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Los Alamos
National Laboratory

Environment and Remediation Support Services Division

Quality Assurance Project Plan

for the

Neighborhood Environmental Watch Network (NEWNET)

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General Information about this plan

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Appendices

This plan has the following appendices:

Number	Appendix Title	No. of pages
A	NEWNET Station Locations	4
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History of revision

This table lists the revision history of this plan.

Revision	Date	Description Of Changes
0	5/25/01	New document, issued as ESH-17-NEWNET.
1	11/3/04	Purpose revised to reflect educational driver.
0	5/2/07	Prioritize work and stations, issued as EP-ERSS-QAP-003, R00

Section 1

Quality Program

Organization

What is NEWNET?

NEWNET (Neighborhood Environmental Watch Network) is a network of ambient monitoring stations having gamma radiation measurement and meteorological sensors. Each station is connected to a database. Data are available via an Internet Web site (http://newnet.lanl.gov).

What is monitored?

The NEWNET system provides real-time data on radiation levels at selected locations near LANL and the adjacent Pueblos. NEWNET stations also monitor relevant environmental conditions such as the ambient temperature and wind.

Purpose

The NEWNET project serves 3 functions.

1. It provides outreach to provide gamma radiation measurements, meteorological data, and tutorial information to the environment departments of interested Pueblos near Los Alamos National Laboratory (LANL). It is operated in cooperation with interested pueblos to monitor selected locations near LANL and pueblo land and provides training in the tools and techniques used to fulfill the requirements for environmental monitoring in DOE Order 5400.5 and the guidance of DOE/EH-0173T.

2. It provides independent monitoring of radioactive gases released from LANSCE, at the request of the radioactive air emissions monitoring program.

3. It supplements the LANL meteorology system by providing additional wind direction data in selected canyons for emergency response purposes.

The priority for maintaining or discontinuing each station is listed in Appendix A, *NEWNET Station Locations*. Note that many stations will be discontinued because of their low priority according to station location criteria (see chapter *Station Design*) or they do not support the project purposes above.

Purpose of this plan

This QA project plan describes the policies and requirements that ensure NEWNET data are collected, analyzed, and reported in a consistent, agreed-upon manner.

Project organization

The NEWNET project is managed within the ERSS (Environment and Remediation Support Services) Division of the EP (Environmental Programs) Directorate by a task leader who reports to the ERSS-GS (Geotechnical Services) group leader. An instrument technician and a database support person are occasionally requested to provide support as needed.

Section 2

Personnel Development

Personnel Training and Qualification

Required personnel education

Documentation of education qualification is maintained by the LANL personnel division. The NEWNET project requires part-time personnel with the following skills:

- an electronics or instrumentation technician to perform maintenance
- a health physicist to evaluate measurements and instrumentation
- a database programmer to maintain the database and the web site

Training of personnel

All personnel performing NEWNET-related work are required to obtain training to this plan and any applicable procedures governing this work prior to performing work for the project. Training will be documented in accordance with applicable EP Directorate quality program training requirements.

Section 3

Quality Improvement

Improving Quality

Performance reports

The project leader provides periodic updates, either verbal or written, to management. These updates are used to keep group management apprised of the focus of the NEWNET activities and to identify any shortcomings that may be identified.

Deficiencies and corrective action

Corrective actions for the project will be initiated, tracked, corrected, and documented according to the applicable EP Directorate quality program and LANL requirements.

Section 4

Documents and Records

Project Procedures

Procedures

Implementing procedures include procedure numbers MAQ-248, "Calibration of the PIC on NEWNET Stations," and MAQ-402, "Calibration & Maintenance of Instruments for the Meteorology Monitoring Program". All procedures will be maintained, revised, issued, distributed, and controlled according to the EP Directorate document control program.

Project Records

Records resulting from the NEWNET project

The number, type, and detail of all records to be kept will provide sufficient information to allow an individual with equivalent education and training to verify or reconstruct the methods used to collect and verify the data collected. Implementing procedures specify the records or other information to be kept as documentation of the performance of the procedure. All records will be maintained in the EP Directorate Records Processing Facility.

Electronic records

The project maintains electronic databases of the data collected at each NEWNET station.

Section 5

Work Processes

Planning and Performing Work

Policy

Work that contributes to achieving the quality specifications of NEWNET project deliverables will be planned and documented in this plan and appropriate implementing procedures.

Quality Objectives and Criteria for Measurement Data

What are DQOs?

Data quality objectives (DQOs) are statements of the uncertainty level a decision-maker is willing to accept in results derived from environmental data. DQOs must strike a balance between time, money, and data quality.

The DQOs are then used to develop a scientific and resource-effective data collection design. NEWNET system operations presented in this document reflect these requirements.

Spatial Boundary of the Study

The spatial boundaries of interest for the NEWNET system include the region surrounding LANL and the adjacent communities.

Temporal Boundary of the Study

Monitoring of external penetrating radiation by the NEWNET system was conducted from March 1997 until September 2002 as part of a Consent Decree, and continues with the support of Santa Clara Pueblo and San Ildefonso Pueblo.

Practical Constraints on Data Collection

- Funding levels
- Equipment capabilities
- Damage to stations due to animals, people, or weather

Quality Objectives and Criteria for Measurement Data, continued

Measurements to be made

Measurements are provided at some stations of the following parameters:

- gamma radiation levels
- temperature
- barometric pressure
- relative humidity
- wind speed and direction

Comparability

Comparability is a measure of the confidence with which one data set can be compared to another. Comparability of the NEWNET data is ensured because of the use of the same equipment, processes, and analytical methods at several station locations.

Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions. Data may be lost due to equipment malfunction, power failure, station destruction, human error, or unacceptable data uncertainty.

Precision and Accuracy

The NEWNET system is operated so that the measurements have the following precision and accuracy:

- Gamma radiation: ±5% precision, ±60% accuracy from 0.06 to 0.3 MeV and ±20% from 0.3 to 8 MeV.
- Temperature: ±5 degrees Celsius
- Atmospheric Pressure: 1%
- Wind Speed: ±1.0 mph
- Wind direction: ±10 degrees
- Relative Humidity: ±10% at 25 degrees Celsius

Station Design

Sampling system design

The primary design objective for the radiation monitoring system is to provide accurate measurements of gamma radiation levels. To achieve the objective, the system design is based on standard instrumentation for real-time gamma radiation.

All NEWNET stations are operated continuously. The stations contain a high pressure ion chamber (HPIC) to measure gamma radiation and meteorology instruments to measure selected meteorological parameters.

Station location

Locations for the NEWNET stations are listed in Appendix B, *NEWNET Station Locations*. Locations are evaluated according to the following criteria:

- importance to the Accord Pueblos;
- importance to the communities adjacent to LANL;
- ability to measure LANSCE emissions;
- ability to measure canyon winds.

Sampling frequencies

Data loggers accumulate data at one minute intervals which are then averaged for 15 minutes.

Measurement parameters

The following parameters may be measured, all averaged every 15 minutes:

- gamma radiation
- temperature
- pressure
- humidity
- wind speed and direction

Station siting evaluation criteria

The specific location of the station should be selected after considering the following criteria.

Station Design, continued

1. **Distance to obstructions greater than two times the height of the obstruction:** If possible, the distance between the station and the obstruction should be at least two times the height of the obstruction. This criterion contributes to unrestricted air flow for meteorological measurements. Stations that do not meet this criterion do not measure wind speed and direction.

2. **Good topographic location:** The area site should be as level and flat as possible. This will provide a stable foundation for the station.

3. **Obstructions:** Obstructions between the source and the station are minimized.

4. **Sources of radiation:** The station is isolated from anomalous sources of radiation.

5. **Grounding**: Consider electrical grounding and lightning protection, especially if the station includes a 10-meter-high pole; stations that do not include a 10-meter-high pole and that are only powered by solar collectors and 12-V batteries do not have to be grounded.

These criteria are important to ensure consistency and adequacy among station locations. Good scientific judgment will be used to select the optimal location based on site-specific criteria and on specific measurement needs. However, not all sites can meet all these criteria. In some cases, a station may be sited close to a building. In this case, it may not be appropriate to include meteorological instrumentation on the station.

NEWNET station equipment

A NEWNET station typically consists of a High Pressure Ion Chamber (HPIC), temperature sensor, pressure sensor, humidity sensor, and may include wind speed and direction sensors. Equipment have the following specifications:

Parameter	Instrumentation	Specifications
Gamma Radiation	Gamma radiation is measured by a Reuter-Stokes High Pressure Ionization Chamber, model RSS-100 (RSS-1013 system includes the electronics, display and Model 100 PIC); Model 120 on portables. This instrument has an ionization chamber filled with argon to a pressure of 25 atmospheres (about 450 psi). Reuter-Stokes is a subsidiary of General Electric.	Range: 0-100 mR Precision: ±5% Accuracy: ±60% at 0.06 to 0.3 MeV, ±20% at 0.3 to 8 MeV Ionization chamber volume: 7.9 liters Energy response: 0.07 to 8 MeV
Parameter	**Instrumentation**	**Specifications**
Temperature	Temperature may be measured by a Met One model 064-2, or equivalent temperature sensor mounted in a Model 075 or 5980 or similar solar shield to reflect solar radiation.	Range: -50 to +50° C
Humidity	Humidity is measured with Rotronic HygromerTM, model 200 series, or an equivalent sensor.	Humidity Range: 0-100% RH Precision at 68-77° F: ± 10% Temperature limits at sensor: -5 to 212° F (-20 to 100° C)

Parameter	Instrumentation	Specifications
Barometric Pressure	Barometric pressure is measured by a Met One Barometric Pressure Sensor Model 090D. This is available in a number of calibration ranges, determined by the elevation of the station. Barometric pressure decreases by about 1" Hg per 1000 ft of elevation. The value is converted to millibars of barometric pressure, and is reported unadjusted for elevation. (Values normally reported in weather reports have been adjusted to pressure at sea level.)	Calibration Range (standard model): 26-32" Hg at 0-1500 feet (elevation) Accuracy:± 1% Operating temperature range: -22 to 50° C

Station Design, continued

Parameter	Instrumentation	Specifications
Wind	Wind data is measured by Met One Model 6266/037 (or equivalent) System, consisting of a wind speed sensor (anemometer cup) and wind direction sensor (vane).	Range:0-100 mph; 0-360 degrees Threshold: 1.0 mph, speed and direction indicators Accuracy:±1.0 mph; ±10 degrees Distance Constant: <5 feet (speed<;1.5 feet (direction) Damping Ratio:0.25 (direction) Temperature Range: -50 to +85° (speed); -50 to 70° C (direction)
HPIC battery	300V lithium pack	55mAH lithium
Data logger	Campbell Scientific CR10X	

Instrument Calibration

Calibration of HPICs	HPICs are calibrated using procedure MAQ-248 “Calibration of the PIC on NEWNET Stations”.
Meteorology instrument calibration	The instruments for measuring atmospheric relative humidity, barometric pressure, wind speed and direction, and temperature are calibrated by their manufacturer or as specified in procedure MAQ-402 “Calibration & Maintenance of Instruments for the Meteorology Monitoring Program”.

Data Management

Data transfer	The data taken by the NEWNET stations are currently stored in a database on the newnet.lanl.gov computer.
Data review	No regular data review is performed. Data may be reviewed and comments added only as extra time is available by the task leader.
Security	The NEWNET computers are on the LANL "green" network and, therefore, must be protected from unauthorized access or "hacking." All NEWNET computers on the green network will be protected by a security program to prevent unauthorized access.
Handling of outliers	Outliers remain in the database; they are not removed from the database or web presentation.

Section 6

Design

Identify design requirements

The NEWNET project requires no hardware design activity. Because data are not used for compliance ore regulatory purposes, no software quality or configuration requirements are necessary, though these requirements will be followed as practicable.

Section 7

Procurement

Procurement of items and services

Procurement of items and services used in the NEWNET project will follow the Laboratory procurement process. Items and services required for the project are commercial grade in nature and no special procurement requirements or needs are necessary.

Section 8

Inspection and Acceptance Testing

Policy

Any materials or services will be inspected and/or tested prior to acceptance for use in the NEWNET Project. Most supplies used during performance of NEWNET activities are commercial grade in nature and require no special acceptance practices or procedures.

Section 9

Management Assessment

Responding to assessments

When violations of requirements are found during a management assessment, a deficiency report will be initiated to document the violation and the corrective actions. Management assessments will be performed as required by LANL ISD-322-1, "Management Assessments."

Section 10

Independent Assessment

Policy

Independent assessments are those assessments conducted by organizations external to the ERSS. The project leader will ensure that any required assessments are conducted according to requirements in LANL ISD-330-3, "External Assessments."

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Appendix A

NEWNET Station Locations

The following stations are in place on the date of this plan. Each is discussed in more detail below the table.

Name	Location	Priority[1]
Santa Clara	West Puye Cliffs road, Arts and Crafts area, ~200 m N of roadway.	A
San Ildefonso	San Ildefonso back entrance, 100 m south of transfer station.	A
East Gate	~500' ESE of East Gate guard tower, in hut on canyon rim.	A
Mortandad Canyon	Next to meteorological station south of LANSCE	A
Buey East	~1 mile west up Canada del Buey canyon from Met Tower.	A
KAPPA site	TA-18, east ridge.	A
DP West	TA21 entrance gate.	A
LA High School	Front lawn, near Diamond Dr.	B
TA-54	Near the White Rock Met Tower.	B
Espanola	NNMC, 100 m west of gymnasium.	B
S-Site	TA16 entrance.	B
Area G NE corner	Outside Area G fence, NE corner, ~10 m N of Airnet station.	C
Area G south	South of building 375.	C
Area G test	~ 50' west of Area G South station.	C
Cochiti	~1/4 mile south of baseball fields on west side of road.	C
Ohkay Owingeh	Ohkay Owingeh School grounds, SE corner of playground.	C
Santa Fe	School for the Deaf orchard, off St Francis Drive.	C

[1]Priority A: top priority; keep these stations running if possible.
Priority B: allow these stations to run but shut them down if they become unreliable.
Priority C: currently not operational; do not revive. Remove these stations.

Discussion of NEWNET Stations

Santa Clara Pueblo	The Santa Clara Pueblo NEWNET station is in Santa Clara Canyon, with a view of Los Alamos. LANSCE is 12 km to the SW. This station is important to provide weather data and to provide assurance regarding LANSCE emissions. Activated air has not been detected at this station, but it is not inconceivable.
San Ildefonso Pueblo	The San Ildefonso Pueblo station is about 1 km SW of the Pueblo's main plaza. LANSCE is about 10 km WSW of the NEWNET station. This station is important to provide weather data and to provide assurance regarding LANSCE emissions. Activated air has not been detected at this station, but it is not inconceivable.
East Gate	The East Gate station is 0.8 km north of LANSCE, and is important for monitoring LANSCE emissions, which are easily detected and quantified at this location. The NEWNET measurements are especially important in understanding unexpected emissions, e.g., in 2005.
Mortandad Canyon	The Mortandad Canyon station is 1 km SE of LANSCE, and is important for monitoring LANSCE emissions, which are easily detected and quantified at this location. The NEWNET measurements were especially important in understanding the unexpected emissions during October and November 2005, and the continued existence of this station is important to both ENV-EAQ and San Ildefonso Pueblo. The station was sited at the request of San Ildefonso Pueblo because the station is between LANSCE and their Sacred Area.
Buey East	The Canada del Buey station is 200 m north of MDA G and 20 m south of the San Ildefonso Sacred Area. It is important to San Ildefonso Pueblo because it measures direct penetrating radiation (DPR) from MDA G. It is also important to provide canyon wind data in Canada del Buey, because canyon winds can channel airborne contamination from MDA G toward White Rock.
Kappa Site	For many years, the Kappa Site station monitored TA-18. Now that the TA-18 critical assemblies are shut down, its value is in monitoring winds south of MDA G, and for this purpose it should be relocated into Pajarito Canyon, directly south of MDA G. Also, although it is 4 km south of LANSCE, the station detected LANSCE emissions in 2005.

DP West	The DP station is 2 km NW of LANSCE and directly between LANSCE and the Los Alamos town site. It detected LANSCE emissions in 2005, and is valuable in assuring that the wind dispersion models are correct and in providing direct assurance that dose rates in the residential areas are small.
Los Alamos High School	The High-School site is 6 km WNW of LANSCE, so the DP station is better placed to monitor LANSCE emissions that may be directed toward the Los Alamos townsite. When the DP site is on, the importance of the High School site for monitoring LANSCE will decrease.
TA-54	The TA-54 station is about 1 km ESE of MDA G, 5 km SE of LANSCE, and lies between these LANL sites and White Rock. Thus, it provides assurance that the LANSCE emissions do not reach White Rock.
Espanola	The Espanola station is at the Northern New Mexico College, which hosts the Certificate in Environmental Monitoring and from time to time faculty members or administrators express some interest in the station.
S Site	On one occasion, the S-Site station detected a radioactive sealed source being used nearby. However, there is no good scientific reason for a station at this location and no effort should be put into maintaining the station. When convenient, it should be shut down and its parts should be used as spares.
Area G NE Corner, Area G South, and Area G Test	The three stations at MDA G are too close to the radiation sources to provide meaningful data. Although they detect direct penetrating radiation (DPR) at MDA G, the data are not useful for public health protection. The stations are off and should be removed when personnel are available to do so.
Cochiti	Station not operating. Cochiti Pueblo personnel no longer show interest in the NEWNET station at their Pueblo. Consequently, it should be removed when personnel are available to do so.
Ohkay Owingeh	Station not operating. Ohkay Owingeh personnel no longer show interest in the NEWNET station at their Pueblo. Consequently, it should be removed when personnel are available to do so.

Santa Fe	Station not operating. Personnel at Santa Fe School for the Deaf no longer show interest in the NEWNET station at their school. Consequently, it should be removed when personnel are available to do so.

Appendix B

References

Requirements and guidance documents:

DOE Order 5400.5, "Radiation Protection of the Public and the Environment," changed January 7, 1993

DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," January 1991

Procedures:

MAQ-MET, "Quality Assurance Project Plan for the Meteorology Monitoring Project"

MAQ-248, "Calibration of the PIC on NEWNET Stations"

MAQ-402, "Calibration & Maintenance of Instruments for the Meteorology Monitoring Program"