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Dr. Walt Kisieleski
Argonne National Laboratory
Division EIS
Argonne, Illinois 60439

Dear Dr. ~~Kisieleski~~ Walt -

Enclosed is a summary of the results Bill Fort has obtained to date from stack tests on yellowcake packaging and drying stacks at uranium mills. These samples were collected using the EPA Method 5 procedures. They were analyzed for isotopic uranium using radiochemical methods and alpha spectrometry, either by our ORP laboratory in Las Vegas or by Eberline Instrument Corp. The results are expressed as pCi of natural uranium released per hour, obtained by summing the three uranium nuclide activities and using the volumetric flow rate calculated at the time of sample collection. The emission rate is also expressed in units of pounds of U_3O_8 per hour, obtained by converting the total uranium activity to mass of U_3O_8. This unit has more meaning to the companies, as it gives them a feel for their product losses.

We have obtained limited information on mill operating parameters during some of the stack tests. Mainly this includes such items as ore grade, tons of ore processed per day, and/or pounds of yellowcake produced and/or packaged during the test period. Our attempts to date to correlate the emission rate with these parameters have been unsuccessful. We had hoped to be able to make some such correlation in order to normalize the emission rate to some "standard" or easily measured parameter. However, it appears that the emission rate is almost constantly variable from hour to hour or even minute to minute, and is controlled by many minor factors which are impossible to pin down.

Our plans for the future are to conduct a few more tests at these mills in order to have at least two sets of samples at each mill. We do not presently plan to add any more mills to the list. Bill has made some particle size tests at one mill, using an in-stack cascade impactor, and he plans to expand on this work. We also plan to do some tests on

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grinding and crushing stacks. We currently are not planning to do any sampling before and after the cleanup systems in order to evaluate scrubber or filter efficiency. This is not our main charter at the present time, and it would be physically very difficult to do because of cramped conditions and lack of straight duct sections before the cleaners in most cases.

This brings you up to date on our yellowcake stack test data. When the sampling program is completed, we plan to publish a report summarizing the data, hopefully including some dispersion/ambient concentration data and population dose estimates. If you have any questions or comments, don't hesitate to call.

Sincerely yours,

Dick

Richard L. Douglas
Chief, Field Studies Branch
Office of Radiation Programs, LVF

Enclosures as stated

SUMMARY OF YELLOWCAKE EXHAUST CLEANUP SYSTEMS

ON URANIUM MILLS SAMPLED BY ORP-LVF

Mill A

Kerr-McGee Ambrosia Lake - Nominal ore throughput 6500 tpd. Started operations 1958.

Cleanup systems: Dryer - Joy Microdyne
Packaging - Two Joy Microdynes (total of 3 exhaust stacks)

Mill B

Union Carbide Uravan. Capacity 1300 tpd. Startup 1947. Has single stack for dryer and packaging area. Uses Raschid rings in a three-tiered wet scrubber.

Mill C

Anaconda Bluewater. Capacity 2000 tpd at time of test; now expanded to 6000 tpd. Startup 1953. Joy Microdyne on packaging stack, homemade "Anaconda scrubber" on dryer.

Mill D

Sohio L-Bar (north of Laguna, NM). Capacity 1500 tpd. Startup 1976. Dryer has Venturi scrubber, packaging stack has Mikro-Pulsaire Dust Collector bag filter system.

Mill E

United Nuclear Church Rock. Capacity 4000 tpd. Startup 1977. Dryer stack has Impi-Jet scrubber, packaging stack Joy venturi scrubber.
NOTE: Visible yellowcake emissions were being released from the packaging stack at time of tests. These have since been reduced by minor maintenance in the packaging room.

Mill F

United Nuclear-Homestake Partners. Capacity 2700 tpd. Startup 1958. Vanadium roaster stack has Hydrofilter followed by type W Rotoclone; packaging stack has Hydrostatic precipitator followed by type W Rotoclone; dryer stack has Joy-Denver followed by type W Rotoclone.

YELLOWCAKE STACK TEST RESULTS

DATE	MILL	STACK	VOL. FLOW RATE DSCFH	EMISSION RATE pCi U_{NAT}/Hr	EMISSION RATE #U_3O_8/Hr
4/18/77	C	PKG.	1.1×10^5	2.0×10^7	0.08
5/17/78	D	PKG.	3.0×10^4	9.6×10^7	0.37*
5/18/78	D	PKG.	3.9×10^4	1.4×10^6	0.005
5/21/78	D	DRYER	1.3×10^5	1.0×10^6	0.004
5/22/78	D	DRYER	1.0×10^5	3.4×10^6	0.001
5/23/78	D	DRYER	1.0×10^5	1.6×10^6	0.006
5/24/78	D	PKG.	3.9×10^4	5.3×10^6	0.02
6/16/78	E	DRYER	3.5×10^5	1.00×10^8	0.38
6/17/78	E	DRYER	3.6×10^5	5.86×10^7	0.22
6/17/78	E	DRYER	3.5×10^5	1.25×10^8	0.48
6/18/78	E	PKG.	1.0×10^5	5.98×10^7	0.23
6/18/78	E	PKG.	1.0×10^5	6.08×10^7	0.23
6/19/78	E	PKG.	9.8×10^4	3.15×10^7	0.12
3/13/73	F	DRYER	3.5×10^4	1.06×10^7	0.04
3/14/73	F	PKG.**	3.1×10^5	5.56×10^6	0.02
3/15/78	F	ROASTER	8.8×10^4	5.53×10^6	0.02

* RUPTURED BAG FILTERS

** SCRUBBER OPERATING, HOWEVER NO PACKAGING PERFORMED DURING TEST

YELLOWCAKE STACK TEST RESULTS

DATE	MILL	STACK	VOL. FLOW RATE DSCFH	EMISSION RATE PCi U_{NAT}/HR	EMISSION RATE #U_3O_8/HR
4/15/77	A	DRYER	6.7×10^5	7.9×10^7	0.3
4/16/77	A	PKG.	2.4×10^5	2.6×10^7	0.1
4/17/77	A	PKG.	2.3×10^5	1.8×10^7	0.07
9/8/77	A	PKG.	2.0×10^5	8.9×10^6	0.03
9/9/77	A	PKG.	2.0×10^5	1.5×10^7	0.06
9/9/77	A	PKG.	2.4×10^5	6.2×10^7	0.24
9/12/77	A	PKG.	2.4×10^5	1.3×10^7	0.05
9/13/77	A	DRYER	4.5×10^5	2.3×10^8	0.87
10/13/77	B	DRY-PKG.	2.1×10^5	3.6×10^7	0.14
10/14/77	B	DRY-PKG.	2.0×10^5	2.8×10^7	0.11
10/15/77	B	DRY-PKG.	2.0×10^5	4.7×10^7	0.18
10/16/77	B	DRY-PKG.	1.9×10^5	6.6×10^7	0.25
10/17/77	B	DRY-PKG.	1.9×10^5	4.2×10^7	0.18
10/18/77	B	DRY-PKG.	1.9×10^5	8.2×10^7	0.31
10/19/77	B	DRY-PKG.	1.9×10^5	7.3×10^7	0.28