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February 23, 1961

Mr. Cecil Buchanan
Assistant Chief
Isotopes Branch
Division of Licensing & Regulation
U. S. A. E.C.
Washington 25, D.C.

Dear Mr. Buchanan:

As we discussed in your office a couple of weeks ago I shall review for you our procedures which we propose to use in wipe tests of various type sources for our clients.

A) Cobalt-60 teletherapy units. We propose to offer a wipe testing service for clients throughout continental United States. The procedure will be to send one of our consulting physicists to the institution to perform the test. He will wipe test with a Watman #40 filter paper (impregnated with green soap water) the closest accessible surface to the source. The source will be kept in the "off position" during the complete test procedure. The "closest position" will, of course vary from one instrument to another. This may represent the dust guard on the front of the cone, it may represent the collimation slit system and/or any cracks or other possible openings into the shield.

The wipe sample (filter paper) will be placed into small plastic bags and sent or brought back to our laboratories for analysis. It will be standard procedure to take at least two wipes since the analysis will have to be done at a later time away from the institution. Upon receipt by our laboratories, the wipe samples will be placed in small 4 cc vials and placed in an NRD Model CS-600 Well type scintillation counter, operated into an NRD Model B-1800 scintillation scaler (or equivalent) and counted. The counting system has been calibrated with standard Cobalt-60 sources prepared by our laboratories. The efficience of this counting system is such that one millimicrocurie results in a net count of approximately 985 counts per minute. A minimum of 5 minute counts are taken on each sample. Any wipe sample containing 5 muc of contamination will be indicative of a leaky source and the client will be so advised and will further be advised to immediately remove the unit from service and take immediate steps to have the source replaced or repaired. If a wipe source did contain the maximum i.e. 5 muc, we would obtain a net counting rate of 5 x 985 = 4925 counts per minute. In a 5 minute count, the total net count would be 24,625 counts. The statistical accuracy of such a count would be plus or minus 0.6%. Hence, the strength of a 5 muc wipe source could be determined to an accuracy of plus or minus 0.6%. A one muc source could be determined with an accuracy of plus or minus 1.56%.

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B) Cobalt-60 open air radiographic sources. Cobalt-60 sources up to 1 curie used in open air radiography will be wipe tested for the client any place within the continental United States or can be brought to our laboratories for such tests. The source will be removed from the safe with approved remote handling devices and stored temporarily in a second lead safe provided. The cavity of the permanent lead storage container will then be wiped with a Watman #40 filter paper impregnated with green soap water to remove any contamination present. If this is done in the field these wipes will be placed in, the same plastic bags as described above are returned to our labs for analysis. The same equipment and procedures as described in (A) above will be employed. Any source showing a removable contamination of 5 muc or greater will be classified as a leaker and the owner will be so advised.

C) Cobalt-60 in radiographic cameras. Cobalt-60 sources of greater than 1 curie used in conjunction with roll out, puff or other type cameras will be wipe tested for clients throughout the continental United States or in our laboratories as long as the total activity does not result in our having in our possession more than the total amount listed on our licenses. As a practical thing, most sources greater than 1 or 2 curies will be safes so large, it will be cheaper and easier to send a man to the client's plant to do the wipe. Depending upon the size of the opening through which the source emerges one of two techniques will be employed. If the opening is $\frac{1}{8}$ inch or greater, a swab will be prepared with cotton or other similar material on the end of a flexible cable. The lock on the shielding device will be removed and the channel through which the sources will be wiped. If the opening is less than $\frac{1}{8}$ inch a Watman #40 filter paper impregnated with green soap water will be used to wipe the opening. The wipe sample will then be handled in the same manner as described in (A) above.

D) Cobalt-60 in radiation cells. A wipe test service will be offered to clients throughout the continental United Stated to test Cobalt-60 sources used in various radiation cells. In this instance, the instrument is too large to bring to our facilities, hence one of our consulting physicists will be sent to the client's institution. He will perform the wipe tests as described in (A) above and the samples will be returned to our labs for analysis as described in (A) above. These devices vary so much in construction, it is difficult to describe in detail the exact procedure. In general, a wipe will be taken at the closest accessible surface to the source. In those instruments where an elevator system is used to lower the irradiation sample into position, the wipe will be made on this elevator system since it will at some time be closest to the source or sources involved.

E) Cobalt-60 as calibration sources. The Cobalt-60 sources used as calibration sources are usually in the millicurie range and hence can easily be sent to our laboratories for checking. In these cases, the sources themselves will be wipe tested. The sources will be removed from the shipping or storage container behind lead shields in

our laboratories using remote tongs or other appropriate handling devices. Either a Watman #40 filter paper or an absorbent material such as kimpak will be treated with a solution of water and green soap or a chelating agent and placed in the jaws of a small vice. The source is then placed between two such pieces of material and the vice closed enough to make a smug fit. The source is then rotated against the filter paper or kimpak in order to remove any contamination present. The wipe source is then analyzed as in a well counter as described in (A) above.

F) Cobalt-60 in level gauges. Here again, the source will probably be in a permanent installation and hence one of our consulting physicists would go to the plant. We propose to offer this service any place throughout the continental United States. The closest accessible surface to the source will be wiped with a Watman #40 filter paper treated with green soap water or a chelating agent and the resulting source will be returned to our laboratories to be analyzed as described in (A) above.

G) Ir-192 as radiographic sources. Those sources under 1 curie used in open air radiography techniques will be tested in the same manner as described for open air Cobalt-60 sources in (B) above. Sources larger than 1 curie used in roll out, puff or other cameras will be tested as described for such Cobalt-60 sources in (C) above. The wipe samples will be returned to our laboratories and counted in the same well system as described in (A) above. This well has been calibrated for Ir-192 by a sample prepared in our laboratories. A sample of Ir-192 is calibrated on an ionization type instrument using the factor of 1 millicurie of Ir-192 as producing a radiation field of 0.55 mr/hr at one meter. A careful dilution is made to obtain a millimicrocurie source which will then be used as a standard.

H) Cs-137 teletherapy sources. We propose to offer a wipe testing service to clients throughout the continental United States. One of our consulting physicists will be sent to the clients institution to perform the tests. A Watman #40 filter paper will be impregnated with green soap water or a chelating agent and wipes will be made at the closest accessible surface to the sources. This will depend upon the particular unit, however will probably be in the dust guard or collimator slit system. The wipe sources will be placed in a plastic bag and returned to our labs for analysis. The same equipment as described in (A) above will be used for the analysis (NRD Well type Scintillation counter and scaler). This counting system will be calibrated with a standard Cs-137 source prepared in our laboratories. The standard will be prepared from larger sources carefully calibrated on our standard electroscope then by careful dilution a millimicrocurie source will be prepared as the well standard. Sufficient counts will be taken to assure better than 1% accuracy for the maximum sample of 5 millimicrocurie.

I) Cs-137 Radiographic sources. Cs-137 sources used by radiographers will be tested as described in (B) or (C) above for Cobalt-60 in air or camera sources as the case may be. The resulting sources will be analyzed in our laboratories as described in (H) above.

(J) Cs-137 Calibration sources. These sources will be tested as described for Cobalt-60 calibration sources as described in (E) above with the sources being analyzed as described in (H) above.

(K) Cs-137 sources in thickness gauges. Cs-137 sources used in thickness gauges will be tested for leakage by one of our consulting physicists at the client's plant. In most cases, it will be possible to wipe test the source itself. A soft absorbent material such as kinpak will be impregnated with green soap water or a chelating agent and with the aid of remote tongs will be used to wipe carefully but thoroughly the surface of the source which is exposed. In those cases where the surface of the source is not available, the closest available location to the source will be wiped. The sources will be returned to our labs and analyzed as described in (H) above.

(L) Sr-90 eye applicators. Sr-90 sources in the form of eye applicators will be wipe tested for our clients throughout the continental United States. In most instances, it will be most practical to have the client send the source to our laboratories for the test. A soft material either Watman #40 filter paper or kimpak impregnated with green soap water or a chelating agent will be placed on a flat surface. The eye applicator will be removed from the storage container with the remote handle provided and the end containing the source will be placed on the wipe source and carefully but firmly twisted and rubbed against the wipe. A Nuclear Measurements PCC-10A proportional counter operating into an NRD B 1600 scaler (or equivalent) will be used for these measurements. The overall efficiency of this counter for the betas from Sr-90 is about 70%. Hence, a 5 millimicrocurie sample of Sr-90 would represent 11,100 disintegration per minute or a counting rate of 7,770 counts per minute. A five minute count would result in 38,850 total counts with a statistical accuracy of plus or minus 0.5%.

(M) Sr-90 sources in thickness gauges. Sr-90 thickness gauge sources will be checked by our consulting physicists at the client's plant and wipe will be made in the same manner as described in (L) above for Cs-137 thickness gauges and the sources returned to our laboratories for analysis as described in (L) above.

(N) Po-210 standard sources. Since most Po-210 sources will be covered with a very thin protective cover, a wipe will not be attempted on the source itself but rather on the storage container in which the source has been stored. Watman #40 filter paper impregnated with green soap water will be used. The resulting source will be analyzed in the same counting system (NMC Model PCC-10A proportional counter and scaler) as described above. The overall efficiency for this counting system for Po-210 has been measured to be 56%. In this case, a 5 millimicrocurie source would result in 6216 counts per minute or 31,080 total counts in 5 minutes. The statistical accuracy of such a count would be plus or minus 0.55%.

(O) Po-210 Be Neutron sources. In wipe testing Po Be neutron sources, a consulting physicist will be sent to the client's facilities. The

The source will be removed from its normal storage container with the necessary and approved handling techniques for that particular installation and placed in a temporary storage container provided. A wipe will then be made on the permanent storage container with Watman filter paper impregnated with green soap water which will be returned to our labs for analysis as described in (O) above.

I am sure there are other types of sealed sources which we shall be called upon to wipe test. If it is a small source, we will probably try to have it sent to our facilities. If it's a large source or one which is permanently mounted on or in a device we will go to the client's facilities to perform the test.

If it is a gamma emitting nuclide, the wipe sample will be analyzed in our well type scintillation counter. If it is an alpha or beta emitter, it will be counted in our proportional counter. Most of our clients will be in the midwest, however we find we are called upon by licensees from all over the country to perform various services, hence we would like to be in a position to offer this service throughout the United States.

This has developed into a rather lengthy dissertation, however I couldn't see how to make it shorter and cover all the points in question in such a possible variety of sources and circumstances.

If you have any further questions, please do not hesitate to contact me.

Very truly yours,

NUCLEAR CONSULTANTS CORPORATION

W. R. Konneker

W. R. Konneker, Ph.D.
President

WRK:pt

CC: F. Comer
D. Dickey
L. Struttman

Minutes of the Meeting
of the Isotope Committee of
Nuclear Consultants Corporation

The meeting was called to order by Dr. Konneker, chairman at 4:00 p.m. on June 21, 1961 in the offices of Nuclear Consultants Corporation at 9842 Manchester Road, St. Louis, Mo.

Those present were: W. R. Konneker
R. L. Curtin
R. E. Muelle
O. L. Pirtle
L. G. Struttman (Absent)

The first order of business was to review the health physics records for the lab. The film badge and dosimeter reports for the first quarter of 1961 were reviewed and found to be in order. No over-exposures were found, however several involved in the production of I-131 capsules were found to be higher than felt necessary. Mr. Muelle health safety officer was instructed to check into the use of lead glass as viewing ports for the new automatic capsule machine. The film badge and dosimeter records show a substantial reduction since the new equipment was placed in service in early May.

Air sample records, radiation survey, waste disposal and incineration records were reviewed and found to be in order.

A review of our new proposed packaging and labeling to go into effect July 1, 1961 was presented by the chairman. All agreed the new system should reduce radiation to lab personnel and give the client more and better information and a better looking package.

Mr. Kenneth Scheffel has now been associated with our staff for some four to five months. It is desirable that he be assigned more responsibilities in the laboratories and be placed in a supervisory position. The committee, after a careful review of Mr. Scheffel's background and experience before joining Nuclear and that obtained working in our labs under Mr. Curtin and Dr. Konneker, agreed that Mr. Scheffel was in its opinion adequately trained and experienced to safely handle and to supervise the handling of byproduct materials in the laboratories. Mr. Curtin will continue to work closely with Mr. Scheffel and Mr. Muelle or Dr. Konneker will be on hand at all times to offer assistance in the field of health physics if such special need arises.

There being no further business the meeting was adjourned at 6:30 p.m.

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