

***AMCHITKA QUARTERLY REPORT***  
***Summary to June 30, 2005***

**The Institute for Circumpolar Health Studies**

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The Amchitka Project is designed to collect health data on former workers who spent time on Amchitka Island during and after the nuclear testing there. The Project has been operating for the last five years trying to contact and determine the health status of all of the construction workers who have worked on Amchitka Island before, during and since the atomic bomb testing that took place there in the Sixties and the Seventies. Since December, 1999, three thousand three hundred fifty-one (3351) former Amchitka workers have been identified including one hundred fifteen identified since the beginning of 2005. Workers have been contacted by the Amchitka Project office to complete extensive work history interviews. If they agree to do so, they are asked to fill out detailed medical history questionnaires and to have a physical examination which includes a doctor's examination, stool test for blood, hearing test, chest x-ray, pulmonary function tests, blood and urine tests. One thousand three hundred one workers (1301) have completed the interview and nine hundred ninety-seven (997) have had the physical examination. The data is compiled by Zenith Administrators and the results of histories, physical examinations, and laboratory tests devoid of personal identifiers are sent quarterly to the Institute of Circumpolar Health Studies.

This report is divided into several components. The first is a summary of the demographics of the workers, which includes gender, age and racial identity of participants. The second part discusses the respiratory health of the workers. It includes an analysis of pulmonary function testing, medical exam and medical history findings and chest x-ray reports. There is a summary of the selected laboratory data and the results of testing for hearing loss. Cross-tabs between basal metabolic index (BMI) a standard measure of obesity and diabetes as determined by elevated fasting blood sugar is also presented. Finally, a compilation of diagnoses for cancer and the work-related lung diseases, asbestosis and silicosis are presented from two different data sources, one is the medical history and the other is the medical diagnoses that physician examiners fill out after completing the physical examination.

The information is provided in both narrative and tabular formats.

## **Demographics**

The Amchitka Project completed twenty new work history interviews and ten new medical examinations for workers since December 31, 2004. The total number of workers

who have interviewed for work history as of June 30, 2005 is 1301. The total number of workers who have completed the medical screening examination is 997, but only 985 medical history forms are entered. The twelve physicals exams that do not have medical histories were done earlier in the project. The total number of known workers is 3351 of whom 32 had no gender recorded, 117 or 3.5 % were female and the overwhelming majority, 3202 or 95.6% are male.

The mean age of the workers who were examined was 59.8 years with a range from 27 to 91 years at the time of physical examination. There have been 64 female workers, and 935 male workers who have completed the physical examination. Gender is recorded in two data fields: one called medical\_history\_personal and the other called workers. Only 749 of those listed in the total workers were listed as having had a physical exam however there are 997 physical exams recorded. Four of the workers who are listed as females in the medical history are listed as males in the worker database. One worker who was listed as male in the personal history was female in the worker database. Three listed no gender in the medical history form but were listed as male in the workers field.

From the MEDICAL HISTORY form the majority of the workers are white (793). The next largest group (122) is Native American/Alaskan Native. There are an additional fourteen workers who were described as other, but in the field that describes their race, they wrote Alaska Native or American Indian nationalities sometimes as mixed race. They are added to the Native American/Alaskan Native group for a total of 136. There are twenty-six African American workers. Nineteen were listed as other including Hispanic and Asian which were listed together. There are 10 for whom no race was entered and no description of racial identity was given.

## **Medical History**

From the medical history a large number of workers say that they have serious respiratory disease. Approximately 7.2% of the workers reported having chronic bronchitis, 5.9% reported having had emphysema, and 9.3 % reported having asthma. Many workers reported having heart problems with 2.7% stating that they had congestive heart failure, and 8.1% stating that they had had a heart attack. Symptoms were common; 25.5% had a productive cough for more than three months and 38.3% claimed to be short of breath with exertion. There continues to be a large proportionate of smokers among the workers, with 673 (67.4 %) claiming to have been smokers at some time, while 306 (30.1%) reported never having been smokers. Surprisingly six workers answered no to “ever smoked cigarettes”, but yes to “current smoker”. Among the smokers 77.6% of them had started smoking by the age of 21 and 11.3% did not answer the question. Sixty-five percent of the smokers were no longer current smokers. Among the current and former smokers 7.8% had a diagnosis of emphysema, 8.5% had a diagnosis of chronic bronchitis, and 9.6% reported having asthma. Of the lifetime non-smokers 1.7% had emphysema, 4.2% had chronic bronchitis, and 8.8% had asthma. Of the smokers 29.3% reported having a chronic productive cough for three months or more, and 44.2% reported being short of breath with exertion. The strong relationship between smoking and respiratory disease is supported by the fact that the symptoms of non-smokers were

reduced; only 17.0% reported chronic productive cough and 25.2% reported being short of breath with exertion.

## Physical Examination Diagnoses

The most common diagnosis neurosensorial hearing loss is given to (834/ 997) 83.4% of the workers who had a physical examination. Other common diagnoses from the medical diagnoses form were:

- Hyperlipidemia (386/ 997) 38.7% of workers
- Hypertension (355/ 997) 35.6% of workers
- Abnormal lung function (250/ 997) 25.1% of workers
- Chronic Obstructive Pulmonary Disease COPD (182/997) 18.3% of workers.
- Arthritis, degenerative (215/ 997) 21.6% of workers.
- Abnormal liver function test (91/ 997) 9.1% of workers.
- Diabetes (87/ 997) 8.7% of workers.
- Coronary Atherosclerosis (74/997) 7.4% of workers
- Pleural plaques (99/997) 9.9% of workers
- Asthma (59/997) 5.9% of workers
- Anemia (53/997) 5.3% of workers
- Guaiac positive stool [an indicator of gastrointestinal bleeding] (67/997) 6.7% of workers
- All Cancer including melanoma, but excluding other skin cancer (124/997) 12.4% of workers

## Radiology Findings and Pulmonary Function Testing

Chest x-rays reports indicate that 164/1000 (16.4%) of the chest x-rays had pleural or parenchymal disease on B-read. Asbestosis which is usually a work related lung disease is diagnosed by radiological features consistent with basal fibrosis (Category 1/0 and over) as determined by a B-reader. Thirteen workers had both pleural and parenchymal disease, eighteen had only parenchymal disease, and 120 had only pleural disease. Physicians diagnosed 99 individuals with pleural plaques, and 14 with asbestosis.

Pulmonary function tests are presented as normal, restrictive disease, obstructive disease, and mixed disease. The criteria for these distinctions are based on the first standard deviation in both the Forced Vital Capacity (FVC) and Forced Expiratory Volume in one second (FEV1). Normally the FEV1 is about 80% of FVC. Normal results fall within the first standard deviation for FVC, FEV1, and the ratio of FEV1/FVC. In restrictive disease both FEV1 and FVC are reduced but the ratio FEV1/ FVC is maintained. In obstructive disease such as asthma FEV1 is reduced disproportionately to FVC because of the obstruction to airflow therefore the FEV1/ FVC ratio is also reduced. Mixed disease has reductions in both the FVC and in the ratio of FEV1/ FVC. There were a total of 982 usable pulmonary function tests. In all there were 106 workers with restrictive lung disease, 89 workers with obstructive lung disease and 37 with mixed lung disease

based on pulmonary function tests. A total of 23.5% of the workers had abnormal pulmonary function tests.

Smoking behavior is associated with reduced lung function. Pulmonary function tests revealed significantly different rates of lung function between smokers and non-smokers. Restrictive lung disease was present in 6.6% of nonsmokers and in 12.3% of smokers. Obstructive lung disease was present in 5.9% of non-smokers and in 10.0% of smokers. Mixed lung disease which is usually the most severe disorder is present in none of the non-smokers and in 5.6% of smokers.

Radiological results and pulmonary function testing was cross-tabulated to determine that 6.0% of workers had abnormal pulmonary function tests and also had abnormalities on B-reads, while 18.3% had abnormal PFT with normal B-reads, and 9.5 % had normal PFTs and abnormal B-reads. Normal B-read and normal PFT was present in 66.8% of this worker population. A total of 232 workers or 23.6% had abnormal PFT results.

## **Hypertension**

Not all workers received all the tests. Hypertension, untreated or poorly controlled, was present in 25.8 % of workers based on the measured values of systolic and diastolic blood pressure taken during the physical examination. The definition of hypertension was systolic blood pressure higher than 145 and/or diastolic blood pressure higher than 90. Providers gave the diagnosis of hypertension, to 350 workers or 35.2%. Since 256 of the workers had elevated blood pressure on the examination, this would indicate that 73.1 % of the workers who had hypertension were poorly controlled or untreated.

## **Beryllium Results**

There were no new positive beryllium tests this quarter. Beryllium testing has not found any cases of beryllium disease with only one positive test on one worker whose repeat testing has been negative twice, and one borderline result on one worker who also has been negative twice.

## **Hearing Loss**

Neurosensorial hearing loss is one of the most common pathological conditions found among these workers. According to AMA rating hearing loss between 500 and 3000 Hertz is regarded as significant. By NIOSH criteria hearing loss between 1000 and 4000 Hertz is significant. By AMA criteria 46.4% of workers had normal hearing. By NIOSH criteria, only 36.8% of workers had no material impairment. Surprisingly more workers were diagnosed with hearing loss (83.4%) than had objective hearing loss from hearing tests.

## **Laboratory Findings**

Based on the laboratory findings hypercholesterolemia was present in 54.4% of the cohort, elevated liver enzymes were present in 11.1%, and 11.7% had elevated fasting blood sugar. Cadmium was tested in only 64 workers and elevation of urinary cadmium was found in 17.2% of those tested and 100% of those with abnormal findings were smokers. Smoking is a known risk factor for elevated blood cadmium.

The providers diagnosed 52 cases of anemia for a rate of 5.3%. We were unable to confirm this because of the unusual way that laboratory results were entered into the database.

## **BMI and Diabetes**

The weight in kilograms divided by the height in meters squared is a calculated standard for measuring obesity in a population. A BMI value under 18 is considered underweight, above 25 is considered overweight, a value over 30 is considered obesity. This older worker population is significantly overweight with an average BMI of 29.5. Only two workers were underweight, while 40.0% were overweight and 41.0% were rated obese, only 18.7% were considered to be normal weight. Obesity is a risk factor for diabetes. Among the obese workers 19.1% had an elevated fasting blood sugar. Among workers of normal weight only 4.7% had elevated fasting blood sugars. There were 87 (8.8% of those having physical examination) cases of diabetes identified by physicians, and only 81 individuals who had a diagnosis of diabetes had fasting blood glucose value in the database. There were 53 workers with a diagnosis of diabetes whose fasting blood sugar was over 120 mg/dl. There were two whose fasting blood sugar was dangerously low at 28 and 41 mg/dl. Therefore (55/87) 62.1% of the workers diagnosed with diabetes were out-of control.

There were 108 workers who had fasting glucose levels that were over 120 mg/dl and of these only 53 had a diagnosis of diabetes, thus 5.5% of the workers had undiagnosed diabetes that was not picked up on the physical exam despite the availability of the laboratory findings. In addition there were seven workers whose fasting blood sugar was below 40 mg/dl. This is either laboratory error or serious hypoglycemia. There was no diagnosis of hypoglycemia made by a physician.

## **Diagnoses including Cancer**

The diagnostic capabilities of the data are still uncertain, as we have not seen any change in the diagnoses fields. Apparently the nurse coordinator is substantiating the diagnoses by confirming with the examining doctor and including these diagnoses in the letter to the participant. We cannot confirm that this is occurring. Diagnoses based on patient history are considerably different than diagnoses listed by examiners. It is difficult to imagine that an important diagnosis such as cancer might be forgotten when the worker is filling out the medical history forms, but as you can see by the comparison of cancer diagnoses as taken from medical history and cancer diagnosis from medical diagnoses filled out by the provider, they are indeed quite different.

Suspicious findings from the physical examination are noted but not confirmed as cancer, such as lung masses or nodules, and blood in the stool which is listed as guaiac positive, and finding anemia. These diagnoses need further investigation to rule out the possibility of lung or colon cancer.

We are still unable to list the diagnoses of the deceased workers and the diagnoses generated by follow-up from the screening, so the diagnostic findings of this program will always underestimate the burden of illness in the population.

## **Data Quality**

Data quality has improved as Zenith has removed errors from the data set as we have reported them. This is very helpful because each reiteration of the data needed to be cleaned for the same errors. We continue to work on removing errors from the database.

## Racial Identity of Examined Workers

(data through June 30, 2005)

Race	Number	Percent
White	791	80.4%
Black	26	2.6%
AK Native/ Amer. Indian	122	12.4%
Other	45	4.6%
Total	984	100.0%

Data Source: AmchJuly05.mdb

Table: MedicalHistoryQues\_Personal

Fields: Race

## BMI and Elevated Fasting Glucose

BMI	Elevated Blood Sugar		total
	Yes	No	
>30 obese	71 (19.1%)	301	372
>25 <30 overweight	28 (7.7%)	336	364
>18 and <25	8 (4.7%)	163	171
<18 underweight	0	2	2
<b>totals</b>	<b>107 (11.8%)</b>	<b>802</b>	<b>909</b>

Data Source: AmchJul05.mdb

Table: labresultspart2

Fields: TestName, TestValue,

Table: PhysicalExams

Fields: Vital Signs\_Height, Vital Signs\_Weight

## Summary of Selected Lab Data

(data through june 30, 2005)

Lab Test	Number of Workers Tested	Criteria for Abnormal Test	Number of Workers with Abnormal Findings	Prevalence of Abnormal Labs
Urinary Cadmium/ creatinine ratio	64	>1.2	11	17.2%
Cholesterol	918	>200 mg/dL	499	54.4%
Renal insufficiency	564	SerumCreatinine > 1.4 mg/dL	54	9.6%
Elevated Fasting Glucose	917	glucose>140	107	11.7%
Hyperthyroid	913	T4>12 uIU/mL	12	1.3%
Hypothyroid	907	TSH>5 ug/dL and T4<5 uIU/dL	11	1.2%
Elevated liver enzymes	917	ALT>50 Or AST>50	102	11.1%
Hypertension, systolic only	996	SBP>145, DBP<90	138	13.9%
Hypertension, diastolic only	996	DBP>90, SBP<145	45	4.5%
systolic and diastolic combined	996	SBP>145 and DBP>90	74	7.4%
<i>Data Source: AmchJul05.mdb</i>				
<i>Table: labresultspart2</i>				
<i>Fields: TestName, TestValue,</i>				
<i>Table: PhysicalExams</i>				
<i>Fields: VitalSigns_BP1_SBP, VitalSigns_BP1_DBP,</i>				
<i>Note: "Criteria for Abnormal Test" values are missing for most test results And were inferred in this table as noted.</i>				

## Respiratory Health Data

### Smoking Behavior and Sequelae

(data through June 30, 2005)

Symptom or diagnosis	Smoker ever	Smoker ne
Chronic bronchitis	8.5%	4.2%
Emphysema	7.8%	1.7%
Asthma	9.6%	8.8%
Chronic cough >3 mon	29.3%	17.0%
Short of breath	44.3%	25.2%

### B-reads and Results of Pulmonary Function Testing

(data through June 30, 2005)

B-reads		Pulmonary Function Testing				
Pleural abnormal	Parenchymal abnormal	Normal	Restrictive	Obstructive	Mixed	totals
No	No	653	72	79	28	832
	Yes	14	3	0	1	18
Yes	No	73	27	9	6	115
	Yes	6	4	1	2	13
Totals		746	106	89	37	978

Data Source: AmchJul05.mdb

Table: labresultspart1

Fields: PFT\_FEV1\_Percent predicted, PFT\_FVC\_Percent predicted, Parenchymal Abnormalities\_Yes; Pleural Abnormalities\_Yes

## Hearing Tests

### AMA Dinaural Hearing Loss by NIOSH Material Hearing Impairment Categories

#### AMA Dinaural Hearing Loss

(data through June 30, 2005)

(data through June 30, 2005)

Category	Frequency	Percent
1	438	46.3%
2	204	21.6%
3	85	9.0%
4	87	9.2%
5	60	6.4%
6	23	2.4%
7	24	2.5%
8	11	1.2%
9	6	0.6%
10	4	0.4%
11	3	0.3%
<b>Total</b>	<b>945</b>	<b>100.00%</b>

Data Source: AmchJul05.mdb

Tables: LabResults\_Part1

Field: Hearing500dbLeft, Hearing1000dbLeft, Hearing2000dbLeft, Hearing3000dbLeft, Hearing500dbRight, Hearing1000dbRight, Hearing2000dbRight, Hearing3000dbRight

#### NIOSH Material Hearing Impairment Categories

AMA Category

		NIOSH Material Hearing Impairment Categories		Total
		0	1	
1	1	337	101	438
2	2	11	193	204
3	3	0	85	85
4	4	0	87	87
5	5	0	60	60
6	6	0	23	23
7	7	0	24	24
8	8	0	11	11
9	9	0	6	6
10	10	0	4	4
11	11	0	3	3
<b>Total</b>		<b>348</b>	<b>597</b>	<b>945</b>

Data Source: AmchJul05.mdb

Tables: LabResults\_Part1

Field: Hearing500dbLeft, Hearing1000dbLeft, Hearing2000dbLeft, Hearing3000dbLeft, Hearing4000dbLeft, Hearing500dbRight, Hearing1000dbRight, Hearing2000dbRight, Hearing3000dbRight, Hearing4000dbRight

### NIOSH Material Hearing Impairment Categories

(data through June 30, 2005)

Category	Frequency	Percent
0	348	36.8%
1	597	63.2%
<b>Total</b>	<b>945</b>	<b>100.0%</b>

Data Source: AmchJul05.mdb

Tables: LabResults\_Part1

Field: Hearing1000dbLeft, Hearing2000dbLeft, Hearing3000dbLeft, Hearing4000dbLeft, Hearing1000dbRight, Hearing2000dbRight, Hearing3000dbRight, Hearing4000dbRight

## Medical History Diagnoses versus Provider Diagnoses

*(data through March 31, 2005)*

<b>Diagnosis or Symptom</b>	<b>Number of cases From medical history</b>	<b>Number of cases From diagnosis codes</b>
<b>Cancer leukemia</b>	<b>41</b>	<b>4</b>
<b>Cancer lung</b>	<b>11</b>	<b>9</b>
<b>Cancer kidney</b>	<b>4</b>	<b>2</b>
<b>Cancer bone</b>	<b>4</b>	<b>1</b>
<b>Cancer thyroid</b>	<b>2</b>	<b>2</b>
<b>Cancer breast</b>	<b>1</b>	<b>3</b>
<b>Cancer esophagus</b>	<b>3</b>	<b>5</b>
<b>Cancer stomach</b>	<b>2</b>	<b>2</b>
<b>Cancer colon</b>	<b>13</b>	<b>14</b>
<b>Cancer pancreas</b>	<b>2</b>	<b>2</b>
<b>Cancer liver</b>	<b>2</b>	<b>2</b>
<b>Cancer ovary</b>	<b>1</b>	<b>0</b>
<b>Cancer oral pharyngeal (throat)</b>	<b>6</b>	<b>5</b>
<b>Cancer bladder</b>	<b>9</b>	<b>13</b>
<b>Cancer testicular</b>	<b>1</b>	<b>1</b>
<b>Cancer uterine</b>	<b>1</b>	<b>1</b>
<b>Cancer prostate</b>	<b>35</b>	<b>40</b>
<b>Non-Hodgkins lymphoma</b>	<b>4</b>	<b>7</b>
<b>Multiple myeloma</b>	<b>3</b>	<b>2</b>
<b>Cancer ureter</b>	<b>0</b>	<b>1</b>
<b>Cancer rectum</b>	<b>N/A</b>	<b>1</b>
<b>Cancer laryngeal</b>	<b>N/A</b>	<b>2</b>
<b>Lung mass or nodule</b>	<b>N/A</b>	<b>20</b>

<b>Anemia</b>	<b>66</b>	<b>53</b>
<b>Guaiaac positive</b>	<b>N/A</b>	<b>67</b>
<b>Asbestosis</b>	<b>8</b>	<b>14</b>
<b>Silicosis</b>	<b>2</b>	<b>4</b>
<b>Diabetes</b>	<b>75</b>	<b>87</b>
<i>Data Source: AmchJul05.mdb</i>		
<i>Table: MedicalHistoryQues_Personal; Medical diagnoses_entry; Medical diagnoses_description</i>		
<i>Fields:as shown</i>		