U.S. Climate Reference Network (USCRN)

Site Identification, Survey, and Selection

FY 02 Research Project

For The

NOAA Regional Climate Centers (RCC)

National Oceanic and Atmospheric Administration
National Environmental Satellite, Data & Information Service
National Climatic Data Center

Submitted By

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Project Description

The U.S Climate Reference Network (USCRN) is being established to monitor present and future climatic trends and variability to better define climatic change over the United States. The USCRN Program estimates a fully developed network of about 250 geographical locations (~500 paired sites) should be sufficient to capture the climatic signal for the Nation. FY 01 funding supported the beginning of the process of selection and procurement of instrumentation for 25 geographic locations. Principal activities in FY 02 will be the identification and selection of CRN instrument sites and the installation of about 44 instrument suites at up to 25 geographic locations.

One goal for the CRN Program in FY 02 is to install, as quickly as possible, all of the remaining instrument suites, about 32, that were procured and calibrated with FY 01 funds. It is essential to test and evaluate the instruments under a variety of environmental (climate) conditions early in the program. First priority is to install several instrument suites (at least 10) in warm humid and dry regions (southeast, south central, southwest).

Goal for FY 02

The goal of the FY 02 task for the Regional Climate Centers (RCC) is to identify, conduct site surveys, select specific pieces of property, and assist with obtaining signed Site License Agreements (SLA) for at least one geographic location (two sites each) in each of the fifty states and the U.S. territory of Puerto Rico.

The USCRN Spatial Density Study Report will be available by the end-of February 2002 and will provide guidance on the approximate geographic locations for a fully populated network of observing sites. Identifying and conducting site surveys in at least one geographic location per state is to commence immediately. Initial deployment of one pair of instrument suites in each state will not adversely affect the USCRN spatial density recommendations.

In the event of a large increase in funding, the selection of CRN sites may progress at a rate of 50-65 geographic locations per year (100-130 pieces of properties) and the subsequent installation at that rate per year. This will require assembling at least two full time Site Selection Teams to meet the demanding schedule. The RCC/State Climatologists who gain experience in FY 02 will be critical leaders/advisors to the special teams.

References

CRN Web Site: http://www.ncdc.noaa.gov/crn.html
CRN Site Information Handbook posted on CRN web site (current version)
CRN Site Survey Form/Checklist posted on CRN web site (current version)
NRC, 1999: *Adequacy of Climate Observing Systems*, National Academy Press, D.C.
Leroy, M., 1998: Meteorological Measurements Representativity, Nearby Obstacles Influence. ***10 Symp. On Met. Observ. & Instr.***, 233-236.
WMO, 1996: ***Doc 8, Guide to Instruments and Methods of Observation***, Geneva, Switzerland.

Top Most Geographic and Site Selection Criteria:

1. Long Term Stability of the Instrument Sites – Low Risk of being asked to leave the location over next 50 years and low risk of significant changes to surrounding area.
2. Larger Climate Signal Not Influenced by Local Features
3. Year Round Access to the Instrument Site for maintenance visits.
4. Nearby Access to AC Power (solar panels under evaluation)

Terms of Reference:

For the purpose of this and other USCRN documents several key definitions are provided here.

USCRN System – Refers to the End-to-End system that accounts for the entire architectural structure of the climate reference network program from the time of observation and reporting, quality control, access, and archiving of the data reported and all associated documentation. This also includes life cycle maintenance for the network, station history (metadata) documentation, and documentation of all processing algorithms and related quality control processes.

Geographic Location – A large general area (several tens of miles in diameter) within which instrument suites are installed, either a single suite or a pair (two nearby suites).

Instrument Site – The physical piece of property (lat/long/elev) where an instrument suite is installed.

Instrument Suite – Measuring sensors and all other supporting equipment and structures located at one site necessary to measure, record, process, store, and transmit data and information.

Sensor – A device that measures an environmental parameter, e.g., air temperature, precipitation, wind speed, solar radiation, soil moisture, and others.

Support Equipment – All other equipment that are not sensors and are part of the instrument suite, e.g., mechanically aspirated shield, batteries and charger, data logger, communications transmitter, tower, and other items.

Hardware Independent Algorithms – Observational data processing algorithms used at the instrument site that are independent of the manufacturer and model of the sensors and supporting equipment.

Equipment Required:

1. Handheld GPS (lat/long/elev)
2. Digital Camera
3. Laptop PC (useful in downloading digital photos and filling in Site Survey Form. Six modest laptops were delivered from the CRN Program Office to the RCCs for CRN Site Selection.)
4. ArcView GIS 8.1

Sequence of Events for Action Items One through Three:

1. Contact potential Host Organizations.
2. Provide copies of CRN Site Information Handbook, URL, and Site Survey Checklist.
3. Obtain remotely as much information of each proposed piece of property as possible:
    a. Latitude, longitude, ~elevation,
    b. Digital photos of specific pieces of property,
    c. Physical condition of property and surrounding area,
    d. Aerial photos and topographic maps at: http://topozone.com/, http://www.mapquest.com/, http://www.geographynetwork.com/, and http://www.terraserver.com/
4. Schedule an on-site visit if sites meet criteria. Ensure have at least three pieces of property to examine per geographic location.
5. Take digital pictures and complete Site Survey Checklist. Provide description of land cover and surrounding features.
6. Write summary report on each site. Make recommendation on best two and why. Submit by e-mail with link to aerial photo URL, if any. If provided paper aerial photos, either mail or scan and send digitally. Send all digital pictures, ID by site and describe what looking at. Found using PPT a good way to organize.
7. Send digital copy of completed Site Survey Form/Checklist to CRN Program Manager.
8. CRN Program Manager reviews all information and consults with RCC/SC inspection team.
9. All info submitted to the NCDC CRN Site Review Committee for a final selection decision.
10. CRN Program Manager makes recommendation to the NCDC Director.
11. Assist in obtaining signed Site License Agreement (SLA). Experience has shown that a Site Survey should be conducted prior to obtaining a signed SLA. Sometimes, the site survey reveals that the property is not acceptable. The up front work and discussions will preclude/minimize this situation from occurring. Typically, the description of the property will be included in the second paragraph of the SLA. However, sometimes an SLA is signed before the site survey and selection process is completed. In this case, a signed memorandum from the Director, National Climatic Data Center, specifying the description of the property selected will be forwarded to the Host Organization.
12. Work with John Hughes to keep CRN Tracking Spreadsheet current.

FY 02 Tasks and Deliverables:

Immediate First Deliverable - By the end of February 2002

Complete on-site survey, assist in obtaining signed SLAs, and be ready to commence site preparation at least five locations in the Southeast, South Central, and/or Southwest regions.

Management

Michael Janis is responsible for project coordination. Each RCC, however, will assign personnel to the project and be responsible for meeting action item deadlines for CRN stations within their respective region. Refer to attached Appendix for this list.

Each RCC will solicit the participation and assistance from State Climatologists and Others.

Schedule and Deliverables

1.	Complete site surveys for at least five geographic locations in the southeast, south central regions (SERCC & SRCC).	February 28, 2002
2.	RCCs are to collectively complete site surveys for at least three geographic locations (2 instrumentation suites per location) each month beginning in February 2002 and ending in September 2002. Minimum total number of sites surveyed by RCCs by September 2002 is 28. [**Plus FY 01 funded work, 22 sites, totals 50 sites.]	September 30, 2002
3.	A progress report will be submitted to PI (Janis) by the 5th working day of each month, detailing progress over the previous month. Report will be promptly compiled and submitted to CRN Program Management at NCDC.	Monthly
4.	As new info is scheduled or known contact John Hughes to update CRN Tracking spreadsheet	As it occurs

**** Refer to password protected U.S. Map posted to the CRN web site for "To Date Summary" of site selection process:**

1. Sites Installed (02/01/02): MT, NC, NE, NH, and RI,

2. 2. Signed SLAs: MT, NC, NE, NH, OK, RI, AK (one site), HI (one site), MS (one site), PA (one site?), and MA

3. Site Surveys Conducted/Sites Approved: AK (one site), MT, NC, NE, NH, OK, RI

4. Started by NCDC - Need RCC/SC assistance to complete: AZ, CA, MA, MS, NV, and PA.

5. ALL REMAINING STATES OPEN FOR ANY LOCATION TBD by RCCs/SCs.

Action Item 1: Identify Geographic Locations and Contact with Potential Host Organizations.

Sequence of Events:

1. Contact potential Host Organizations.
2. Provide copies of CRN Site Information Handbook, CRN URL, and Site Survey Checklist.
3. Obtain via phone/e-mail as much information of proposed pieces of property as possible and contact points.
    a. Latitude, longitude, and ~elevation
    b. Digital photos of specific pieces of property,
    c. Physical condition of property and surrounding area,
    d. Aerial photos and topographic maps at: http://topozone.com/, http://www.mapquest.com/, http://www.geographynetwork.com/, and http://www.terraserver.com/
4. IF you feel the property meets criteria for instrument site, schedule an on-site visit. Ensure have at least three pieces of property to examine per geographic location.

References:
CRN Site Information Handbook posted at CRN web site (current version)
CRN Web Site: http://www.ncdc.noaa.gov/crn.html

Background: The highest criteria for selecting a geographic location and specific instrument sites is a low risk that the sites will remain essentially uninfluenced for 50 years or more by significant changes to the immediate environmental surroundings. This is particularly true with regards to possible future encroachments by manmade structures. This criteria means observing sites will be in rural areas and suggests the use of national and state parks, deeded lands, such as Universities, Audubon Society, Arboretums, Botanical Gardens, etc. properties. Sites should be located where they will be able to detect, monitor, and quantify climatic trends and variations, i.e. places where observational values are least influenced by local environmental factors.

It is always desirable when a site can be located nearby an observing station with high quality long-term records, such as a U.S. Historical Climate Network (USHCN) site. Location near other observing network sites, such as the National Atmospheric Deposition Program (NADP) or Surface Solar Radiation (SURFRAD) provides additional advantages, such as complimentary observations and local technical response support. Try to identify two different Host Organizations in a given geographical location. This lowers the risk of both (paired sites) being abandoned if one Host decides to end support during 50+ years.

Why Paired Site?
The reason for the paired site decision is to lower the risk against the closing of an instrument site and not having another long-term site in the nearby vicinity. Hence, there is the desire for two different Host Organizations and some reasonable distance between the two (paired) sites. However, it is not always possible (often not) to find nearby sites under the management of two different Host Organizations. Your best judgment will be required in assessing the one Host Organization decision.

In certain limited cases a single site may be acceptable. This determination would be based on a very high confidence level (very low risk) that the property and the Host Organization are deemed to be extremely reliable and stable. An example would be an astronomical observatory, such as on Mauna Loa, or other similar type long-term (historical and potential continuation in the future) research type location, such as National Parks.

How Far is Too Far and How Close is Too Close – Locating "Paired" Sites?
Fundamentally, this is a subjective decision with some objective guidelines. The precipitation parameter is difficult to use as a measure. The topography between the two sites will influence the decision. Ken Hubbard has some study results, which suggest 8-10 miles. Not less than one mile, not more than 25-30 miles are good rules. Are they far enough to minimize the risk that a single natural event (flood, tornado, etc.) would take out both sites? Are they close enough that both sites capture the area's climate environment, particularly with respect to temperature?

Additional important siting criteria are:
1. Nearby availability of AC power.
2. Year-round access to a site for maintenance visits (scheduled and non-scheduled).
3. Two *different* Host Organizations in a given geographical location, lowering the risk of both sites being abandoned by a Host ending support (asking for 50-100 year commitment).
4. Do not identify CRN geographic locations adjacent (nearby) to each other on the opposite side of a common state boundary line.
5. Avoid pulling power from the same pole to the two sites. It is generally not possible to avoid the same local power grid.

Using knowledge of their respective regions, the RCCs, in close collaboration with the respective State Climatologist (SC), if willing and available, will identify at least one potential geographic locations in each state and at least three (or four) specific pieces of candidate 60' x 60' properties, and then proceed to conduct on-site visual surveys. A Site Survey Checklist will be filled out during the site inspection. The CRN Site Information Handbook, draft SLA, and Site Survey Checklist should be shared with all potential Host Organizations and others to ensure an adequate understanding of the program and CRN site requirements.

Refer to the CRN Tracking Spreadsheet (excel file) accessible through the CRN web page indicating the current status of Site Selections and Installations. RCCs can contact references for locations listed and/or find other Host Locations. It is password protected, but all the RCCs have access (maintained by John Hughes). State Climatologists can obtain access by contacting their respective RCC for the password.

Current Instrumentation Installation Status as of 1/15/02:
- Montana, two sites are up and running.
- Nebraska, two sites are up and running.
- New Hampshire, two sites are up and running.
- North Carolina, two sites are up and running.
- Rhode Island, two sites are up and running.
- Oklahoma - Plan to install Feb/Mar '02 or as soon as practical, depending on the weather.

General Guidance for identifying Geographic Locations: (Refer to the CRN Site Information Handbook and the CRN web page, *CRN Network Design Specifications.*)

- Regionally and Spatially Representative. Stations will be distributed to ensure that all major nodes of the nation's climate variability are captured while taking into account regional orographic factors. The Network Spatial Density Study will provide guidance.

- General location sensitive to measuring long term climate variability and trends. The site location is representative of the climate of the region, and is not heavily influenced by unique local topographic and mesoscale/microscale features/factors.

- Reasonably high probability of long-term site stability and surrounding area. Minimize risk of encroachments over time and/or the chance the site will close due to the sale of the land or other factors. Stations located on government (federal, state, local) land or at colleges (granted/deeded land with land use restrictions) often provide a higher stability factor. A review of recent (last ten years) and possible future area population growth patterns is a part of the overall evaluation process.

- Avoid high-risk sites: Flood Plains (low areas adjacent to river basins, estuaries, and coastal offshore barrier islands/beaches); Above-average frequency of tornados; Enclosed locations that may "trap" air and create unusually high incidents of fog, cold air advection, etc.; Vicinity of orographically induced winds, such as Santa Ana and Chinook; Complex meteorological zones, such as adjacent to an ocean or other large bodies of water; and Persistent periods of extreme snow depths (e.g., several meters/tens of feet). Digital topographic maps, aerial photographs, and a climatological profile of the area will be examined as part of the overall site evaluation and selection process.

- Proximity (kilometers) to an existing or former observing site with a relatively long period of record (decades) of daily maximum and minimum temperature and precipitation is highly desirable. Location near other observing network sites, such as (SURFRAD) provide additional advantages, such as complimentary observations and local technical response support. The historical data (metadata) record and observational data from these sites should be of sufficient quality and detail to permit reasonable processing of the data to account for changes with a high degree of confidence (i.e., documented vegetation and terrain changes, changes in the location of the station and/or instruments, type of instruments described, the observation time, the observing practices, etc.).

- Site is located in the vicinity of other similar observing systems, which are operated and maintained by personnel with a knowledge, understanding, and appreciation for the purpose of climate observing systems.

- Avoid endangered species habitats and sensitive historical locations of a sensitive nature.

- AC power source available nearby. However, in some cases solar panels may be an

alternative to achieve the use of an otherwise highly desirable location.

- Relatively easy year round access by vehicle for installation and periodic maintenance.

- Refer to the following URLs. There are other networks not listed, please share this info.
  - New COOP Modernization Density Map (Steve DelGreco) CD ROM (2 CD set) provided to each RCC. PC minimums: OS WIN 2000, Pentium 800Mhz, CD ROM 24X, 128MB RAM, and ERSI ArcGis - ArcView 8.1 S/W.
  - National Atmospheric Deposition Program (NADP) http://nadp.sws.uiuc.edu/
  - Atmospheric Radiation Measurement (ARM) http://www.arm.gov/docs/sites.html
  - Surface Solar Radiation (SURFRAD) http://www.srrb.noaa.gov/surfrad/sitepage.htm
  - Long Term Ecological Research (LTER) http://lternet.edu/sites/
  - Radiosondes http://www.ua.nws.noaa.gov/nws upper/htm
  - Wind Profiler (Upper Air) http://www-dd.fsl.noaa.gov/gps/site_info.html
  - PrimeNet Parks www.forestry.umt.edu/researrch/MFCES/programs/primenet
  - AmeriFlux CO2http://public.ornl.gov/ameriflux/Participants/Sites/Map/index.cfm
  - National Parks http://www.us-national-parks.net/
  - USHCN http://www.ncdc.noaa.gov/ol/climate/research/ushcn/daily.html
  - USDA Soil Climate Analysis Network (SCAN) http://www.wcc.nrcs.usda.gov/scan/
  - NSF National Ecological Observatory Network (NEON) http://www.sdsc.edu/NEON/ and http://www.npaci.edu/online/v4.6/neon.html
  - SuomiNet network of GPS receivers to provide real time atmospheric precipitable water vapor measurements and other geodetic and meteorological information. http://www.unidata.ucar.edu/suominet/
  - Paleoclimate Tree Rings GIS http://map2.ngdc.noaa.gov/website/paleolim/viewer.htm
  - Remote Automated Weather Stations (RAWS) http://www.fs.fed.us/raws/

Action Item 2: Conduct On-Site Inspection of proposed specific pieces of property.

Sequence of Events:

1. Ensure that you clearly identify to the host organization representative the exact location that the tower will be located for each piece of property (Record latitude, longitude, & elevation).
2. Take digital pictures from each tower location and fill out the Site Survey Form/Checklist. Ensure photos of the nearest AC power pole (direction and distance from the tower location) are taken. Go to the AC pole and take a photo back to where the tower will be located. Describe the terrain features between the tower and AC pole. Provide a good description of land cover/surrounding features, etc.
3. Write summary report on each site. Make and justify recommendation on best two sites. Submit by e-mail with link to aerial photo URL, if any. If provided paper aerial photos, either mail or scan and send digitally. Send all digital pictures, ID by site and describe what looking at. Found using PPT a good way to organize.
4. Send digital copy of completed Site Survey Form/Checklist to CRN Program Manager.
5. Work with John Hughes to keep CRN Tracking Spreadsheet current.

References:

CRN Site Information Handbook posted at CRN web site (current version)
CRN Site Survey Form/Checklist posted on CRN web site (current version)
Leroy, M., 1998: Meteorological Measurements Representativity, Nearby Obstacles Influence. ***10 Symp. On Met. Observ. & Instr.***, 233-236.

Background: The on-site survey is required to evaluate the pieces of property for suitability and acceptability, when the Host Organization identifies potential instrument sites.

Local Site Representativity Evaluation (Classification Scheme)
Reference: Leroy, M., 1998, and WMO, 1996.

Local environmental and nearby terrain factors have an influence on the "quality of a measurement." The selection of a CRN instrument site will be the result of a balance between competing demands, such as those highlighted above and an assessment of the "quality of measurements" guidelines outlined below.

The most desirable local surrounding landscape is a relatively large and flat open area with low local vegetation in order that the sky view is unobstructed in all directions except at the lower angles of altitude above the horizon. No significant obstruction within 300 meters of the instrument tower. The area occupied by an individual instrument site is typically about 18 m x 18 m (~60 ft x ~60 ft).

There will be many sites that are less than ideal. The CRN will use the classification scheme below to document the "meteorological measurements representativity" at each site. This scheme, described by Michel Leroy (1998), is being used by Meteo-France to classify their network of approximately 550 stations. The classification ranges from 1 to 5 for each measured parameter. The errors for the different classes are estimated values.

a) Classification for Temperature/Humidity
Class 1: Flat on horizontal ground surrounded by a clear surface with a slope below 1/3 (<19

degrees). Grass/low vegetation ground cover <10 cm high. Sensors located at least 100 meters (m) from artificial heating or reflecting surfaces, such as buildings, concrete surfaces, and parking lots. Far from large bodies of water, except if it is representative of the area, and then located at least 100 meters away. No shading when the sun elevation >3 degrees.

Class 2: Same as Class 1 with the following differences. Surrounding Vegetation <25 cm. No artificial heating sources within 30m. No shading for a sun elevation >5 degrees.

Class 3 (error 1 C): Same as Class 2, except no artificial heating sources within 10m.

Class 4 (error >/= 2 C): Artificial heating sources <10m.

Class 5 (error >/= 5 C): Temperature sensor located next to/above an artificial heating source, such a building, roof top, parking lot, or concrete surface.

b) Classification for Precipitation

One factor to consider is an area surrounded by uniform obstacles of about the same height. Wind speed is a significant factor that affects the accuracy of measuring liquid and frozen precipitation. A wind shield can be placed around the gauge to improve the accuracy of the "catch." CRN sites measure only wind speed (no direction) at a height of 1.5m, near the height of the gauge orifice.

Class 1: Flat horizontal ground surround by a cleared surface with a slope below 1/3 (<19 degrees). Any obstacle must be located at a distance of at least 4 times the height of the obstacle. An obstacle is an object seen from the precipitation gauge with an angular width of =/>10 degrees.

Class 2 (error 5%): Same as Class 1, except an obstacle is located at a distance of at least 2 times its height.

Class 3 (error 10% to 20%): Ground with a slope below 1/2 (<30 degrees). Any obstacle is located at a distance of at least its height.

Class 4 (error >20%): Ground with a slope >30 degrees. Obstacles located at a distance less than their height.

Class 5 (error > 50%): Obstacles overhanging the gauge.

c) Classification for Solar Radiation

Class 1: Flat horizontal ground with a slope of the terrain <2 degrees. No obstacles within 100 meters.

Class 2 (error 10%): Slope of the terrain <5 degrees. Obstacles within 100m and an angular height >7 degrees but <10 degrees.

Class 3 (error 15%): Slope of the terrain <7 degrees. Obstacles within 100m and an angular height =/>10 degrees.

Class 4 (error 20%): Obstructions that would obstruct a significant portion of direct radiation.

Class 5 (error 30%): Obstacles overhanging the sensor or near a building.

d) Classification for Wind

Defined for wind sensor at a height of 10m. CRN measures wind speed only (no direction) at a height of 1.5m.

Class 1: Sensor located at a distance of at least ten (10) times the height of the obstacle (elevation angle <5.7 degrees). Object considered an obstacle if seen at angular width >10 degrees. Obstacle is below 5.5m height within a 150m radius and 7m within a 300m radius. Wind sensor located a minimum distance of 15 times the width of thin nearby obstacles (i.e. mast, tree with angular width <10 degrees). Surrounding terrain relief change </= 5m within a 300m radius.

Class 2 (error 10%): Same as Class 1 except terrain change </= 5m within a 100m radius.

Class 3 (error 20%): Same as Class 1 except no obstacles within five times the height of the nearby obstacles (elevation angle <11.3 degrees). Wind sensor located a minimum distance of 10 times the width of thin nearby obstacles. Terrain change </= 1m within a 10m radius.

Class 4 (error 30%): Same as Class 3 except no obstacles within 2.5 times the height of the nearby obstacles (elevation angle <21.8 degrees).

Class 5 (error >40%): Obstacles within 2.5 times the height of the nearby obstacles.

Class 6 (error >50%): Obstacles with a height >10m, seen with an angular width greater than 60 degrees are within a 20m distance.

Sample Steps in Site Selection for a single CRN location: Approximate total time 7 days

Identify Potential Geographic Locations: 0.5 – 1.5 day

Which elevations? Is there historical compatibility? Which biomes [plant communities that are characteristic of climatic area]? Which climate regimes: east, west, coast, coast range, western valley, mountains, high plateau, etc.?

Identify Possible Host Organization/Partners 2.0 days

Identify and contact representatives of these areas.

Describe the program and type of commitment needed, send material, and ask about specific locations, learn procedures they will internally require.

Describe the need for nearby (paired) site.

Arrange meetings and travel schedule, coordinate logistics with state climatologist (if collaborating) and with the institutional partner.

Travel to Site/Conduct Survey 3.0 days

Fly to airport, drive to potential sites, physical documentation of site and backup site, sketches, photo documentation, visit with site sponsor.

Insure snowfall will be dealt with properly, that power is available, that local cooperator(s) will be able to monitor and tend to sites regularly, for the next several decades, obtain commitments to not disturb site for next several decades.

Identify nature of communications, reliability of communications, and idiosyncrasies for both sites.

Write progress reports 0.5 day

Action Item 3: Secure Signed Site License Agreement (SLA)

Sequence of Events:

1. CRN Program Manager reviews all information and consults with RCC/SC inspection team.
2. All info submitted to the NCDC CRN Site Review Committee for a final selection decision.
3. CRN Program Manager makes recommendation to the NCDC Director.
4. RCC assists CRN Program with obtain signed Site License agreement (SLA).
   Note: In most cases it is not desirable to get the SLA signed before selecting the actual property. This can present a false sense of acceptance before the site review/selection. It may turn out that site is not acceptable after conducting the site survey. Hopefully the up front work and discussions will produce at least two good pieces of property in a given location and greatly reduce this type of "false" start.
5. Work with John Hughes to keep CRN Tracking Spreadsheet current.

Reference: *CRN Site Information Handbook* posted at CRN web site (current version)

Background: When the Director of NCDC approves the individual site, then a signed SLA is required before site preparations can begin.

Site information is delivered to the CRN Program Office, who will negotiate the final SLA with the site.

There is a generic Draft Site License Agreement (SLA) that has been approved by the Department of Commerce (DOC) General Counsel. Refer to the CRN Site Information Handbook for a copy of the SLA. While minor modifications can be made to fit a specific location need, significant changes will require a legal review. In general, the SLA will:

- Provide CRN project personnel access to site
- Oblige host organization to maintain integrity/security of site
- Maintain grounds, i.e. mow grass
- Provide access to AC power
- Inform CRN project manager of damage to equipment/site
- Clean pyranometer and empty rain gauge as needed

Notes:

1. Be Up Front and Honest with the Host Organization. Describe the physical instrument configuration, particularly the size and shape of the Small DFIR. Show a picture.
2. The Host Organization will be provided web access to their respective USCRN sites shortly after installation is completed and during the nine month test and evaluation period.
3. The installation sequence will depend on the ability to negotiate SLA with each site at each geographic location.
4. Each FY installation plan must account for spatial distribution considerations as if there will be no more sites installed in future years. The CRN Spatial Density Study Report will provide an FY deployment plan based on geographic locations and "best to date" distribution.

Other Important Information:

How far away should a tilled field be from a USCRN instrument site?
As a guide, land that will undergo periodic agricultural projects, such a regular tilling, etc., should be a minimum of 90 meters (~300 feet) from the proposed USCRN instrument site. Ideally, the distance should be 200 meters.

In general, Agricultural Experimentation Sites and nearby land used for agricultural purposes should not be the first choice of a USCRN instrument site. Identification and selection of these type potential sites require close examination of the issues before committing to a Site Survey. National Parks, Botanical Gardens, as well as locations near other long term observing sites, such as LTER, PrimeNet, etc., should be considered first as prime candidates. Arboretums, Audubon, and Botanical Gardens might till land. Must ask the right questions and gage the situation.

AC Power – How Far Is Too Far? - Distance between the AC source and the CRN instrument site should be as short as possible, typically <300 feet is preferred. However, in some cases the terrain between the AC source and the CRN site may be a more critical consideration of site acceptability than the distance factor.

Currently one site has a run of 700 feet. The related cost of installation was driven much higher at this site. The longest run we can make from an AC source is 2,000 feet (less than 10 volt drop over length of power line). If the run were longer than 2,000 feet, a high voltage line and transformer would need to be used. This would have to be done by the electric company.

The longest spool of 10-gauge wire typically comes in spools up to 1,000 feet. If the total distance (down power pole, across land, into CRN site terminal box) exceeds 1,000 feet, then there will be a need to come out of the ground to splice the wires. This presents a significant safety issue associated with bring the wire above ground and installing a junction box inside which the power cables are spliced together. CRN needs to avoid this situation.

Fences - The size and type fence required will be Site Dependent. You and the Host Org. Rep. will need to make a decision. Need to know the Fence Requirement for Site Prep/Installation. In many cases, the CRN instrument suite will be in a relatively "secure" location. It is not possible to deter the determined trespasser, so no fence arrangement will be completely adequate. The objective of a fence is to provide a physical barrier, which makes a statement - please do not come closer or touch the equipment. Also, if the area is used for grazing, then perhaps a barbwire fence is needed to deter the animals, typically cattle and horses.
Typically, the minimum CRN fence requirement is around the instrument tower. Usually ~20' x ~20', chain link, green, four (4) feet high with a gate. In most cases, the Small DFIR fence should provide an adequate barrier around the precipitation gauge.
Barbwire - If the area is used for grazing, then barbwire (three or five strand - ask host) around the entire 60' x 60' perimeter is recommended.

In some cases, the Host Org. might ask for a fence (other than barb wire) to enclose the entire 60' x 60' piece of property. This is the case at the Audubon Society location near Lincoln, NE. The Host Org. has many visitors, particularly children, and wanted to limit their physical proximity to the instruments.

Small DFIR with a Single Alter (in center of SDFIR inner fence ring) is the selected CRN Wind/Snow Shield for the Geonor Precipitation Gauge. Diameter: Outer Fence 26 feet, Inner Fence 13 feet, then Single Alter 4 feet, then the precipitation gauge in the center. Top of shield is about six (6) feet high. Refer to the October 2001 NCAR Report for design specs and digital pictures. At least in FY 02 - Most all Initial Installations come with ONLY the Single Alter Shield and Geonor. The Small DFIR will be installed during first scheduled maintenance visit. In latter half of FY 02, SDFIR will start appearing as part of the initial installation.

Second Precipitation Gauge and Relative Humidity Sensors will follow in FY 03. Items under evaluation and testing in FY 02/03

CRN Web Site:
CRN Web Page (Background Info and Data Posted for Public Access):
http://www.ncdc.noaa.gov/crn.html

Access also available through the NCDC Home Page: www.ncdc.noaa.gov

APPENDIX

List of Respective RCC Points of Contact (POC) as of 01/29/02

RCC	Contact	E-mail	Address	Telephone	Fax
Northeast	Dan Graybeal	dyg2@cornell.edu	1123 Bradfield Hall Cornell University Ithaca, NY 14853	607-255-1751	607-255-2106
Southeast	Sam Baker	baker@dnr.state.sc.us	SC Department of Natural Resources 1201 Main St. Columbia, SC 29201	803-737-0800	803-253-6248
Southern	Kevin Robbins	krobbins@mistral.srcc.lsu.edu	260 Howe-Russell Bldg. Louisiana State University Baton Rouge, LA 70803	225-388-5021	225-388-2912
Midwest	Steve Hilberg	hberg@uiuc.edu	Illinois State Water Survey 2204 Griffith Drive Champaign, Il 61820	217-333-8495	217-244-0220
High Plains	Glen Roebke	groebke2@unl.edu	University of Nebraska 246 L W Chase Hall Lincoln, NE 68583-0728	402-472-6704 402-450-6007 (cell)	402-472-6614
Western	Kelly Redmond	krwrcc@dri.edu	Desert Research Institute 2215 Raggio Parkway Reno, NV 89512	775-674-7010	775-674-7016