SELENIUM TOXICITY IN MAN

by

W. C. Cooper*

Selenium in water or food will cause the teeth to be more susceptible to dental caries. 5 ppm of arsenic in drinking water will be effective in offsetting 11 ppm of selenium or selenides in food or water.

Experimenter "Simiani" determined that small amounts of selenium administered to rats will cause the skin to turn a yellowish color.

Elemental selenium is relatively insensitive. Selenium dust or selenium fumes will collect in the nose and cause trouble and loss of smell. When aluminum-selenium rectifier plates were melted in a scrap furnace, the fumes caused workers to become ill and they were hospitalized. All workers were well within three days. Selenium dioxide in the furnace smoke probably caused intense irritation which caused the workers to leave the furnace area as soon as possible, thus saving any further sickness.

Selenium dioxide is a white powder which dissolves in water to form selenious acid. The acid will burn and penetrate the skin, causing severe irritation.

Selenium oxychloride is a liquid which causes severe burns.

Selenites and selenates can be harmful if swallowed or allowed to remain in contact with the skin, but most are less harmful than the comparable tellurium compounds.

Hydrogen selenide gas can be given off during processing operations. It causes fatigue, irritation, and intoxication.

Excessive selenium in the body, which is not given off in the urine, tends to collect and remain in the liver.

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* Summary of a talk given by W. C. Cooper, Selenium-Tellurium Development Association, New York, New York, for the First International Symposium on Selenium in Biomedicine, Corvallis, Oregon, September 7, 1966.

Summary by T. C. Matthews
9-23-66

SELENIUM IN HUMAN NUTRITION

by

L. L. Hopkins*

A small amount of selenium is advantageous to health of man and animals. Most foods in the United States contain traces of selenium. Certain areas in the United States are considered to be deficient areas in that the foods grown in those areas are low in selenium. These are New England, the Atlantic Coast, Florida, northern California, and the Pacific Northwest.

Lambs fed vitamin E and selenium grow faster than lambs which are fed selenium alone.

Children in Egypt, Jordan, and Central America who are suffering serious malnutrition are also often found to be selenium deficient. Dry skim milk powders are much used in developing countries because they are easy to ship and store. But these dry milk powders vary widely in the amount of selenium contained due to being produced in various parts of the world.

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* Summary of a talk given by L. L. Hopkins, United States Food and Drug Administration, Washington, D.C., for the First International Symposium on Selenium in Biomedicine, Corvallis, Oregon, September 7, 1966.

Summary by T. C. Matthews
9-23-66

LIST OF SAMPLES TAKEN ON GLENDALE INTERCHANGE HIGHWAY INSPECTION

No.	Station		Type Sample	Description	Assay for
P-31345 AAG-141	436+25 to 436+50	(Upper Bench)	Split from 25' channel	Fractured Fe-stained argillite	Se
P-31346 142	436+35	" "	30" channel	"high grade" in section of No. 1 sample	Se
P-31347 143	436+85	" "	Grab	3" rusty quartz in argillite includes 2" clay seam 4' to S.	Au,Ag,Se
P-31348 144	437+15	" "	Grab	3" quartz seam in greenstone	Au,Ag,Se
P-31349 145	440+00	(Main cut)	Grab	Clover growing from cut between upper bench and grade	Se
P-31350 146	438 to 439+50	(Upper Bench)	Multiple grab	Contains quartz, greenstone, calcite, etc.	Se
P-31351 147	439+50	" "	Grab	Fractured Fe-stained argillite	Au,Ag,Se
P-31352 148	439+65	" "	Grab	From 3 small quartz veinlets in 5-foot area	Au,Ag,Se
P 31353 149	440	" "	Grab	From "pocket" in 6" quartz vein 20' up on cut above bench	Au,Ag,Se
P-31354 150	440+00 to 441+25	" "	Multiple grab	Fe-stained vein quartz, greenstone, etc.	Se
P-31355 151	441+25	" "	Grab	Fractured iron-stained greenstone and quartz	Au,Ag,Se
P-31356 152	B-443+25 to B-448 (B=NW side off ramp cut)		Multiple grab	Greenstone w/epidote, quartz & a white leaching surface coating	Se
P31357 153	B-446+00		Grab	From 6" rusty zone in greenstone	Se
P31358 154	440+20	(Main cut)	Grab	Greenstone w/dissem. pyrite	Au,Ag,Se

List of Samples taken on Glendale Interchange Highway Inspection

No.	Station	Type Sample	Description	Assay for
P-31359 AAG-155	439+20 (Main Cut)	Grab	Greenstone w/fibrous amphibole, epidote, garnet, & some chalcopyrite	Au,Ag,Cu,Se
P-31360 156	437+65 (Main Cut)	Grab	Highly sheared chloritic greenstone w/some quartz & minor sulfides	Au,Ag,Se
P-31361 157	454+50 to 456+50 (S. side of interchange	Split from multiple grab	From numerous small quartz lenses in brown clay	Au,Ag,Se

GEOLOGY OF SELENIUM DISTRIBUTION

By H. W. Lakin*

Selenium is associated with sulfur of volcanic origin and because of its similar molecular radii often replaces it in small amounts. In igneous rocks it tends to be concentrated with sulfides, particularly in the sulfides associated with ultrabasic rocks. From its volcanic origin it is distributed by erosional processes and redeposited in sedimentary rocks where it tends to be concentrated in greater abundance than in igneous rocks.

A criterion for telling whether the selenium present will be toxic is the ratio at the surface compared to its presence at depth. If there is an increase of selenium with depth it will often be toxic. A decrease of selenium at depth indicates the area is nontoxic. Examples of this were Hawaii, where nontoxic soils in some areas of high rainfall (+100") had surface concentrations of selenium as high as 20 ppm but at depth dropped to 0.2 ppm. In the Rocky Mountains area bedrock in toxic areas ranged between 1.5 to 103 ppm. In these areas soil selenium concentration was often less than the underlying bedrock. The highest concentration of selenium is in sedimentary rocks containing organic matter.

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* Summary of a talk given by H. W. Lakin, Research Chemist, U.S. Geological Survey, Denver, Colorado, for the First International Symposium on Selenium in Biomedicine, Corvallis, Oregon, September 6, 1966.

Summary by R. G. Bowen
9/23/66

SELENIUM - OCTOBER 1956

The quoted market price has risen from $2 to $13.50. Mason wrote to a number of companies requesting information on markets for selenium. Results are indicated below:

Bureau of Mines - Price schedules have not been established.
Braun Corporation - Will buy 99.9% pure powdered Se.
E. I. DuPont - Are not buying Se.
Harshaw Chemical - Are purchasing metal.
International Smelting & Refining - Do not know of any ore or concentrate being mined for selenium content.
Kennecott Copper Corporation - Do not buy any Se ore.
American Smelting & Refining - There appears to be little primary ore that contains sufficient ore to be worthwhile.
Kawecki Chemical Company - Are interested in obtaining new sources of supply for materials running above 1% Se.
Foote Mineral Company - Do not purchase Se.

Hoagland contacted the State Department of Agriculture and determined that there are many varieties of Astragalus, which will concentrate selenium if it is present in the soil. These plants will also grow in soils barren of selenium; so the presence of any type of plant does not necessarily indicate the presence of selenium.

July 15, 1956, The Oregonian carried an article describing a substantial selenium find in Poison Basin. Letters from the Bureau of Mines, Shawano Development Corporation, and O. A. Beath indicate that this prospect did not prove to be worthwhile.

Shawano sent us a sample of ore which their field tests indicate to contain selenium.

The Bureau of Mines, Salt Lake City, sent us a sample of ore which they report to contain .105% Se. The qualitative test used in the spectrographic laboratory at present does not show the Se content of this ore.

We have not been able to determine what grade of ore might be considered to be commercial, but it appears that it would be not less than .5%.

T. C. Matthews

STATE DEPARTMENT OF GEOLOGY AND MINERAL INDUSTRIES

1069 STATE OFFICE BUILDING
PORTLAND 1, OREGON

October 4, 1966

mple submitted by Len Ramp and R. Van Cleave

mple received on September 1, 1966.

alysis requested Selenium, copper, gold and silver

Analysis by:

L. L. Hoagland
Assayer-Chemist

ab. No.	Sample Marked	Results of Analysis				Remarks
		OUNCES PER TON		%	%	
		GOLD (Au)	SILVER (Ag)	SELENIUM (Se)	COPPER (Cu)	
P-31345	AAG-141	Nil	0.70	Nil	Trace	The method used in detecting selenium in these samples was developed by the U.S. Bureau of Mines to detect selenium in rocks and soils, and is sensitive to 15 parts per million or 0.0015%.
P-31346	AAG-142	Nil	0.80	Nil	- -	
P-31347	AAG-143	Nil	Nil	Nil	- -	
P-31348	AAG-144	Nil	Nil	Nil	- -	
P-31350	AAG-146	Nil	Nil	Nil	- -	
P-31351	AAG-147	Nil	Trace	Nil	- -	
P-31352	AAG-148	Nil	Trace	Nil	- -	
P-31353	AAG-149	Nil	Nil	Nil	- -	
P-31354	AAG-150	Nil	Trace	Nil	- -	
P-31355	AAG-151	Nil	Nil	Nil	- -	
P-31356	AAG-152	Nil	Nil	Nil	- -	
P-31357	AAG-153	Nil	Nil	Nil	- -	
P-31358	AAG-154	Nil	Trace	Nil	- -	
P-31359	AAG-155	Nil	Nil	Nil	0.05	
P-31360	AAG-156	Nil	Nil	Nil	- -	
P-31361	AAG-157	Nil	0.40	Nil	- -	
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