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EXECUTIVE  
SUMMARY OF  
THE ECONOMIC IMPACT  
NORTHWEST AIRLINES  
AIRBUS MAINTENANCE  
FACILITY AND JET  
ENGINE REPAIR  
FACILITY ON  
MINNESOTA,  
ST. LOUIS  
COUNTY  
AND DULUTH

by

Jerrold M. Peterson  
Richard Lichty,  
and Miguel Garcia

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**Executive Summary of the Economic Impact  
Northwest Airlines Airbus Maintenance Facility and  
Jet Engine Repair Facility  
On Minnesota, St. Louis County and Duluth**

by

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The potential location of Northwest Airlines Airbus Maintenance Facility (NWAMF) at Duluth International Airport will have a major economic impact on the city, county and state. During the construction phase of this project the NWAMF would have a 1995 peak in annual wage and salary impact of \$248 million and 8,077 new jobs in the state. Of this state impact, St. Louis County will receive income impact \$204 million and receive 6,290 new jobs. Obviously, the City of Duluth will receive significant benefit with \$161 million in wage and salary impact and 3,786 of these new jobs. In addition, Northern St. Louis County would also have the potential of receiving a Northwest Jet Engine Repair Facility (NWJRF), and 500 additional new jobs by 1999. The total wage and salary income impact of this potential facility would be \$103 million in wage and salary and 3,343 new jobs for the state. Northern St. Louis County possibly Hibbing is the potential location of the facility and it would receive the bulk of the county's impact of \$86 million in wage and salary and 2,701<sup>1</sup> new jobs (See Tables 13 and 14). Over all the growth in wage and salary income of the proposed NWAMF plus the NWJRF to the State of Minnesota has the potential of providing \$351 million in new income with 11,420 new jobs annually by the year 1995.

The repair and maintenance facility represent a potential direct investment of \$200,000,000 with employment of 1,208 high paying jobs. The construction phase of the project is assumed to begin January 1, 1991 with operation beginning January 1, 1992. The direct employment of the construction of the plant will employ 865 workers with direct and indirect employment of 2,133 workers. The construction phase is assumed to end by December 31, 1995. The operation phase will initially employ 233 beginning 1992 and increasing to 1,208 employees.

In addition, the expansion of the local economy will require about 1,000 new residential homes average price of \$100,000 for a total annual housing of \$20 million for each of five years.

To estimate the total economic impact of the acquisition of NWAMF for Minnesota, Northeast Minnesota and Duluth we used two different computer models. The first model is the input output model for the state and the second model is an input output model for St. Louis County. Both models are used to estimate the direct and indirect employment and income impacts of the facility. In general, the larger the geographic area examined the larger the economic impact because there are fewer leakage of income and employment out of the area.

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<sup>1</sup> Difference between wage and salary from Table 2 compared to Table 13. Also the difference between wage and salary from Table 3 compared to Table 14.

The economic impact of the acquisition of the NWAMF for the state of Minnesota are estimated by determining the direct and indirect annual impact income of the facility on the state from all activities (See Table 1). These activities are the operation of the NWAMF \$95,480,320, plant construction \$97,000,000, new housing \$38,800,000, training \$2,791,280 and retail income \$14,507,526. The total direct and indirect income impact of new facility to the state if it is located at Duluth is \$248,579,096. The state will have an annual increase employment of 8,077 new jobs.

Of the total income impact on the state, St. Louis County will receive \$203,996,626 in total wage and salary impact resulting in 6,337 of the state 8,077 new jobs (See Table 2). This income impact is estimated for NWAMF of \$84,801,600 and 2,394 jobs, plant construction \$73,500,00 and 2,133 jobs, new housing \$29,400,000 and 509 jobs, training \$1,787,500 and 47 jobs and new retail sales of \$14,507,526 with 1,254 new jobs.

Of the total County impact the City of Duluth will receive \$121,729,893 in total wage and salary impact from the project resulting in 3,786 new jobs of the county's expected increase. The income and jobs are shown in Table 3. The construction impact is assumed to last only until 1996. The operating impact will last the life of the facility which is assumed to be 20 or more years. In Comparison to Duluth current economy, the income impact represents 10.74 percent<sup>2</sup> of the current personal income of \$1,597 million. The 3,786 new jobs represents 8.51 percent of the current total employment in Duluth of 44,500.

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<sup>2</sup> Assumes wage and salary income attracts non labor income in the same current percentage for Duluth of 0.71. Thus, the \$121,729,893 in wage and salary income becomes \$171,450,553 in personal income.

**Table 1**  
**Minnesota**  
**Total Impact of NWAMF**  
**Annual 1995**

	<u>Wage and Salary</u>	<u>Employment</u>
NWAMF	\$ 95,480,320	2,891 jobs
Plant Construction	97,000,000	3,227
Housing	38,800,000	627
Training	2,791,250	78
Retail <sup>3</sup>	14,507,526	1,254
<b>Total</b>	<b>\$248,579,096</b>	<b>8,077</b>

Source: Jerrold M. Peterson, Richard Lichty and Miguel Garcia "Estimated Impact of the Proposed Northwest Repair and Maintenance Operation on the Duluth, St. Louis County and Minnesota Economies." Working Paper No. 90-6 Duluth: Bureau of Business and Economic Research 1990 to be published.

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<sup>3</sup> Retail income estimated based on average retail salary 1988 \$11,569.

**Table 2**  
**St. Louis County**  
**Total Impact of NWAMF**  
**Annual 1995**

	<u>Wage and Salary</u>	<u>Employment</u>
NWAMF	\$ 84,801,600	2,394 jobs
Plant Construction	73,500,000	2,133
Housing	29,400,000	509
Training	1,787,500	47
Retail <sup>4</sup>	14,507,526	1,254
<b>Total</b>	<b>\$203,996,626</b>	<b>6,337</b>

Source: Jerrold M. Peterson, Richard Lichty and Miguel Garcia "Estimated Impact of the Proposed Northwest Repair and Maintenance Operation on the Duluth, St. Louis County and Minnesota Economies." Working Paper No. 90-6 Duluth: Bureau of Business and Economic Research 1990 to be published.

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<sup>4</sup> Retail income estimated based on average retail salary 1988 \$11,569.

**Table 3**  
**City of Duluth**  
**Total Impact of NWAMF**  
**Annual 1995**

	<u>Wage and Salary</u>	<u>Employment</u>
NWAMF	\$ 51,050,563	1,441 jobs
Plant Construction	44,247,000	1,284
Housing	17,698,800	306
Training	--	--
Retail <sup>5</sup>	8,733,530	755
<b>Total</b>	<b>\$121,729,893</b>	<b>3,786</b>

Source: Jerrold M. Peterson, Richard Lichty and Miguel Garcia "Estimated Impact of the Proposed Northwest Repair and Maintenance Operation on the Duluth, St. Louis County and Minnesota Economies." Working Paper No. 90-6 Duluth: Bureau of Business and Economic Research 1990 to be published.

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<sup>5</sup> Retail income estimated based on average retail salary 1988 \$11,569.

Table 4

Minnesota Annual Operation Impact

	<u>Direct Operation Impact</u>	<u>Indirect Operation Impact</u>	<u>Total Operation Impact</u>
Wage and Salary	62,816,000	32,664,320	95,480,320
Employment	1,208	1,683	2,891

Source: Bureau of Business and Economic Research.  
1. St. Louis Average Salary \$18,538  
2. Minnesota Average Annual Salary \$21,471

Table 5

St. Louis County Annual Operation Impact

	<u>Direct Operation Impact</u>	<u>Indirect Operation Impact</u>	<u>Total Operation Impact</u>
Wage and Salary	62,816,000	21,985,600	84,801,600
Employment	1,208	1,186	2,394

Source: Bureau of Business and Economic Research.  
1. St. Louis Average Salary \$18,538  
2. Minnesota Average Annual Salary \$21,471

Table 6

**Minnesota Annual Direct And  
Indirect Construction Impact**

	<b><u>Direct Income Impact Plant Construction</u></b>	<b><u>Indirect Income Impact Plant Construction</u></b>	<b><u>Total Income Impact Plant Construction</u></b>
<b>Wage and Salary</b>	50,000,000	47,000,000	97,000,000
<b>Employment</b>	865	2,362	3,227

Source: Bureau of Business and Economic Research.

1. St. Louis County Average Annual Wage \$18,538
2. Minnesota Average Annual Wage \$21,471

Table 7

St. Louis County Annual Direct And  
Indirect Construction Impact

	<u>Direct Income Impact Plant Construction</u>	<u>Indirect Income Impact Plant Construction</u>	<u>Total Income Impact Plant Construction</u>
Wage and Salary	50,000,000	23,500,000	73,500,000
Employment	865	1,268	2,133

Source: Bureau of Business and Economic Research.  
1. St. Louis County Average Annual Wage \$18,538  
2. Minnesota Average Annual Wage \$21,471

Table 8

**Minnesota Annual Housing Construction  
Direct And Indirect Construction Impact**

	<u>Direct Impact Housing Construction</u>	<u>Indirect Impact Housing Construction</u>	<u>Total Impact Housing Construction</u>
<b>Wage and Salary</b>	20,000,000	18,800,000	38,800,000
<b>Employment</b>	346	326	672

Source: Bureau of Business and Economic Research.  
1. St. Louis Average Salary \$18,538  
2. Minnesota Average Annual Salary \$21,471

Table 9

**St. Louis County Annual Housing Construction  
Direct And Indirect Construction Impact**

	<u>Direct Impact Housing Construction</u>	<u>Indirect Impact Housing Construction</u>	<u>Total Impact Housing Construction</u>
<b>Wage and Salary</b>	20,000,000	9,400,000	29,400,000
<b>Employment</b>	346	163	509

Source: Bureau of Business and Economic Research.  
1. St. Louis Average Salary \$18,538  
2. Minnesota Average Annual Salary \$21,471

Table 10

Minnesota Annual Training Impact

	<u>Direct Impact Training</u>	<u>Indirect Impact Training</u>	<u>Total Impact Training</u>
Wage and Salary	1,925,000	866,250	2,791,250
Employment	35	43	78

Source: Bureau of Business and Economic Research.  
1. St. Louis County Average Annual Salary \$18,538  
2. Minnesota Average Annual Salary \$21,471

Table 11

St. Louis County Annual Training Impact

	<u>Direct Impact Training</u>	<u>Indirect Impact Training</u>	<u>Total Impact Training</u>
Wage and Salary	1,375,000	412,500	1,787,500
Employment	25	22	47

Source: Bureau of Business and Economic Research.

1. St. Louis County Average Annual Salary \$18,538
2. Minnesota Average Annual Salary \$21,471

Table 12

**Employment Impact of Retail Sales  
In St. Louis County**

	<u>Retail Sales</u>	<u>Employment<sup>1</sup></u>
1992	66.27	1037
1993	70.07	1096
1994	73.97	1157
1995	80.17	1254
1999	48.05	752

Source: Bureau of Business and Economic Research.  
1. St. Louis Average Salary \$18,538.  
2. Minnesota Average Annual Salary \$21,471.

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<sup>1</sup> \$735,000,000 Duluth 11,500 average trade employment = \$63,913 average retail sales per employee.

**Table 13**  
**St. Louis County**  
**Total Impact of NWAMF and NWJRF**  
**Annual 1995**

	<u>Wage and Salary</u>	<u>Employment</u>
NWAMF and NWJRF	\$120,946,325	3,414 jobs
Plant Construction	104,828,000	3,042
Housing	41,934,000	726
Training	2,157,872	67
Retail <sup>6</sup>	20,685,372	1,788
<b>Total</b>	<b>\$290,551,569</b>	<b>9,038<sup>7</sup></b>

Source: Jerrold M. Peterson, Richard Lichty and Miguel Garcia "Estimated Impact of the Proposed Northwest Repair and Maintenance Operation on the Duluth, St. Louis County and Minnesota Economies." Working Paper No. 90-6 Duluth: Bureau of Business and Economic Research 1990 to be published.

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<sup>6</sup> Retail income estimated based on average retail salary 1988 \$11,569.

<sup>7</sup> Will not equal total due to rounding off the numbers.

**Table 14**  
**Minnesota**  
**Total Impact of NWAMF and NWJRF**  
**Annual 1995**

	<u>Wage and Salary</u>	<u>Employment</u>
NWAMF and NWJRF	\$134,998,793	4,087 jobs
Plant Construction	137,147,456	4,563
Housing	54,858,982	887
Training	3,946,524	110
Retail <sup>8</sup>	20,512,065	1,773
<b>Total</b>	<b>\$351,463,820</b>	<b>11,420</b>

Source: Jerrold M. Peterson, Richard Lichty and Miguel Garcia "Estimated Impact of the Proposed Northwest Repair and Maintenance Operation on the Duluth, St. Louis County and Minnesota Economies." Working Paper No. 90-6 Duluth: Bureau of Business and Economic Research 1990 to be published.

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<sup>8</sup> Retail income estimated based on average retail salary 1988 \$11,569.

Table 15

Impact of the NWAMF and NWJRF  
over Five Years  
1991 - 1995

	<u>Estimated Total Impact Wage and Salary in Million</u>	<u>Estimated Total Impact Retail Sales in Million</u>	<u>Estimated Average Annual Employment</u>
Duluth	\$ 470.29	\$ 287.79	2915
St. Louis County	\$1,122.79	\$ 478.04	6960
Minnesota	\$1,358.33	\$ 478.04	8794

Source: Bureau of Business and Economic Research.  
1. St. Louis Average Salary \$18,538.  
2. Minnesota Average Annual Salary \$21,471.

## Notes

### Here are some term definitions:

1. Wage and salary impact--this is the total salary times the income multiplier. It is interpreted as the total wages and salaries generated out of a direct wage and salary input. It is greater than the income impact since much of the income earned is spent outside of the region.
2. Output impact -- the direct and indirect output (intermediate production plus final demand) impact from an assumed change in final demand.
3. Employment impact -- the employment generated out of an assumed change in the level of final demand.

### Here are some assumptions:

1. For the plant operation, I assumed that the wage and salary was \$6,281,600 per year.
2. For the plant operation, I assumed a final demand of \$103,436,208 to calculate employment impacts. This is one of the weak assumptions for my impact analysis. It is based on the amount of final demand generated in the nation by employment in the air transportation sector applied to the employees of the county and the state.
3. Now, for the construction. I don't have any data breaking down construction into wages and salaries, purchases of capital equipment, or exports. Therefore, I had to assume that the entirety of construction money went to personal consumption expenditures or to exports and that the money was spent to purchase local commodities. This means that the construction impacts are definitely overstated. If we want to stay with this possibility, we should assume that all \$50,000,000 for the plant goes as sales of local goods and services to construction worker families or to exports.
4. The employment multipliers are a bit low it would seem. I didn't have the time to collect employment to gross output ratios for St. Louis County or for Minnesota. Therefore, I took national ratios. I don't know what else to do about this, the multipliers look reasonable otherwise.
5. The multipliers are based on a ten sector input-output table. The table was constructed from national coefficients using ADMATR (Charles Lamphear's program). Ten sectors were selected because of the ease of dealing with small table when only a few days were available. If we carry this any further, we should expand the size of the tables significantly. We may need help from Lamphear in doing this since parts of his program don't seem to be working.

The effect of highly aggregated tables of this type is to increase the value of the multipliers somewhat. The ten sectors are as follows:

1. Agriculture, Forestry & Fisheries
2. Mining
3. Construction: New Construction
4. Construction: Maintenance and Repair Construction
5. Manufacturing: Durable Goods
6. Manufacturing: Non-Durable Goods
7. Transportation and Communication
8. Wholesale and Retail Trade
9. Finance, Insurance, and Real Estate
10. Services

6. I could have closed the table with respect to households. However, the multipliers are on the high edge as things stand. To close it with respect to households would make it very difficult to explain the size of the results.

Given this,

**Here are the results:**

1. Plant Operations: Wage and Salary Impacts  
**St. Louis County\*** Assume 1,208 employees @ \$52,000 =  
\$62,816,000 \* 1.35 = \$84801600.  
**Minnesota\*** Assume 1,208 employees @ \$52,000 =  
\$62,816,000 \* 1.52 = \$95,480,320.
2. Plant Operations: Employment Impact  
**St. Louis County\*** Assume \$103,436,208 sales to final demand \* .0000119 = 1,230 total employees  
**Minnesota\*** Assume \$103,436,208 final demand \* .0000113 = 1,375 total employees.
3. Plant Construction -- Output Impact  
**St. Louis County\*** Assume \$50,000,000 construction \* 1.40 = \$70,000,000.  
**Minnesota\*** Assume \$50,000,000 construction \* 1.89 = \$94,500,000.
4. Plant Construction -- Income  
**St. Louis County\*** Assume \$50,000,000 construction \* 1.47 = \$73,500,000  
**Minnesota\*** Assume \$50,000,000 construction \* 1.94 = \$97,000,000.
5. Plant Construction -- Employment  
**St. Louis County\*** Assume \$50,000,000 construction \* .0000173 = 865 employees.  
**Minnesota\*** Assume \$50,000,000 construction \* .0000227 = 1,135 employees.

6. Housing Construction -- Output Impact  
**St. Louis County\*** Assume \$20,000,000 \* 1.40 = \$28,000,000.  
**Minnesota\*** Assume \$20,000,000 \* 1.89 = \$37,800,000.
7. Housing Construction -- Income  
**St. Louis County\*** \$20,000,000 \* 1.47 = \$29,400,000  
**Minnesota\*** \$20,000,000 \* 1.94 = \$38,800,000.
8. Housing Construction -- Employment  
**St. Louis County\*** \$20,000,000 \* .0000173 = 346 employees.  
**Minnesota\*** \$20,000,000 \* .0000227 = 454 employees.
9. Training -- Wage and Salary  
**St. Louis County\*** \$1,925,000 trainers' salaries \* 1.3 = \$2,502,500.  
**Minnesota\*** \$1,925,000 trainers' salaries \* 1.45 = \$2,791,250.