

COMPETING SOURCE EMISSION INVENTORIES FOR AIR QUALITY ANALYSIS

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ABSTRACT

An air quality analysis is required in Oregon when emissions from new or modified sources are greater than Significant Emission Rates. In addition to the new or modified source, dispersion modeling may require the inclusion of emissions from nearby competing sources to ensure air quality standards will not be violated. Good quality emissions data for these competing sources are not always available to sources or consultants performing the analysis.

Oregon Department of Environmental Quality (ODEQ) currently prepares competing source emission inventories for the analysis because emissions and permitting information are already available at the agency in electronic or paper format. However, there is no formal guidance available for selecting which sources to include and the level of emissions information to incorporate into each inventory. ODEQ prepares the inventories on a case-by-case basis for each project but a more common approach is warranted in order to standardize the methodology and provide a more consistent and transparent process.

The purpose of this paper is to describe a formal process for developing competing source emission inventories. The paper will discuss the development of selection criteria to determine which sources to include in the inventories. Specifically, these criteria may include competing source emission rates and distances, emission timing, pollutant averaging time, concentration gradients, meteorology, topography, and other factors.

INTRODUCTION

Beginning in 2012, changes in personnel shifted some regional duties to ODEQ's Air Quality Technical Services (AQTS) section and provided an opportunity to more clearly define emission inventory roles in air quality analysis modeling. AQTS currently reviews and approves permit modeling protocols and modeling results for New Source Review (NSR) and Prevention of Significant Deterioration (PSD) as well as provides modeling services for other air quality analysis needs for the agency. In addition, AQTS prepares point and nonpoint emission inventories for State Implementation Plans, National Emissions Inventory, rule and policy development, and now permit modeling projects. This paper primarily covers the development of point source emission inventories or competing source emission inventories for permit modeling.

A competing source emission inventory is an accounting of emissions from sources located nearby a new or modified source undergoing air quality analysis. The proposed emission increases from the new or modified source and emissions from the competing source inventory are modeled to determine if federal or state air quality standards could be violated. ODEQ's competing source emission inventories only include stationary and portable sources with federal or state air operating permits and

allowable emission limits for pollutants of concern identified by the analysis. All other emission source categories are captured in air quality monitoring data provided by ODEQ for permit modeling.

It makes sense that ODEQ would develop competing source emission inventories for air quality analysis because emissions and permitting data are already available in an electronic or paper format at headquarters or regional offices. There are other reasons for why ODEQ should prepare these inventories as well:

- 1) direct access to permitting databases and files,
- 2) more familiar with types and location of permitted sources in the state,
- 3) access to emission inventory references and tools,
- 4) direct access to permit writers for assistance

When it is necessary for a new or modified source to do competing source modeling it is not clear in federal or state rules from whom or where they should get the emissions and model input data. Regardless of whether ODEQ prepares the inventories or not, new or modified sources and consultants would still need to obtain at a minimum a list of competing sources from ODEQ. ODEQ modeling and inventory staff are involved in the development of modeling protocols and provides air quality monitoring and inventory data early on in the permit modeling process. ODEQ prefers to provide competing source emission inventories to new or modified sources and their consultants to ensure good quality data is used in the models. However, this places the burden on ODEQ to prepare these lists and emission inventories in a limited amount of time and may require inventory staff to collect information from paper files to estimate emissions. This is time consuming and is not always feasible within the limited timeframes of permit modeling projects.

So far, competing source emission inventories have been developed by ODEQ on a case-by-case basis without formal guidance on how to identify competing sources. Federal modeling guidance leaves competing source determination up to the “professional judgement” of state and local reviewing authorities. (40 CFR Part 51, Section 8.2.3 (b)) However, Oregon rules do provide a method for identifying competing sources for permit modeling but it relies on information not usually available when the inventory is initially developed. This provides some difficulty in identifying nearby sources with emissions that significantly impact the surrounding area and whether they should be considered for inventorying.

Time constraints, limited staff availability, and lack of formal guidance prompted a need to create a formal screening process for competing source determination. The purpose of the case study for this paper is to demonstrate the complexity in selecting sources for competing source emission inventories. In addition, the study will contribute to the design of a screening process to identify sources for competing source inventories and provide a platform to apply the new screening process in a real world situation.

SCREENING PROCESS DESIGN

This section formalizes the steps for a screening process to identify nearby sources for competing source emission inventories. The screening process design incorporates various criteria into the steps such as emission rates and distances, concentration gradients, emission timing, pollutant averaging times, topography, meteorological conditions, and other factors as needed.

The evaluation of past inventories prepared for permit modeling projects indicated there are four main steps to competing source determination. These four steps can be used for any permit modeling project throughout the state to identify nearby sources for competing source emission inventories. The screening process steps are as follows:

- 1) Develop initial list of nearby sources within a 50 km radius,
- 2) Apply “Range of Influence” Screening Method,
- 3) Assess topography and meteorological conditions, and
- 4) Evaluate remaining nearby sources for background rather than inventorying

The goal for standardizing a screening process is to narrow the initial list of nearby sources from Step 1 down to a manageable number of significant sources in Step 4 that will be included in the competing source emission inventory.

Oregon’s State and Federal Air Operating Permit Programs:

Competing source emission inventories for Oregon only include sources with a federal or state air operating permit. ODEQ permits many of these small and large sources under Divisions 216 or 218 of the Oregon Administrative Rules (OAR) for the Air Contaminant Discharge Permit (ACDP) or Title V permit programs. ACDPs are primarily assigned to regulate small sources that emit less than 100 tons per year (tpy) of any regulated pollutant, but are also required for any large new or modified sources undergoing air quality analysis. There are six types of ACDPs: Basic, Simple, General, Standard, Short Term Activity, and Construction. A General ACDP differs from other types in that permits are assigned based on industry type. So a rock crusher, ready-mix concrete plant, or sawmill would be assigned to a specific source category with generic allowable emission limits and common emission sources and processes for that industry type.

Basic ACDPs traditionally do not have formal allowable emission limits in their permit. However, in order to be assigned a Basic permit the business cannot emit greater than 9 tpy of any regulated pollutant. Simple and Standard permits are more complex and typically have site-specific allowable emission limits but might be assigned generic allowable limits as well. The other two types of ACDPs only apply to short term activity or construction at a facility that do not require long term permits.

Oregon permits large industrial sources under a Title V permit and their allowable emission limits are site-specific. They can emit 100 tpy or more of a criteria pollutant and/or 10-25 tpy of single or multiple hazardous air pollutants which identifies them as a major source according to the United States Environmental Protection Agency (USEPA). Only Title V and Basic, Simple, General, and Standard ACDPs will be evaluated through this formal screening process for competing source emission inventories.

1) Develop initial list of sources within a 50 km radius

The first step is to identify nearby sources relative to the new or modified source for inclusion in the competing source emission inventory. This is done by plotting the new or modified source on a map with a 50 km radius boundary using the Oregon ArcGIS online tool. The reason for this is to identify what counties fall within the boundary.

A list of stationary and portable nearby sources that have a Title V or ACDP permit with allowable emissions limits for the pollutants of concern is generated for each county within the

boundary from ODEQ's *Tracking Reporting and Administration of Air Contaminant Sources* (TRAACS) permitting database. The list includes source information, allowable emission limits and permitting information, and geographic coordinates used in Step 2 of the screening process.

2) "Range of Influence" Screening Method

Oregon rules provide a methodology for identifying nearby sources to include in competing source modeling. The "Range Of Influence" (ROI) method estimates the distance from a nearby source that their emissions can significantly impact the surrounding area. Equation (1) estimates the distance of impact by dividing the annual allowable emissions by a pollutant specific constant found in Table 1.

$$\text{Equation (1) ROI} = Q/K$$

where

Q = annual allowable emission rate in tons per year (tpy)

K = pollutant specific constant in tons per year/km (Table 2)

Table 1. Pollutant Specific Constant for ROI Calculation

Pollutant	CO	NO _x	PM _{2.5} /PM ₁₀	SO ₂	Lead
K	40	5	5	5	0.15

The ROI of the nearby source is compared to the modeled Source Impact Area (SIA) of the new or modified source to define significance. If the ROI is greater than the SIA for at least one pollutant the nearby source is included in the modeling. The SIA is based on modeled values of the SIL analysis which determine the extent of impact the new or modified source will have on the surrounding area.

Oregon rules sets the maximum ROI at 50 km for nearby sources that can be included in competing source analysis; however, it is left to the discretion of the agency to request for sources that are greater than the maximum be included as well. The ROI is only relevant for PSD Class II and III areas. The ROI for PSD Class I areas use the modeling domain of the new or modified source evaluated which would be defined by ODEQ.

The SIA is not always available at the time of inventory preparation but will be available to refine the inventory for final modeling. In the meantime, the ROI was revised to work without the SIA. To adequately cover impacts by both nearby sources and new or modified sources the annual allowable emission limits are added together for each pollutant and the ROI is calculated from the total emissions. This will require new or modified sources to provide their requested annual allowable emission limits to perform this step; however, this information should be available early on in the modeling process. Equation (2) is the revised ROI formula which works without the SIA,

$$\text{Equation (2) ROI} = Q/K = (\text{new or modified source (Q)} + \text{nearby source (Q)})/K$$

where,

Q = annual allowable emission rate in tons per year (tpy)

K = pollutant specific constant in tons per year/km (Table 2)

The combined ROI is then compared against the distance from the nearby source to the new or modified source to determine significance. If the ROI is greater than the distance for at least one of the

pollutants the nearby source would stay on the list. The remaining list of significant nearby sources is now advanced to the next step to assess topography and local meteorology.

3) Topography and Meteorological Conditions Assessment

Terrain plays an important role in deciding whether a nearby source should be included in the inventory or removed. This step analyzes any natural or artificial features that surround nearby sources and the new or modified source. In addition, analysis is needed for how topography can cause unique meteorological conditions such as localized weather patterns and act as a barrier for pollutant transport.

The ROI sources are re-mapped to evaluate for physical barriers within the proximity of the new or modified source. Physical features such as buildings, hills, or mountains and their elevations are identified on the map in relation to where the nearby sources and new or modified source is located. So, if the physical barrier is significant and likely will block pollutant transport then that nearby source can be eliminated from the list.

In addition, becoming familiar with local weather patterns and topography of the area can provide insight to whether a nearby source's emissions will have a significant impact. Meteorological data can be obtained from National Oceanic and Atmospheric Administration (NOAA) or local airports to analyze weather patterns of the area. A general knowledge of topography, annual prevailing winds (direction and speeds), number of stagnant days, and average rainfall could all be factors to consider when determining if a nearby source is significant enough to be kept on the list.

4) Considerations for removal from competing source emission inventories

ODEQ's competing source emission inventories are only for stationary and portable sources with ACDP or Title V permits; however, in actuality some of the ACDP permit types do not result in significant enough emissions to be inventoried on an individual basis. Specifically, Basic and General ACDPs could be evaluated for inclusion in the background concentration of the model because their actual emissions are insignificant even when individual sources emissions are totaled for the permit category. Basic permits do not have allowable emission limits but General Permits do have generic allowable permit limits. Table 2 is the generic allowable emission limits for the ACDP General Permit type.

Table 2. Generic Allowable Emission Limits

Generic Allowable Emissions Limits				
CO	NOX	PM10	PM2.5	SO2
(tpy)				
99	39	14	9	39

Basic permits are only required to keep emissions below 9 tpy for any regulated pollutant. In both cases, actual emissions typically do not add up to even 10% of allowable emission limits which creates a huge gap between what they are allowed to emit and what they actually emit. Add distance into the equation and impact of emissions for these permit types becomes less significant.

There are other reasons to evaluate the significance of some ACDP permit type categories when considering removing them from the list. These reasons were developed into criteria to evaluate whether

a nearby source with a particular permit type should be eliminated or kept on the list. The criteria are as follows:

- 1) small or intermittent sources do not operate at the same time as the new or modified source,
- 2) source does not emit a pollutant of concern,
- 3) portable source has no known geographic coordinates, and
- 4) a source's actual emissions are substantially lower than the allowable emission limit in their permit and not expected to operate near the assigned limit.

Though, it would appear that nearby sources should automatically be removed for any of the reasons mentioned above it is not that clean cut. For example, an intermittent source operating simultaneously as the new or modified source may not violate long-term pollutant averaging times but might cause a violation of short-term averaging times. However, distance to the new or modified source plays a big role in violating short term averaging times so anything located more than a few kilometers out should not be significant. These types of nearby sources may still need to be considered for inventorying depending on the needs of the modeling project.

A cutoff was established to take this scenario and the other criteria above into consideration when deciding whether to remove or keep any nearby sources with General or Basic ACDP permits on the list. Any source with these permit types located greater than 5 km from the new or modified source would be considered insignificant and would be included in the background concentration. Any source located within 5 km of the new or modified source would be included in a competing source emission inventory. The only two exceptions are if a source does not emit a pollutant of concern or is a portable that has no geographic coordinates to perform screening Step 2 above.

APPLICATION OF SCREENING PROCESS

A CASE STUDY FOR COMPETING SOURCE DETERMINATION FOR WASHINGTON COUNTY

Background

Figure 1, is a map showing where Washington County is located in Oregon. Washington County, outlined in red, is located in northwestern Oregon at the northern end of the Willamette Valley. The Willamette Valley extends from Portland to Eugene and is surrounded by the Cascade Range on the eastside and the Coastal Range on the westside.

Figure 1. Oregon Map

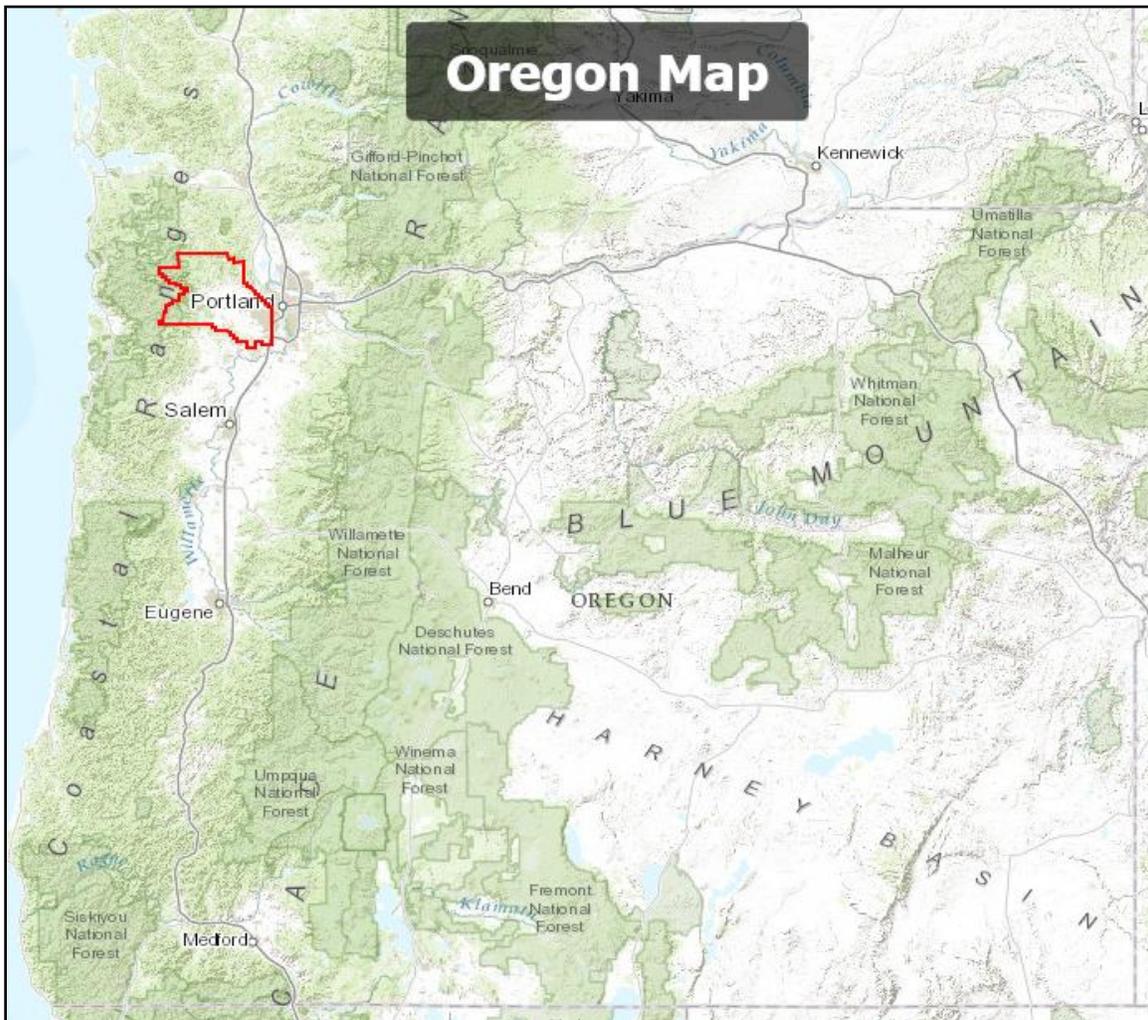
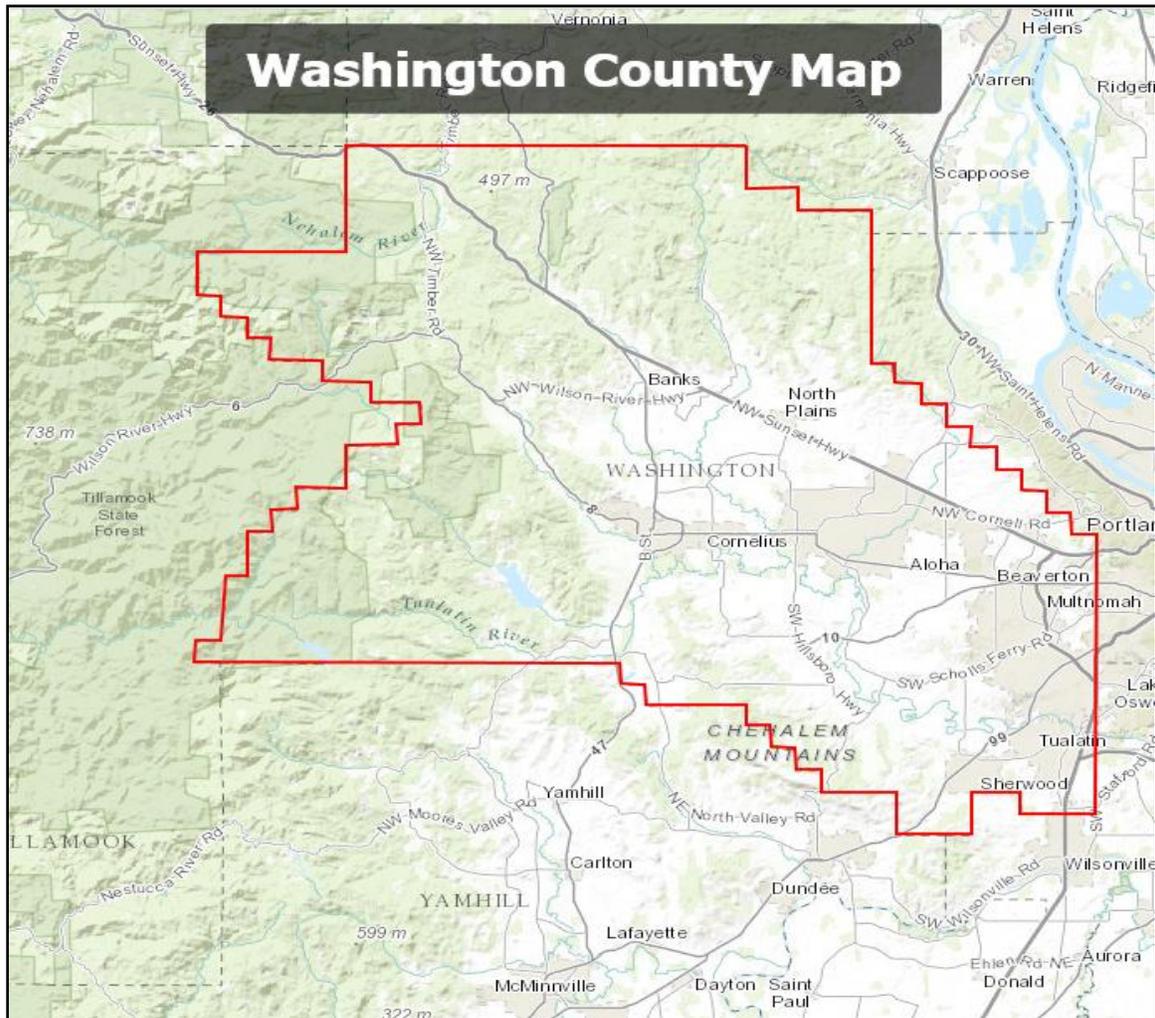


Figure 2, is a map outlining the Washington County border in red. The county covers an area of 724 square miles with a population of 562,998 people according to the 2014 US Census. Most of the population and businesses are located in the southeast corner of the county. Washington County is one of three counties that makes up the Portland Metropolitan Area and is considered the 2nd most populated county in the state. Beaverton, Cornelius, Forest Grove, Hillsboro, Sherwood, and Tigard are just some of the major cities located in the county. Hillsboro is the county seat and largest city while Forest Grove is the oldest city in the county. The major industries in Washington County are agriculture, lumber,

manufacturing, and food processing. And now, the electronics manufacturing industry is steadily growing and beginning to surpass other manufacturing industries in the Hillsboro area.

Figure 2. Washington County Map



About the Case Study Subject

The source proposing modifications is located in Hillsboro between Tualatin-Valley highway and Highway 26. The proposed emission increases will raise allowable emission limits in the ACDP permit. This triggered certain regulatory requirements which required the source to apply for a permit and do PSD analysis. Modeling results indicated that proposed emission increases will cause an exceedance of Significant Air Quality Impact Levels (SILs) for particulate matter (PM10 and PM2.5) and nitrogen dioxides (NO2). The results for carbon monoxide (CO) only showed an exceedance of the 1 hour standard but not the 8 hour standard for the SIL. See Table 3 below for Oregon’s Significant Air Quality Impact Levels.

Table 3: Oregon Significant Air Quality Impact Levels

 State of Oregon Department of Environmental Quality Significant Air Quality Impact Table 1 – OAR 340-200-0020				
Pollutant	Averaging Time	Air Quality Area Designation		
		Class I	Class II	Class III
SO ₂ (µg/m ³)*	Annual	0.10	1.0	1.0
	24-hour	0.20	5.0	5.0
	3-hour	1.0	25.0	25.0
	1-hour	---	8.0	---
PM ₁₀ (µg/m ³)	Annual	0.20	0.2	0.2
	24-hour	0.30	1.0	1.0
PM _{2.5} (µg/m ³)	Annual	0.06	0.3	0.3
	24-hour	0.07	1.2	1.2
NO ₂ (µg/m ³)	Annual	0.10	1.0	1.0
	1-hour	---	8.0	---
CO (mg/m ³)**	8 hour	---	0.5	0.5
	1-hour	---	2.0	2.0

* micrograms/cubic meter
** milligrams/cubic meter

Since modeling results put the source above the SIL for those pollutants additional air quality analysis is required. The additional analysis will ascertain if the proposal for emission increases and nearby source emissions would violate federal or state air quality standards. The additional air quality analysis requires the preparation of a competing source emission inventory.

The source will be referred to as “modified source” from this point on in the case study.

Why choose Washington County for the Case Study?

To date, two competing source lists and eight competing source emission inventories for permit modeling projects have been completed around the state. Most permit modeling projects are fairly rural in location and the number of nearby sources pulled in for inventorying has been quite minimal. However, recent permit modeling projects have been located in more urban areas which have resulted in a greater volume of nearby sources initially considered for competing source determination. Washington County is the most urban area used for a competing source inventory and will help demonstrate more accurately the gross volume of nearby sources that may be included for competing source determination.

In addition, the county has unique topographical features that creates localized meteorological conditions within the county and obstructs pollutant transport. This would affect where model receptors are located within the county and may help further screen nearby sources for the inventory. Data from the Washington County emission inventory will be used to demonstrate whether particular selection criteria could be useful for competing source determination.

APPLICATION OF SCREENING PROCESS: CASE STUDY RESULTS AND DISCUSSION

This section takes the formal screening process designed in the previous section and applies it to the Washington County case study. The case study is broken down by screening step to observe the refining of the list of nearby sources down to those only significant enough to include in a competing source emission inventory.

1) Develop Initial List of Nearby Sources

The first step was to plot the modified source and a 50 km radius for the case study on a map and identify the counties that fell within the boundary. Six counties fell within the 50 km boundary: Clackamas, Columbia, Marion, Multnomah, Washington, and Yamhill. The 50 km boundary did cross over two counties but sources from these counties were not included in the case study. Tillamook County Oregon had no sources located within the boundary and Clark County in Washington would be eliminated in Step 3 based on topography and location to modified source. A list of nearby sources for the six counties was generated from the TRAACS permitting database.

The initial list compiled, totaled 480 nearby stationary and portable sources within the boundary and is shown in Table 4 broken down by county. Multnomah, Washington, and Clackamas counties respectively contained the highest number of stationary sources within the 50 km radius.

Table 4. Number of Sources per County within 50km boundary

<u>County Name</u>	<u>Number of Sources</u>
CLACKAMAS	49
COLUMBIA	8
MARION	24
MULTNOMAH	163
WASHINGTON	64
YAMHILL	21
Portables NWR	50
Portables WR	101
	480

Portable sources for both regions make up the second highest total next to Multnomah County but are treated a little differently here because they do not have geographic coordinates and is only known by the ODEQ regional offices that manage the permits. Portables in NWR fall within the 50 km boundary and can be located in any three of the following counties at one time: Clackamas, Multnomah, and Washington. In other words, portables move around between the counties and may be located in one county today and another tomorrow. The 50 NWR portable sources listed in Table 4 are a total for all three counties. The portables for WR are similar in concept but cover a larger area than the 50 km boundary. The 101 portables listed in the table cover all of WR regardless of whether they are located outside the boundary.

Table 5 separates the sources by permit program and type to identify the permit types with the most sources. General ACDP permits carry the largest volume of sources at 318 followed by Standards and Simples combined with 109 sources. 480 stationary and portable sources are a large undertaking for emission inventory staff to prepare actual emissions at the process-level.

Table 6 compares the number of nearby sources at the 50 km and 30 km boundaries. When the 30 km boundary is applied, the number of nearby sources is reduced from 329 to 242. Though, the number of sources with General permits reduced by 54 it would still be a lot of work to inventory them individually, especially since the emissions may not be significant enough to impact the surrounding area. The other permit types under the 30 km boundary did reduce by 10-11 sources each but are more complex to inventory.

Table 6. Number of Sources by Permit Type and Boundary Comparison

Permit Type*	< 50 km	< 30km
Title V:	30	20
ACDP:		
Standards	57	48
Simples	50	39
Generals	182	128
Basic	10	7
	329	242

The 30 km boundary does not take into consideration any sources further away that might still have a significant impact. It was concluded that the 50 km boundary was more appropriate boundary to establish the initial list of nearby sources. Step 2 provides a better method for identifying nearby sources that may significantly impact their surroundings based on emission rates and distance. Boundaries alone cannot adequately identify potential nearby sources but in combination with further screenings steps it provides a place to start developing the initial list.

2) Range of Influence Screening Method

Since the ROI was revised to work without the SIA, ODEQ still needed the modified source's requested allowable emission limits and distance measurements for all 329 nearby sources to complete the calculations. Table 7 is the requested annual allowable emission limits for the modified source.

Table 7. Modified Source Annual Allowable Emission Limits

Modified Source Annual Allowable Emission Limits				
CO	NOX	PM10	PM2.5	SO2
164	95	32	28	39

The revised ROI method looks at the combined distance that the nearby source and modified source emissions will have on the surrounding area. The annual allowable emissions for both sources are added together for each pollutant and the ROI is calculated from the total emissions. (See Equation (2)) The combined ROI estimate is then compared against the distance from the nearby source to the modified source to determine significance. Table 8 below is an example of a nearby source that remains on the list because the NOX ROI is 26.80 km which is greater than the distance of 24 km to the modified source.

Table 8. ROI results compared to distance

SEQ ID	County	Distance to Site (km)	ROI calculation (km)				
			CO	NOX	PM10	PM2.5	SO2
267	WASHINGTON	24	6.58	26.80	9.20	7.40	15.60

115 sources were removed from the list because ROIs for all five pollutants were less than the distance from each nearby source to the modified source. Table 9 is a breakdown by county of the remaining nearby sources considered to have a significant impact along with the modified source.

Table 9. Number of Sources by County

County	# of Sources
Clackamas	14
Columbia	3
Multnomah	125
Marion	1
Washington	62
Yamhill	9
	214

Multnomah County has the highest number of sources that remain on the list and can be seen in Figure 4 as a cluster of sources located north of the Tualatin Mountains on the map. Washington County comes in second with the highest number of sources that remain on the list and are located south of the Tualatin Mountains.

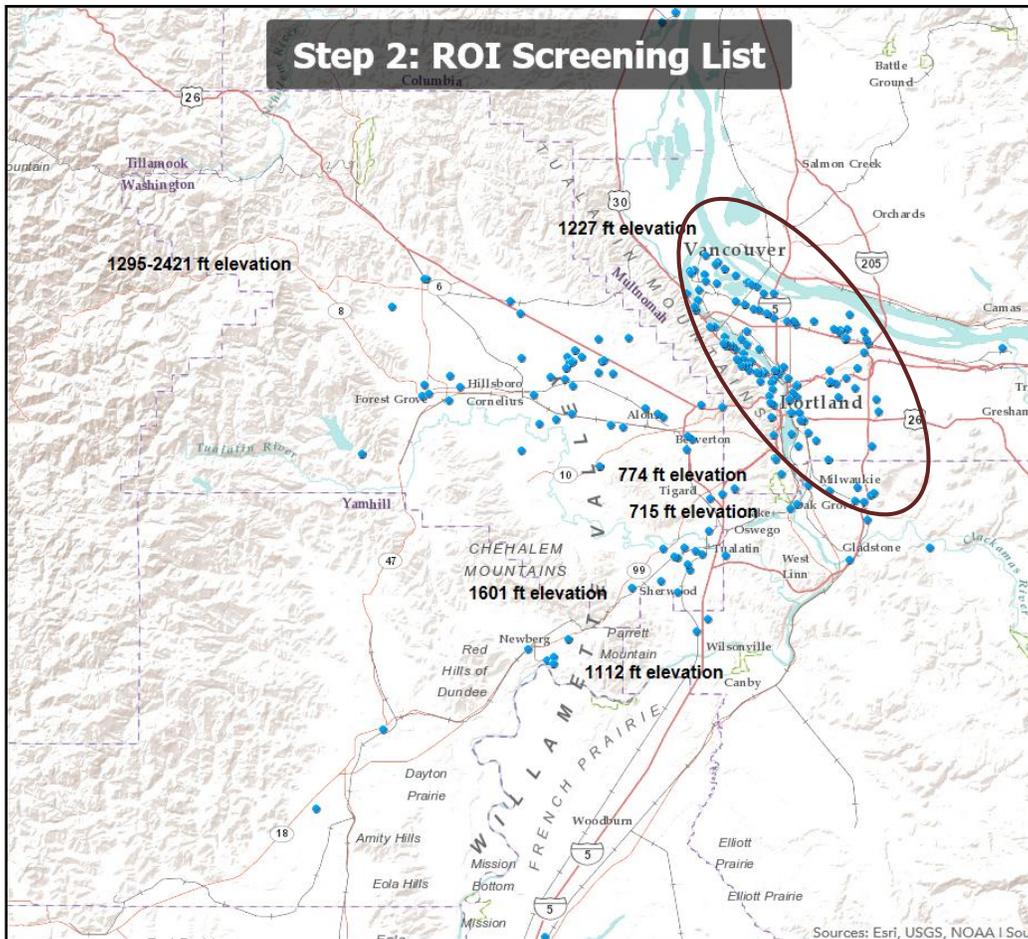
Table 10 are the nearby sources that remain on the list after application of the boundaries in Step 1 and the ROI screening method employed in this step. General ACDPs still contain the most sources that would need to be included in the competing source emission inventory.

Table 10. Comparison of Source Removed Based on 30 km Boundary and ROI Screening Method

Permit Type	< 50 km	< 30km	ROI Screening Method
Title V:	30	20	25
ACDP:			
Basic	10	7	7
Generals	182	128	114
Simples	50	39	28
Standards	57	48	40
	329	242	214

*Does not Include Portables from NWR and WR.

Figure 4. Step 2: ROI Screening List



Sources: Esri, USGS, NOAA | Sources: Esri, DeLorme, USGS, NPS

The remaining list of significant nearby sources identified via the ROI screening method is now advanced to the next step to assess topography and meteorological conditions.

3) Topography and Meteorological Conditions Assessment:

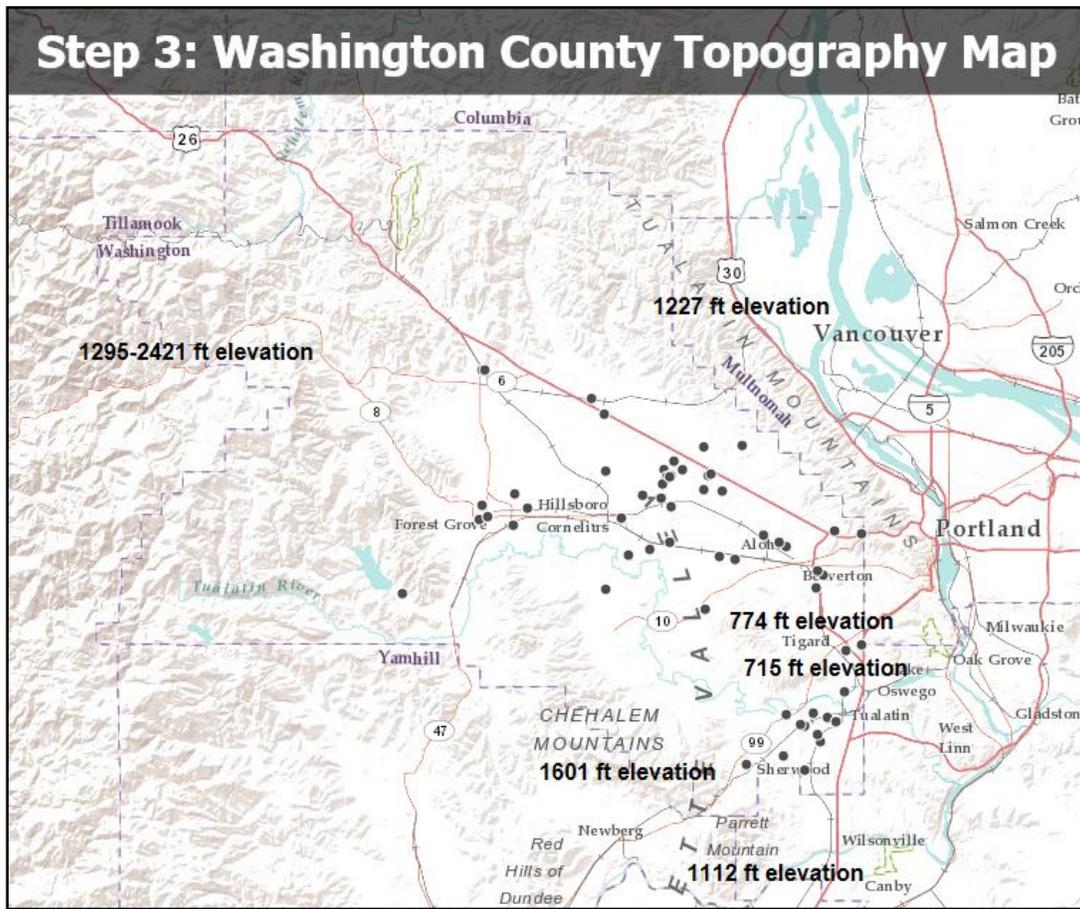
Topography:

Terrain plays an important role in deciding whether a nearby source should be included in the inventory or can be removed. This step analyzes any natural or artificial features that surround nearby sources and the modified source. In addition, analysis is needed for how topography can cause unique meteorological conditions such as localized weather patterns and act as a barrier for pollutant transport.

Washington County was chosen for the case study because of its unique terrain. As indicated earlier, the modified source is located in the northwestern Willamette Valley which is surrounded by hills and mountains. Figure 5 shows the terrain for Washington County identifying hills and mountains and their elevations for the valley. Though, the local mountains are not as high as Mount Hood (11,249 ft) or Mount St. Helens (8365 ft) they are a physical barrier to emissions entering or leaving this part of the valley. The county is essentially located in a bowl with the Tualatin Hills Mountains (1227 ft) in the

north connecting with the Coastal Range (1295-2421 ft) that runs north to south. The Chehalem Mountains (1601 ft), Parrett Mountain (1112 ft), Cooper Mountain (236 meters or 774 ft) and Bull Mountain (715 ft) make up the south and east corner of the valley.

Figure 5. Step 3: Washington County Topography Map



Sources: Esri, USGS, NOAA | Sources: Esri, DeLorme, USGS, NPS

The topography described above eliminated potential sources from the list because of their location on the far side of a physical barrier rendering their emissions inconsequential. This step narrowed down the list to only those nearby sources located within Washington County. 152 sources from Columbia, Multnomah, Clackamas, Marion, and Yamhill counties were removed from the list. That leaves 62 nearby sources to move on to the next step.

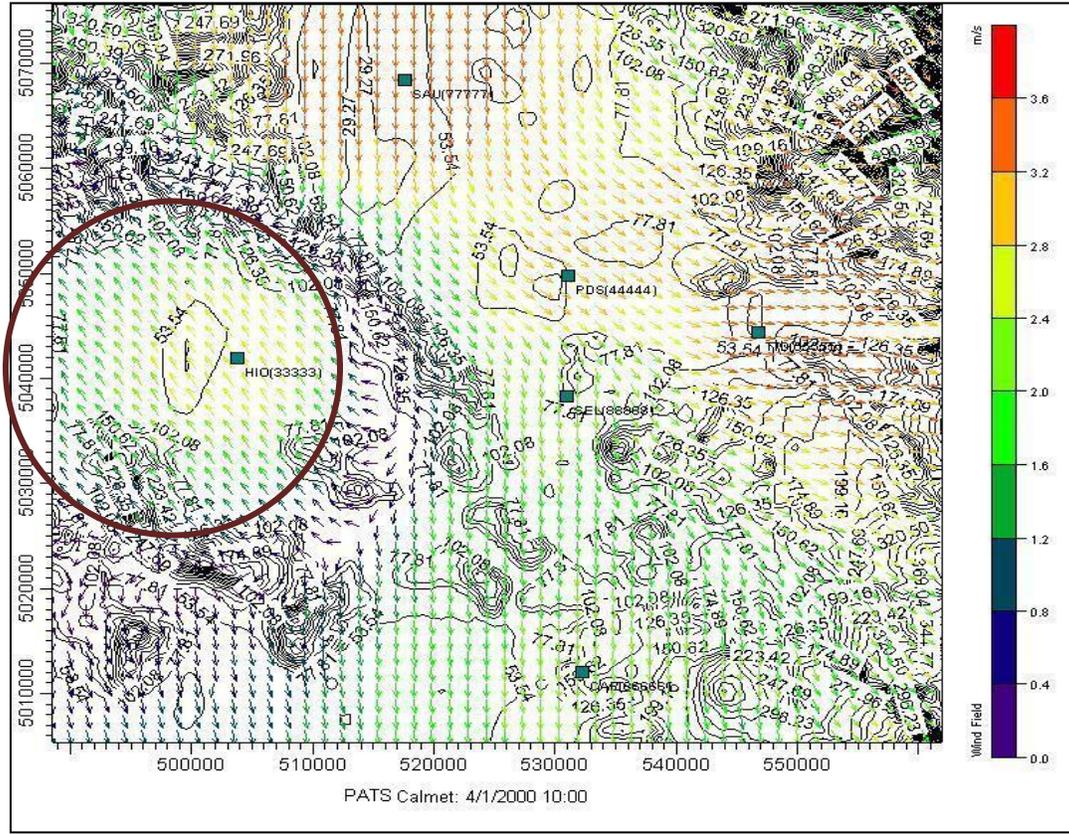
Meteorological Conditions:

Figure 6 is a map of windfields in the Portland Metro area and Washington County. The map was created for a modeling project back in 2000 but it can be used here to evaluate how topography can affect meteorological conditions. This map is only meant to demonstrate how wind direction and speed is greatly affected by topography.

Wind picks the path of least resistance which means topography will act as a barrier to pollutant transport. On the north side of the Tualatin Mountains winds advance faster from the north and slow as they are deflected to the southeast by the terrain. This can also create unique localized weather patterns because Washington County is actually located in a bowl. Several times out of the year the county

experiences stagnant days with heavy fog that may not move out of the area for several days to weeks during the winter months. Also, prevailing winds generally travel from SSW and create circular patterns that do not move anything out of the county. The map confirms that emissions from sources outside the county will likely not have a significant impact. See the circle in Figure 6 for the extent of area that is of consequence.

Figure 6. Windfields Map for Portland Metro Area and Washington County



Oregon Department of Environmental Quality - PATs Project 4/2000

4) Evaluate remaining nearby sources for background rather than inventorying

62 sources remain on the list from the last screening step and advance to this final step for evaluation. Table 11 is a breakdown of remaining sources on the list by permit type.

Table 11. Remaining Sources to Evaluate from Step 3

Permit Program Type	Permit Type	# of Sources
ACDP	Basics	2
ACDP	Generals	35
ACDP	Simples	13
ACDP	Standards	11
TV	Title V	1
		62

ODEQ's competing source emission inventories are only for stationary and portable sources with ACDP or Title V permits; however, in actuality some of the ACDP permit types do not result in significant enough emissions to be inventoried on an individual basis. Specifically, ACDP Basic and General Permits could be evaluated for inclusion in the background of the model because their emissions are insignificant even when individual source emissions are totaled for the permit category. Table 12 demonstrates this issue by comparing 2013 actual annual emissions to generic allowable emission limits for each permit type in Washington County. The actual annual emissions for these permit types are only 3% each for CO and NOX, 6% each for PM10 and PM2.5, and approximately 1% of SO2 annual allowable emissions limits for each pollutant. Potentially, 28 sources with General and Basic ACDP permits could be removed from the list because of the actual and allowable emissions comparison. However, an additional 5 more sources can be removed based on criteria mentioned in Step 4 of the Screening Process Design section. Table 13 shows a total of 33 sources removed based on permit type and the > 5 km cutoff for General and Basic ACDPs.

Table 12. Annual Actual and Allowable Emissions Comparison by General and Basic Permit Types

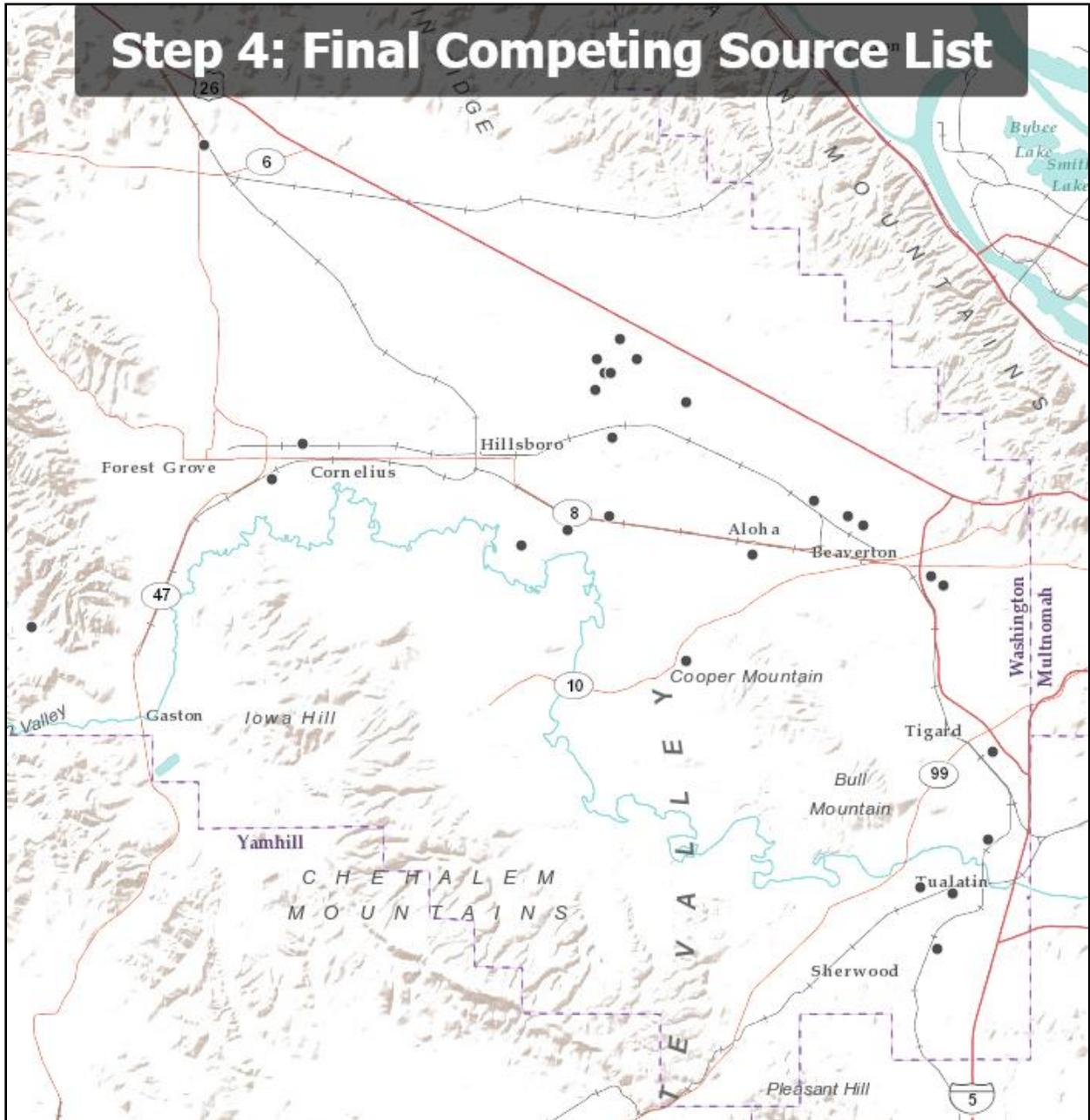
General Permit Type Code	Permit Type Description	# Sources Per Permit Type	2013 Actual Emissions					Generic Allowable Emissions per Permit Type				
			CO	NOX	PM10 (tpy)	PM2.5	SO2	CO	NOX	PM10 (tpy)	PM2.5	SO2
AQGP-007	Asphalt Plants	3	26.9	4.8	5.2	5.2	0.9	297	117	42	27	117
AQGP-008	Rock Crushers	1	---	---	7.0	0.4	---	99	39	14	9	39
AQGP-009	Ready-mix/concrete plants	5	0.3	1.8	2.0	0.6	0.0	495	195	70	45	195
AQGP-010	Sawmills/millwork	4	26.3	4.7	3.6	3.6	0.2	396	156	56	36	156
AQGP-011	Boilers NG/Oil	5	11.3	14.8	0.5	0.5	4.4	495	195	70	45	195
AQGP-012	Crematories	5	1.0	1.2	3.5	3.5	0.0	495	195	70	45	195
AQGP-015	Seed Cleaning	1	---	---	0.1	0.0	---	99	39	14	9	39
AQGP-016	Coffee Roaster	2	---	0.2	0.4	0.4	---	198	78	28	18	78
Basic	Boiler NG	2	4.3	5.1	0.1	0.1	0.1	198	78	28	18	78
		28	70.0	32.6	22.4	14.3	5.5	2772	1092	392	252	1092
		% of Allowable Emission Limits for Permit Type					3%	3%	6%	6%	1%	

Table 13. Sources Removed from List by Permit Type

ACDP Permit Type Code	Permit Type Description	# Sources Per Permit Type
BS	Boiler NG	1
AQGP-007	Asphalt Plants	2
AQGP-008	Rock Crushers	1
AQGP-009	Ready-mix/concrete plants	3
AQGP-010	Sawmills/millwork	5
AQGP-011	Boilers NG/Oil	5
AQGP-012	Crematories	3
AQGP-015	Seed Cleaning	1
AQGP-016	Coffee Roaster	2
AQGP-018	Electrical Generation	6
AQGP-027	Surface Coating	2
Simples	Electrical Generation	2
		33

So, 33 sources were removed from the list based on this final step of the screening process. This leaves 29 sources that would need to be included in a competing source emission inventory for Washington County. Figure 7 shows where the final 29 sources are located in the county.

Figure 7. Step 4: Map of Final Competing Source List



MRLC, State of Oregon, State of Oregon DOT, State of Oregon GEO, Geobase, Esri, HERE, DeLorme, Intermap, USGS, NGA, USDA, EPA, NPS, U.S. Forest Service

DISCUSSION:

The case study was a good way to apply the new screening process to a real world situation. The modified source's location in Washington County had the potential to ensnare a large number of sources for the inventory and the topography created unique conditions for which sources could actually be removed from the final list. Initially, the study started out with 480 nearby sources but 151 portables were immediately removed based on lack of knowledge for their current location and considered in the background concentration of the model. Table 14 summarizes the number of sources left on the list after (less the portables) each step.

Table 14. Comparison of Sources Remaining on the List after Each Screening Step

Permit Type	Step 1	Step 2	Step 3	Step 4
Title V:	30	25	1	1
ACDP:				
Basic	10	7	2	1
Generals	182	114	35	5
Simples	50	28	13	11
Standards	57	40	11	11
	329	214	62	29

A total of 300 sources were removed from the list from Steps 1 through 4. Step 3 of the screening process removed the most sources from the list, 152 sources in total. As can be seen in Figures 4, 5, and 7 shows how topography is the key to elimination in this study because it created a significant barrier to pollutant transport in and out of Washington County to compete with the modified source.

General permits, considered the largest number of nearby sources throughout the entire screening process, were reduced by 177 sources. 300 sources may seem like a lot to remove from the list but their emissions are still accounted for in the air quality monitoring data provided for permit modeling. The sources removed are still available for further evaluation when the SIA becomes available and it might pull some nearby sources back into the list. But for now 29 sources are more manageable than 329 and can be inventoried down to process-level more efficiently!

RECOMMENDATIONS:

From past experience developing competing source lists and emission inventories it became apparent that ODEQ needed a screening process to downsize the number of nearby sources that could be drawn into future permit modeling projects, especially projects located in urban areas. This new screening process will help staff work a lot more efficiently to meet permit modeling deadlines.

The following are recommendations to formalize the new screening process:

- screening process can be used for different areas around the state
- use 50 km boundary for the initial list in Step 1
- use ROI screening method for Step 2
- use 5 km cut-off for Basic and General ACDP Permits in Step 4
- return to Step 2 to use SIA when it becomes available in the ROI screening method and repeat steps 2-4 and revise initial inventory

Competing source determination may still require a case-by-case analysis but the development of the list will at least be consistent and transparent with the new screening process. Refinement of the inventory for final modeling will be required once the SIA becomes available but at least the original list is already identified. Step 2 of the ROI screening method can be revisited by inserting the SIA into the calculation and isolate the additional list of nearby sources to consider for inventorying.

To conclude this paper it must be noted that this new screening process is ever evolving and may change when new federal or state modeling guidance is released in the future.

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- 2) Oregon Department of Environmental Quality, Oregon Administrative Rules (OARs), Chapter 340: <http://www.deq.state.or.us/regulations/rules.htm>
 Division 216, Air Contaminant Discharge Permits
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 Division 225, Air Quality Analysis Requirements (OAR 340-225-0020 (12) and (13))
- 3) Oregon Department of Environmental Quality, Oregon PSD Modeling Guidance Document (Draft); (Oregon: August 7, 2014)
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KEY WORDS

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