

ESTABLISHING AND USING AIRNET ACTION LEVELS

Purpose This Air Quality Group procedure describes how periodically to calculate AIRNET action levels, how to evaluate AIRNET data against “investigation” and “alert” action levels, and the actions to take in response to AIRNET monitoring data that exceed these levels.

Scope This procedure applies to the evaluation of biweekly and quarterly analytical data (alpha, beta, tritium, uranium, plutonium, americium, and gamma spectroscopy data) from samples collected by the AIRNET system.

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Hazard Control Plan The hazard evaluation for this work is in HCP-ESH-17-Office Work.

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02/05/04

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General information about this procedure

Attachments This procedure has no attachments.

History of revision This table lists the revision history and effective dates of this procedure.

Revision	Date	Description Of Changes
0	1/3/96	New document.
1	5/15/96	Revised applicability to samples collected after 1995.
2	9/23/97	Inserted table of levels from AIRNET plan; revised levels based on 1996 sampling data.
3	3/19/02	New process implemented for setting action levels, deleted attachment listing action levels.

Who requires training to this procedure? The following personnel require training before implementing this procedure:

- Persons who perform this procedure

Training method The training method for this procedure is “**self-study**” (**reading**) and is documented in accordance with the procedure for training (ESH-17-024).

Definitions specific to this procedure Action Level: A numerical value that has been established by statistical analysis or set according to regulatory limits and used as a criterion for action. There are two types of action levels: *investigation (IL)* and *alert (AL)*.

Investigation Level (IL): A level used to indicate that an air concentration value may exceed the maximum expected value for the sampling environment and that an investigation into causes is warranted.

Alert Level (AL): A level used to indicate that a release or other significant problem may have occurred and that special actions are necessary to document the release or problem. ALs are based on the airborne concentrations that would correspond to a 1-mrem dose if the concentration were present an entire year. The 10-mrem concentrations in 40CFR61, Appendix E, Table 2 are used as the basis for AL calculations. (Special condition: In some special cases, the AL is *smaller* than the IL. In such cases, the AL is **not** considered exceeded, unless the IL also has been exceeded.)

General information, continued

References

The following documents are referenced in this procedure:

- ESH-17-AIRNET, “Sampling and Analysis Plan for the Radiological Air Sampling Network (AIRNET)”
- ESH-17-024, “Personnel Training”
- ESH-17-033, “Analytical Chemistry Data Management and Review for AIRNET”
- ESH-17-208, “Evaluation of Biweekly AIRNET Data”
- ESH-17-216, “Management of AIRNET Field Data”
- ESH-17-223, “Evaluation of Quarterly AIRNET Data”
- ESH-17-502, “Air Pathways Dose Assessment”
- ESH-17-503, “Calculation of Doses from Unplanned Airborne Releases”
- Memo ESH-17:02-109, “2002 Action Levels,” Craig Eberhart to Ernie Gladney and Angelique Luedeker, March 15, 2002

Note

Actions specified within this procedure, unless preceded with “should” or “may,” are to be considered mandatory guidance (i.e., “shall”).

Evaluation of alpha and beta data

Evaluation of alpha/beta data After the alpha/beta data have been determined to be valid or have had qualifiers applied to them (as described in the Sampling and Analysis Plan for AIRNET, ESH-17-033, and ESH-17-216), they are available for comparison to action levels, as described in this chapter. If an investigation level (IL) is exceeded, perform the steps in the chapter *Actions when investigation level is exceeded*. Because alpha/beta measurements are **not** used for compliance determinations, there is no Alert Level for alpha/beta results.

Development and definition of ILs for gross alpha and gross beta concentrations Biweekly gross alpha/beta concentrations vary greatly with natural fluctuations in atmospheric conditions. Therefore, to be truly meaningful, the investigation levels must reflect these conditions.

Alpha and beta activities are closely related to the concentrations of radon decay products in the atmosphere. Their concentrations tend to fluctuate with atmospheric conditions, which are reasonably uniform within the sampling area. Therefore, the alpha and beta air concentrations tend to vary consistently across the sampled area (i.e., most or all of the stations will be higher, lower, or the same relative to the previous sampling period). To normalize for natural variations, the investigation level is determined by the mean of the current alpha or beta data set under review plus/minus $3s$ (where $3s$ is three times the long-term standard deviation of the data). The long-term standard deviation is determined using at least one year of recent prior measurements with any significant outliers (such as data taken during a fire) removed. For alpha/beta data, both high *and* low investigation levels are used.

Periodically calculate investigation levels for alpha and beta Update the alpha/beta investigation levels about every two years by using the most recent 1 to 5 years of net concentration data. Before calculating the IL, remove rejected and qualified data from the historical data set used to establish the IL.

To calculate the IL levels for alpha and beta using the database method, follow the appropriate instructions in the AIRNET database user's guide. If the calculation needs to be checked manually, follow the steps below.

Evaluation of alpha and beta data, continued

Steps to manually determine IL for alpha and beta

To manually determine the IL for alpha and beta, perform the following steps:

Step	Action
1	Perform all of these steps for the alpha data and again for the beta data.
2	Collect at least one year and up to 5 years of net concentration data to use in calculating the IL. Update the IL approximately every two years by including the immediately past two year's data in the determination, as appropriate.
3	After removing rejected and qualified data, calculate the mean of the net historical data by sample period.
4	Subtract the net historical sample-period mean from each net concentration value in that historical sample period to determine a "normalized" set of differences for each historical sample period. Each such set of normalized differences will have a mean of zero.
5	Using the normalized differences from all of the sample periods in the entire data set, calculate the 3s of the normalized values.
6	Store this 3s value in the AIRNET database in the "ActionLevels" table in the alpha or beta IL locations, as appropriate.
7	Have a second person perform 100% verification of the calculations and any manually entered numbers in the database.

Evaluate individual gross alpha and beta measurements

After the biweekly sample analysis results are available, evaluate the data for gross alpha and beta action levels by following the appropriate instructions in the AIRNET database user's guide. If the evaluation needs to be checked manually, follow the steps below.

Steps to manually evaluate individual gross alpha and beta

To manually evaluate the biweekly data for gross alpha and beta action levels, perform the following steps:

Step	Action
1	Perform all these steps for the alpha data and again for the beta data.

Steps continued on next page.

Evaluation of alpha and beta data, continued

Step	Action
2	After removing rejected data, calculate the mean of all station net concentrations for the given sampling period.
3	If the current net air concentration for any single station is outside the mean for the sampling period (step 2 above) \pm the 3s IL value calculated above, then the air concentration at that location has exceeded the IL . Note: Both abnormally high <i>and</i> low values are of interest.
4	Have a second person perform 100% verification of the calculations and any manually entered numbers in the database.

Actions if investigation level is exceeded

If IL is exceeded, follow-up analyses may need to be performed to assess whether the cause was likely random chance, sampling errors or assumptions, or real. For example, data may have been identified as having sampling errors or false assumptions. If the measurement is determined to be real, attempt to determine whether the result was natural or from LANL operations.

Steps to follow if an IL is exceeded

If an IL is exceeded, perform the steps in the chapter *Actions when investigation level is exceeded*. Additionally, use professional judgment to determine if the following steps are applicable:

Step	Action
1	If appropriate, request gamma analysis of the filter(s) to ascertain whether amounts of naturally occurring ^{210}Pb are abnormally high.
2	After the gamma count, request that the half filter be dissolved and perform standard isotopic analyses plus ^{210}Po and/or ^{210}Pb .
3	If results from Step 2 or other documented professional determinations indicate a probable natural source, then no further action is required (results should be described in a memo to file). If results indicate a probable LANL source, notify the appropriate management and attempt to identify the source. Document the findings.

Evaluation of tritium data

Evaluation of tritium data After the tritium data have been determined to be valid or have had qualifiers applied to them (as described in the Sampling and Analysis Plan for AIRNET, ESH-17-033, and ESH-17-216), they are available for comparison to action levels, as described in this chapter. If an action level is exceeded, perform the steps in the chapters *Actions when investigation level is exceeded* or *Actions when alert level is exceeded*, as appropriate.

Special note regarding Area G tritium Tritium sources at the Lab include stack emissions and emissions from diffuse sources, primarily Area G. The diffuse emissions at Area G are influenced by atmospheric conditions and increase greatly during the hot, dry months. Therefore, the action levels for Area G stations are calculated differently from those for the rest of the AIRNET stations.

Note: Other stations may be evaluated in the same manner as Area G stations, based on professional judgement (e.g., station 25 at TA-16).

Development and definition of tritium investigation levels for stations outside Area G For stations *outside* of Area G, atmospheric conditions such as temperature and humidity have very little effect on atmospheric tritium concentrations. Because these concentrations do not vary meaningfully with seasonal or other natural fluctuations, it is reasonable to compare current values with the mean (and range) of earlier values. Therefore, these evaluations involve the “standard” practice of comparing the current value to a multi-year historical mean, on a station-by-station basis, plus the $3s$ for that mean. The historical data set used to establish the IL will include up to the most recent 5 years of net concentration data, with outliers and rejected data removed before determining the IL. Outliers will be removed by performing the Rosner’s or Dixon’s tests as appropriate. See the memo ESH-17:02-109 for information regarding these tests.

Periodically recalculate tritium investigation level Update the tritium investigation about every two years by using the most recent 1 to 5 years of net concentration data for stations *other* than Area G (see note on page 7 about stations included in “Area G”). The historical data set used to establish the IL should have outliers and rejected data removed before calculating the IL.

To calculate the IL levels for tritium using the database method, follow the appropriate instructions in the AIRNET database user’s guide. If the calculation needs to be checked manually, follow the steps below.

Evaluation of tritium data, continued

Steps to manually determine IL for tritium

To manually determine the IL for tritium, perform the following steps:

Step	Action
1	Collect at least one year and up to 5 years of net concentration data to use in calculating the IL. Update the IL approximately every two years by including the immediately past two year's data in the determination, as appropriate.
2	After removing rejected data and outliers, calculate the mean of the net historical data by station.
3	Calculate the 3s of each station average.
4	Add the 3s to the applicable station average for all stations.
5	Store these average +3s values in the AIRNET database in the "ActionLevels" table in the tritium station locations.
6	Have a second person perform 100% verification of the calculations and any manually entered numbers in the database.

Evaluate non-Area G tritium data

After the biweekly sample analysis results are available, evaluate the data for stations *outside of Area G* for tritium action levels by following the appropriate instructions in the AIRNET database user's guide (see note on page 7 about stations included in "Area G"). If the evaluation needs to be checked manually, follow the steps below.

Steps to manually evaluate tritium data

To manually evaluate biweekly tritium data for stations *outside of Area G*, perform the following steps:

Step	Action
1	Determine whether a given station's analytical sample concentration exceeds the MDA for that analysis. If yes, proceed to the next step. If no, then the IL is not exceeded.
2	Determine whether a given station's net air concentration exceeds the uncertainty (2s) of the net air concentration. If yes, proceed to the next step. If no, then the IL is not exceeded.

Steps continued on next page.

Evaluation of tritium data, continued

Step	Action
3	Compare the station's net air concentration to the IL value in the "Action Levels" table. If the current value exceeds the value in the table (mean plus 3s of the historical data set), then the IL is exceeded . Investigate and document the cause if the IL is exceeded.
4	If the IL is exceeded and the tritium level is above 150 pCi/m ³ , then the AL is also exceeded . Investigate and document the cause if the AL is exceeded. Note: See Definitions for an explanation of the AL.

Development and definition of tritium investigation levels for Area G stations

To incorporate seasonal effects into the tritium IL for Area G stations, up to the most recent 5 years of data (for each individual station) will be used to calculate "Period Values" based on rolling, multi-year 5-period averages, where a period is the normal 2-week sampling period. The IL is the multi-year 5-period average net concentration plus its corresponding 2s. There is no outlier testing or removal for Area G data, but rejected data will not be included in the calculation.

Periodically recalculate Area G tritium investigation level

Update the tritium investigation levels about every two years by using the most recent 1 to 5 years of net concentration data for stations *within* Area G. Before calculating the IL, remove rejected data from the historical data set used to establish the IL.

To calculate the IL levels for Area G tritium using the database method, follow the appropriate instructions in the AIRNET database user's guide. If the calculation needs to be checked manually, follow the steps below.

Steps to manually determine IL for Area G tritium

To manually determine the IL for Area G tritium, perform the following steps:

Step	Action
1	Collect at least one year and up to 5 years of net concentration data to use in calculating the IL. Update the IL approximately every two years by including the immediately past two year's data in the determination, as appropriate.

Steps continued on next page.

Evaluation of tritium data, continued

Step	Action
2	After removing rejected data, calculate the multi-year mean of the net historical data by station using the period of interest, the 2 periods immediately before, and the two periods immediately after the period of interest (a “five period rolling average”).
3	Calculate the 2s of each station/period average.
4	Add the 2s to the applicable station/period average for all stations.
5	Store these average+2s values in the AIRNET database in the “ActionLevels” table in the Area G tritium station locations.
6	Have a second person perform 100% verification of the calculations and of the manually entered numbers in the database.

Evaluate Area G tritium data After the biweekly sample analysis results are available, evaluate the data for Area G tritium action levels by following the appropriate instructions in the AIRNET database user’s guide. If the evaluation needs to be checked manually, follow the steps below.

Steps to manually evaluate Area G tritium data To manually evaluate biweekly tritium data for Area G stations, perform the following steps:

Step	Action
1	Determine whether a given station’s analytical sample concentration exceeds the MDA for that analysis. If yes, proceed to the next step. If no, then the IL is not exceeded.
2	Determine whether a given station’s net air concentration exceeds the uncertainty (2s) of the net air concentration. If yes, proceed to the next step. If no, then the IL is not exceeded.
3	Compare a given station’s net air concentration to the IL value in the “ActionLevels” table. If the concentration exceeds the average +2s, then the IL is exceeded . Investigate and document the cause if the IL is exceeded.
4	If the IL is exceeded and the air concentration exceeds 150 pCi/m ³ , then the AL is also exceeded . Investigate and document the cause if the AL is exceeded. Note: The alert level is not exceeded, regardless of concentration, unless the IL is first exceeded. See Definitions for an explanation of the AL concentration.

Evaluation of tritium data, continued

Actions if action level is exceeded If IL or AL is exceeded, follow-up analyses may need to be performed to assess whether the cause was likely random chance, sampling errors or assumptions, or real. For example, data may have been identified as having sampling errors or false assumptions. If the measurement is determined to be real, attempt to determine whether the result was natural or from LANL operations.

If an action level is exceeded If an action level is exceeded, perform the steps in the chapter *Actions when investigation level is exceeded* or *Actions when alert level is exceeded*, as appropriate.

Evaluation of uranium data

Evaluation of uranium data

After the uranium data have been determined to be valid or have had qualifiers applied to them (as described in the Sampling and Analysis Plan for AIRNET, ESH-17-033, and ESH-17-216), they are available for comparison to action levels, as described in this chapter. If an action level is exceeded, perform the steps in the chapters *Actions when investigation level is exceeded* or *Actions when alert level is exceeded*, as appropriate.

Development and definition of investigation levels for uranium concentrations

The concentration of airborne uranium varies significantly from site to site and over time. Furthermore, while naturally occurring uranium in the soil normally exhibits a U-234/U238 activity ratio of one, that ratio can change if depleted or enriched uranium is introduced. This concentration variability and its isotopic distribution depend on three primary variables:

- the type and amount of local soils available to become airborne,
- the conditions of those soils (which are strongly weather dependent), and
- local uranium emissions.

Because of these variables, it is not appropriate to determine uranium investigation action levels by comparison across multiple locations or even over long time periods at one location.

Additionally, naturally occurring uranium is normally detected in air samples, and the activity ratio of U-234 to U-238 in natural uranium is one (1). Therefore, concentrations of uranium where this ratio is not one (i.e., depleted or enriched uranium present) could indicate measurable emissions of uranium from LANL where a depleted or enriched uranium source is used.

Therefore, since only non-natural airborne uranium is of concern, a real-time “dynamic” investigation level is used for testing the relation of U-234 to U-238 in air samples. This IL is calculated by comparing the difference of the two current values of interest to their propagated uncertainties. If the difference is larger than the 3s propagated uncertainty, the IL is exceeded; that is, non-natural uranium may have been detected.

There is no specific IL for U-235 because the above test provides a method of detecting enriched uranium, which would include higher than normal U-235. Additionally, U-235 measurements rarely exceed detectable levels.

Evaluation of uranium data, continued

Calculating ILs for uranium

Unlike most other ILs in this procedure, the IL for U-234 and U-238 is NOT calculated on a periodic basis; rather, it is calculated every sample period for each sample as described below.

To calculate the IL levels for uranium using the database method, follow the appropriate instructions in the AIRNET database user's guide. If the calculation needs to be checked manually, follow the steps below.

Steps to manually determine ILs for uranium

To manually determine the IL for uranium isotopes, perform the following steps:

Step	Action
1	For the uranium measurement period and station of interest, calculate the difference between the U-234 and U-238 net air concentrations.
2	Sum the squares of their uncertainties, take the square root, and divide by 2 to convert from 2s to 1s.
3	Use this 1s propagated uncertainty for comparison with the U-234/238 difference.
4	Have a second person perform 100% verification of the calculations and any manually entered numbers in the database.

Evaluate uranium isotopic results

After the quarterly sample analysis results are available, evaluate the data for uranium action levels by following the appropriate instructions in the AIRNET database user's guide. If the evaluation needs to be checked manually, follow the steps below.

Steps to manually evaluate uranium

To manually evaluate quarterly isotopic uranium values, perform the following steps:

Step	Action
1	Divide the individual U-234/U-238 differences by their applicable 1s value determined above.
2	If the result is greater than 3, then the air concentration exceeds the IL. If so, investigate and document the findings.

Steps continued on next page.

Evaluation of uranium data, continued

Step	Action
3	If the result above is greater than 3, observe whether the U-234 or U-238 is larger. If U-234, then excess enriched uranium is indicated. If U-238, excess depleted uranium is indicated.
4	The following Alert Levels each correspond to an annual dose of 1 mrem if the concentration is continuously present for the year. $^{238}\text{U} = 830 \text{ aCi/m}^3$ $^{235}\text{U} = 710 \text{ aCi/m}^3$ $^{234}\text{U} = 770 \text{ aCi/m}^3$ If the AL for any radionuclide above is exceeded, investigate and document the findings.
5	Have a second person perform 100% verification of the calculations and any manually entered numbers in the database.

Actions if action level is exceeded

If IL or AL is exceeded, follow-up analyses may need to be performed to assess whether the cause was likely random chance, sampling errors or assumptions, or real. For example, data may have been identified as having sampling errors or false assumptions. If the measurement is determined to be real, attempt to determine whether the result was natural or from LANL operations.

If an action level is exceeded

If an action level is exceeded, perform the steps in the chapter *Actions when investigation level is exceeded* or *Actions when alert level is exceeded*, as appropriate.

Evaluation of Pu and Am data

Evaluation of Pu and Am data After the plutonium and americium data have been determined to be valid or have had qualifiers applied to them (as described in the Sampling and Analysis Plan for AIRNET, ESH-17-033, and ESH-17-216), they are available for comparison to action levels, as described in this chapter. If an action level is exceeded, perform the steps in the chapters *Actions when investigation level is exceeded* or *Actions when alert level is exceeded*, as appropriate.

Development and definition of ILs for Pu and Am concentrations Plutonium and americium isotopes are present in the environment in small amounts, primarily as a product of atmospheric testing of nuclear devices. Because the concentrations of these constituents are so low in our air samples, it is reasonable to compare current values with the mean (and range) of earlier values. Therefore, these evaluations involve the “standard” practice of comparing the current value to a multi-year historical mean, on a station-by-station basis, plus the 3s for that mean. The historical data set used to establish the IL will include up to the most recent 5 years of net concentration data, with outliers and rejected data removed before determining the IL. Outliers will be removed by performing the Rosner’s or Dixon’s tests as appropriate. See the Brooks reference for information regarding these tests.

Periodically recalculate Pu and Am investigation levels Update the Pu and Am investigation levels about every two years by using the most recent 1 to 5 years of net concentration data. The historical data set used to establish the IL should have outliers and rejected data removed before calculating the IL.

To calculate the IL levels for Pu and Am using the database method, follow the appropriate instructions in the AIRNET database user’s guide. If the calculation needs to be checked manually, follow the steps below.

Steps to manually determine IL for Pu & Am To manually determine the IL for Pu and Am, perform the following steps:

Step	Action
1	Collect at least one year and up to 5 years of net concentration data to use in calculating the IL. Update the IL approximately every two years by including the immediately past two year’s data in the determination, as appropriate.

Steps continued on next page.

Evaluation of Pu and Am data, continued

Step	Action
2	After removing rejected data and outliers, calculate the mean of the net historical data by station.
3	Calculate the 3s of each station average.
4	Add the 3s to the applicable station average for all stations.
5	Store these average+3s values in the AIRNET database in the "ActionLevels" table in the Pu and Am station locations.
6	Have a second person perform 100% verification of the calculations and any manually entered numbers in the database.

Evaluate uranium isotopic results

After the quarterly sample analysis results are available, evaluate the data for action levels by following the appropriate instructions in the AIRNET database user's guide. If the evaluation needs to be checked manually, follow the steps below.

Steps to manually evaluate Pu and Am data

To manually evaluate Pu and Am isotopes, perform the following steps:

Step	Action
1	Determine whether a given station's analytical sample concentration exceeds the MDA for that analysis. If yes, proceed to the next step. If no, then the IL is not exceeded.
2	Determine whether a given station's net air concentration exceeds the uncertainty (2s, or other lab-provided value) of the net air concentration. If yes, proceed to the next step. If no, then the IL is not exceeded.
3	Compare the Pu and Am concentrations to the IL values in the "ActionLevels" Table. If the current value exceeds the mean plus 3s of the historical data set then the IL is exceeded . Investigate and document the cause if the IL is exceeded.
4	<p>The following Alert Levels, in aCi/m³, each correspond to an annual dose of 1 mrem if the concentration is continuously present for the year.</p> <p style="margin-left: 40px;"> ²³⁸Pu = 210 aCi/m³ ^{238/39}Pu = 200 aCi/m³ ²⁴¹Am = 190 aCi/m³ </p> <p>If the AL for any radionuclide above is exceeded, notify appropriate management, investigate and document the findings.</p>

Evaluation of Pu and Am data, continued

Actions if action level is exceeded If IL or AL is exceeded, follow-up analyses may need to be performed to assess whether the cause was likely random chance, sampling errors or assumptions, or real. For example, data may have been identified as having sampling errors or false assumptions. If the measurement is determined to be real, attempt to determine whether the result was natural or from LANL operations.

If an action level is exceeded If an action level is exceeded, perform the steps in the chapter *Actions when investigation level is exceeded* or *Actions when alert level is exceeded*, as appropriate.

Evaluation of gamma spectroscopy data

Evaluation of gamma spectroscopy data

After the gamma spectroscopy data have been determined to be valid or have had qualifiers applied to them (as described in the Sampling and Analysis Plan for AIRNET, ESH-17-033, and ESH-17-216), they are available for comparison to action levels, as described in this chapter. If an action level is exceeded, perform the steps in the chapters *Actions when investigation level is exceeded* or *Actions when alert level is exceeded*, as appropriate.

Development and definition of ILs for gamma spec concentrations

Gamma spectroscopy is used to analyze AIRNET samples for a large number of gamma emitters. Very rarely do any of the results exceed the minimum detectable activity for any radionuclide. Therefore, the IL for a gamma spectroscopy result is defined as a measured concentration greater than its detection limit.

Steps to evaluate gamma spec data

To evaluate gamma spectroscopy data, perform the following steps:

Step	Action
1	<p>Observe whether the value is shown with a “<” symbol for a radionuclide in Step 2 below. If there is no “<” symbol, the Investigation Level (IL) is exceeded. If the current value exceeds the IL, investigate and document the findings.</p> <p>Note: Be-7, K-40, and Pb-210 are naturally occurring and do not have an IL. Thus, if there is no “<” in front of them, they do not exceed IL. If non-natural radionuclides, other than those listed in Step 2 are detected (i.e., no “<” in front of the result), they should also be investigated.</p>

Steps continued on next page.

Evaluation of gamma spectroscopy data, continued

Step	Action
2	<p>The following Alert Levels, in fCi/m³, each correspond to an annual dose of 1 mrem if the concentration is continuously present for the year.</p> <p>⁷³As = 1100 ⁷⁴As = 220 ¹⁰⁹Cd = 59 ⁵⁷Co = 130 ⁶⁰Co = 1.7 ¹³⁴Cs = 2.7 ¹³⁷Cs = 1.9 ⁵⁴Mn = 28 ²²Na = 2.6 ⁸³Rb = 34 ⁸⁶Rb = 56 ¹⁰³Ru = 260 ⁷⁵Se = 17 ⁶⁵Zn = 9.1</p> <p>If the AL for any radionuclide above is exceeded, notify appropriate management, investigate and document the findings. Note that naturally occurring radionuclides are not included in the list above.</p>

Actions if action level is exceeded

If IL or AL is exceeded, follow-up analyses may need to be performed to assess whether the cause was likely random chance, sampling errors or assumptions, or real. For example, data may have been identified as having sampling errors or false assumptions. If the measurement is determined to be real, attempt to determine whether the result was natural or from LANL operations.

Steps to follow if an action level is exceeded

If an action level is exceeded, perform the steps in the chapter *Actions when investigation level is exceeded* or *Actions when alert level is exceeded*, as appropriate.

Actions when an investigation level is exceeded

When an investigative level is exceeded, the following steps apply

To determine the cause for exceeding an investigation level, perform the following steps (except as indicated for individual analyses as noted above):
NOTE: Performing the steps below is a matter of professional judgement. If a datum barely exceeds the IL, it may not warrant contacting facility personnel to assess causes unless there are other indications (such as seeing elevations at more than one location or for more than one period) that a release occurred.

Step	Action
1	If appropriate, review field collection data sheets and /or consult with field personnel to determine if anything was noted during sample collection.
2	Review calculations to ensure correct results were obtained.
3	Consult the ESH-17 analytical chemistry coordinator about possible analytical errors (e.g., out-of-control equipment, poor tracer recovery, potential cross contamination, etc.).
4	Check operational activities for any abnormal releases involving the radionuclide in question or any atmospheric nuclear testing being conducted or significant radiological accidents worldwide. If it is apparent which facility caused the elevated reading, contact the facility manager, operational health physicist, and/ or the radiological control technicians and discuss any changes in operational activities that could explain the reported value.
5	If the elevated value cannot be attributed to one of the above causes and samples were originally split, consider submitting the second half of the sample for <u>priority</u> analysis. If a sample is not submitted, skip to step 7.
6	When data are received from the second sample, perform the appropriate statistical test to determine whether there is a statistical difference between the two data results. If there is a statistical difference, continue evaluation to assess whether contamination could have occurred to the higher sample sometime after field collection. If the higher sample cannot be shown to have been contaminated, it should be considered for further evaluation (to be conservative).
7	Using a time plot of the data or a standardized trend analysis, review previous sampling periods and determine whether there is an obvious trend occurring for this sampling location. If an obvious upward trend is identified, use best professional judgment to assess additional actions to be taken. Likewise, if this appears to be a one-time spike, continue the evaluation to determine potential causes.

Steps continued on next page.

Actions when an investigation level is exceeded, continued

Step	Action
8	Document all actions taken (e.g., the date and who was contacted, what was provided, results from resubmission, etc.) in the health physics review memo (see ESH-17-208 or -223 or a subsequent follow-up memo).

Actions when alert level is exceeded

When an alert level is exceeded When an alert level in a publicly accessible area is exceeded, perform the following steps:

Step	Action
1	Perform all the steps in the previous chapter.
2	Determine the effective dose equivalent (EDE) to the nearest receptor according to ESH-17-502. <ul style="list-style-type: none">• If the EDE exceeds 1 mrem, also determine the EDE to the maximally exposed individual from all Laboratory emissions according to ESH-17-503.• If the station is an FFCA location, notify the Rad-NESHAP Air Quality Monitoring Project Leaders immediately.• If station is located where a Facility Manager is responsible, as applicable, contact the respective FM to determine whether an official DOE “occurrence report” needs to be initiated.
3	Provide written confirmation of actions taken regarding this issue to the responsible project leader (the project leader will determine whether to forward this information to the group leader for examination). Provide justification if no further action is needed to resolve the issue.
4	Document the data review and actions taken (e.g., the date and who was contacted, what was provided, where the sample was resubmitted, results from the resubmission, etc.).
5	Forward to the records coordinator a copy of all records and documents regarding the data review and any actions taken.

Records resulting from this procedure

Records

The following records generated as a result of this procedure are to be submitted **within three weeks of generation** as records to the group records coordinator:

- the original laboratory result indicating the high value
- printout of “Action Level” table from the AIRNET database
- details of any actions taken
- data analysis and review
- any exposure assessments performed

[Click here to record “self-study” training to this procedure.](#)