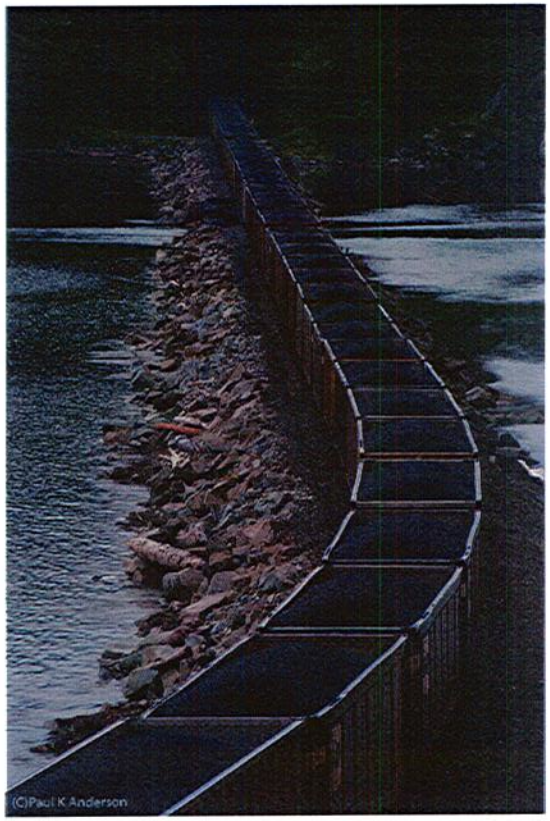


Photo Credit: Paul Anderson



SIERRA CLUB

OAK 2395

Transporting coal by rail

SIERRA CLUB

OAK 2396

Coal train derailment Mesa, WA

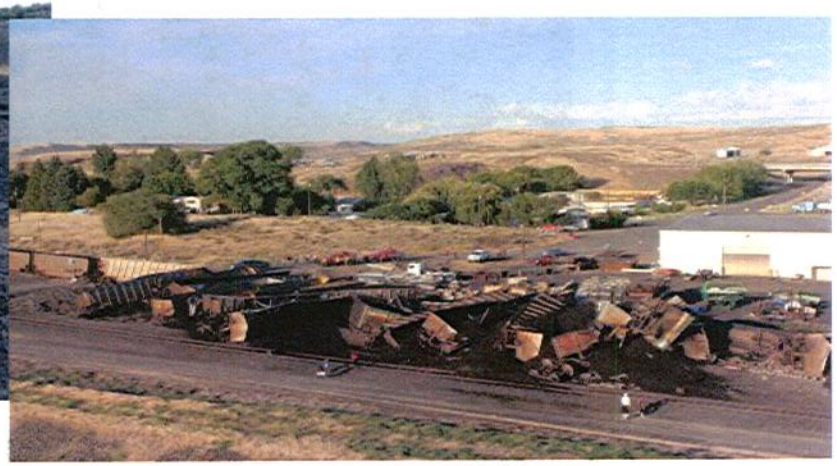
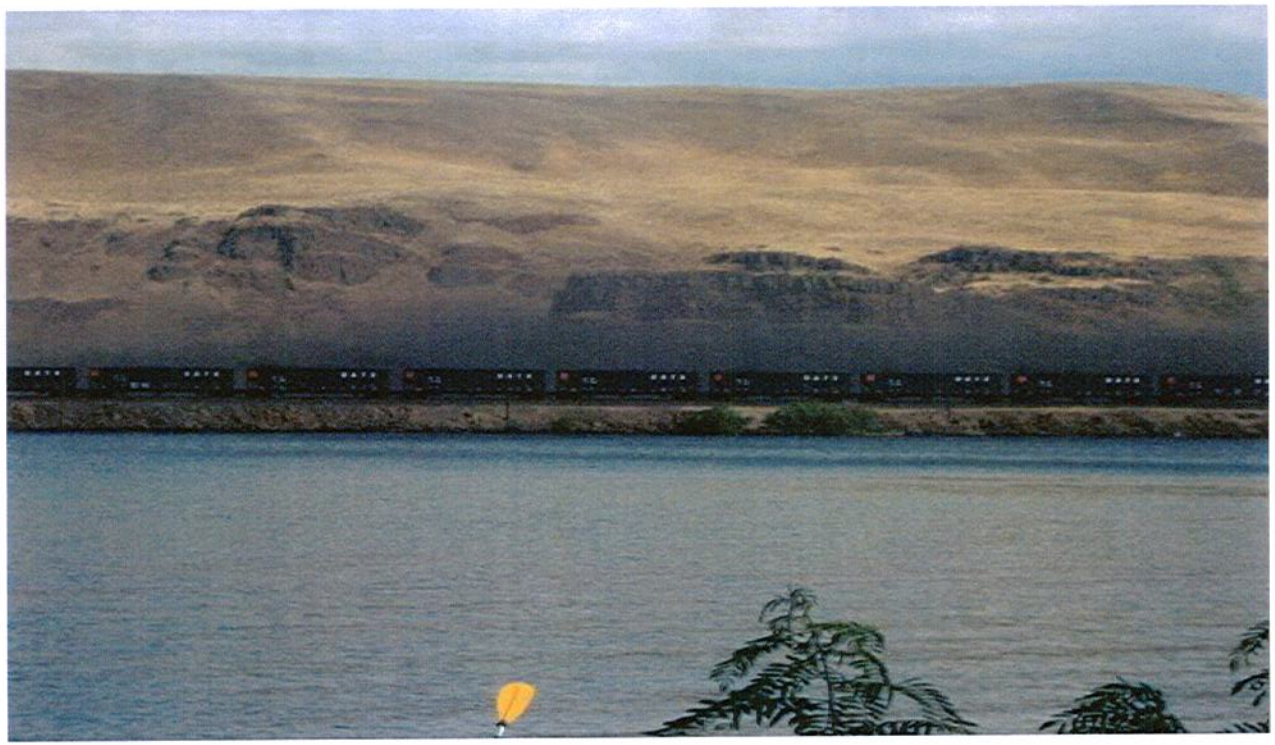


Photo Credit: Tony Eveland

SIERRA CLUB

OAK 2397

Coal Dust near Columbia River



Columbia River near Horsethief Lake July 14, 2012

SIERRA CLUB

OAK 2398

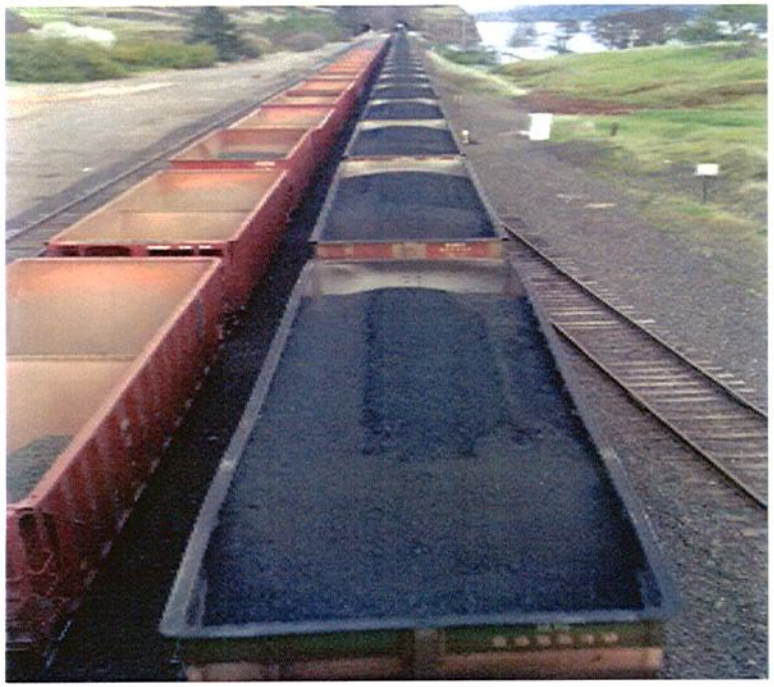
Coal Chunks from Trains in the Water

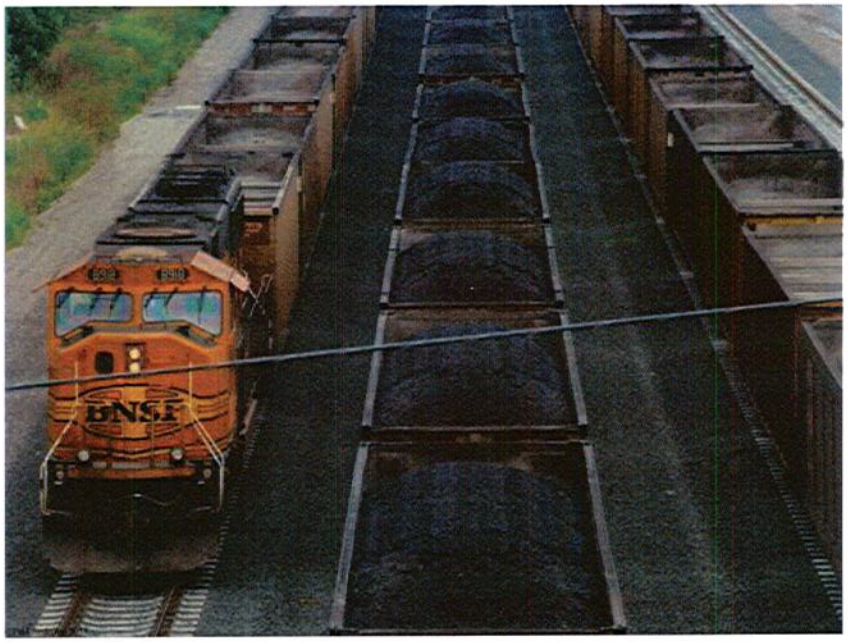
Rock Creek Delta near Stevenson, WA January 9, 2013

SIERRA CLUB

OAK 2399

Surfactants as pollutants





Surfactants or topping agents shearing off of coal near Lyle, WA and Everett, WA

SIERRA CLUB

OAK 2400

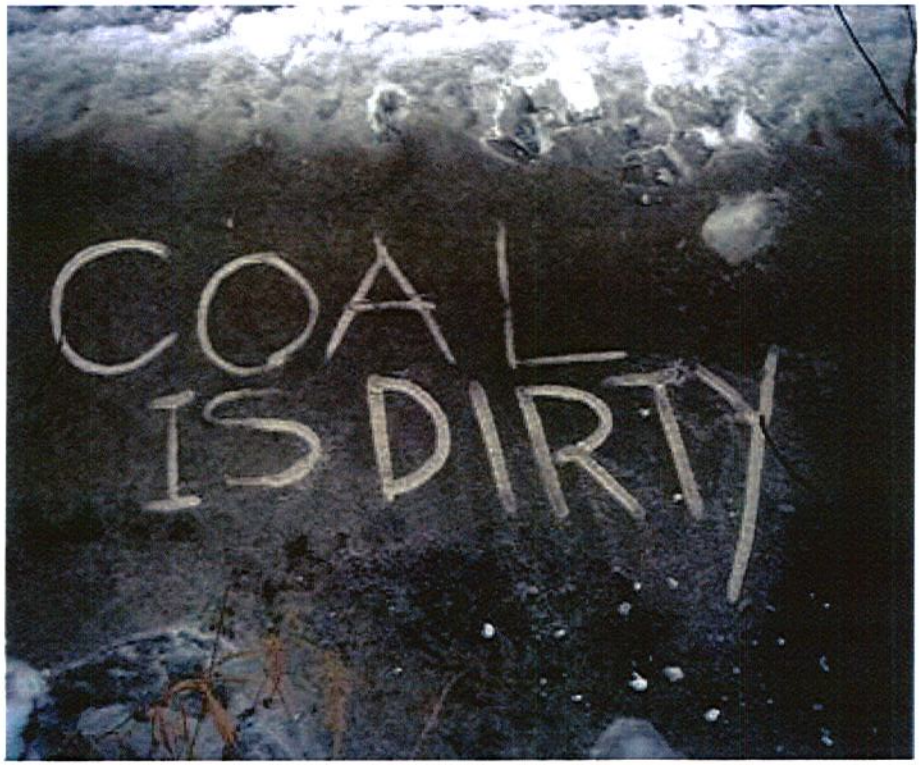


Photo credit: Russ Maddox

SIERRA CLUB

OAK 2401

Comments on the Air Quality (Chapter 4) and Coal Dust (Chapter 6) Sections of the Draft EIS for the Proposed Tongue River Railroad Company, Inc. Rail Construction and Operation in Custer, Powder River and Rosebud Counties, Docket No. FD 30186, Surface Transportation Board (STB), Office of Environmental Analysis (OEA)

By

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Introduction

The Draft EIS attempts to analyze the potential environmental impacts of the Tongue River Railroad Company's (TRRC) October 2012 revised application to the STB requesting authority to construct and operate a rail line in southeast Montana. In TRRC's December 2012 supplemental application, TRRC identified its preferred route for the proposed Tongue River Railroad as the 42-mile Colstrip Alternative, which would travel between Colstrip, Montana, and the Ashland/Otter Creek areas of Montana. The Draft EIS purportedly analyzes the environmental impacts of the proposed rail line and alternatives, including the No-Action Alternative.

These comments specifically focus only on the Air Quality and Coal Dust impacts of the proposed action and on how these impacts affect the interests of the Northern Cheyenne Tribe (hereafter "Tribe"). As the Draft EIS notes, "[T]he Northern Cheyenne Indian Reservation borders the west side of the Tongue River in the project area near Ashland."[2] In addition, the mines that would be the source of coal for the proposed action would also be located very close to the Tribe's western boundaries.[3]

[1] Resume provided in Attachment A.

[2] See file _Introductory_Material.pdf, p. 28.

[3] See file _Introductory_Material.pdf, p. 36 (S-10, Figure 2).

As detailed below, there are numerous flaws and unsupported assumptions in the STB's analysis of the potential adverse air quality impacts in the project area. As a result, it appears that the STB has seriously understated the potential impacts to air quality on the Northern Cheyenne Reservation, which is a Class 1 airshed.

General Comments

[A] The Draft EIS Improperly Characterizes the Impacts from Air Quality and Coal Dust Due to the Project

In the Abstract, describing the proposed action, the STB states that:

> "TRRC proposes to construct and operate a 42-mile rail line (the Colstrip Alternative) between Colstrip, Montana and the Ashland and Otter Creek areas of Montana. The Board's Office of Environmental Analysis (OEA) and the cooperating agencies have prepared this Draft Environmental Impact Statement (EIS), which analyzes the environmental impacts that could occur if TRRC were to construct and operate the proposed rail line. This Draft EIS analyzes the environmental impacts of ten build alternatives and the No-Action Alternative. Any of the build alternatives could have minor to highly adverse impacts on the following resources: transportation, greenhouse gases and climate change, noise, biological resources, water resources, visual resources, cultural and historical resources, land resources, geology and soils, socioeconomics, and environmental justice. All other resources would experience negligible impacts. OEA has included draft recommended mitigation measures in this Draft EIS. These mitigation measures will be considered by the Board as potential conditions if the Board decides to grant TRRC authority to construct and operate the rail line."[4]

We note that the Abstract quoted above, by not including "Air Quality" or "Coal Dust" among the resources that could have "minor to highly adverse" impacts, indicates that these would have "negligible" impacts. As detailed below, this characterization of both the Air Quality and the Coal Dust impacts due to the project as "negligible" is based on numerous unsupported and optimistic assumptions in the analysis by the STB/OEA.[5] Specifically, the STB has not properly

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[4] *Ibid.*

[5] I recognize that, all of its flaws notwithstanding, the Draft EIS does admit that air quality impacts from its cumulative assessment (i.e., including the project and the identified 18 or so other projects whose impacts would likely coincide in time/space) are not negligible:

> "OEA determined that the cumulative impacts of the proposed rail line and the other projects that OEA identified <u>could affect</u> grade-crossing safety, grade-crossing delay, <u>air quality</u>, greenhouse gases and climate change, biological resources, water resources, visual resources, cultural resources, geology and soils, paleontological resources, land use and recreation, energy resources, and socioeconomics." (emphasis added) See file _Introductory_Material.pdf, p. 24-25 (Q&A-14/15).

assessed air quality impacts to lands and resources (including agriculture, water quality, recreation, etc.) belonging to and affecting the Tribe.[6]

[B] The Entire Air Quality Analysis in the Draft EIS is Inappropriately Censored by Reliance on the Board's "Thresholds"

In the Draft EIS, the STB discusses the impacts from trains that will be transporting coal as a result of this proposed action and states that:

> "OEA used a computer model to predict where the trains from the proposed rail line would travel and to identify rail lines that would experience an increase in rail traffic. The model identified segments of rail where the volume of traffic could increase beyond the Board's thresholds for environmental analysis (an increase of eight trains per day or more for areas in compliance with national air quality standards and an increase of three trains per day or more for areas not in compliance with national air quality standards). OEA analyzed the potential environmental impacts that could occur on these rail segments due to increased rail traffic."[7]

I note that the Draft EIS does not include any discussion or support (that I could find) which justifies the Board's threshold (i.e., an increase of eight trains per day or more for areas in compliance with national ambient air quality standards (NAAQS) and an increase of three trains per day or more for areas not in compliance with NAAQS). It is not clear how these thresholds were established. Specifically, it is not clear which of the several NAAQS were controlling in establishing these thresholds – i.e., the PM2.5 NAAQS, the PM10 NAAQS, the CO NAAQS, the NOx NAAQS, or some other NAAQS. Clearly, assumptions on the emissions of pollutants (from the locomotives) as well as from coal dust, brake wear dust and re-entrained track-side dust would be fundamental to and foundational to establishing these thresholds.

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[6] In fact, the analysis misleads in its likely impacts on the Tribe. For example, in Chapter 4, page 4-8, the Draft EIS states that "[N]one of the build alternatives would pass through Lame Deer or the Northern Cheyenne Reservation." While that may be true as a factual matter, in context, it appears to imply that therefore there should not be air quality impacts on the Tribe. This is highly misleading. Several of the route alignments are located immediately adjacent to the Tribe's boundaries; as such, there are likely to be significant adverse air quality impacts on the Reservation, both during construction and operation of the project.

[7] See file _Introductory_Material.pdf, p. 14 (Q&A-4)

The entire analysis in the Draft EIS is flawed because of reliance on these unsupported "thresholds." As the Draft EIS states:

> "OEA assessed the potential environmental impacts that could occur because of increased rail traffic on rail lines that would experience an increase beyond the Board's thresholds for environmental analysis. This Draft EIS does not consider impacts on rail lines that would not experience a net increase in rail traffic because of construction and operation of the proposed rail line or that <u>would experience an increase less than the Board's thresholds for environmental analysis</u>."[8] (emphasis added).

Thus, since the Draft EIS clearly relies on these "thresholds," and only considers those rail alternative routes/volumes that exceeded these "thresholds," the manner in which these "thresholds" were established, along with all supporting details, including all calculations and assumptions should be provided for public review. As it stands, by not providing this basic detail, the Draft EIS lacks adequate transparency.

[C] The Analysis is Not Transparent Due To Its Reliance on the Integrated Planning Model

Further, on this point, the Draft EIS relies on the Integrated Planning Model (IPM)[9] to determine the various rail route alternatives and volumes[10] (before censoring them as discussed above).

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[8] See file _Introductory_Material.pdf, p. 22 (Q&A-12)

[9] See, for example, file _Introductory_Material.pdf, p. 21 (Q&A-11), as follows:

> "[B]ecause there were so many variables that needed to be considered to determine where the trains would move, OEA used a computer model called the Integrated Planning Model (IPM). The model determines the least overall cost for meeting U.S. electric demand. In determining the least cost solution, IPM identifies where each coal plant obtains the coal that it consumes and how much it will consume. The model determines the amount of coal and thus the number of trains needed to transport the coal. <u>Inputs to the model included coal production and transportation costs, national and international coal distribution patterns, and economic and regulatory uncertainties such as low natural gas prices and carbon dioxide emission regulations that could affect coal markets in the future</u>." (emphasis added)

[10] For example, the Draft EIS notes that:

> "[T]he estimated coal dust emission rates were based on the maximum estimated train traffic for any scenario to provide a conservative estimate (high production scenario, southern alternatives, 26.7 trains per day…" (internal citations omitted). See Appendix G, p. G-11.

Yet, there is no discussion in the Draft EIS regarding this model and whether the myriad assumptions made in its implementation are appropriate or reliable. For example, there is little discussion on any calibration or back-testing that may indicate or shed light on the reliability of the IPM results.

Therefore, all of the general and specific issues discussed below relating to Air Quality and Coal Dust impacts to the Tribe are underpinned by these two basic and unsupported assumptions – namely on the use of the IPM model with no discussion as to its reliability in the current context; and the further censoring of the IPM output routes/volumes using the unsupported Board's "thresholds." The validity of Draft EIS is significantly compromised due to the lack of discussion and transparency on these two issues. The STB should consider reissuing the Draft EIS, correcting these major deficiencies.

The above notwithstanding, we provide the following additional general comments.

[D] The Overall Assessment of Air Quality Impacts is Simplistic

Summarizing the results of its Air Quality analysis (excluding climate change impacts), the Draft EIS states that:

> "OEA modeled the potential effects of the proposed rail line on air quality in the project area. OEA found that construction and operation of the proposed rail line would not cause the concentrations of nitrogen dioxide, carbon monoxide, lead, particulate matter, or sulfur dioxide in the air to exceed the national standards for air quality. The addition of the project-related trains to existing rail traffic could adversely affect air quality along some existing rail lines outside of the project area, but would not cause concentrations of pollutants in the air to exceed national standards."[11]

I note that the air quality impacts on the resources of the Tribe were not specifically addressed in the DEIS – which seems to focus entirely on NAAQS compliance in the "project area" as the only end point of the air quality analysis.

This estimate of 26.7 trains per day, which is noted to be "conservative" and is widely used as such as a basic input in estimating "maximum" impacts is itself simply an output of the IPM, including all of its assumptions and uncertainties.

[11] See file _Introductory_Material.pdf, p. 15-16 (Q&A-5-6)

For reasons that are discussed below, this is a major (and likely fatal) shortcoming of the entire analytical framework of the DEIS – affecting all of the impacts analyses and not just that for Air Quality. By assessing the Air Quality impacts "in the project area" but not specifically on the resources of the Tribe, in effect, the analysis assumes that impacts throughout the "project area" are of equal importance.

This (implicit) assumption is false. Impacts are not the same everywhere in the "project area." That is, the same level of predicted air quality (i.e., concentrations of specific pollutants derived from modeling) even assuming the stated modeling was done correctly from a technical standpoint (which we specifically do not believe or concede) can have different impacts at different locations. We note that the Tribe's lands are designated as a Class I area, deserving of special protection for numerous air quality related values, including visibility, haze, and deposition.

As an example, let's say that the predicted (i.e., modeled) maximum concentration of PM10 adjacent to a certain build alternative is X ug/m3. Let us further assume that X is smaller than the NAAQS for PM10 in this instance. One possible conclusion from this analysis is that the impact is therefore "negligible" (from a NAAQS compliance standpoint). Yet, the predicted concentration of PM10 (and its constituents, say toxic metals) could be deposited into the Tongue River, which is adjacent to certain of the build alternatives. And, as a result, this deposition could adversely affect the ability to fish, swim, or recreate in the river. From this latter standpoint, the predicted PM10 concentration is no longer a "negligible" impact. Thus, context matters. NAAQS is not the only attribute that is appropriate for the air quality assessment. And, specific locations within the "project area" matter. The air quality analysis presented in the Draft EIS does not distinguish or consider such distinctions. As a result, it draws simplistic and incorrect conclusions.

[E] The Coal Dust Impacts Analysis is Not Reliable Since the Input Source Term Quantifying Coal Dust Emissions Is Not Reliable

With regards to coal dust and its effect on human health, the Draft EIS states that:

> "OEA analyzed the risks of airborne coal dust and determined that exposure would be within applicable standards and guidelines. The aggregate concentration of all types of particulate matter, including airborne coal dust, would be below air quality standards for particulate matter. OEA also analyzed how coal dust could affect human health if it were to be ingested by humans or to make its way into soil or water. OEA found that the concentrations of all of the chemical components of coal dust would be below the screening levels for human exposure in soil, dust, water, and fish. OEA concluded that coal dust from rail cars on the proposed rail line would not affect human health."[12]

I disagree with this analysis and conclusion. The entire coal dust analysis is dependent on a correct assessment of the source(s) of the coal dust due to the project – i.e., the coal dust that is not only directly emitted from the rail cars themselves (and which can become airborne and then disperse and deposit not just adjacent to but throughout the project area) but also that which is re-entrained as a result of the passage of trains affecting trackside dust which will accumulate over time. I have significant concerns with how each of these "source" terms has been handled in the analysis. For example, as discussed below, re-entrainment of coal dust is not analyzed at all.[13] Based on my concerns, I do not believe that the analysis is appropriate. Thus, I do not believe that the conclusions of the analysis can or should be relied upon.

The Draft EIS also states as follows, with regards to coal dust and its impacts on surface waters:

> "OEA analyzed the potential effect of coal dust from rail cars on the proposed rail line that could make its way into surface waters. OEA found that coal dust constituents in surface water would be below screening levels for ecological exposure, except for barium. The conservative analysis assumptions overestimate the amount of barium that would actually be found in surface waters such that actual barium concentrations would be lower and below screening levels."[14]

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[12] See file _Introductory_Material.pdf, p. 16 (Q&A-6)

[13] See Chapter 4, p. 4-14.

[14] See file _Introductory_Material.pdf, p. 17 (Q&A-7)

Again, as with the impacts on human health from coal dust, as discussed above – the key driver of the surface water impact analysis is the proper assessment of the "sources" of coal dust. In this regard, I show that the analysis falls short – thereby making any conclusions unreliable.

[F] The Draft EIS Improperly Attempts to Dismiss Predicted Significant Impacts

As a general flaw, at times when the predicted impacts are above corresponding thresholds and thus inconvenient, the Draft EIS minimizes such results of significance by claiming, without support or discussion, that the underlying analysis "overestimates" these impacts and that actual impacts would be lower. I provide two such examples.

First, in discussion the level of barium (present in coal dust) impacts to surface waters, the Draft EIS states:

> "OEA also found that estimated concentrations of coal dust in soil, sediment, and surface water would be below screening levels for ecological exposure, with the exception of barium in surface water. OEA's analysis, however, overestimated the amount of barium that would actually be found in surface waters so that actual barium concentrations resulting from the proposed rail line would be lower and below screening levels."[15]

Second, in relation to the impacts of NO2, which even the STB's analysis in the Draft EIS shows will result in an exceedance of the NAAQS, the Draft EIS states:

> "The modeling results indicate that the 1-hour NO2 standard also would be exceeded for the medium production scenario in 2023 (for the northern and southern alternatives) and the high production scenario in 2037 (for the southern alternatives only). The AERMOD model has been documented in a number of studies to over-predict the highest 1-hour NO2 concentration from 1.7 to 2 times the observed concentration (RTP Environmental Associates 2013, American Petroleum Institute 2012, Golder 2011). Therefore, anticipated maximum 1-hour NO2 concentrations would be expected to be less than the modeled levels. The maximum modeled 1-hour NO2 concentrations would not exceed the NAAQS in any analysis year with a downward adjustment for this model bias."[16] (internal citations omitted)

[15] See file _Introductory_Material.pdf, p. 39 (S-13).

[16] See Chapter 4, p. 4-17 through 4-18.

These are misleading characterizations and should be struck from the Draft EIS. If the STB/OEA believes that its analysis overestimates a predicted impact, it should provide specifics of how and why this overestimate occurred rather than vague and unquantified references to overestimation and bias.

The STB should then correct or not include such overestimate. Or, the STB should provide its analysis of what it believes the "actual" (as opposed to the overpredicted) impact will be. But, in reality, no one – not even the STB – can provide an analysis of the "actual" future impact. That is why analyses rely on predictions. And, predictions can include, with good reason, conservative assumptions. That is not because the goal is to inflate a future impact – it is simply a prudent practice in order to accommodate the many unknowns inherent in a predictive analysis that can result in underestimating impacts.

For example, as the STB notes and as I discuss above, much is unknown and unknowable about how the various rail alternatives were developed in the first place. Models used at every stage of the analysis rely on myriad assumptions – not all of which are "conservative" leading to only high levels of impacts.

In the first example above the analysis in the Draft EIS does not include the quantitative impacts of train derailments and the resultant spillage or vast quantities of coal directly into the Tongue River or into its feeder streams or near its banks and thence to the waters of the river. Should that occur, it is certain that not only barium but most other dust/metal impacts to water (and sediments) would be large, persiatent and therefore significant – directly affecting the Tribe in a most adverse manner. Nor can the STB assure that such derailments will never occur in the future. No one can. For example, well publicized derailments in the Powder River Basin have occurred in the recent pass and there cannot be guaranteed assurances by anyone, much less the STB, that they will not occur in the past.

In the second example above, the Draft EIS notes overestimation by AERMOD but does not discuss underestimation of the emission rates used. For example, actual emissions rates from locomotive and other equipment are affected by deterioration of the underlying equipment. It is not unheard of that equipment sometimes do not meet respective standards. This is especially

true of mobile equipment. Therefore, by using emission rates corresponding to the standard, the analysis assumes 100% compliance with standards, which is not a conservative assumption.[17] Use of higher non-compliant emission rates, such as may occur in practice, will result in higher, not lower impacts.

And, in addition, the analysis for NO2 compares the estimated concentrations to the NAAQS today. NAAQS are subject to change (and have generally been subject to downward revisions). If in the future, the NAAQS becomes lower then the predicted impacts would be even greater on a relative basis.

For all of these reasons, the STB should, at the very least, not mischaracterize the results of its own analysis. The public is entitled to a straightforward, transparent, assessment and interpretation of impacts – not a qualitative, backdoor, misleading, revisionist interpretation of the analysis – when the results are inconvenient.

[G] Conclusion

As detailed above, there are significant basic flaws with the overall analytical framework for the air quality analysis in the Draft EIS. Unless corrected or properly supported, any additional "analyses" which rest on these basic framework assumptions cannot lead to reliable conclusions. Nonetheless, I point out some of the additional issues and technical shortcomings in the Air Quality and Coal Dust analyses as presented in the Draft EIS.

[17] The analysis does not contain any information regarding the level of compliance of the many current locomotive in the BNSF fleet with applicable standards. It is therefore an implicit and unsupported non-conservative assumption that all of the locomotives in the fleet are and will comply with their respective standards at all times.

Specific Comments on Air Quality

In addition to the General Comments above, I provide the following specific comments on the Air Quality analysis presented in the Draft EIS in this section.

[A] Construction Impacts Are Not Temporary And Are Not Demonstrated To Be Negligible

The Draft EIS's own estimates of construction fugitive dust (i.e., PM10, as an example), as shown in Tables 4-11 or 4-12 show that emissions of PM10 will be thousands of tons per year, depending on the alternative considered. For the Decker alternative, using 12 month construction schedule, for example, emissions are 2,583 tons per year.

Yet, the Draft EIS concludes that:

> "In summary, air pollutant emissions during construction would be temporary and at any given time would occur only where construction is occurring or along roads traveled by construction vehicles. Pollutant concentrations during construction are expected to remain within applicable air quality standards…. OEA concludes that construction and operation impacts would be negligible."[18]

I believe that characterizing construction emissions as "temporary" is misleading when, in fact, depending on the build alternative/production scenario, construction could last for 3 to 6 years, the former on a year round basis.[19] While this may be "temporary" only in the sense that it will not last for decades, anything that lasts for multiple years is hardly "temporary." I suggest the Draft EIS remove references to "temporary" in this context due to its erroneous implication.

I also disagree with the STB's statement that "concentrations during construction are expected to remain within applicable air quality standards." Here again, the truth of that statement depends on when and where the NAAQS or MAAQS assessments are conducted. It is clear that ambient air will be affected adversely by construction activities. Even though the most significant impacts will occur within and adjacent to the railroad right-of-way and along roads supporting

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[18] See Chapter 4, p. 4-1. See also Section 4.5.1.1, p. 4-13.

[19] See Appendix E, Table E.1-104.

construction, many of the NAAQS and MAAQS have very short averaging times,[20] such as the hourly MAAQS for NO2, ozone, sulfur dioxide, and hydrogen sulfide; hourly NAAQS for ozone; 3-hour average NAAQS for sulfur dioxide; 8-hour average NAAQS for carbon monoxide and ozone; 8-hour average MAAQS for carbon monoxide; 24-hour average NAAQS for sulfur dioxide, PM10, and PM2.5; and 24-hour average MAAQS for sulfur dioxide and PM10.

The emission calculations presented in the Draft EIS simply do not provide enough details for each of the pollutant emissions on very short-term basis so that the short term NAAQS and MAAQS can be properly assessed. Construction emissions are discussed in Section E.1.5 in Appendix E of the Draft EIS.[21] However, none of the emissions summary Tables E.1-109 through E.1-128 show the maximum hourly construction emissions for any of the alternatives. While Tables E.1-120, E.1-121, and E.1-123 show the estimated daily emissions, that is not sufficient to analyze impacts on a still-smaller time scale.

Thus, based on a lack of emission estimates, coupled with similar lack of modeling for short term impacts, there is no basis to conclude that all construction impacts will be "negligible" even when the assessment is purely limited to that of NAAQS and MAAQS compliance.

In addition, I disagree with the STB's suggestion that the only meaningful impact of construction impacts is comparison with NAAQS and MAAQS. I am particularly concerned with the impacts on the Tribe's lands and the Tongue River (which is a critical resource for the Tribe) due to deposition of emissions from the construction phase on many of the potential alternatives such as portions of the Decker, Tongue River, and even Colstrip alignments. I did not see any specific assessment of such impacts on the Tribe in the Air Quality section.[22]

Finally I note that construction impacts will be occurring along with many other projects as discussed in the cumulative analysis. These will be additive and further exacerbate impacts on

[20] See Chapter 4, Table 4-2, p. 4-7.

[21] I note that many of the Tables in this section reference "Table E.1-177" which does not exist . See, for example, FN1 to Tables E.1-89. E.1-90, E.1-91, E.1-92, E.1-93, and E.1-94.

[22] In fact, a search of the words 'Tribe" or "Cheyenne" for the entire Air Quality section Appendix E, where the details of the analysis are presented, did not result in a single instance of these words. Thus, the Air Quality analysis is deficient since it did not conduct any specific and particular analysis of impacts on the Tribe's resources.

the Tribe's resources. These cumulative impacts during construction have not been properly quantified or assessed.

[B] Construction Impacts Rely on Information Provided By TRRC That Are Unverifiable

Construction air quality impacts for all alternatives other than Colstrip rely on ratios such as those listed in Appendix E, Table E.1-105 (which, in turn appear to be based on earthwork volumes listed in Table E.1-106), which were provided by TRRC. However, no details as to how these earthwork volumes were estimated or calculated and the underlying assumptions that were made in arriving at these ratios are not provided anywhere in the Draft EIS.

Even assuming that the details provided by TRRC relating to the Colstrip alternative are correct[23] – and this too is unveriable as presented in the Draft EIS – the assessment of construction impacts for all of the other alternatives rests on the ratios of these unverifiable earthwork volumes from TRRC.

Thus, using these unverifiable earthwork volumes constitutes an act of faith. The Draft EIS should provide the underlying cut/fill drawings along each alignment and similar documention which presumably provide the basis of the earthwork estimates received from TRRC.

[C] The Air Quality Analysis Improperly Limits the Study Area

Addressing the study area, the Draft EIS states that:

> "Potential impacts on *criteria pollutant* concentrations relative to the National Ambient Air Quality Standards (NAAQS) and Montana Ambient Air Quality Standards (Montana AAQS) would be negligible beyond the immediate vicinity (less than 1 kilometer) of the rail line right-of-way, so detailed air quality modeling for the NAAQS assessment is limited to this smaller portion of the study area."[24]

[23] See, for example, details provided in Appendix E, Tables E.1-89, E.1-103, E.1-92, E.1-108, etc. showing the list of equipment that will be required,equipment sizes, equipment fuel consumption rates, and the expected annual hours of operation of the each type of equipment.

[24] See Chapter 4, p 4-2.

I know of no empirical reasons or any laws of nature that would justify constraining the study area for the entire air quality analysis to just the immediate vicinity – i.e., less than 1 km of the rail line right of way. I note again that the impact of air quality is not just felt in its effect on the NAAQS and MAAQS; additional impacts will occur due to deposition and transport of pollutants away from this immediate area during construction and during actual operation. For example, emissions of PM2.5 will likely travel far from just the vicinity of the rail line. So will emissions from gaseous pollutants such as NOx. Of course, any deposition onto adjacent roads and/or the Tongue River can be further dispersed and transported away from the immediate vicinity via secondary processes. Thus, there is no justification to handicap the entire analysis by severly constraining the study area as noted above. This conceptually unsupported assumption is a fatal flaw.

[D] Fugitive Dust Control Levels Are Unsupported

Appendix E, Table E.1-107 shows uncontrolled and controlled emission factors for fugitive dust for PM10 and PM2.5. In each case, the control efficiency based on 'watering" is assumed to be 50%. However, no basis is provided for this assumption.

Dust control via watering is subject to many variables, not limited to: the quantity of water used; the manner in which the water is applied to the activity causing the dust, including proximity of the watering equipment; the type of atomization used; the size distribution of the water droplets; and the training of the operators.

Thus, a control efficiency of 50% is not automatically guaranteed without much more detail. The Draft EIS does not provide any support for assuming the 50% control efficiency used in its emission estimates. Thus, the estimated emissions, just from this standpoint alone, are unsupported and too high.

[E] The Use of Wind Speeds From The Birney Station May Not Be Conservative

The Draft EIS states that:

> "[T]he average wind speed at Birney (2.3 meters per second, about 5.1 mph) is lower than at Miles City (4.4 meters per second, about 9.9 mph). Use of the lower

> wind speed at Birney results in a more conservative analysis (higher pollutant concentrations) than the higher wind speed at Miles City. Accordingly, OEA used the data from the Birney station for the air quality analysis."[25]

While the use of the lower wind speed may result in a more conservative analysis from a dispersion modeling standpoint, these lower wind speeds, if used for the emissions calculations from various sources of fugitive dust will not result in conservative emissions estimates. Since emissions estimates are critical inputs to the dispersion modeling analysis, in addition to the meteorological data such as wind speeds, the overall impact of using lower wind speeds – both for emission estimates and for dispersion modeling – cannot be discerned. The Draft EIS should fully clarify this issue.

[F] The Analysis Does Not Use Appropriate Coal Particle Size Distributions

The particle size distribution of the coal that will be emitted as dust, and also from spillage and reentrainment of previously deposited dust is an obviously critical parameter in the air quality impacts analysis. Since large particles are expected to deposit closer to the source or activity while smaller particles will travel much farther, it is important to establish the proper size distributions for the coal particles.

Additionally, PRB coal is known to be highly friable,[26] subject to breakage under many factors. Thus, the particle size distribution of PRB coal in the rail cars, which is subject to vibration, settling, abrasion, etc., is an important aspect of the inputs to the analysis.

However, the entire Draft EIS analysis relies on unsupported particle size distribution data not from the PRB but from Australia – with no discussion whatsoever as to why the characteristics of Australian coals are relevant to the current analysis. In Table E.1-42, the PM10 and PM2.5 fractions of coal are assumed to be 45% and 8.6% of TSP, respectively, referencing work from Australia. Although there is additional discussion of this in Appendix E, Section E.2.3.2, that discussion provides even less assurance for this assumption. In fact, the additional discussion in

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[25] See Chapter 4, p. 4-6.

[26] See, for example, http://krtcommodities.com/files/PRB%20COAL%20DEGRADATION.pdf.

Section E.2.3.2 provides no comfort that the assumed size fractions have any resemblance to that from PRB coals:

> "Ideally, the characterization of the particle size distribution for the proposed rail line could be improved by matching the coal characteristics of the coal that TRRC would haul with one of the 11 coals assessed in the Katestone Scientific (2000) study (Table E.2-1). <u>However, the coal characterization information on these 11 coal types is not available</u>."[27] (emphasis added)

As to the larger sized particles, whose dispersion was not modeled, the Draft EIS states:

> "The majority of the coal dust particles are large (greater than 250 microns) and deposit quickly after being lifted from the moving train, and therefore, would be deposited within 5 meters (16 feet) of the rail line and would not contribute to nuisance impacts beyond the right-of-way. OEA estimated that these large coal dust particles would account for about 62 percent of the total mass of coal dust emitted from rail line operation."[28]

The analysis provides no citations or support for any of the assumptions excerpted above – such as the fact that "majority of the coal dust particles are large (greater than 250 microns)," that these particles would be "deposited within 16 feet of the rail line,"[29] or that these particles "account for about 62 percent of the total mass of coal dust." Without supporting documentation for these assumptions, there is no basis to assess the accuracy of the coal dust dispersion analysis in the Draft EIS.

In summary, the particle size distributions assumed in the analysis – both for the larger fractions and for the smaller fractions – are simply unsupported.

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[27] See Appendix E, p. E-133.

[28] See Chapter 4, p. 4-18.

[29] If, as the Draft EIS contends that no particles greater than 250 microns have been ever found more than 16 feet of a rail line in the PRB, it should provide documentary proof of this patently absurd assumption.

Specific Comments on Coal Dust

[A] Coal Dust Emissions Are Significantly Underestimated

OEA has concluded that coal dust from trains on the proposed rail line would not harm human health or the environment.[30] This is not supported by the analysis presented. As presented, the total TSP, PM10, and PM2.5 emissions due to coal dust, even for the high production scenario range from several hundred tons per year (depending on route alternative) for TSP to several tens of tons per year for PM2.5.[31] For the Decker alternative in this high production scenario, which I will use as an example, this table shows TSP emissions of 168.3 tons/year due to wind driven emissions from the tops of the loaded rail cars.

I note that these emission estimates appear to be quite low. For example, in a presentation to members of the STB Board in 2009, BNSF indicated that coal dust emissions from the tops of rail cars are 600 pounds per car over a 400 mile route.[32] Thus, for the Decker alternative (distance 51.1 miles[33]), the per car emissions from the top should be around 76 pounds. Using the Draft EIS assumption of 125 cars per train,[34] the coal dust emissions from the top would be 4.79 tons per train. Per the Draft EIS, in the high production scenario this southern alternative would have 26.7 trains per day.[35] Thus, the daily emissions of coal dust from the loaded car tops should be 26.7 times 4.79 or 127.9 tons per day. Annually, therefore, emissions for Decker/High Production should be 46,687 tons per year. Compare this to the 168.3 tons/year used in the analysis.[36] The value used in the analysis is 277 times smaller.

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[30] See Chapter 6, p. 6-1.

[31] See Chapter 4, Table 4-19.

[32] http://www.scribd.com/doc/129350651/Surface-TransMinutes-9-10-09-1

[33] See _Introductory_Material.pdf, Table 1, p. S-6.

[34] See Appendix E, Table E.1-1.

[35] See Appendix E, Table E.1-5.

[36] Even if I make the assumption that BNSF's statement to the STB Board in 2009 referred to uncontrolled emissions (i.e., before the use of any load shaping and application of topper agents) and using the BNSF-claimed 85% reduction as a result of these mitigations, I arrive at an annual emissions estimate for the Decker/High Production alternative of 46,687*(1-0.85) or 7003 tons/year – which is over 41 times the value used in the analysis.

This analysis indicates that that the calculated estimates for the coal dust projected to be emitted in the Draft EIS are grossly inaccurate. If the estimated emissions are hundreds of times smaller than what BNSF itself has reported, then the rest of the impact analysis is, plainly, wrong.

Moreover, I note that the Draft EIS estimates for coal dust are riddled with several critical assumptions – none of which are supported or even properly discussed in the Draft EIS. For example:

- On page E-43, the emission factor equation for coal dust used in the analysis is shown. It includes, as an important input variable, the train speed in km/hr. While the Draft EIS "anticipates that average operating speeds would range from 29.7 to 39.5 miles per hour, depending on the build alternative and whether the train is loaded or empty…,"[37] the specific assumed speed(s) used in the calculations for each build alternative/line are not stated further in this section or anywhere else the Draft EIS to the best of our knowledge.

- Again, with regards to the the emission factor equation for coal dust noted above, it is attributed to Connell Hatch 2008, Witt et al. 1999, and Ferreira et al. 2003. As far as I could determine, none of these studies involved PRB coal. In fact, as the Draft EIS explicitly states, "[M]uch of the basis for the coal dust emissions is based on research conducted in Australia by government agencies, academics, and the Australian Rail Track Corporation over the past 10 years."[38] It is therefore unclear why this equation, based on Australian coals, without any further adjustments, is relevant or representative of coal dust emissions from trains and rail cars carrying PRB coal. This is a critical assumption, used without any discussion at all in the analysis.

I understand that BNSF has claimed to be studying coal dust emissions (albeit for ballast related issues and not environmental impacts, per se) for the last decade.[39] Therefore, it is not clear why

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[37] Draft EIS, Chapter 2, Section 2.3.

[38] See Appendix E, p. E-130. See also, discussion in Section E.2.3.1, beginning on p. E-132.

[39] On its website, BNSF states that

> "[S]ince 2005, BNSF has been at the forefront of extensive research regarding the impacts of coal dust escaping from loaded coal cars on rail lines in the Powder River Basin (PRB), which is located in Wyoming and Montana. From these studies, BNSF has determined that coal dust poses a serious threat to the stability of the track structure and the operational integrity of our lines in,

actual data on PRB coals (including properties, dust emissions, etc.) from these BNSF studies themselves were not used in the analysis to estimate the source term in the coal dust analysis. The analysis does not critique the prior BNSF work in order to justify its rejection and use of the Australian-coal based data.

While ignoring any PRB-related data developed by BNSF as a starting point, the analysis freely uses the BNSF-based control efficiency of 85% (a combination of 50% due to coal shaping in the rail car and an additional 70% due to the use of BNSF-approved topper agents) to reduce its estimate of predicted emissions. See Table E.1-42. However, the public record does not contain any details or underlying data as basis for any of these control efficiency assumptions. Other than a brief public summary by BNSF simply reporting the results but none of the underlying data, these critical control efficiency assumptions are not documented anywhere in the Draft EIS.

[B] Coal Dust Emissions Calculations Do Not Include Reentrainment Emissions

In addition to the significant underestimation noted above, the emissions calculations (and later modeling) for coal dust do not seem to account for re-entrainment of coal dust previously deposited trackside or in adjacent right-of-ways.[40] Smaller sized particles including PM10 and fine particulate matter including PM2.5 are readily resuspended when a train passes; thus these emissions should have been included in the emissions calculations. As a result of their omission, the estimated emissions (which are also then used in the modeling analysis) are underestimated. This should be corrected.

[C] Impacts Analyses Contain No Uncertainty Analyses

In Appendix G, neither the human impacts analysis nor the ecological impacts analysis contains a discussion of the uncertainties inherent in these analyses. It is customary to include a discussion of such uncertainties in any health or ecological risk assessment. Given the numerous

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> and close to, the mines in the PRB. The STB, our regulating agency, has confirmed that coal dust is a harmful contaminant of rail ballast. Tests have shown that dusting events from untreated cars occur with the most frequency close to the mine loading points in the PRB and materially decrease as the railcars move further from the PRB."

See http://www.bnsf.com/customers/what-can-i-ship/coal/coal-dust.html.

[40] See Appendix E, Section E.2.1, p. E-131.

assumptions and unknowns associated with human and ecological risk assessments in general, results of such assessments are accompanies by a discussion of uncertainties in order to provide appropriate context to the reader. Without the discussion on uncertainties, readers can often misinterpret the results (i.e., the predicted risks) of such assessments. The Draft EIS should therefore include such uncertainty analyses.

[D] Estimation of Trace Element Concentrations in Coal Dust Are Improper

In Appendix G, Section G.2.1, the Draft EIS states that:

> "OEA included in the exposure assessment each of the trace elements that had measured values in the composite data. To obtain a single concentration value for each trace element, OEA averaged the concentrations of each chemical in each workbook. Then, if the element was reported in both workbooks, OEA averaged the two averages into an overall average concentration (Table G-1)."

The Draft EIS should disclose why the STB used averaging (or even double averaging, as discussed above) instead of the more customary use of maximum values, particularly given the "screening" nature of the overall assessment and the fact that the underlying coal properties database is not discussed other than the results were from 2004.[41] The Appendix does not discuss where the samples originated from (i.e., from just the Otter Creek Mine area, the other mines that could also be developed as a result of this project, or elsewhere); how the samples were obtained; or how representative the samples were in relation to the coal seams at the likely mines.

In view of these many questions, it is improper to simply use averages as the starting point of the analysis. Gven the fundamental flaw in this basic input, none of the subsequent "results" of the analysis, both for human as well as ecological impacts, are reliable.

[E] Composition of Most of the Topper Agents is Unknown

It is clear from the discussion of the topper agents in Appendix G that much is unknown as far as the composition of almost all of the "approved" agents. For example, the Draft EIS states:

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[41] See Appendix G, p. G-2.

> "The MSDS include wide ranges for the concentrations of some the constituents (e.g., 5 to 50 percent). In other cases, the MSDS identify some constituents as "proprietary" and provide no further information."[42]
>
> "Given that the actual chain length is not specified, the environmental fate of this topper agent is uncertain."[43]
>
> "The purpose of Soil-Sement® is to bind to soils, making it likely that the copolymer of acrylic and polyvinyl acetate will preferentially bind to soils, although given the limited information available on the composition of the product and mobility characteristics of the constituents, this is uncertain."[44]
>
> "The MSDS for AKJ CTS-100 does not provide information on ecotoxicity or chronic impacts…..The MSDS does not describe the environmental mobility of the product in air, water, and soil/sediment, but the MSDS notes that accidentally released product should not be flushed into sewers."[45]
>
> "The MSDS does not describe the environmental mobility of AKJ CTS-100C in air, water, and soil/sediment, nor does it provide information on ecotoxicity."[46]
>
> "No additional information is provided in the MSDS on the chemical components in Min Topper S+0150."[47]

Given this level of lack of knowledge of these topper agents, it is not clear why the present "analysis" is, in fact, useful at all. Unless the STB can obtain meaningful data on the constituents in these agents, it has no basis to present is findings as some sort of impact analysis. Coupled with the lack of any uncertainty analyses as noted earlier, the entire analysis is misleading and unreliable.

[F] Additional Assumptions Relating to Topper Agent Emissions are Unsupported

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[42] See Appendix G, p. G-4.

[43] See Appendix G, p. G-6. Pertaining to Nalco Dustbind Plus.

[44] See Appendix G, p. G-7. Pertaining to Midwest Soil-Sement.

[45] See Appendix G, p. G-7. Pertaining to AKJ CTS-100. In addition, this topper agent contains an unknown proprietary addition (See Table G-2).

[46] See Appendix G, p. G-8. Pertaining to AKJ CTS-100C. In addition, this topper agent contains an unknown proprietary addition (See Table G-2).

[47] See Appendix G, p. G-9. Pertaining to Mintech Min Topper S+0150. In fact, nothing useful is known about this topper agent (See Table G-2).

Continuing further, the Draft EIS states that:

> "Assuming a railcar is 480 square feet in surface area or 4,603 cubic feet in volume (BNSF Railway Company 2013) and assuming that the topper agent penetrates the top 4 inches of the coal in the railcar, the topper agent would penetrate 160 cubic feet of coal, corresponding to approximately 3.5 percent of the coal in the railcar."[48]

This statement raises numerous questions that are not addressed in the Draft EIS, including the following:

> What is the basis of the surface area of each railcar as noted above?
>
> Are all railcars assumed to have the same surface area?
>
> What is the basis of the volume of each railcar as noted above?
>
> Are all railcars assumed to have the same volume?
>
> What is the basis for assuming that any of the topper agents "penetrates the top 4 inches of the coal" as assumed above?
>
> What is the basis for assuming that any of the topper agents fully covers the <u>entire</u> exposed surface area of <u>each</u> railcar in an unit train?

Without addressing these questions with further detailed discussion of how these agents are actually applied in practice, the various assumptions above are unsupported.

[G] Coal Deposition Modeling is Fatally Compromised

With regards to coal dust deposition modeling, the Draft EIS states that:

> "OEA modeled wet, dry, and total coal dust deposition rates based on estimated rail car coal dust emissions, adjusted for the use of load profiling and topper agents for coal dust emission reduction. OEA estimated deposition rates at 10-meter intervals from the center of the rail line to a distance of 300 meters on each

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[48] See Appendix G, p. G-9.

> side of the rail line, or 60 locations (receptors). OEA evaluated particle size categories of less than 60 microns in diameter, 60 to 250 microns in diameter, and the sum of the two (i.e., all particles up to 250 microns in diameter)."[49]

It is not at all clear why the Draft EIS included as its smallest size fraction, particle size of "less than 60 microns in diameter." It is obvious that the particle sizes of concern include much smaller sizes such as PM10 and PM2.5 (for which there are NAAQS) and which are capable for being inhaled, resulting in adverse health outcomes. It is also clear that these much smaller size particles could travel much father than the assumed 300 meters distance on each side of the rail line. Unless the STB can demonstrate that none of the (very friable PRB coal dust) particles are or can be less than 10 microns or 2.5 microns, simply assuming that even the smallest particles will not travel beyond 300 meters is an unsupported assumption. Thus, I believe that the results of these deposition modeling are unreliable and should be set aside.

[49] See Appendix G, p. G-11.

Conclusions

As discussed in detail in these comments, the Draft EIS contains significant deficiencies in both the air quality and the coal dust emissions analyses.

A major and unexplained flaw that affects both sections is the apparent significant underestimation of coal dust emissions from railcars. The coal dust emissions estimates provided in the Draft EIS – relying on Australian work with no discussion as to relevance to the PRB coals that will be transported – do not approach the levels of emissions publicly stated by BNSF, the operator of the proposed project in statements to the STB. Also, the coal dust emissions estimates omit assessment of re-entrainment emissions of dust previously deposited. Since the coal dust emissions estimates are foundational inputs that feed into the air quality analyses, the results of all the air quality analyses that rely on these vastly underestimated coal dust emissions are also therefore underestimated and cannot be relied upon.

As discussed above, the air quality analysis is significantly compromised in other aspects as well, including the following: it suffers from a lack of transparency with no support for numerous assumptions including the use of the IPM Model; it improperly relies on improper and unsupported Board thresholds to censor the analysis at the outset; it does not distinguish between the Tribe's Class I area and its need for special protections versus other impacted areas; and it improperly relies on the NAAQS and MAAQS as the only appropriate comparison standards.

Based on this review, I conclude that the coal dust and air quality emissions assessments in the Tongue River Railroad Draft EIS are deeply flawed and fail to provide a reliable evaluation of the potential environmental and human health impacts from emissions of coal dust and other air pollutants.

ATTACHMENT A - RESUME

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CONSULTANT, ENVIRONMENTAL AND ENERGY ISSUES

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EXPERIENCE SUMMARY

Dr. Sahu has over twenty three years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment for a wide range of emissions sources; soils and groundwater remediation including landfills as remedy; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

He has over twenty one years of project management experience and has successfully managed and executed numerous projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public.

He has provided consulting services to numerous private sector, public sector and public interest group clients. His major clients over the past twenty three years include various steel mills, petroleum refineries, cement companies, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, and various entities in the public sector including EPA, the US Dept. of Justice, California DTSC, various municipalities, etc.). Dr. Sahu has performed projects in over 44 states, numerous local jurisdictions and internationally.

In addition to consulting, Dr. Sahu has taught numerous courses in several Southern California universities including UCLA (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management) for the past seventeen years. In this time period he has also taught at Caltech, his alma mater (various engineering courses), at the University of Southern California (air pollution controls) and at California State University, Fullerton (transportation and air quality).

Dr. Sahu has and continues to provide expert witness services in a number of environmental areas discussed above in both state and Federal courts as well as before administrative bodies (please see Annex A).

EXPERIENCE RECORD

2000-present **Independent Consultant.** Providing a variety of private sector (industrial companies, land development companies, law firms, etc.) public sector (such as the US Department of Justice) and

public interest group clients with project management, air quality consulting, waste remediation and management consulting, as well as regulatory and engineering support consulting services.

1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for** Air Quality/Geosciences/Hazardous Waste Groups, Pasadena. Responsible for the management of a group of approximately 24 air quality and environmental professionals, 15 geoscience, and 10 hazardous waste professionals providing full-service consulting, project management, regulatory compliance and A/E design assistance in all areas.

Parsons ES, **Manager for Air Source Testing Services**. Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.

1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department. Responsibilities included multimedia regulatory compliance and permitting (including hazardous and nuclear materials), air pollution engineering (emissions from stationary and mobile sources, control of criteria and air toxics, dispersion modeling, risk assessment, visibility analysis, odor analysis), supervisory functions and project management.

1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department. Responsibilities included permitting, tracking regulatory issues, technical analysis, and supervisory functions on numerous air, water, and hazardous waste projects. Responsibilities also include client and agency interfacing, project cost and schedule control, and reporting to internal and external upper management regarding project status.

1989-1990 Kinetics Technology International, Corp. **Development Engineer.** Involved in thermal engineering R&D and project work related to low-NOx ceramic radiant burners, fired heater NOx reduction, SCR design, and fired heater retrofitting.

1988-1989 Heat Transfer Research, Inc. **Research Engineer**. Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

EDUCATION

1984-1988 Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.

1984 M. S., Mechanical Engineering, Caltech, Pasadena, CA.

1978-1983 B. Tech (Honors), Mechanical Engineering, Indian Institute of Technology (IIT) Kharagpur, India

TEACHING EXPERIENCE

Caltech

"Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.

"Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.

"Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.

"Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.

“Thermodynamics and Heat Transfer,” Fall and Winter Terms of 1996-1997.

U.C. Riverside, Extension

"Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Various years since 1992.

"Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Various years since 1992.

"Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.

"Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.

"Process Safety Management," University of California Extension Program, Riverside, California. Various years since 1992-2010.

"Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.

"Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.

"Advanced Hazardous Waste Management" University of California Extension Program, Riverside, California. 2005.

Loyola Marymount University

"Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1993.

"Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.

"Environmental Risk Assessment," Loyola Marymount University, Dept. of Civil Engineering. Various years since 1998.

"Hazardous Waste Remediation" Loyola Marymount University, Dept. of Civil Engineering. Various years since 2006.

University of Southern California

"Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.

"Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

University of California, Los Angeles

"Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000, Spring 2003, Spring 2006, Spring 2007, Spring 2008, Spring 2009.

International Programs

"Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.

"Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.

"Air Pollution Planning and Management," IEP, UCR, Spring 1996.

"Environmental Issues and Air Pollution," IEP, UCR, October 1996.

PROFESSIONAL AFFILIATIONS AND HONORS

President of India Gold Medal, IIT Kharagpur, India, 1983.

Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992-present.

American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-present.

Air and Waste Management Association, West Coast Section, 1989-present.

PROFESSIONAL CERTIFICATIONS

EIT, California (# XE088305), 1993.

REA I, California (#07438), 2000.

Certified Permitting Professional, South Coast AQMD (#C8320), since 1993.

QEP, Institute of Professional Environmental Practice, since 2000.

CEM, State of Nevada (#EM-1699). Expiration 10/07/2011.

PUBLICATIONS (PARTIAL LIST)

"Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).

"Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).

"On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).

"Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).

"Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C.Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).

"A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).

"Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R.Gavalas, *Combust. Flame*, **77**, 337-346 (1989).

"Particle Measurements in Coal Combustion," with R.C. Flagan, in "**Combustion Measurements**" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).

"Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.

"Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).

"HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NOx Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

“From Puchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada,” with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

"The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants," with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

Annex A

Expert Litigation Support

1. Occasions where Dr. Sahu has provided Written or Oral testimony before Congress:

(a) In July 2012, provided expert written and oral testimony to the House Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology at a Hearing entitled "Hitting the Ethanol Blend Wall – Examining the Science on E15."

2. Matters for which Dr. Sahu has have provided affidavits and expert reports include:

(b) Affidavit for Rocky Mountain Steel Mills, Inc. located in Pueblo Colorado – dealing with the technical uncertainties associated with night-time opacity measurements in general and at this steel mini-mill.

(c) Expert reports and depositions (2/28/2002 and 3/1/2002; 12/2/2003 and 12/3/2003; 5/24/2004) on behalf of the United States in connection with the Ohio Edison NSR Cases. *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

(d) Expert reports and depositions (5/23/2002 and 5/24/2002) on behalf of the United States in connection with the Illinois Power NSR Case. *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

(e) Expert reports and depositions (11/25/2002 and 11/26/2002) on behalf of the United States in connection with the Duke Power NSR Case. *United States, et al. v. Duke Energy Corp.*, 1:00-CV-1262 (Middle District of North Carolina).

(f) Expert reports and depositions (10/6/2004 and 10/7/2004; 7/10/2006) on behalf of the United States in connection with the American Electric Power NSR Cases. *United States, et al. v. American Electric Power Service Corp., et al.*, C2-99-1182, C2-99-1250 (Southern District of Ohio).

(g) Affidavit (March 2005) on behalf of the Minnesota Center for Environmental Advocacy and others in the matter of the Application of Heron Lake BioEnergy LLC to construct and operate an ethanol production facility – submitted to the Minnesota Pollution Control Agency.

(h) Expert Report and Deposition (10/31/2005 and 11/1/2005) on behalf of the United States in connection with the East Kentucky Power Cooperative NSR Case. *United States v. East Kentucky Power Cooperative, Inc*., 5:04-cv-00034-KSF (Eastern District of Kentucky).

(i) Affidavits and deposition on behalf of Basic Management Inc. (BMI) Companies in connection with the BMI vs. USA remediation cost recovery Case.

(j) Expert Report on behalf of Penn Future and others in the Cambria Coke plant permit challenge in Pennsylvania.

(k) Expert Report on behalf of the Appalachian Center for the Economy and the Environment and others in the Western Greenbrier permit challenge in West Virginia.

(l) Expert Report, deposition (via telephone on January 26, 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) in the Thompson River Cogeneration LLC Permit No. 3175-04 challenge.

(m) Expert Report and deposition (2/2/07) on behalf of the Texas Clean Air Cities Coalition at the Texas State Office of Administrative Hearings (SOAH) in the matter of the permit challenges to TXU Project Apollo's eight new proposed PRB-fired PC boilers located at seven TX sites.

(n) Expert Testimony (July 2007) on behalf of the Izaak Walton League of America and others in connection with the acquisition of power by Xcel Energy from the proposed Gascoyne Power Plant – at the State of Minnesota, Office of Administrative Hearings for the Minnesota PUC (MPUC No. E002/CN-06-1518; OAH No. 12-2500-17857-2).

(o) Affidavit (July 2007) Comments on the Big Cajun I Draft Permit on behalf of the Sierra Club – submitted to the Louisiana DEQ.

(p) Expert Report and Deposition (12/13/2007) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case. *Plaintiffs v. Allegheny Energy Inc., et al.*, 2:05cv0885 (Western District of Pennsylvania).

(q) Expert Reports and Pre-filed Testimony before the Utah Air Quality Board on behalf of Sierra Club in the Sevier Power Plant permit challenge.

(r) Expert Report and Deposition (October 2007) on behalf of MTD Products Inc., in connection with General Power Products, LLC v MTD Products Inc., 1:06 CVA 0143 (Southern District of Ohio, Western Division)

(s) Experts Report and Deposition (June 2008) on behalf of Sierra Club and others in the matter of permit challenges (Title V: 28.0801-29 and PSD: 28.0803-PSD) for the Big Stone II unit, proposed to be located near Milbank, South Dakota.

(t) Expert Reports, Affidavit, and Deposition (August 15, 2008) on behalf of Earthjustice in the matter of air permit challenge (CT-4631) for the Basin Electric Dry Fork station, under construction near Gillette, Wyoming before the Environmental Quality Council of the State of Wyoming.

(u) Affidavits (May 2010/June 2010 in the Office of Administrative Hearings))/Declaration and Expert Report (November 2009 in the Office of Administrative Hearings) on behalf of NRDC and the Southern Environmental Law Center in the matter of the air permit challenge for Duke Cliffside Unit 6. Office of Administrative Hearing Matters 08 EHR 0771, 0835 and 0836 and 09 HER 3102, 3174, and 3176 (consolidated).

(v) Declaration (August 2008), Expert Report (January 2009), and Declaration (May 2009) on behalf of Southern Alliance for Clean Energy et al., v Duke Energy Carolinas, LLC. in the matter of the air permit challenge for Duke Cliffside Unit 6. *Southern Alliance for Clean Energy et al., v. Duke Energy Carolinas, LLC*, Case No. 1:08-cv-00318-LHT-DLH (Western District of North Carolina, Asheville Division).

(w) Declaration (August 2008) on behalf of the Sierra Club in the matter of Dominion Wise County plant MACT.

(x) Expert Report (June 2008) on behalf of Sierra Club for the Green Energy Resource Recovery Project, MACT Analysis.

(y) Expert Report (February 2009) on behalf of Sierra Club and the Environmental Integrity Project in the matter of the air permit challenge for NRG Limestone's proposed Unit 3 in Texas.

(z) Expert Report (June 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*

(aa) Expert Report (August 2009) on behalf of Sierra Club and the Southern Environmental Law Center in the matter of the air permit challenge for Santee Cooper's proposed Pee Dee plant in South Carolina).

(bb) Statements (May 2008 and September 2009) on behalf of the Minnesota Center for Environmental Advocacy to the Minnesota Pollution Control Agency in the matter of the Minnesota Haze State Implementation Plans.

(cc) Expert Report (August 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(dd) Expert Report and Rebuttal Report (September 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(ee) Expert Report (December 2009) and Rebuttal reports (May 2010 and June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(ff) Pre-filed Testimony (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(gg) Pre-filed Testimony (July 2010) and Written Rebuttal Testimony (August 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(hh) Expert Report (August 2010) and Rebuttal Expert Report (October 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Liability Phase.

(ii) Declaration (August 2010), Reply Declaration (November 2010), Expert Report (April 2011), Supplemental and Rebuttal Expert Report (July 2011) on behalf of the United States in the matter of DTE Energy Company and Detroit Edison Company (Monroe Unit 2). *United States of America v. DTE Energy Company and Detroit Edison Company*, Civil Action No. 2:10-cv-13101-BAF-RSW (US District Court for the Eastern District of Michigan).

(jj) Expert Report and Deposition (August 2010) as well as Affidavit (September 2010) on behalf of Kentucky Waterways Alliance, Sierra Club, and Valley Watch in the matter of challenges to the NPDES permit issued for the Trimble County power plant by the Kentucky Energy and Environment Cabinet to Louisville Gas and Electric, File No. DOW-41106-047.

(kk) Expert Report (August 2010), Rebuttal Expert Report (September 2010), Supplemental Expert Report (September 2011), and Declaration (November 2011) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(ll) Written Direct Expert Testimony (August 2010) and Affidavit (February 2012) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(mm) Deposition (August 2010) on behalf of Environmental Defense, in the matter of the remanded permit challenge to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(nn) Expert Report, Supplemental/Rebuttal Expert Report, and Declarations (October 2010, November 2010, September 2012) on behalf of New Mexico Environment Department (Plaintiff-Intervenor), Grand Canyon Trust and Sierra Club (Plaintiffs) in the matter of Plaintiffs v. Public Service Company of New Mexico (PNM), Civil No. 1:02-CV-0552 BB/ATC (ACE). (US District Court for the District of New Mexico).

(oo) Expert Report (October 2010) and Rebuttal Expert Report (November 2010) (BART Determinations for PSCo Hayden and CSU Martin Drake units) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(pp) Expert Report (November 2010) (BART Determinations for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

(qq) Declaration (November 2010) on behalf of the Sierra Club in connection with the Martin Lake Station Units 1, 2, and 3. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Case No. 5:10-cv-00156-DF-CMC (US District Court for the Eastern District of Texas, Texarkana Division).

(rr) Pre-Filed Testimony (January 2011) and Declaration (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

(ss) Declaration (February 2011) in the matter of the Draft Title V Permit for RRI Energy MidAtlantic Power Holdings LLC Shawville Generating Station (Pennsylvania), ID No. 17-00001 on behalf of the Sierra Club.

(tt) Expert Report (March 2011), Rebuttal Expert Report (Jue 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (US District Court for the District of Colorado).

(uu) Declaration (April 2011) and Expert Report (July 16, 2012) in the matter of the Lower Colorado River Authority (LCRA)'s Fayette (Sam Seymour) Power Plant on behalf of the Texas Campaign for the Environment. *Texas Campaign for the Environment v. Lower Colorado River Authority*, Civil Action No. 4:11-cv-00791 (US District Court for the Southern District of Texas, Houston Division).

(vv) Declaration (June 2011) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

(ww) Expert Report (June 2011) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

(xx) Declaration (August 2011) in the matter of the Sandy Creek Energy Associates L.P. Sandy Creek Power Plant on behalf of Sierra Club and Public Citizen. *Sierra Club, Inc. and Public Citizen, Inc. v. Sandy Creek Energy Associates, L.P.*, Civil Action No. A-08-CA-648-LY (US District Court for the Western District of Texas, Austin Division).

(yy) Expert Report (October 2011) on behalf of the Defendants in the matter of *John Quiles and Jeanette Quiles et al. v. Bradford-White Corporation, MTD Products, Inc., Kohler Co., et al.*, Case No. 3:10-cv-747 (TJM/DEP) (US District Court for the Northern District of New York).

(zz) Declaration (February 2012) and Second Declaration (February 2012) in the matter of *Washington Environmental Council and Sierra Club Washington State Chapter v. Washington State Department of Ecology and Western States Petroleum Association,* Case No. 11-417-MJP (US District Court for the Western District of Washington).

(aaa) Expert Report (March 2012) and Supplemental Expert Report (November 2013) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.,* Civil Action No. 4:10-cv-4969 (US District Court for the Southern District of Texas, Houston Division).

(bbb) Declaration (March 2012) in the matter of *Center for Biological Diversity, et al. v. United States Environmental Protection Agency,* Case No. 11-1101 (consolidated with 11-1285, 11-1328 and 11-1336) (US Court of Appeals for the District of Columbia Circuit).

(ccc) Declaration (March 2012) in the matter of *Sierra Club v. The Kansas Department of Health and Environment*, Case No. 11-105,493-AS (Holcomb power plant) (Supreme Court of the State of Kansas).

(ddd) Declaration (March 2012) in the matter of the Las Brisas Energy Center *Environmental Defense Fund et al., v. Texas Commission on Environmental Quality,* Cause No. D-1-GN-11-001364 (District Court of Travis County, Texas, 261st Judicial District).

(eee) Expert Report (April 2012), Supplemental and Rebuttal Expert Report (July 2012), and Supplemental Rebuttal Expert Report (August 2012) on behalf of the states of New Jersey and Connecticut in the matter of the Portland Power plant *State of New Jersey and State of Connecticut (Intervenor-Plaintiff) v. RRI Energy Mid-Atlantic Power Holdings et al.,* Civil Action No. 07-CV-5298 (JKG) (US District Court for the Eastern District of Pennsylvania).

(fff) Declaration (April 2012) in the matter of the EPA's EGU MATS Rule, on behalf of the Environmental Integrity Project

(ggg) Expert Report (August 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Harm Phase.

(hhh) Declaration (September 2012) in the Matter of the Application of *Energy Answers Incinerator, Inc.* for a Certificate of Public Convenience and Necessity to Construct a 120 MW Generating Facility in Baltimore City, Maryland, before the Public Service Commission of Maryland, Case No. 9199.

(iii) Expert Report (October 2012) on behalf of the Appellants (Robert Concilus and Leah Humes) in the matter of Robert Concilus and Leah Humes v. Commonwealth of Pennsylvania Department of Environmental Protection and Crawford Renewable Energy, before the Commonwealth of Pennsylvania Environmental Hearing Board, Docket No. 2011-167-R.

(jjj) Expert Report (October 2012), Supplemental Expert Report (January 2013), and Affidavit (June 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

(kkk) Pre-filed Testimony (October 2012) on behalf of No-Sag in the matter of the North Springfield Sustainable Energy Project before the State of Vermont, Public Service Board.

(lll) Pre-filed Testimony (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

(mmm) Expert Report (February 2013) on behalf of Petitioners in the matter of Credence Crematory, Cause No. 12-A-J-4538 before the Indiana Office of Environmental Adjudication.

(nnn) Expert Report (April 2013), Rebuttal report (July 2013), and Declarations (October 2013, November 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(ooo) Expert Report (May 2013) and Rebuttal Expert Report (July 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

(ppp) Declaration (August 2013) on behalf of A. J. Acosta Company, Inc., in the matter of A. J. Acosta Company, Inc., v. County of San Bernardino, Case No. CIVSS803651.

(qqq) Comments (October 2013) on behalf of the Washington Environmental Council and the Sierra Club in the matter of the Washington State Oil Refinery RACT (for Greenhouse Gases), submitted to the Washington State Department of Ecology, the Northwest Clean Air Agency, and the Puget Sound Clean Air Agency.

(rrr) Statement (November 2013) on behalf of various Environmental Organizations in the matter of the Boswell Energy Center (BEC) Unit 4 Environmental Retrofit Project, to the Minnesota Public Utilities Commission, Docket No. E-015/M-12-920.

(sss) Expert Report (December 2013) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

(ttt) Expert Testimony (December 2013) on behalf of the Sierra Club in the matter of Public Service Company of New Hampshire Merrimack Station Scrubber Project and Cost Recovery, Docket No. DE 11-250, to the State of New Hampshire Public Utilities Commission.

(uuu) Expert Report (January 2014) on behalf of Baja, Inc., in Baja, Inc., v. Automotive Testing and Development Services, Inc. et. al, Civil Action No. 8:13-CV-02057-GRA (District of South Carolina, Anderson/Greenwood Division).

(vvv) Declaration (March 2014) on behalf of the Center for International Environmental Law, Chesapeake Climate Action Network, Friends of the Earth, Pacific Environment, and the Sierra Club (Plaintiffs) in the matter of Plaintiffs v. the Export-Import Bank (Ex-Im Bank) of the United States, Civil Action No. 13-1820 RC (United States District Court for the District of Columbia).

(www) Direct Prefiled Testimony (June 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17319 (Michigan Public Service Commission).

(xxx) Expert Report (June 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).

(yyy) Declaration (July 2014) on behalf of Public Health Intervenors in the matter of EME Homer City Generation v. US EPA (Case No. 11-1302 and consolidated cases) relating to the lifting of the stay entered by the Court on December 30, 2011 (US Court of Appeals for the District of Columbia).

3. Occasions where Dr. Sahu has provided oral testimony <u>in depositions, at trial or in similar proceedings</u> include the following:

(zzz) Deposition on behalf of Rocky Mountain Steel Mills, Inc. located in Pueblo, Colorado – dealing with the manufacture of steel in mini-mills including methods of air pollution control and BACT in steel mini-mills and opacity issues at this steel mini-mill.

(aaaa) Trial Testimony (February 2002) on behalf of Rocky Mountain Steel Mills, Inc. in Denver District Court.

(bbbb) Trial Testimony (February 2003) on behalf of the United States in the Ohio Edison NSR Cases, *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

(cccc) Trial Testimony (June 2003) on behalf of the United States in the Illinois Power NSR Case, *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

(dddd) Deposition (10/20/2005) on behalf of the United States in connection with the Cinergy NSR Case. *United States, et* al. *v. Cinergy Corp., et al.*, IP 99-1693-C-M/S (Southern District of Indiana).

(eeee) Oral Testimony (August 2006) on behalf of the Appalachian Center for the Economy and the Environment re. the Western Greenbrier plant, WV before the West Virginia DEP.

(ffff) Oral Testimony (May 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) re. the Thompson River Cogeneration plant before the Montana Board of Environmental Review.

(gggg) Oral Testimony (October 2007) on behalf of the Sierra Club re. the Sevier Power Plant before the Utah Air Quality Board.

(hhhh) Oral Testimony (August 2008) on behalf of the Sierra Club and Clean Water re. Big Stone Unit II before the South Dakota Board of Minerals and the Environment.

(iiii) Oral Testimony (February 2009) on behalf of the Sierra Club and the Southern Environmental Law Center re. Santee Cooper Pee Dee units before the South Carolina Board of Health and Environmental Control.

(jjjj) Oral Testimony (February 2009) on behalf of the Sierra Club and the Environmental Integrity Project re. NRG Limestone Unit 3 before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(kkkk) Deposition (July 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al*.

(llll) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Coleto Creek coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(mmmm) Deposition (October 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(nnnn) Deposition (October 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

(oooo) Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Tenaska coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (April 2010).

(pppp) Oral Testimony (November 2009) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(qqqq) Deposition (December 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

(rrrr) Oral Testimony (February 2010) on behalf of the Environmental Defense Fund re. the White Stallion Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(ssss) Deposition (June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

(tttt) Trial Testimony (September 2010) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, State of Maryland, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case in US District Court in the Western District of Pennsylvania. *Plaintiffs v. Allegheny Energy Inc., et al.,* 2:05cv0885 (Western District of Pennsylvania).

(uuuu) Oral Direct and Rebuttal Testimony (September 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

(vvvv) Oral Testimony (September 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

(wwww) Oral Testimony (October 2010) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

(xxxx) Oral Testimony (November 2010) regarding BART for PSCo Hayden, CSU Martin Drake units before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(yyyy) Oral Testimony (December 2010) regarding BART for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

(zzzz) Deposition (December 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(aaaaa) Deposition (February 2011 and January 2012) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

(bbbbb) Oral Testimony (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

(ccccc) Deposition (August 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (US District Court for the District of Colorado).

(ddddd) Deposition (July 2011) and Oral Testimony at Hearing (February 2012) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of

Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

(eeeee) Oral Testimony at Hearing (March 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

(fffff) Oral Testimony at Hearing (April 2012) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

(ggggg) Oral Testimony at Hearing (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

(hhhhh) Deposition (March 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

(iiiii) Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(jjjjj) Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

(kkkkk) Deposition (February 2014) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

(lllll) Trial Testimony (February 2014) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.*, Civil Action No. 4:10-cv-4969 (US District Court for the Southern District of Texas, Houston Division).

(mmmmm) Trial Testimony (February 2014) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

(nnnnn) Deposition (June 2014) and Trial (August 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).

Atmospheric Pollution Research

Diesel Particulate Matter and Coal Dust from Trains in the Columbia River Gorge, Washington State, USA

--Manuscript Draft--

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Abstract:	We examined the emissions of diesel particulate matter (DPM) and coal dust from trains in the Columbia River Gorge (CRG) in Washington State by measuring PM1, PM2.5, CO2, and black carbon (BC) during the summer of 2014. We also used video cameras to identify the train type and speed. During the two-month period, we identified 293 freight trains and 74 coal trains that gave a PM2.5 enhancement of more than 3.0 µg/m3. We found an average PM2.5 enhancements of 8.8 and 16.7 µg/m3, respectively, for freight and coal trains. For most freight trains (52%), and a smaller fraction of coal trains (11%), we found a good correlation between PM2.5 and CO2. Using this correlation, we calculated a mean DPM emission factor (EF) of 1.2 gm/kg fuel consumed, with an uncertainty of 20%. For four coal trains, the videos revealed large plumes of coal dust emanating from the uncovered coal cars. These trains also had the highest peak PM2.5 concentrations recorded during our study (53-232 µg/m3). Trains with visible coal dust were observed for 5.4% of all coal trains, but 10.3% when the effective wind speed was greater than 90 km/h. We also found that nearly all coal trains emit coal dust based on (1) statistically higher PM2.5 enhancements from coal trains compared to freight trains; (2) the fact that most coal trains showed a weak correlation between PM2.5 and CO2,

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	whereas most freight trains showed a strong relationship; (3) a statistically lower BC/PM2.5 enhancement ratio for coal trains compared to freight trains; and (4) a statistically lower PM1/PM2.5 enhancement ratio for coal trains compared to freight trains. Our results demonstrate that, on average, passage of a diesel powered open-top coal train result in nearly twice as much respirable PM2.5 compared to passage of a diesel-powered freight train.
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Diesel Particulate Matter and Coal Dust from Trains in the Columbia River Gorge, Washington State, USA

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Abstract

We examined the emissions of diesel particulate matter (DPM) and coal dust from trains in the Columbia River Gorge (CRG) in Washington State by measuring PM_1, $PM_{2.5}$, CO_2, and black carbon (BC) during the summer of 2014. We also used video cameras to identify the train type and speed.

During the two-month period, we identified 293 freight trains and 74 coal trains that gave a $PM_{2.5}$ enhancement of more than 3.0 μg/m^3. We found an average $PM_{2.5}$ enhancements of 8.8 and 16.7 μg/m^3, respectively, for freight and coal trains. For most freight trains (52%), and a smaller fraction of coal trains (11%), we found a good correlation between $PM_{2.5}$ and CO_2. Using this correlation, we calculated a mean DPM emission factor (EF) of 1.2 gm/kg fuel consumed, with an uncertainty of 20%.

For four coal trains, the videos revealed large plumes of coal dust emanating from the uncovered coal cars. These trains also had the highest peak $PM_{2.5}$ concentrations recorded during our study (53–232 μg/m^3). Trains with visible coal dust were observed for 5.4% of all coal trains, but 10.3% when the effective wind speed was greater than 90 km/h. We also found that nearly all coal trains emit coal dust based on (1) statistically higher $PM_{2.5}$ enhancements from coal trains compared to freight trains; (2) the fact that most coal trains showed a weak correlation between $PM_{2.5}$ and CO_2, whereas most freight trains showed a strong relationship; (3) a statistically lower BC/$PM_{2.5}$ enhancement ratio for coal trains compared to freight trains; and (4) a statistically lower PM_1/$PM_{2.5}$ enhancement ratio for coal trains compared to freight trains. Our results demonstrate that, on average, passage of a diesel powered open-top coal train result in nearly twice as much respirable $PM_{2.5}$ compared to passage of a diesel-powered freight train.

Keywords

Diesel particulate matter, coal dust, air pollution from trains, air pollution from rail.

1. Introduction

Rail locomotives powered by diesel fuel travel through the Columbia River Gorge National Scenic Area as well as many urban areas in Washington State. Evaluating the air quality impacts from rail traffic for people living near rail lines is hampered by a lack of data. Several plans that would expand coal shipments by rail through Washington and Oregon to coastal ports for export to Asia have been proposed. New export facilities have been proposed for Longview and Bellingham, Washington. One proposed port near Bellingham would have the capacity to ship up to 54 million metric tons of coal annually (WA DOE, 2013).

The U.S. Department of Health and Human Services states that diesel particulate matter (DPM) is "reasonably anticipated to be a human carcinogen" (U.S. DHHS, 2014). The World Health Organization also categorizes DPM as "carcinogenic to humans" (WHO, 2012). In urban areas, including Seattle, the most significant "air toxic" is DPM, contributing over 80% of the cancer risk for air toxics (Keill and Maykut, 2003; PSCAA, 2005). DPM sources consist of rail locomotives, ships and diesel trucks, both on road and off road. Average DPM concentrations for the Seattle area are 1.4–1.9 μg/m^3, based on monitoring and a chemical mass balance model (Keill and Maykut, 2003; Maykut et al., 2003). These DPM concentrations make up 15–20% of the mass of total particulate matter with diameters less than 2.5 μm ($PM_{2.5}$).

Emission standards for new and remanufactured locomotives, developed by the U.S. Environmental Protection Agency (EPA) (40 CFR part 1033) have decreased steadily over the past several decades. For diesel locomotives various standards apply based on the date of manufacture: Tier 0, 1973–2001; Tier 1, 2002–2004; Tier 2, 2005–2010; Tier 3, 2011–2014; and Tier 4, after 2015 (U.S. EPA, 2013). Tier 4 locomotives must comply with a PM_{10} standard of 0.03 g/bhp-hr, which is about 0.19 g of PM_{10} per kg of fuel consumed (U.S. EPA, 2009).

Previous studies looked at rail yards as air pollutant sources. They determined that the primary source of $PM_{2.5}$ at these sites was diesel fuel combustion. One study investigated the impact of DPM emissions on $PM_{2.5}$ concentrations at an Atlanta area rail yard (Galvis et al., 2013). Using measurements collected upwind and downwind of the rail yard, they found the average "neighborhood" contribution to $PM_{2.5}$ was 1.7 μg/m^3. The emission factors (EFs) per kg of diesel fuel burned were calculated to be 0.4–2.3 grams DPM. The EFs were not determined from individual train measurements but were calculated using three different methods, each based on differing assumptions. Two studies of a Roseville, California, rail yard also found

significant enhancements in $PM_{2.5}$ from the yard. Using measurements from upwind and downwind, Cahill et al. (2011) found an average $PM_{2.5}$ enhancement of 4.6 μg/m^3, and Campbell and Fujita (2006) found even larger contributions (7.2–12.2 μg/m^3). Cahill et al. (2011) also demonstrated that particles with diameters below 1 μm are the major contributor to $PM_{2.5}$ aerosol mass from diesel exhaust. Abbasi et al. (2013) studied concentrations in the interior of trains and close to rail lines and found significantly elevated $PM_{2.5}$ and PM_{10} concentrations, particularly in stations that were underground. Gehrig et al. (2007) looked at electric trains in Switzerland and examined the influence of dust from these trains on PM_{10} concentrations. Several studies investigated the EFs of on-road diesel trucks and buses (Jamriska et al., 2004; Zhu et al., 2005; Cheng et al., 2006; Park et al., 2011; Dallmann et al., 2012), but we have found no similar studies on diesel rail.

Trains that carry coal in uncovered rail cars may also release coal dust, in addition to DPM, into the atmosphere. The BNSF railway requires that a surfactant be applied over the top of coal being transported by rail (see BNSF Railway, 2013). However, we are unaware of any studies reported in the scientific literature that evaluate the efficacy of this or the impact of coal dust on air quality. By examining the PM by train type, we can examine whether there is respirable coal dust ($PM_{2.5}$) as part of the emissions from coal trains. We will also examine the particle size distribution because combustion-related particles and coal dust, which is mechanically generated, are associated with particles of different sizes (Seinfeld, 1986).

A substantial amount (44–60%) of the diesel engine $PM_{2.5}$ mass is black carbon (BC) (Bond et al., 2004; Kirchstetter and Novakov, 2007; Ramanathan and Carmichael, 2008). Because radiative forcing due to BC is the major light-absorbing species in atmospheric aerosol, it is significant both globally and regionally (Jacobson, 2001; Ramanathan and Carmichael,

2008). In addition, because of BC's surface properties, it is possible for polyaromatic hydrocarbons (PAHs) and other semi-volatile compounds to be adsorbed and transported by BC (Dachs and Eisenreich, 2000). Health organizations are also taking a hard look at BC because of its contribution to the harmful effects caused by $PM_{2.5}$, including cardiopulmonary and respiratory disease (Jansen et al., 2005; Janssen et al., 2011; U.S. EPA, 2012).

Because of the lack of information on $PM_{2.5}$ concentrations and the exposure to humans from diesel trains, the debate over coal dust and the scarcity of information on diesel train EFs, we sought to measure these air quality effects by answering the following questions:

1. What are the DPM emission factors for locomotives in Washington State and how do these compare with published values?
2. Do open-top coal-carrying trains emit respirable coal dust ($PM_{2.5}$) into the air? If so, can we quantify the emissions?

To address these questions we measured PM_1, $PM_{2.5}$, CO_2, black carbon and meteorology at a location in the Columbia River Gorge next to the rail line. Because we wanted to quantify DPM and coal dust exposure and quantify the EFs from each train, we collected measurements every 10 seconds in order to identify the air quality impacts of individual trains. In a previous study, we measured a similar suite of parameters in 2013 at a site in Seattle, Washington, and (very briefly) at a site in the Columbia River Gorge (Jaffe et al., 2014). In the previous study, we quantified DPM emission factors from diesel trains, evaluated the neighborhood scale exposure to $PM_{2.5}$ from trains and found evidence that suggested emissions of coal dust, based on particle size. In the present analysis, we report new data taken in 2014 that more clearly identifies and quantifies the emissions of DPM and coal dust from coal-carrying trains.

2. Experimental

Measurements were made at a site between the towns of Lyle and Dallesport, Washington, in the Columbia River Gorge (approximately 45.7^{o}N, 121.2^{o}W) between June 7–August 10, 2014. The instruments were housed in a weather-proof enclosure, located about 10 meters above and 20 meters northeast of the rail line. Two video cameras were used; one took video of the trains at a 90° angle to the rail line, and one viewed the trains arriving/departing to the northwest. The rail line travels along the north side of the Columbia River. There were no roads between our site and the river. Our measurement site was approximately 200 meters southwest of Washington Route 14, a state highway with light traffic. The measurement location used in 2014 was in the same general location, but about 300 meters away, from the site we used for our 2013 measurements (Jaffe et al., 2014). At this site the rail line is almost completely flat; there is a maximum grade of 1 meter per km in the next few km in either direction.

We used a DustTrak DRX Aerosol Monitor (Model #8533, TSI, Inc., Shoreview, MN) to measure size-segregated PM. The DustTrak reports 4 size fractions of PM mass concentrations: PM_1, $PM_{2.5}$, PM_{10} and TSP. The instrument uses aerosol scattering to calculate its measurements. Therefore, its measurements are not the same as mass-based measurements (Wang et al., 2009). The DustTrak is calibrated against Arizona road dust (ISO 12103-1) by the manufacturer and so will not correctly reflect the mass concentration for other types of aerosol. This is specifically the case for diesel PM because of the particle size (Park et al., 2011). Obtaining accurate measurements with the DustTrak requires comparing its measurements with a mass-based measurement (Moosmuller et al., 2001). The DustTrak has been used to quickly measure several PM size fractions and determine EFs of individual vehicles in several previous studies (e.g., Park et al., 2011; Dallmann et al., 2012), but usually after using a mass-based method to calibrate the

response factor (Jamriska et al., 2004; Zhu et al., 2005; Cheng et al., 2006; Jaffe et al 2013). In our study, the DustTrak was calibrated against two mass-based measurements—a Tapered Element Oscillating Microbalance (TEOM) and the EPA Federal Reference Method at a routine air quality monitoring station in Seattle, Washington (details below).

The DustTrak inlet was stainless steel tubing (4.8 mm i.d.) facing downward from a height of approximately 2 meters above ground level. The flow rate through the inlet was 3.0 liters per minute. With these conditions, the flow was laminar. To estimate the particle sampling efficiency, we used the methodology and program provided by von der Weiden et al. (2009). The wind speeds during train sampling in the CRG varied between 1–11 meters per second (mps), with an average of 4.5 mps during the sampling period. For particles less than 2.5 µm aerodynamic diameter, we calculated greater than 90% particle transmissions at all wind speeds up to 15 mps. For particles between 3–10 µm aerodynamic diameter, the inlet sampling efficiency would be much less than 1.0 and vary with wind speed (von der Weiden et al., 2009). For this reason, we used only the $PM_{2.5}$ and PM_1 data in this analysis.

We measured CO_2 using a Licor-820 (Licor, Inc., Lincoln, NE) with a small vacuum pump for sampling. The inlet was a 4.8 mm i.d. stainless steel tube (38 mm long) connected to PFA tubing. We zeroed the instrument using CO_2-free air and calibrated it with a 395 ppmv standard from Airgas, Inc. We calibrated the instrument both before and after the deployment; the instrument response varied by less than 1 ppmv between these calibrations. We used DAQFactory on a PC to record data from the DustTrak , the Licor-820 (CO_2, cell temperature and pressure) and the meteorological station. We recorded 10-second averages for PM and CO_2 data.

To identify trains and quantify their speeds, we used two Night Owl cameras (Model CAM-MZ420-425M) that were equipped with infrared (IR) night vision. The cameras were motion activated and operated with iSpy open source camera security software. However, even with the IR capability of the cameras, we were unable to identify the type of trains at night. We considered using an auxiliary light to view the trains at night; however, this was rejected as the Columbia River Gorge is classified as a National Scenic Area, which limits lighting options. Only trains that could positively be identified as freight or coal were used in this analysis, so this excluded all trains passing our site in full darkness.

BC was measured using an aethalometer (Magee Scientific model AE22). BC data were collected at one-minute time resolution at 370 nm and 880 nm. BC loading was determined using infrared attenuation data at 880 nm alone, because at 370 nm, other organic compounds may contribute interference (Wang et al., 2011). The aethalometer determines raw BC concentration (BC_0, ng/m^3) from measured attenuation values (ATN, m^{-1}) via

$$BC_0 = 10^9 \text{ x } ATN/\sigma \quad (1)$$

where σ is the calibrated cross-section (16.6 m^2/g at 880 nm). As in our previous study (Jaffe et al., 2014), we applied a correction to the BC_0 concentrations to account for diminishing transmission as a function of BC loading. Transmission (Tr) is calculated from each attenuation value:

$$Tr = e^{-ATN/100} \quad (2)$$

Following Kirchstetter and Novakov (2007), we calculated the corrected BC mass loading (BC_{corr}, ng/m^3) as:

$$BC_{corr} = BC_0 /(0.88 \text{ x } Tr + 0.12) \quad (3)$$

The DPM EFs are calculated for each passing train in units of DPM emitted per kg of diesel fuel burned using:

$$EF\ (PM_{2.5}) = \frac{\Delta PM_{2.5}}{\Delta CO_2}\ \text{x}\ CF\ \text{x}\ W_c \qquad (4)$$

where the $\Delta PM_{2.5}/\Delta CO_2$ or "enhancement ratio" is calculated from the Reduced Major Axis (RMA) regression slopes of the 10-second CO_2 and $PM_{2.5}$ data for each passing train, in units of $\mu g/m^3$ per ppmv. CF is a conversion factor to convert CO_2 concentrations in ppm to $\mu g\ C/m^3$ units using the ideal gas law at 1 atm and 25°C (1 ppmv CO_2 = 490.7 ugC/m^3). W_C is the mass fraction of carbon in diesel fuel (870 g C/kg fuel) (Lloyd's Register, 1995; Cooper, 2003), which yields overall units on the EF of g $PM_{2.5}$/kg fuel consumed. Yanowitz et al. (2000) showed that over 95% of diesel fuel carbon is released as CO_2.

Enhancement ratios ($\Delta PM_{2.5}/\Delta CO_2$ and $\Delta PM_1/\Delta PM_{2.5}$) were calculated from the 10-second data using the RMA regression method, which considers errors in both the x and y variables (Ayers, 2001; Cantrell, 2008). Absolute enhancements were calculated by subtracting out the PM, BC and CO_2 maximums during train passage from the background concentration measured prior to each trains passage. The RMA regression parameters were calculated for each train passage using a program written in Java utilizing Apache Commons Mathematics Library 3.3. The program first looked for a $PM_{2.5}$ enhancement of at least 3 $\mu g/m^3$ over the median value from the past 17 minutes (100, 10-second data points). The accuracy of the Java program to calculate PM and CO_2 enhancements and the RMA regression parameters were manually verified for approximately 20% of the peaks. All times in this manuscript are given in Pacific Daylight Time (PDT).

3. Results

3.1 Calibration of the DustTrak

We compared the DustTrak $PM_{2.5}$ concentrations with a TEOM and the filter-based Federal Reference Method (FRM) at a routine air quality monitoring site in Seattle, Washington (Beacon Hill), operated by the Puget Sound Clean Air Agency (PSCAA). Comparison data were obtained between April 30–May 20, 2014. TEOM data were continuous and reported on an hourly basis, the filter-based FRM measurements were for 24 hours and conducted every third day only. At this site, the TEOM is a Thermo Fisher Scientific Model 1400AB with 8500C Filter Dynamic Measurement System (FDMS) with the Very Sharp Cut Cyclone (VSCC™) modification (U.S. EPA, 2014). This configuration is designated by the EPA as a Federally Equivalent Method (FEM) for $PM_{2.5}$. The inlet and flow configuration used for the DustTrak at the Beacon Hill site were identical to the configuration used in the Columbia River Gorge.

We found a very good correlations between the TEOM $PM_{2.5}$, the FRM and the DustTrak's reported $PM_{2.5}$. Table 1 shows the regression parameters.

The 95% confidence interval in the slope for the DustTrak-TEOM comparison is +/- 4.5%, whereas it is +/- 32% for the DustTrak-FRM comparison due to the very small sample size. In both cases, the intercepts are insignificantly different from zero (95% confidence interval overlaps zero). Because of this, we corrected all of the DustTrak PM data using the TEOM slope of 0.5577. This slope is 22% greater than the one reported by Jamriska et al. (2004), who reported a slope of 0.458. It also is approximately 14% greater than our earlier DustTrak comparison at a different site, where we reported a slope of 0.491 (Jaffe et al., 2014). These differences may be attributable to different aerosol types at these sites. Given these differences, we estimated the uncertainty in the corrected DustTrak PM_1 and $PM_{2.5}$ values to be ±20%.

3.2 Overview of observations on train emissions in the Columbia River Gorge

As each train passed our observation site, we may detect a peak in PM and CO_2, but this depended on the wind direction and wind speed. If the winds were from the north to northeast directions, our sensors recorded minor peaks only, or no peaks at all, in PM and CO_2. We found that small PM events had a lower correlation between the various parameters. For this reason, we screened out small peaks where the maximum $\Delta PM_{2.5}$ (enhancement above background) was < 3 μg/m^3. If a peak larger than this value was detected and the video confirmed a simultaneous train passage, then we included this peak in our analysis. We included only freight and coal-carrying trains, since these were the dominant types that we observed in the Columbia River Gorge. Trains that carried mixed loads (e.g., freight plus coal), sand or other unidentifiable or uncovered cargo were not included in this analysis. We also observed very few passenger trains during the daytime hours, in contrast to our previous study in Seattle (Jaffe et al., 2014).

During this study, we observed 367 events with $\Delta PM_{2.5}$ > 3 μg/m^3 that were identified by the video cameras as either freight or coal. We refer to each train passage with a detectable PM peak and verified by the video as a "train event." Table 2 shows a summary of the 367 train events, including number and average peak PM_1 and $PM_{2.5}$ enhancement values (over background). The peak PM_1 and $PM_{2.5}$ enhancements (10-second) from coal trains are about double the enhancements seen from freight trains. In addition, there are three extreme events with $PM_{2.5}$ enhancements greater than 75 μg/m^3 that were seen only for the coal trains. The differences between the peak PM enhancements for coal and freight trains are statistically significant (P<.001). The statistically significant difference remains even if these extreme events are excluded from the analysis. For all train events, there is an excellent relationship between the

PM_1 and $PM_{2.5}$ data, although the fraction of $PM_1/PM_{2.5}$ varies by train type. This is discussed in section 3.5 below.

However, only some train events showed a good correlation between $PM_{2.5}$ and CO_2. Figure 1 shows an example of a freight train that passed our site on July 10, 2014. In this case, the $PM_{2.5}$ enhancement is 24 μg/m^3, the CO_2 enhancement is 39 ppmv and the two are very well correlated, indicating that the dominant source of PM is diesel exhaust. Figure 2 shows an example of a coal-carrying train that passed by on July 18, 2014. For this example, the peak $PM_{2.5}$ concentration is more than 6 times the peak shown previously for the freight train, while the CO_2 enhancement is much smaller. In addition, the CO_2 peaks occurred at the start and end of the train passage due to locomotives at the beginning and end of this train, which is typical of the very long coal trains. The height of the CO_2 peak shows no obvious relationship with train type and likely varies mainly with meteorology, which influences the degree to which the combustion exhaust gases reach the measurement site. For the coal train (Figure 2), the dominant source of PM is not diesel exhaust but coal dust. This was confirmed by the video (discussed below). It should be noted that DPM was probably present but is not apparent in the data due to the much larger coal dust peak. In this case, because the PM concentrations were not correlated to CO_2, we were not able to calculate a DPM emission factor. For this reason, we did not include train events in the DPM EF calculation if the $PM_{2.5}$–CO_2 R^2 is less than 0.5. We also excluded train events that had very small CO_2 enhancements ($\Delta CO_2 < 2$ ppmv), as these had erratic behavior.

3.3 DPM emission factors

The $\Delta PM_{2.5}/\Delta CO_2$ was used to derive the DPM emission factors. The average $\Delta PM_{2.5}/\Delta CO_2$ slope for all train events was found to be 6.56 μg/m^3 per ppmv, but this included many trains with a very poor correlation between $PM_{2.5}$ and CO_2. For the DPM emission factor calculation, we restricted our analysis to only those cases with an R^2 for the $PM_{2.5} – CO_2$ relationship of 0.5 or greater and a CO_2 enhancement of at least 2 ppmv. Table 2 shows the number of each train type that was used for the DPM analysis and statistics on the $PM_{2.5} – CO_2$ slope.

The data in Table 2 show that while most freight trains were included in this analysis, the majority of coal trains were not included. This is due to the fact that most of the coal train events show a poor correlation between $PM_{2.5}$ and CO_2 (see Figure 2). One coal train that would otherwise have been included in the DPM calculation had a $PM_{2.5} – CO_2$ slope of 12.0, more than 10x the mean value, and had visible coal dust in the video. Thus the large amount of $PM_{2.5}$ in this case cannot be attributed solely to DPM. This train event was not included in the DPM analysis. With this exclusion, the mean and median slopes for freight and coal trains are rather similar. Using equation 4, we find that the mean and median DPM EFs from our study are 1.2 and 0.99 g/kg fuel consumed, with an overall uncertainty of 20%. Our previous observations in the Pacific Northwest (Jaffe et al., 2014) found an average EF for diesel locomotives of 0.94 g/kg.

Diesel EFs for locomotives have been previously reported from several measurement campaigns. Kean et al. (2000) reported locomotive emission factors of between 1.8–2.1 g/kg using the EPA “NONROAD” model. A 2009 report (U.S. EPA, 2009) estimated that average locomotives EFs are declining about 5% per year, with a 2014 value of 0.98 g/kg. A study by Sierra Research in 2004 (Sierra Research, 2004) forecast a much slower decrease in the EFs of diesel locomotives, compared to U.S. EPA (2009), and for 2014 projected 1.4 g/kg. Our average

measured EF is consistent with those cited in the above literature for the 2014 time frame, within the respective uncertainties.

3.4 Black carbon

We obtained simultaneous BC and $PM_{2.5}$ data on 294 of the trains. Table 3 reports the observed $BC/PM_{2.5}$ and $PM_1/PM_{2.5}$ enhancement ratios (discussed in section 3.5)

These data show that, on average, 43% of the $PM_{2.5}$ was BC for all trains. In our previous study using similar data from 2013 (Jaffe et al., 2014), we found that the BC/PM_1 fraction was 52%, with most of those observations on freight trains. Our new data in 2014 indicates a significant difference ($P<.001$) in the average $BC/PM_{2.5}$ fraction for freight (0.47) and coal trains (0.29). Previous studies have found values that are similar to our freight train values for the BC/PM fraction. A study by Hildemann et al. (1991) found that 55% of diesel emissions were BC, and Watson et al. (1994) reported 45%. An Atlanta study (Galvis et al., 2013) found that diesel trains had BC to $PM_{2.5}$ ratios of 47–52%. The significant difference in the $BC/PM_{2.5}$ between coal and freight trains, shown in Table 3, indicates a significant coal dust component in the PM from the coal trains.

We assume that the coal dust has the same composition as the coal being shipped. This coal, from the Powder River Basin of Wyoming and Montana, has a relatively low carbon content compared to other coal types (ca 50% C), with the remainder of the mass made up of moisture and minerals, such as silicates, iron oxides and calcium oxide (NETL, 2012). While the low carbon content is partly responsible for the low $BC/PM_{2.5}$ fraction, shown in Table 3, our data suggest that other factors may also be involved. This could include a change in the mass absorption cross section for coal dust, as compared to diesel exhaust, which might reflect the

impact of the coal mineral content, the organic matter composition or the size distribution of the particles.

3.5 $PM_1/PM_{2.5}$ fraction

The DustTrak calculates concentrations of PM in four size ranges, but due to the inlet sampling efficiency (discussed in section 2) we considered only data for PM_1 and $PM_{2.5}$. Table 3 gives the statistical parameters on the $PM_1/PM_{2.5}$ enhancement ratio. Coal trains showed a larger mass fraction of particles above 1μm aerodynamic diameter, and this difference is statistically significant. This reflects the significant contribution of coal dust to the $PM_{2.5}$ concentrations during the passage of the coal trains.

3.6 Influence of coal dust on $PM_{2.5}$ concentrations

In four cases, the videos revealed visible coal dust from the open-top coal trains. These visible coal dust plumes were seen in the four train events with the highest peak $PM_{2.5}$ concentrations (Table 4). We call these four train events with the highest $PM_{2.5}$ and visible coal dust "super-dusters." Two of the "super-duster" videos have been archived as part of the supplemental materials for this paper (8/7/2014 and 7/27/2014). Figure 3 shows still images obtained from the video before and after train passage for the "super duster" on 8/7/2014, along with the measured $PM_{2.5}$ concentrations. We found that 4 out of 74 coal trains, or 5.4%, were classified as "super dusters" during our study.

A number of factors could be important in explaining the coal dust emissions of $PM_{2.5}$ from coal trains. These include quality of the surfactant application or factors that may disturb the coal/surfactant surface, such as high train speeds, exposure to high winds or rough handling

during transport. While we have no information on upstream conditions, our data do allow us to examine the influence that train and local wind speed may have played on dust emissions. To do this, we calculated train speeds for each coal train from the videos. We also calculated the vector component of the winds in the direction opposite to the trains' travel. The sum of train speed plus vector wind speed represents the true wind speed across the open-top coal trains. We refer to this as the effective wind speed. During our study, the average train speed was 71.3 km/h and the average vector wind speed was 14.9 km/h.

Figure 4 shows the effective wind speed versus peak $PM_{2.5}$ for each coal train event. The four "super dusters" are shown as large red squares. While no simple relationship emerges from this analysis, the data do suggest that "super dusters" are more likely to occur when the effective wind speed is greater than 80–90 km/h. Above 90 km/h, the fraction of "super dusters" is 10.3% (3 out of 29 trains), compared to 5.4% at all wind speeds. Thus we can view wind speed as one factor that increases the risk of high-level coal dust exposure. However, the fact that many coal trains with effective wind speeds greater than 90 km/h are not "super dusters" indicates that other factors, such as quality of the surfactant applied to the coal surface, must also be important.

4. Conclusions

We measured PM_1, $PM_{2.5}$, BC and CO_2 during 367 train passages (train events) in the Columbia River Gorge. From the data, we calculated a DPM EF average of 1.2 g/kg fuel consumed (±20%) on 163 of those train events that show a good correlation between $PM_{2.5}$ and CO_2 (mostly freight trains). Our data indicate that nearly all open-top coal trains release coal dust, which contributes to enhanced $PM_{2.5}$ in the Columbia River Gorge. In four train events, that we call "super-dusters," the coal dust emissions led to visible dust plumes and the highest $PM_{2.5}$

concentrations observed in our study. But nearly all coal trains generate some degree of coal dust ($PM_{2.5}$) based on the following evidence:

1. Statistically higher peak $PM_{2.5}$ concentrations during passage of coal trains compared to freight trains. The peak $PM_{2.5}$ enhancements during a coal train passage are nearly double, on average, compared to the value during a freight train passage (Table 2);
2. The fact that most freight trains (52%) show a good correlation between $PM_{2.5}$ and CO_2, whereas very few coal trains (15%) show this relationship (Table 2);
3. The BC/$PM_{2.5}$ enhancement ratio is statistically higher for freight trains compared to coal trains (Table 3);
4. The PM_1/ $PM_{2.5}$ enhancement ratio is statistically higher during passage of freight trains compared to coal trains (Table 3).

These four results demonstrate statistically significant differences between freight and coal trains, even if the four super-dusters are excluded from the statistical analysis.

Because our focus was on air quality, we measured the respirable size fractions of PM. Thus it is not possible to relate our observations to any data on bulk loss of coal during transport, since most of this loss will occur as much larger size particles. Because most coal train events show a poor correlation between $PM_{2.5}$ and CO_2, it is not possible to rigorously derive a fuel-based emission factor for the coal dust. Nonetheless, our data provide some guidance to anyone wishing to calculate total $PM_{2.5}$ emissions from the railway sector. Since the peak $PM_{2.5}$ values for coal trains are nearly double those for freight trains, it is reasonable to conclude that the total $PM_{2.5}$ emissions from coal trains are approximately double those of freight trains. This would imply that the coal train $PM_{2.5}$ emissions consist of approximately half DPM and half coal dust.

Though all coal trains appear to generate some degree of dust, the "super-dusters" generate visible plumes and the highest concentrations of $PM_{2.5}$. "Super-dusters" represent 5.4% of all coal trains but 10.3% when the effective wind speed is greater than 90 km/h. This indicates that wind is one factor contributing to the coal dust emissions, but it is not the only explanatory factor.

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Figure captions

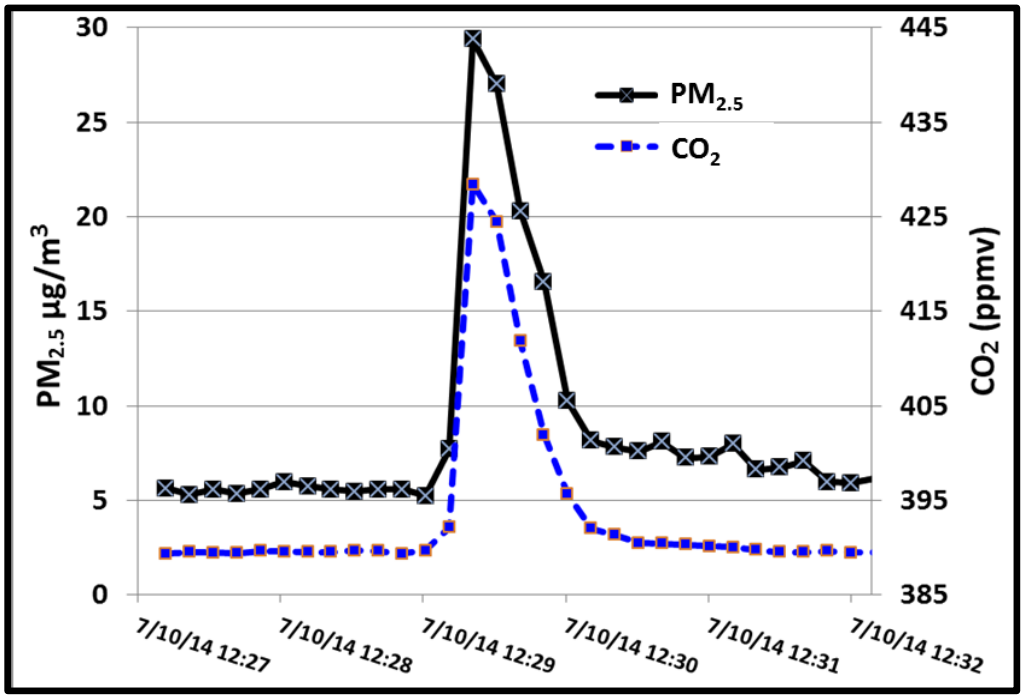
Figure 1. $PM_{2.5}$ and CO_2 during passage of a freight train on 7/10/2014 at 12:29 PDT. The two values show a good correlation with an R^2 of 0.98 and a slope of 0.61 µg/m^3 per ppmv.

Figure 2. $PM_{2.5}$ and CO_2 during passage of a coal train on 7/18/2014 at 4:56 PDT. The two parameters show no correlation during this time period. The train was observed to have locomotives in the front and rear, giving rise to the CO_2 peaks at the beginning and end of this time period.

Figure 3. Images captured from the video camera before and after coal train passage on 8/7/2014 at 17:28 PDT. The full video of this train passage is archived as part of the supplemental materials for this paper. The camera looks to the west, downriver in the Columbia River Gorge. The coal train is visible in the right image and was moving from left to right.

Figure 4. Peak $PM_{2.5}$ enhancement for each coal train passage versus effective wind speed over the top of the train. The effective wind speed is calculated as the train speed plus the vector component of the wind at 180° to the train's movement. The four "super dusters" are shown as large red squares.

Figure 1


30
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PM2.5 µg/m3
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PM2.5
CO2
7/10/14 12:27
7/10/14 12:28
7/10/14 12:29
7/10/14 12:30
7/10/14 12:31
7/10/14 12:32

Figure 2

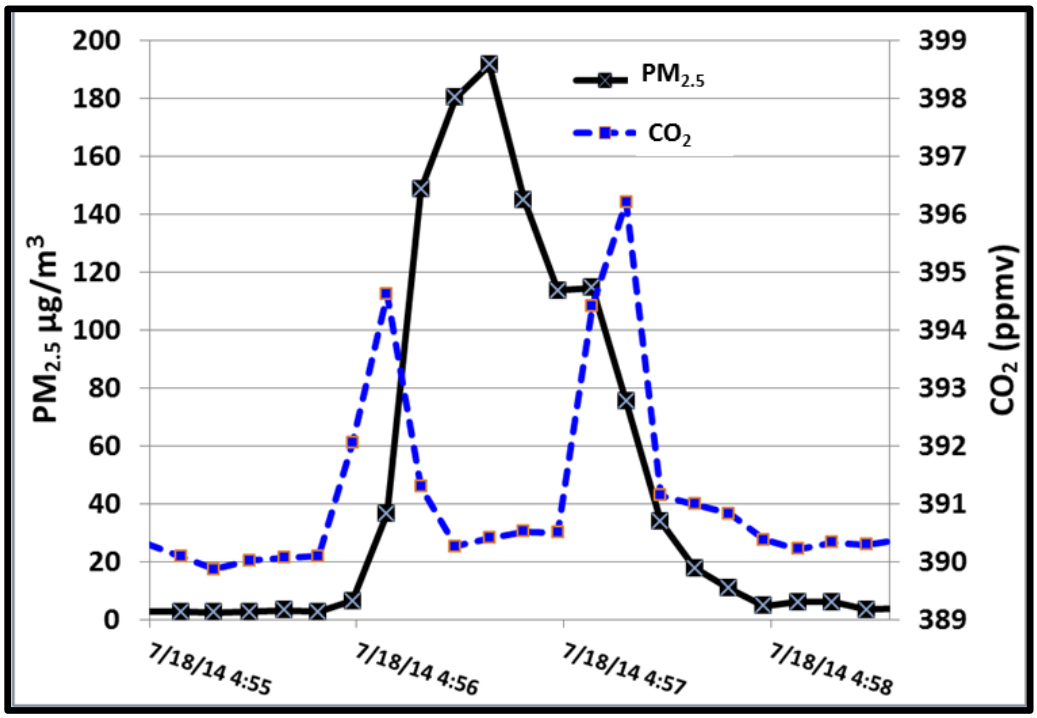
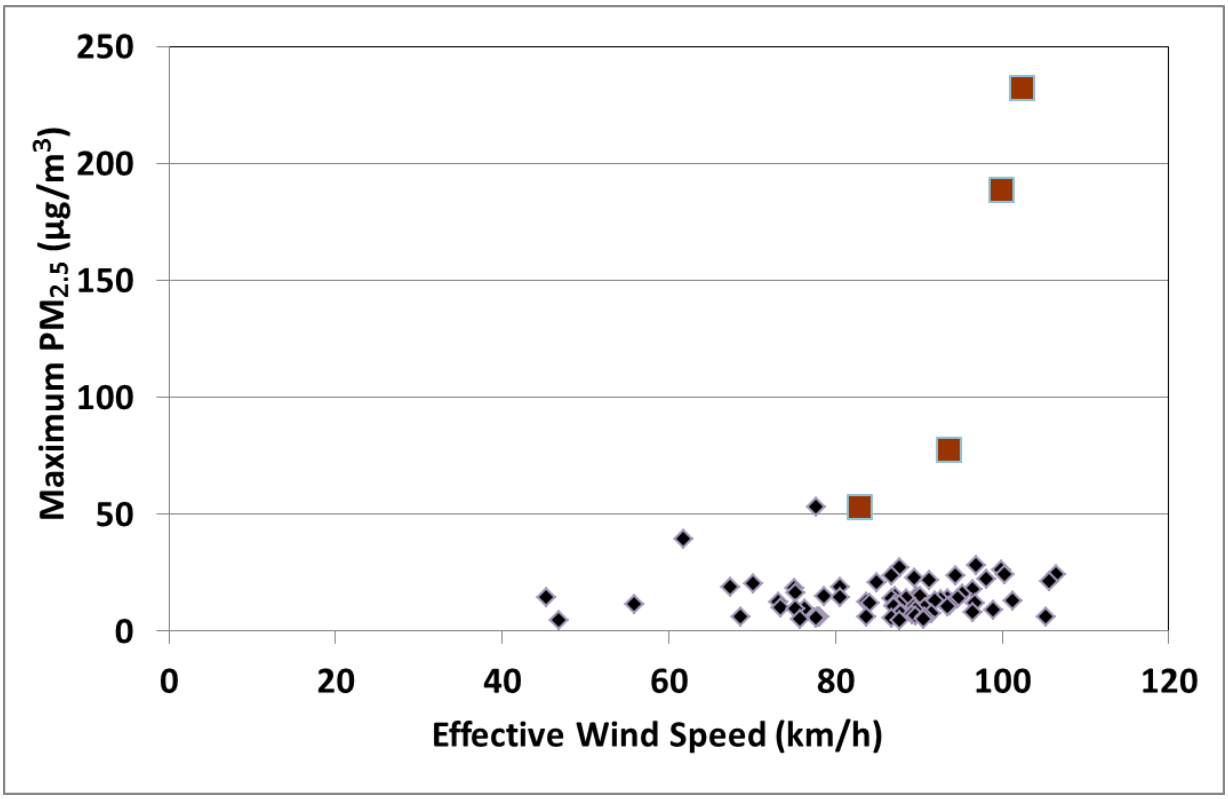

PM2.5
CO2
PM2.5 µg/m3
CO2 (ppmv)
200
180
160
140
120
100
80
60
40
20
0
399
398
397
396
395
394
393
392
391
390
389
7/18/14 4:55
7/18/14 4:56
7/18/14 4:57
7/18/14 4:58

Figure 3

Video
Video
Before train passage $PM_{2.5}$ = 2 µg/m³
After train passage $PM_{2.5}$ = 234 µg/m³

Figure 4


250
200
150
100
50
0
Maximum PM2.5 (µg/m3)
0
20
40
60
80
100
120
Effective Wind Speed (km/h)

Tables

Table 1. Regression parameters for the comparisons between the DustTrak data, the TEOM data and the FRM method at the PSCAA site at Beacon Hill, Seattle, Washington.

Comparison equation (using Reduced Major Axis regression)	R^2	N
TEOM $PM_{2.5}$ ($\mu g/m^3$) = DustTrak x 0.5577 – 0.6977	0.74	485 (hourly averages)
FRM $PM_{2.5}$ = DustTrak x 0.5524 – 0.8433	0.92	7 (24-hour samples)
FRM $PM_{2.5}$ = TEOM x 1.05 – 0.4326	0.96	7 (24-hour samples)

Table 2. PM and CO_2 data for freight and coal trains. Slopes for $\Delta PM_{2.5}/\Delta CO_2$ relationship is reported only for those train events with R^2>0.5 and ΔCO_2 >2 ppmv.[a]

	Freight	**Coal**	**All trains**
Number	293	74	367
Average peak ΔPM_1 (μg/m^3)	11.0	19.7	12.5
Average peak $\Delta PM_{2.5}$ (μg/m^3)	10.7	20.9	13.0
Maximum $\Delta PM_{2.5}$ (μg/m^3)	57.2	232.3	232.3
Number with $PM_{2.5} - CO_2$ R^2 > 0.5 and ΔCO_2>2 ppm	152 (52%)	11 (15%)	163 (44%)
Mean/median $\Delta PM_{2.5}/\Delta CO_2$ slope (μg/m^3/ppmv)	0.70/0.56	0.71/0.56	0.70/.56
Max/Min slope	3.88/0.10	1.64/0.20	3.88/0.10

[a]In addition to the criteria given in the text above, we excluded one additional case with visible coal dust and an extremely high $PM_{2.5}$–CO_2 slope (12.0).

Table 3. $BC/PM_{2.5}$ and $PM_1/PM_{2.5}$ enhancement ratios for freight and coal trains.

	Freight	**Coal**	**All trains**
N (for $BC/PM_{2.5}$ analysis)	233	61	294
Mean/median $BC/PM_{2.5}$ (unitless)	0.47/0.40	0.29/0.20	0.43/0.35/0.27
Standard deviation on $BC/PM_{2.5}$	0.27	0.23	0.27
N (for $PM_1/PM_{2.5}$ analysis)	293	74	367
Mean/median $PM_1/PM_{2.5}$ (unitless)	0.93/0.93	0.96/0.96	0.96/0.96
Standard deviation on $PM_1/PM_{2.5}$	0.03	0.03	0.03

Table 4. The four train events with the highest peak $PM_{2.5}$ concentrations. In each case, a coal train with a visible coal dust plume was confirmed in the video recording.

Date/time (PDT)	Peak $PM_{2.5}$ conc. μg/m^3	Peak BC μg/m^3	BC/$PM_{2.5}$ ratio
8/7/14 17:28	232.3	53.5	0.23
7/18/14 4:57	188.8	88.9	0.47
7/20/14 14:07	77.6	8.86	0.11
7/27/14 21:16	53.1	9.13	0.17