OAW Testimony in Response to the
Hillsboro Airport Parallel Runway 12L/30R
Draft Supplemental Environmental Assessment (3/15/13)

April 17, 2013

To: Ms. Renee Dowlin, Senior Environmental Planner, Port of Portland, P.O. Box 3529, Portland, Oregon 97208

Please accept this testimony on behalf of Miki Barnes, LCSW and Oregon Aviation Watch (OAW).

No Current Need for Additional Capacity at HIO

More Operations at HIO in 1989 Than Now

The Hillsboro Airport Parallel Runway 12 L/30R Draft *Supplemental* Environmental Assessment (SEA) opens with the statement that the 2005 Hillsboro Airport (HIO) Master Plan recommended a new parallel runway to serve forecasted demand.[1]

It is noteworthy that there were more runway operations at HIO in 1989 than there are now. Yet the 1990 Hillsboro Airport Master Plan stated that it would not be necessary to plan for operational delays or airport expansions until airport capacity reached 250,000 to 300,000 annual operations. According to the Federal Aviation Administration (FAA) Terminal Area Forecast (TAF) for January 2013, the annual operational count at HIO is expected to remain below 250,000 for the next 28 years, topping out at 246,717 in 2040.[2]

In addition there were far more based aircraft at HIO in 1990, 341, compared to 257 in 2011.[3]

The 1990 Master Plan "assuming a relatively high proportion of touch-and-go activity" also identified alternatives to adding a third runway by pointing out that the capacity at HIO could "effectively be increased by changes in the Airport's peaking characteristics (e.g., more even spread of operations throughout the day, week, and year, etc.) Such changes would enable the airfield to accommodate at least 300,000 operations per year."[4]

Per the 1990 Hillsboro Airport (HIO) Master Plan,

> "...the airport presently experienced some 215,800 aircraft operations in 1989. The Master Plan forecasts project a demand of 278,000 aircraft operations in 2010. The 250,000 to 300,000 capacity of the present runway would therefore be reached near the end of the 20-year Master Plan time frame. Significant operational delays would begin to occur during this period unless additional airport improvements are made. The most effective of such improvements would

> be construction of a parallel runway...This addition would increase the airfield capacity to approximately 400,000 aircraft operations per year."[5]

In light of the above, it remains unclear as to why subsequent HIO Master Plans totally ignored the 1990 analysis and recommendations by laying claim to the contention that, "Based upon planning guidelines used by the FAA, development of a third runway is presently justified."[6] In 1995 there were 219,444 total operations at HIO.[7] It appears that approximately 50,000 of the total were helicopter operations that do not require a runway bringing the count down to 181,000,[8] so obviously runway capacity remained well below the 250,000 to 300,000 triggering point noted in the 1990 Master Plan. Nonetheless, the 1995 Master Plan gallingly stated that, "The 1990 Master Plan Update also recommended a third runway to the east of Runway 12/30"[9] while choosing to completely ignore the timing data based on a runway operational count of 250,000 to 300,000.

The deceptive assertion that additional airport capacity was needed continued with the 2005 Master Plan which also opted to disregard the 1990 Master Plan data on airport capacity.

The SEA asserts that the Hillsboro Airport (HIO) third runway expansion, "is needed because activity levels are approaching runway capacity."[10] This statement obviously deserves further scrutiny as it directly conflicts with earlier Port of Portland forecasts.

The 2009 Hillsboro Airport Draft Environmental Assessment (EA) on the Third Runway estimated that Annual Runway Operations at HIO in 2010 would total 196,600.[11] It was based on the assumption that there would be a total of 270,300 annual operations in this same year.[12] In fact, the actual 2010 total operational count was 220,213,[13] more than 50,000 less than anticipated.

The annual runway operations figure is arrived at by subtracting out local helicopter training operations as this type of aircraft does not need a runway. Per the 2009 third runway proposal EA, "Helicopter activity at HIO is forecast to be 88,200 annual operations through the forecast period [until 2025]. Current and projected future helicopter training flights in the local pattern account for nearly 75,000 of these annual operations."[14] Subtracting 75,000 from 220,213 brings us to a total of 145,213 runway operations in 2010.

Moreover, HIO's annual operations have continued to decline. In 2011 HIO logged 214,243 total operations.[15] Subtracting out the revised Supplemental Environmental Assessment (SEA) helicopter operational count in 2011, there were 147,722 runway operations.[16] By 2012 the count dropped even further to 202,967.[17] Of that number 60,853 were helicopter operations[18] thus the actual runway operations for 2012 were 142,114.

Returning to the 1990 Master Plan which stated that the current runway can accommodate upwards of 300,000 operations annually, HIO currently has twice as much runway capacity as it needs.

Again the 1990 Master Plan stated that "...the airport presently experienced some 215,800 aircraft operations in 1989." Minus 12% for helicopter activity in that year,[19] the number drops to 189,684. This is still significantly higher than current annual runway operations which according to the 2013 *Supplemental* Environmental Assessment were 147,722 in 2011 with the expectation that with the unconstrained forecast these numbers would increase to 155,070 in 2016 and 167,090 in 2021.[20] Obviously these totals are not even close to the, "250,000 to 300,000 capacity of the present runway."

Clearly, based on assertions made by the Port in earlier master plans, there is no justifiable need for a third runway at Hillsboro Airport.

Please see the analysis from Williams Aviation Consultants for additional information on delay, congestion, and ASV.

Hillsboro Aviation

It is misleading to base future Hillsboro Airport forecasts on personal income and employment analysis largely because the vast majority of HIO flights, perhaps as many as 90%, are on behalf of a single flight training school, more specifically Hillsboro Aviation, which recruits students from around the globe.

Hillsboro Aviation (HA), one of four Fixed Base Operators (FBOs) located at HIO, is a private for-profit company. Their website[21] states that HA has trained pilots from over 75 countries and also claims to be "...one of the largest combined helicopter flight training and airplane flight training schools in the United States."

HA maintains that it "flies in excess of 63,000 hours annually" which on average translates into more than 7 aircraft in the air simultaneously 24 hours per day, 7 days a week, every single day of the year. The ensuing noise and pollution places a significant burden on the surrounding community and contributes to excessive noise pollution, environmental degradation and the erosion of livability. These impacts will only worsen with the increased capacity that a third runway will provide.

HA reports that it has over 40 training airplanes[22] and more than 30 training helicopters[23] as well as an additional fleet of aircraft for the charter, site seeing, fire fighting and cargo transport divisions of their company. The FAA Registry lists 95 aircraft under Hillsboro Aviation, though some have been deregistered.[24] Thus, of the 257 aircraft based at HIO in 2011,[25] nearly a third are owned by Hillsboro Aviation.

The Why Choose Us? section of their website includes a list of the various organizations and airlines that have made them "a leader in the industry" by choosing to obtain pilot training through their company.

- The Airline Pilot Association of Taiwan chose Hillsboro Aviation as its premier location to train.

- The Japan Aviation Academy chose Hillsboro Aviation as their exclusive pilot-training school.

- Shanghai Airlines chose Hillsboro Aviation to train its pilots.

- China Eastern Airlines chose Hillsboro Aviation to train its pilots.

- Air China chose Hillsboro Aviation to train its pilots.

- PTES (Cessna's single-engine piston airplane and Robinson helicopter dealer in China) chose Hillsboro Aviation as its U.S. aviation partner.

- Luftfartsskolen School of Aviation in Norway chose Hillsboro Aviation to train its pilots.

- The CAAC (Chinese government) approved Hillsboro Aviation to conduct both airplane and helicopter training.

- Hillsboro Aviation has logged over 1,000,000 flight hours in our 33-year history.[26]

It stands to reason that training aircraft will log far more hours than private pilots yet the SEA completely failed to differentiate and analyze the impact of flight training activity at this facility.

Nearly two-thirds – 137,905 – of HIO's total operations for 2011 were categorized as local.[27] Per the HIO Master Plan "Local operations are performed by aircraft which: (a) Operate within the local traffic pattern or within sight of the airport; (b) Are known to be departing for, or arriving from, flight in local practice areas located within a 20 mile radius of the airport; (c) Execute simulated instrument approaches or low passes at the airport."[28]

The Port of Portland 2005 Hillsboro Master Plan reveals that "Future growth in local operations will be driven by training operations at Hillsboro Airport. This will be a function of the businesses on the airport which provide pilot training services."[29]

Max Lyons, the owner and president of Hillsboro Aviation, has indicated his intent to continue profiting from and growing his business at HIO.

As stated in the SEA, "The original Environmental Assessment noted that the proposed runway project would include the construction of a 3,600 –ft long parallel runway"[1] as well as a number of new taxiways including Taxiway D. In total disregard for the 9th Circuit Court remand of the entire project, the Port moved forward with constructing Taxiway D in 2011. The $4 Million funding for the taxiway was provided through the

State of Oregon ConnectOregon funding for non-highway projects. Included in the May 2010 Application Review Packet was a letter addressed to Bill Wyatt, the Executive Director of the Port of Portland, from Max Lyons. It was stamped 11/30/09. In this communication, Lyons stated,

> With the tremendous growth that we have seen at the Hillsboro airport, we have been concerned of the airport's ability to continue to service the increased activity over the last 3 to 5 years. It has been clear to us, that a third runway will help alleviate much of the congestion that we are experiencing and will allow the airport and its tenants to continue expanding as the impact of the current recession subsides.
>
> Prior to 2009, over the previous 16 years, Hillsboro Aviation grew at an average of 20% annually. We have become the largest flight training facility for both airplanes and helicopters on the pacific west coast as well as the largest dealer for helicopters in the U.S. Even though we have seen a decrease in business in 2009, we are very hopeful and expect that general aviation will begin to recover in 2011 and 2012.[30]

In this letter Lyons openly reveals his expectation that the third runway will accommodate future expansion on behalf of his company and other airport tenants.

The quotes discussed above provide credible evidence that Lyons has every intention of expanding his business if a third runway is constructed.

Global Aviation

And he is not alone. Global Aviation Inc. is also a fixed based operator at HIO. A 11/20/09 letter from the Vice President of Global Aviation Inc., Brian Lockhart, to Port of Portland Executive Director, Bill Wyatt expressed support for the HIO third runway proposal and the ConnectOregon III third runway/taxiway D funding request. The excerpt below reveals the intent of this company to expand.

> The addition of the parallel runway will make Hillsboro more attractive to the type of aircraft that are the focus of Global's business. The excess demand that we anticipate will develop within the next three years partly as a result of the additional airport capacity, is the driving force behind the plans we are making to expand our 63,000 square feet aircraft hanger space by 50%.[31]

Global Aviation's website claims that their business coordinates domestic and international itineraries and states that it has 5 charter aircraft in their HIO fleet[32] though this writer was unable to find a listing for these aircraft in the FAA Registry under Global Aviation.[33]

Aero Air

As noted in the SEA, Aero Air. A company which provides a number of services including charter flights,[34] completed a hangar extension project in 2012.[35] According to the FAA Registry, there are currently 19 aircraft registered to Aero Air LLC.[36] The SEA provided no information whatsoever on the number of operations logged by this company nor did it comment on the extent to which the recent hangar expansion might contribute to future growth at HIO.

Premier Jets

Per the Federal Registry, there are 23 aircraft registered to Premier Jets,[37] an FBO that offers both charter and cargo services.[38] Of the 23 aircraft, 8 are registered to a Hillsboro address and the remaining to a Portland PO Box. Applebee Aviation[39] also lists Premier Jets as its business address.

Applebee Aviation, owned by Mike and Jenni Applebee, purchased Apple Valley Airport in 2004. They then proceeded, without obtaining proper permits, to engage in commercial aviation activity including helicopter training and a sightseeing tour business.[40] This grass airstrip is located approximately 12 miles from Hillsboro in Buxton, Oregon, a pastoral community situated in unincorporated Banks in the foothills of the coastal range. Due to noise, environmental, safety and a number of other concerns, this airport expansion plan met with widespread public opposition. In the ensuing years, multiple Washington County and Oregon Land Use Board of Appeals (LUBA) hearings were held. Defending their livability and quality of life from this aggressive company ultimately cost concerned community residents well over $100,000 in legal fees.

Throughout the course of these events, Applebee received a number of citations. Even though a 12/20/06 hearings officer denied the application for commercial activity,[41] helicopter noise and concerns about environmental violations[42] continue to blight the community up to the present day. The SEA did not address the potential impact of Applebee Aviation on the community.

FBO Summary

The above discussion reveals that nearly half the based aircraft at HIO are operated by the four FBOs listed above. Hillsboro Aviation, Aero Air, and Premier Jets have a combined total of 122 aircraft registered to them and Global Aviation advertises five charter aircraft as well, yet the SEA provides no explanation whatsoever about their business usage. Nor are the annual operations by Nike, Intel and other corporate users included. This is a major omission that ultimately renders the SEA survey findings meaningless. To factor in recreational flyers, who most likely log far fewer operations than an aviation business or flight training school, skews the results.

Regarding the necessity of this expansion to accommodate the private business interests at HIO, it is worth noting that according to the Hillsboro Airport Minimum Standards Section "1.21.1.9:

> The Port is under no obligation to provide financing and or make any improvements at the airport to facilitate any development or consummate any Airport Agreement or Permit proposed by a current or prospective Operator or Tenant. The Port is under no obligation to: (a) pursue federal, state, or other funds to contribute to such development or (b) provide matching funds if required to secure such funding."[43]

Delay

The SEA stated that HIO "2011 activity resulted in delays estimated from near 0.5 minute to approximately 1.6 minutes (with an average of about 1 minute). By 2021, at the forecast level of activity reaching approximately 94% of ASV, delays are estimated from 0.75 minute of delay to 2.7 minutes (averaging about 1.75 minutes)…"[44] However, it is important to note that 8/25/11 Ninth Circuit Court of Appeals ruling in Barnes, et al vs. USDOT pointed out that, "As used in the HIO Master Plan, ASV represents a 'reasonable estimate of the maximum level of aircraft operations that can be accommodated at an [airport] in a year' at acceptable levels of service."

Following this statement is a footnote which reads as follows, "ASV has another widely-used definition: the level of delay at which the average delay per operation is 4 minutes."[45] Indeed, Order 5090.C3 states, "Annual Capacity or Annual Service Volume, as reported in the NPIAS, is the level of annual activity at which the average delay per operation is 4 minutes."[46] It appears that the HIO Master Plan relied on a 1983 circular instead of the updated Dec. 4, 2000 FAA Order 5090.C3 to arrive at their delay projections.

A second footnote contained in the ruling also addressed this issue:

> See FAA Order 5090.3C at 24. That order, however, defines ASV as the level of annual activity at which the average delay per operation is 4 minutes. By contrast, the HIO Master Plan appears to calculate the ASV as the level of annual activity at which the average delay per operation is slightly more than 1.2 minutes.[47]

In any case, the forecasted 2021 delay from 0.75 minute to 2.7 minutes with an average of 1.75 minutes is less than half the average 4 minute delay in the FAA Order 5090.3C. Yet another indication that a third runway is not warranted at this time.

HIO Reliever Airport

The Ninth Circuit Court of Appeals, Barnes et al vs. the USDOT 8/25/11 ruling stated that,

> HIO's role is defined within both state and federal aviation plans. HIO is designated as a reliever airport in FAA's *National Plan of Integrated Airport Systems* (NPIAS). Reliever airports are specially designated to reduce congestion at large commercial service airports by segregating GA aircraft from commercial airlines and air cargo activities. HIO is classified as a reliever for PDX. At the state level, the *Oregon Aviation Plan* prepared by the Oregon Department of Aviation (ODA) classifies HIO as a Category 2, Business or High Activity General Aviation Airport. Neither the NPIAS nor the *Oregon Aviation Plan* anticipate HIO changing from a GA airport to a commercial service airport in the future.[48]

However, there is no congestion to relieve at PDX as operations at this facility and every other commercial airport in Oregon have steadily declined in recent years. PDX which has two parallel runways and a third crosswind runway, logged 216,195 operations in 2012,[49] roughly 13,000 more than HIO. With three existing runways, PDX has an abundance of excess capacity and could accommodate at least twice as many operations as it currently handles.

Operations at Oregon's Commercial Airports on the Decline

Portland International Airport (PDX) serves as a prime example of the decline in annual operations at Oregon's commercial facilities. The investment of $6 Million for a PDX North Runway Extension, the $4.25 Million PDX Deicing project grant, and the $3.5 Million PDX taxilane grant, all funded via ConnectOregon,[50] did not prevent this airport from plummeting to an operational count that marks a 27 year low, commensurate with 1985 levels. In 2011 it logged 220,874 operations, 106,000 fewer flights than it did in 1997 when it peaked at an all time high of 327,731.[51]

Eugene Mahlon Field, the second largest commercial airport in the state also received money from ConnectOregon - $4,103,461 for an air cargo facilities improvement project and $451,111 for a ramp reconstruction.[52] Even so, its annual operational count plunged by more than 50 percent, from over 161,653 in 1991 to 69,676 in 2011.[53]

Total operations at Roberts Field in Redmond, a recipient of several ConnectOregon grants - $1.5 Million for a cargo ramp and development project, $7.5 Million for a terminal expansion, and $350,000 for a taxiway and reconstruction project[54] - tumbled from a high of 94,936 in 2007 to 46,510 in 2011.[55]

Pendleton's Eastern Oregon Regional now logs less than a third as many operations as it did in 1998 when it peaked at 41,214. By 2012 its annual operational count had fallen to 12,221. FAA forecasts expect operations at this facility to drop even further to 11,555 by 2013.[56]

Rogue Valley International in Medford is down from 94,007 total operations in 1992 to 43,422 in 2011. Operations are expected to continue declining over the next few years.[57]

This facility received $4,760,000 from ConnectOregon for an air cargo expansion project.[58]

The operational count at Klamath Falls plummeted to a 20 year low in 2009 and is expected to level out at around 36,000 after peaking at 84,000 in 1992.[59] This facility received $1 Million from ConnectOregon for a jet factory service center.[60]

Southwest Oregon Regional in North Bend, despite receiving $10 Million from the Oregon Legislature in 2005 for a terminal and an additional $624,000 ConnectOregon grant for an air traffic control tower[61], peaked at 57,722 operations in 1999 before dropping to 21,036 operations in 2011.[62]

Over a four year period from 2007 through 2011 the annual operational count at Salem McNary Airport plummeted from 99,432 to 33,901.[63] This represents a drop of more than 63 percent. Operations at this facility are expected to remain on the decline for the next decade. This airport recently lost its designation as a commercial airport and is now classified as general aviation.

Astoria and Newport Airports' aspirations for commercial status were stymied by the loss of a controversial $3.6 Million ConnectOregon SeaPort Airline subsidy,[64] which was discontinued due to lack of passengers using the service.

Many Oregon General Aviation Airports Historically Lose Money

Port of Portland Ordinance No. 389-R Section 1.1.6 acknowledges that, "Portland Hillsboro Airport, Portland Mulino Airport, and Portland Troutdale Airport have sustained net losses throughout their respective periods of operation by the Port and have never produced revenues sufficient to offset the Port's operating and capitol costs for aeronautical assets in use at such airports…"[65] The Port has owned and operated the Hillsboro Airport for 46 years, Troutdale Airport for 70 years and Mulino Airport from 1988 to 2007.

A recent revision to the ordinance now states that Hillsboro and Troutdale "have recently produced revenues sufficient to offset the Port's operating costs although not sufficient to offset capitol costs for aeronautical assets in use at such airports…" These capitol costs are significant and typically rely heavily on public funding thus the claim that these facilities are now generating revenue seems spurious at best. In fact, the Final Draft of the 2013 Port of Portland Transportation Improvement Plan includes a number of multi-million dollar projects, totaling out to over $42 Million for the Hillsboro Airport over the next five to 10 years. All are listed as "unfunded" excepting a $4 Million Connect Oregon III grant which was disbursed to the Port for Taxiway D even though the entire runway/taxiway project was remanded by the Ninth Circuit Court of Appeals for further environmental review.[66] That the state funded this project regardless of the court decision strongly suggests that the ConnectOregon program maintains an attitude of utter indifference to established national environmental laws as well as the health and well being of the community.

The Port also lists more than $18 Million in unfunded projects for the Troutdale Airport. Thus Hillsboro and Troutdale airports combined top out at over $60 Million within the next five years. This is a lot of money to invest in historically non-revenue generating facilities that primarily serve the for-profit flight training industry and recreational pilots. Surely public dollars can be spent more wisely.

Despite massive public subsidies the majority of Oregon's airports, most of which serve private aviation related business interests, either fail to generate revenue or chronically lose money. Per the Oregon State Department of Aviation, "Since 2009, over 289 million dollars in FAA funds and over 89 million in ConnectOregon funding have maintained and improved the infrastructure of Oregon airports."[67] The primary beneficiaries of this lavish 378 million dollar outlay are an affluent few who own and operate their own airports, own private aviation related businesses and flight training schools, individuals and companies who can afford to invest in multi-million-dollar jets, and those with the financial wherewithal to own private aircraft and helicopters worth hundreds of thousands of dollars. In other words, scarce federal and state dollars are routinely funneled into the hands of the top one percent and other high end wage earners while simultaneously and habitually shortchanging education, the environment, social services, health care, high speed rail, the arts, and other worthy programs.

Other airports around the state are also chronically dependent on public handouts. According to the Oregon Department of Aviation (ODA), the ODA owns and operates 28 state airports. All but three of these airports lost money during the biennium ending in June of 2011.[68]

Aurora is listed as being in the black with $142,108. Of course, no mention is made of the millions in federal and state monies sunk into this, predominantly through-the-fence facility in recent years including a $2.7 Million ConnectOregon III grant for an air traffic control tower with a federal match of $673,800,[69] even though most of the businesses that expect to benefit are not even located on airport property. In addition, $4,365,089 in FAA AIP funds was dispersed to this facility between 2007 and 2008 for a land acquisition and taxiway relocation project.[70] Clearly the exorbitant cost of subsidizing this facility, which primarily serves flight training and corporate jet owners, far exceeds the revenue generated.

Environment Pollutants

According to the SEA, "The original Environmental Assessment presented the existing conditions in the form of the 2007 emissions inventory for the criteria and precursor pollutants…A new existing conditions (2011) emissions inventory was not prepared for this Supplemental Environmental Assessment…"[71]

This failure to reevaluate the emissions inventory is of grave concern, particularly insofar as the readings of the criteria pollutants contained in the initial environmental assessment relied on a DEQ monitoring station located 17 mile east of Hillsboro in SE Portland[72] – a

site that is much closer to PDX than HIO. Given the distance, the data presented hardly seems relevant and serves as yet another example of the Port's failure to take a hard and honest look at the actual impacts of HIO on the community and the environment.

Hillsboro Air Quality and DEQ Monitoring Site

There is serious concern on a statewide level about the air quality in Hillsboro where HIO is located. Indeed a 2/5/13 fact sheet released by the Oregon Department of Environmental Quality (ODEQ) announced its decision to place air toxics monitoring equipment in Hillsboro.

Per the DEQ informational materials on this topic:

> Hillsboro is the highest priority for air toxics monitoring statewide. This ranking is based upon the following criteria:
>
> Modeling data
> - The 2017 projections from the Portland Air Toxics Solutions model show elevated levels of air toxics caused by high emissions and poor ventilation.
>
> Census data
> - Rapid population growth over the last ten years contributes to increased emissions and exposures.
> - Compared to other parts of the Portland Metro region, there are higher estimated impacts from air pollution on low income, minority and other sensitive populations.
>
> Monitoring data
> - DEQ has never monitored for air toxics in Hillsboro.
> - Particulate monitoring predicts potentially high air toxics levels in Hillsboro.[73]

An ODEQ fact sheet entitled Portland Air Toxics 2017 Modeling Study raises additional concerns about air quality in the region. "The model showed that 8 of the 15 pollutants cause the most risk. These pollutants are 1,3 butadiene, Benzene, Diesel particulate, 15 PAH, Napthalene, Cadmium, Acrolein, [and] Formaldehyde…The largest source of air toxins is gasoline and diesel engines that produce 1,3 butadiene, benzene, ethylbenzene, diesel particulate, arsenic, and chromium."[74]

Lead

Lead is also a major concern. Out of nearly 20,000 airports nationwide, HIO ranks is the top one percent, 21st in the nation in lead emissions.[75] According to the initial environmental assessment on the third runway, HIO emitted 0.7 tons of lead into the air in 2007.[76] The SEA indicates that lead emissions are expected to rise to between 0.81 to 0.92 tons per year (tpy) but does not provide clear data on years or timelines in some of the tables provided on this topic.[77]

The majority of flights in and out of HIO are piston engine aircraft. Per a recent Environmental Health Perspectives report, "…today piston-engine aircraft are the chief source of lead emissions in the United States, emitting 57% of the 964 tons of lead put into the air in 2008, according to the most recent figures from the National Emissions Inventory."[78]

SEA Tables 6-2 and 6-3 [79] both indicate that already high levels of lead emissions will continue to increase at HIO from an estimated 0.7 in 2007 to 0.9 by 2021.

HIO needs to take definitive steps to reduce rather than increase lead emissions. Nearly doubling the capacity at this facility by adding a third runway has the potential to contribute to a near doubling of lead emissions particularly if an existing flight training business expands or an as yet unidentified flight training school moves in.

A Santa Monica Airport lead study reported that, "Four factors were found to most highly influence air lead concentrations: Engine 'run-up' check duration, taxi-out time, fraction of twin-engine aircraft, and lead concentration in the fuel."[80] The SEA emissions inventory discussed in the tables cited above does not include run-ups. As a result, there is a high likelihood that the *SEA* underestimated the actual lead emissions at HIO. Please note that Santa Monica Airport is a general aviation facility that logs less than half as many operations annually than HIO does.

Also of note, after completing a study of airports in 6 North Carolina Counties, Duke University researchers concluded that, "living within 1000 m [2/3 mile] of an airport where aviation gasoline is used may have a significant effect on blood lead levels in children. Our results further suggest that the impacts of aviation gasoline are highest among those children living closest to the airport."[81]

Yet the SEA did nothing to measure lead emissions at or in the vicinity of HIO.

Friends of the Earth, an environmental group, which in 2006 petitioned the EPA to phase out the use of lead in aviation fuel, issued the following warning:

"... even small discrete doses from aircraft emissions can have long term health and environmental impacts... Piston-engine emissions of lead occur at ground level as well as flying altitude. Lead from this source is thus concentrated near airports and is also dispersed over a large geographic area potentially contributing to higher ambient concentrations in many communities. Numerous groups within the population may be at risk."[82]

Lead and Health Impacts

According to the EPA, "Children are particularly vulnerable to the effects of lead. Exposures to low levels of lead early in life have been linked to effects on IQ, learning, memory, and behavior. There is no identified safe level of lead in the body." [83]

Research also indicates that "…once an elevated blood lead concentration has been detected, it is too late to prevent lead's deleterious effects on the developing brain. This fact, plus the very low blood lead levels established to negatively impact development indicate that the only way to prevent childhood lead poisoning is to prevent lead from ever getting into children's bodies."[84]

Estimates indicate "that the U.S. incurs $43.4 billion annually in the costs of all pediatric environmental disease, with childhood lead poisoning alone accounting for the vast majority of it. This is a very high cost to our society, which include medical costs, disability, education and parental lost work time." [85]

Over the past 50 years the Centers for Disease Control (CDC) has periodically lowered acceptable blood lead levels for children and has ultimately concluded that, "...no level of lead in a child's blood can be specified as safe."[86]

The Centers for Disease Control Agency for Toxic Substances and Disease Registry (ATSDR) states that:

> In adults, about 94% of the total amount of lead in the body is contained in the bones and teeth. About 73% of the lead in children's bodies is stored in their bones. Some of the lead can stay in your bones for decades; however, some lead can leave your bones and reenter your blood and organs under certain circumstances (e.g., during pregnancy and periods of breast feeding, after a bone is broken, and during advancing age).
>
> About 99% of the amount of lead taken into the body of an adult will leave in the waste within a couple of weeks, but only about 32% of the lead taken into the body of a child will leave in the waste. Under conditions of continued exposure, not all of the lead that enters the body will be eliminated, and this may result in accumulation of lead in body tissues, especially bone. [87]

The excerpt below from the National Institute of Health discusses the impacts of lead on the human organism.

> Lead is a very strong poison. When a person swallows a lead object or breathes in lead dust, some of the poison can stay in the body and cause serious health problems... it is more common for lead poisoning to build up slowly over time. This occurs from repeated exposure to small amounts of lead. In this case, there may not be any obvious symptoms. Over time, even low levels of lead exposure

> can harm a child's mental development. The health problems get worse as the level of lead in the blood gets higher.
>
> Lead is much more harmful to children than adults because it can affect children's developing nerves and brains. The younger the child, the more harmful lead can be. Unborn children are the most vulnerable. Possible complications include behavior or attention problems, failure at school, hearing problems, kidney damage, reduced IQ, slowed body growth...
>
> Symptoms of lead poisoning may include: abdominal pain and cramping (usually the first sign of a high, toxic dose of lead poison), aggressive behavior, anemia, constipation, difficulty sleeping, headaches, irritability, loss of previous developmental skills (in young children), low appetite and energy, and reduced sensations.
>
> Very high levels of lead may cause vomiting, staggering walk, muscle weakness, seizures, or coma.
>
> ...Adults who have had mildly high lead levels often recover without problems. In children, even mild lead poisoning can have a permanent impact on attention and IQ.
>
> People with higher lead levels have a greater risk of long-lasting health problems. They must be followed carefully.
>
> Their nerves and muscles can be greatly affected and may no longer function as well as they should. Other body systems may be harmed to various degrees, such as the kidneys and blood vessels. People who survive toxic lead levels may have some permanent brain damage. Children are more vulnerable to serious long-term problems.
>
> A complete recovery from chronic lead poisoning may take months to years.[88]

Recent research now links very low blood lead levels (occurring at typical background exposures) with ADHD. The symptoms of ADHD include extreme hyperactivity, impulsivity, inattentiveness and distractibility. ADHD often co-occurs with conduct and oppositional defiant disorders. Blood lead levels less than 1 mcg/dL, well below the 5 mcg/dL level of concern established by the CDC in 2012, contribute to the development of ADHD. “Blood lead levels from 1 to 10 μg/dL are associated with lower child intelligence quotient (IQ), weaker executive cognitive abilities, behavior symptoms of ADHD and diagnosis of ADHD in community surveys."[89] As stated by Nigg et al, "…ADHD, both as a diagnosis and as a symptom dimension, is associated with blood lead levels at low exposure, levels, even below 2.5mcg/dL."[90]

An extensive body of literature now links elevated blood lead levels even in very low amounts with ADHD. The symptoms of ADHD include extreme hyperactivity,

impulsivity, inattentiveness and distractibility. ADHD often co-occurs with conduct and oppositional defiant disorders. Background low-level lead exposure, well below the 5 mcg/dL level of concern established by the CDC in 2012, is associated with ADHD. "Blood lead levels from 1 to 10 ug/dL are associated with lower child intelligence quotient (IQ), weaker executive cognitive abilities, behavior symptoms of ADHD and diagnosis of ADHD in community surveys."[91]

Lead exposure in adults is linked with cardiovascular disease and dementia[92] as well as an increase in violent behavior.[93]

Noise

The World Health Organization acknowledges that, "Severe noise problems may arise at airports hosting many helicopters or smaller aircraft used for private business, flying training and leisure purposes."[94]

As noted earlier, nearly two-thirds – 137,905 – of HIO's total operations for 2011 were categorized as local.[95] Per the HIO Master Plan "Local operations are performed by aircraft which: (a) Operate within the local traffic pattern or within sight of the airport; (b) Are known to be departing for, or arriving from, flight in local practice areas located within a 20 mile radius of the airport; (c) Execute simulated instrument approaches or low passes at the airport."[96]

Approximately two-thirds of the 220,000 operations logged at HIO in 2011, involved "touch and go" maneuvers wherein student pilots repetitively circle within 4 to 5 miles of the airport at an altitude of less than 2,000 feet. "Local operations (consisting largely of training activity) currently represent about 68 percent of total operations at HIO."[97]

Regarding designated locations within 20 miles of the airport, according to a U.S. Airport/Facility Directory, there is an "Intensive Flight Training" area adjacent to HIO that extends over Buxton, Banks, and Manning then west towards Timber. It continues south over Gales Creek, Forest Grove, Carlton and Lafayette. From McMinnville it proceeds east almost to St. Paul then north back to HIO.[98]

The SEA significantly downplays the impact of the aircraft noise generated by aviation activity. Despite numerous complaints, community members who are routinely impacted by HIO generated aviation noise, the SEA maintains that significant noise impacts only pertain to those impacted by the 65 DNL levels which according to the Port is completely located on airport property. The Port historically exhibits a dismissive stance towards community noise concerns. Their attitude of disregard is in conflict with the World Health Organization [WHO] Guidelines for Community Noise which indicates that noise pollution "has profound health implications."[99]

Per the WHO report, "Although everyone may be adversely affected by noise pollution, groups that are particularly vulnerable include infants, children, those with mental or

physical illnesses, and the elderly. Because children are particularly vulnerable to noise induced abnormalities, they need special protection."[100]

The World Health Organization has documented seven categories of adverse health effects of noise pollution on humans. The following excerpt is from a summary of the WHO report.[101]

> 1. Hearing Impairment: Hearing damage is related to duration and intensity of noise exposure and occurs at levels of 80 dB or greater, which is equivalent to the noise of heavy truck traffic. Children seem to be more vulnerable than adults.
>
> 2. Interference with Spoken Communication: Noise pollution interferes with the ability to comprehend normal speech and may lead to a number of personal disabilities, handicaps, and behavioral changes. These include problems with concentration, fatigue, uncertainty, lack of self confidence, irritation, misunderstandings, decreased working capacity, disturbed interpersonal relationships, and stress reactions.
>
> 3. Sleep Disturbances: Uninterrupted sleep is known to be a prerequisite for good physiological and mental functioning in healthy persons. Noise pollution is a major cause of sleep disturbances. Apart from various effects on sleep itself, noise pollution during sleep causes increased blood pressure, increased heart rate, increased pulse amplitude, vasoconstriction, cardiac arrhythmias, and increased body movement. These effects do not decrease over time. Secondary effects include fatigue, depressed mood and well-being, and decreased performance. Combinations of noise and vibration have a significant detrimental effect on health, even at low sound pressure levels.
>
> 4. Cardiovascular Disturbances: A growing body of evidence suggests that noise pollution may be a risk factor for cardiovascular disease. Acute exposure to noise activates nervous and hormonal responses, leading to increased blood pressure and heart rate and to vasoconstriction. If the exposure is of sufficient intensity, there is an increase in heart rate and peripheral resistance; an increase in blood pressure, and increased levels of stress hormones (epinephrine, norepinephrine, and cortisol).
>
> 5. Disturbances in Mental Health: Noise pollution is not believed to be a cause of mental illness, but it is assumed to accelerate and intensify the development of latent mental disorders. Noise pollution may cause or contribute to the following adverse effects: anxiety, stress, nervousness, nausea, headache, emotional instability, argumentativeness, sexual impotence, changes in mood, increase in social conflicts, neurosis, hysteria, and psychosis. Children, the elderly, and those with underlying depression are particularly susceptible to these effects.
>
> 6. Impaired Task Performance: The effects of noise pollution on task performance have been well-studied. Noise pollution impairs task performance, increases

errors, and decreases motivation. Reading attention, problem solving, and memory are most strongly affected by noise. Noise produces negative after-effects on performance, particularly in children; it appears that the longer the exposure, the greater the damage.

7. Negative Social Behavior and Annoyance Reactions: Annoyance is defined as a feeling of displeasure associated with any agent or condition believed by an individual to adversely affect him or her. Annoyance increases significantly when noise is accompanied by vibration or by low frequency components. The term annoyance does not begin to cover the wide range of negative reactions associated with noise pollution; these include anger, disappointment, dissatisfaction, withdrawal, helplessness, depression, anxiety, distraction, agitation, or exhaustion. Social and behavioral effects are complex, subtle, and indirect. These effects include changes in everyday behavior (closing windows and doors to eliminate outside noises), changes in social behavior (aggressiveness or disengagement), and changes in social indicators (residential mobility, hospital admissions, drug consumption, and accident rates), and changes in mood (increased reports of depression). Noise above 80 dB is consistently associated with decreased helping behavior and increased aggressiveness.

In addition, WHO research indicates that, "Risk for noise-induced hearing impairment may increase when the noise exposure is combined with exposure to vibration or with exposure to ototoxic drugs or chemicals."[102] Ototoxicity is defined as "ear poisoning which results from exposure to drugs or chemicals that damage the inner ear or the vestibulo-cochlear nerve (the nerve sending balance and hearing information from the inner ear to the brain)… Environmental chemicals have long been implicated in ototoxicity. Little research has been done to substantiate their precise effect on ears, but most are associated with hearing disturbances that may be permanent."[103] Included on the list of environmental chemicals that contribute to ototoxicity are two of the criteria pollutants emitted by HIO aviation activity and discussed in the SEA – lead and carbon monoxide.

Though the Port claims to have four noise monitors[104] located in the vicinity of the airport, the SEA relied on modeling and estimates, rather than actual readings. In addition, a Part 150 noise study has never been carried out at HIO. As a result, the Port's assertion that the entire 65 DNL is located on airport property is in question. It is also of concern that the Port did not address the considerable annoyance factor of student pilots constantly training over the area both close in to the airport and at designated practice areas within a 20 mile radius of HIO.

The addition of a third runway will only increase the frequency and intensity of noise and consequent health impacts on the community.

Santa Monica Airport Health Impact Assessment

The Santa Monica Airport is a general aviation facility that accommodates corporate jets, flight training, and recreational hobbyists. Like Hillsboro, it is located in a populated urban area. As noted earlier, Santa Monica typically logs less than half as many operations annually as Hillsboro does.[105]

A 2010 report[106] written by a group of UCLA pediatric residents found significant adverse health impacts associated with this airport. The section below is excerpted directly from the report.

Key Findings

1. Airport operations, particularly jet take-offs and landing, are contributing to elevated levels of black carbon in the area surrounding Santa Monica Airport. Elevated exposure to black carbon is associated with:

- increased rates of respiratory and cardiovascular disease including asthma, bronchitis, and increased risk for sudden death
- irreversible decrease lung function in children
- increased carcinogenic risk

2. Elevated levels of ultrafine particles (UFP) are associated with aircraft operations and jet takeoffs and are found in the area surrounding Santa Monica Airport. Elevated exposure to UFPs are associated with:

- increased inflammation and blockage of blood vessels in mice models
- greater lung inflammation with exposure to UFPs than exposure to larger particulates in rodent models

3. Elevated levels of polycyclic aromatic hydrocarbons (PAH) are found in the area surrounding Santa Monica Airport. Exposure to PAH has been associated with:

- increased carcinogenic risk
- disruption of the hormonal balance in adults.
- reproductive abnormalities with exposure during pregnancy
- lower IQ scores in children.

4. Levels of noise due to plane and jet take-offs from Santa Monica Airport are above Federal Aviation Airport thresholds. Excessive noise is associated with:

- hearing loss.
- higher levels of psychological distress
- impaired reading comprehension and memory among children.

Future Growth Potential With Addition of Runway

The Port of Portland 2005 Hillsboro Master Plan reveals that,

> Future growth in local operations will be driven by training operations at Hillsboro Airport. This will be a function of the businesses on the airport which provide pilot training services. The number and type of these businesses through the planning period cannot readily be determined. That will be the function of private business models and business practices. However, considering that historically businesses have been established at Hillsboro Airport that provide pilot training services, it can be expected that these activities will continue in the future.[107]

The experience of other airports indicates that flight training can increase unexpectedly and quite rapidly. Castle Airport in California is an elucidating example. Per the FAA forecasting, this facility logged 60,234 operations in 2011 with the expectation that it would level off at around 72,000 annually over the next 28 years.[108]

However a recent newspaper report indicates that, "the airport's traffic has grown significantly in the past few months, largely because of Sierra Academy of Aeronautics student pilots. The airport is on target to hit about 120,000 to 150,000 operations by the end of the calendar year, according to county officials."[109] This represents an unanticipated doubling of operations at this facility in the less than a year.

A similar pattern emerged at the Port of Portland owned and operated Troutdale Airport. Like Castle, the Troutdale Airport is on the list selected for tower closure due to sequester cuts and also like Castle, Troutdale experienced a sudden and uncharacteristic increase in operations. According FAA projections, annual operations at this airport were expected to remain below 60,000 until 2020 with a gradual increase to 65,000 by 2040.[110] Yet for some inexplicable reason there was a dramatic 35,000 increase from 56,790 operations in 2011 to 91,556 forecast for 2012, the majority of which appear to be local touch and go training flights. The Troutdale Airport and Hillsboro Airport, both owned and operated by the Port of Portland, are heavily utilized by Hillsboro Aviation, a private for-profit international flight training school. It is likely that the increase in operations at Troutdale was on behalf of this company. The 2013 FAA TAF report now expects Troutdale to accommodate upwards of 100,000 operations or more annually over the next 28 years.[111]

These two examples alone demonstrate how suddenly and unexpectedly operations can increase if a flight training business decides to expand or a new tenant moves in.

Cumulative Impacts

Though the Port of Portland has owned and operated the Hillsboro Airport for over 46 years, it has never completed an Environmental Impact Statement, despite multiple expansion projects over this timeframe.

Present

Port expects to begin a $5.6 million improvement project on a Runway 2/20 Rehabilitation, Relocation, and Taxiway Improvement Project this spring. Despite the hefty use of public monies no environmental assessment on this project was done. There was no public process, hearing, or review prior to contract approval by the Port of Portland Commissioners. No opportunity was ever provided at a Hillsboro Airport Roundtable Exchange (HARE) meeting or any other venue in Washington County to comment or present testimony.

Past

Aero Air completed a hangar expansion project in 2012.[112]

Taxiway D was constructed in 2011.[113]

Taxiway C was extended in 2010.[114]

In 2012 Port pursued a HIO 1200-Z NPDES Permit allowing the Port and its HIO tenants to use deicing fluid at HIO but refused to answer questions posed by Oregon Aviation Watch (OAW) on this matter or respond to OAW comments on the action.

An Intel expansion project at Ronler Acres mentioned in the SEA does not indicate how or if this development will impact HIO.[115]

The SEA mentions a Veterans Drive expansion by City of Hillsboro which began in 2011 but does not indicate how this development will impact future HIO growth.[116]

Future

The 2013 Port Transportation Improvement Plan[117] identifies the following projects within the next 5 years. All are listed as unfunded except for the $4,000,000 received from ConnectOregon for the Taxiway D portion of the third runway proposal.

- HIO Wash Racks (Cost estimate - $620,100)
- HIO Relocate Charlie Pattern Landing Site (Cost estimate $1,433,100)
- HIO Construct East Access Road (Cost estimate - $1,886,560)
- HIO Reconstruct Runway 2/20. Construct Taxiway Extension (Cost estimate - $15,391,050)
- HIO Relocate Taxiway C (Cost estimate - $4,512,600)

- HIO Taxiway to NW Corporate Center (Cost estimate - $1,050,000)
- HIO Construct Runway 12/l30R (Cost estimate $13,000,000)

Within 10 years
- HIO Relocate Taxiway AA (Cost estimate $4, 700,000)

In addition, a number of letters addressed to Bill Wyatt, the Executive Director of the Port of Portland and submitted to the Oregon Department of Transportation for funding through ConnectOregon III,[118] reveal that certain current airport tenants and the local business community anticipate an expansion of operations at HIO. Several allude to freight mobility though the SEA did not acknowledge plans or address the possible impact of moving cargo out of HIO. In fact, the 2005 HIO Master Plan states that,

> Air freight is moved by both the passenger air carriers and all-cargo airlines. The cargo handling from the passenger and mixed airlines is only feasible at PDX where the passenger airlines operate…The larger aircraft operated by all-cargo carriers would be prohibited from using Hillsboro Airport, an all-cargo airline that operates a turboprop or piston-powered fleet would be the only type of air cargo operation that could be accommodated at Hillsboro Airport. These aircraft are similar in size to the existing fleet at Hillsboro Airport and could be easily integrated into existing airport operations.[119]

If this option was under consideration, it should have been addressed in the SEA but was not.

- An 11/13/19 letter from the Greater Hillsboro Area Chamber of Commerce and signed by President Deanna Palm stated,

  "The addition of a parallel runway and improvements to a taxiway will better accommodate increased commuter jet traffic. This additional infrastructure will also open up the NE quadrant of the airport for increased development of aviation businesses."[120]

- As noted earlier in this submission, a letter penned by Max Lyons, President of Hillsboro Aviation and stamped 11/30/09 read as follows,

  "With the tremendous growth that we have seen at the Hillsboro airport, we have been concerned of the airport's ability to continue to service the increased activity over the last 3 to 5 years. It has been clear to us, that a third runway will help alleviate much of the congestion that we are experiencing and will allow the airport and its tenants to continue expanding as the impact of the current recession subsides. Prior to 2009, over the previous 16 years, Hillsboro Aviation grew at an average of 20% annually. We have become the largest flight training facility for both airplanes and helicopters on the pacific west coast as well as the largest dealer for helicopters in the U.S. Even though we have seen a decrease in business in 2009, we are very hopeful and expect that general aviation will begin to recover in 2011 and 2012."

- An 11/19/09 letter from the Portland Business Alliance and signed by President and CEO, Sandra McDonough, supports the ConnectOregon funding request stating, "The projects identified by the Port of Portland will make significant improvements to freight mobility, connectivity and productivity…"[121]

- The Oregon Business Association in a letter dated 11/16/09 and signed by Chair Daniel Block asserted that the project "will make significant improvements to freight mobility, productivity and have a direct impact to our regional economy."[122]

- Global Aviation, a current tenant at HIO, also indicated an intent to expand. In a letter dated 11/20/09 company President, Brian Lockhart, stated that, "The addition of the parallel runway will make Hillsboro more attractive to the type of aircraft that are the focus of Global's business. The excess demand that we anticipate will develop within the next three years partly as a result of the additional airport capacity, is the driving force behind the plans we are making to expand our 63,000 square feet aircraft hanger space by 50%."[123]

Conclusion

For the reasons set forth in this document, Oregon Aviation Watch is opposed to all further growth at HIO. If the Port and FAA do continue to pursue this expansion, we strongly recommend that an Environmental Impact Statement should be prepared to address the environmental degradation and erosion of quality of life due to the Hillsboro Airport.

Attachments

- FAA TAF Detail Report (January 2013).
- Portland-Hillsboro Airport Master Plan Report. September 1990. Pg. 67 and 47.
- Portland Hillsboro Airport Master Plan Update 1995-2015. October 1996. Pg. 3, 37, 38, and 44.
- Portland International Airport Monthly Traffic Report December, 2012: Calendar Year Report.
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- 3/27/13 email correspondence between Jim Lubischer and HIO FAA Tower Manager Joe Fiala on HIO helicopter operations in 2011 and 2012.
- Hillsboro Aviation website printouts.
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- ConnectOregon III Application packet letter from President of Hillsboro Aviation, Max Lyons, to Bill Wyatt, Director of the Port of Portland.
- Hillsboro Tribune article by Jim Redden. Airport Fight May Have a Rough Landing. (1/25/13).
- ConnectOregon III Application packet letter from Vice-President of Global Aviation, Brian Lockhart, to Bill Wyatt, Director of the Port of Portland

- Global Aviation website printouts
- FAA Registry – Global Aviation
- Aero Air website printout
- FAA Registry – Aero Air
- FAA Registry – Premier Jets
- Premier Jets website printouts
- Applebee Aviation website printouts
- Oregonian articles on Apple Valley expansion plans and legal violations
- Washington County Letter to Michael and Jennie Appelebee re: Violation of Conditions of Approval
- Hillsboro Airport General Aviation Minimum Standards. Pg. 15.
- FAA Order 5090.3C. Pg.20.
- ConnectOregon Report
- FAA Terminal Area Forecast for Portland International Airport (January 2013)
- FAA Terminal Area Forecast for Eugene Mahlon Field (January 2013)
- FAA Terminal Area Forecast for Roberts Field in Redmond (January 2013)
- FAA Terminal Area Forecast for Eastern Oregon Regional in Pendleton (January 2013)
- FAA Terminal Area Forecast for Rogue Valley International in Medford (January 2013)
- FAA Terminal Area Forecast for Klamath Falls (January 2013)
- FAA Terminal Area Forecast for Southwest Oregon Regional in North Bend (January 2013)
- FAA Terminal Area Forecast for Salem McNary Airport (January 2013)
- Agenda for the Port of Portland Board of Commissioners Meeting (3/13/13) – See agenda Item No. 2 on Ordinance No. 389-R
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- Oregon Business Alliance letter to Bill Wyatt included in Hillsboro Airport Proposed Runway 12L/30R and Taxiway D Project. Connect Oregon III Application Review Package. (May 2010).
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1. Hillsboro Airport Parallel Runway 12L/30R. Draft *Supplemental* Environmental Assessment. Prepared for Port of Portland by Barrilleaux, J. and Dowlin R. (3/15/13). Pg. 1.

2. Federal Aviation Administration (FAA) Terminal Area Forecast (TAF). Detail Report (January 2013).

3. Hillsboro Airport Parallel Runway 12L/30R. Draft *Supplemental* Environmental Assessment. Prepared for Port of Portland by Barrilleaux, J. and Dowlin R. Appendix B. Pg. 3-10. (3/15/13).

4. Portland-Hillsboro Airport Master Plan Report. Prepared by Hodges & Shutt for Port of Portland. (September 1990). Pg. 67.

5 Ibid.

6. Hillsboro Airport Master Plan Final Report. Prepared for Port of Portland by W&H Pacific, Inc. (October 1996). Pg. 3.

7. Federal Aviation Administration (FAA) Terminal Area Forecast (TAF). Detail Report (January 2013).

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