

United States Department of Energy
Nuclear Criticality Safety Program (NCSP)

1-Week Manager's Course

Student Information Booklet

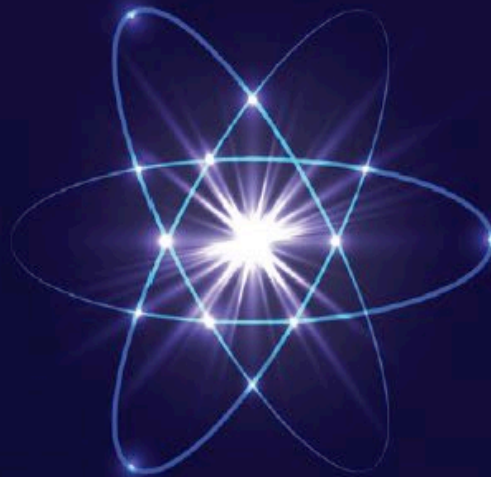


Table of Contents

TABLE OF CONTENTS	2
COURSE DESCRIPTION	4
COURSE SCHEDULE	4
DAF/NCERC Course Schedule	4
Sandia Course Schedule	4
COURSE CONTENT	5
DAF/NCERC Manager Course	5
Sandia Manager Course	5
COMPLETION REQUIREMENTS	6
COURSE POINTS-OF-CONTACT	6
PREREQUISITES	6
Sandia Hands-on Training Prerequisites	6
DAF/NCERC Hands-on Training Prerequisites	6
SITE SPECIFIC INFORMATION	7
Sandia Hands-on Training Logistics	7
Sandia Badge Information	7
Sandia Prohibited Items	7
Lodging and Dining in Albuquerque	8
Sandia Maps/Directions	9
Directions to the Innovation Parkway Office Complex (IPOC) from the Airport	9
Map of the Sandia Badge Office	10
Getting to Tech Area V (TA-V) from all Kirtland AFB Gates	11
Sandia Technical Area 5 (TA-V) Map	12
Nevada Field Office (NFO)/Nevada Support Facility (NSF) Classroom Training Logistics	13
Location	13
Badge Information	13
Cell Phones and Laptops	13
Prohibited Articles	13
Traveling to the NSO/NSF	13
DAF/NCERC Hands-on Training Course Logistics	13
General Information	13
Badging	13

Dosimeters and Radiation Doses.....	14
Prohibited Articles.....	14
Information on Things to Bring	15
Dress Code	15
Travel Onsite at NNSS.....	15
DAF/NCERC Travel Logistics.....	16
Travel Information to Las Vegas.....	16
Travel Information to the NNSS (DAF/NCERC) from Las Vegas	16
Rental Car Information	16
Lodging Information	16
Maps of NSF/NSO, NNSS, DAF/NCERC and Mercury.....	17
Las Vegas (shows Nevada Support Facility (NSF))	17
Nevada National Security Site (NNSS) Map (Mercury and the DAF)	18
Mercury	19
Nevada Support Facility (NSF).....	20

Course Description

This Nuclear Criticality Safety Program's (NCSP) class is designed for Managers and Criticality Safety Officers with Nuclear Criticality Safety (NCS) responsibilities, Fissile Material Operators, Regulatory Personnel and Process supervisors. The course is one-week long and is offered at two locations: the National Critical Experiment Research Center (NCERC) and Sandia National Laboratory (SNL/Sandia). The purpose of this course is to provide an experimental hands-on training experience addressing important characteristics of neutron-multiplying systems, which will include: awareness of fissile material in process operations, along with discussion of the theory and implications for safety of fissionable material operations; awareness and understanding of Department of Energy (DOE) mandates developed specifically for fissile material operators, process supervisors, and managers with NCS responsibilities, regarding application of DOE Orders, Guides, Rules, American Nuclear Society (ANS) standards in performance of criticality safety evaluations that meet DOE standards and hazards analysis methods and implementation/maintenance of NCS controls, with respect to the roles and responsibilities of all those who are involved.

A diverse team of instructors, experimenters, and coordinators participate in the conduct of these courses. Individuals from Oak Ridge National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratory, National Nuclear Security Administration, Los Alamos National Laboratory, and National Security Technologies, LLC, currently participate in the course planning and execution.

Course Schedule

The Manager training with critical assemblies will depend upon your registration choice and clearance level. Uncleared, L- and Q-cleared students can attend the Sandia Hands-on course located at Technical Area 5 (TA-V) at Sandia National Laboratory (SNL/Sandia). Q-cleared students can attend the Hands-on Training at the National Critical Experiment Research Center (NCERC) located at the Device Assembly Facility (DAF) at the Nevada Nuclear Security Site (NNSS), located approximately 65 miles from Las Vegas, NV.

DAF/NCERC Course Schedule

- Monday, 8:00 am – 5:00 pm – Meet in Las Vegas Nevada Support Facility (232 Energy Way) in the Sedan or Great Basin conference room.
- Tuesday, 7:00 am – 5:00 pm – Meet at Mercury Badge Office to enroll in DAF security system; Proceed to the DAF Entry Guard Station (EGS) for the rest of the day
- Wednesday – Thursday, 7:45 am – 5:00 pm - Meet at DAF Entry Guard Station (EGS) to allow time for DAF entry with escorts.
- Friday, 8:00 am – 1 pm – Meet in Las Vegas Nevada Support Facility (232 Energy Way) in the Sedan or Great Basin conference room.
- NOTE: Monday you may bring a lunch or eat in the cafeteria. Tuesday – Thursday, bring a lunch and snacks for breaks. No lunch is provided.
- NOTE: Your badge is needed each day of training. If you are getting a visitors' badge, you will meet at 7:15 am on Monday at the Nevada Field Office badge office.

Please refer to the DAF/NCERC Hands-on Training Logistics section of this document for more information on location and badging.

Sandia Course Schedule

- Monday, 7:15 am – 5:00 pm – Meet at the IPOC Sandia Badge Office
- Tuesday – Thursday, 7:45 am – 5:00 pm – Meet at TA-V, Building 6577

- Friday – 7:45 am – 1:00 pm – Meet at TA-V, Building 6577

Please refer to the Sandia Hands-on Training Logistics section of this document for information on location and badging.

Course Content

The content of the DAF/NCERC and Sandia Manager courses are similar in nature, although the lectures are based on the types of critical assemblies at the location. The course content for each course is provided below.

DAF/NCERC Manager Course

- Review of NCS fundamentals
- Criticality safety standards and DOE regulations
- DOE requirements, national standards, and overview of the DOE Nuclear Criticality Safety Program
- Overview of DOE-STD-3007 and an overview of criticality safety evaluation content
- Experimental methodology introduction
- Training Assembly for Criticality Safety (TACS) experimental methodology
- TACS subcritical experiments
- Overview of reactor physics
- Planet subcritical hand-stacking experimental methodology
- Planet Hands-on operations and approach to critical and critical operations
- Advanced hands-on demonstration with the BeRP ball and the Np sphere
- Flattop critical operations
- Godiva IV critical assembly demonstration
- Review of experimental criticality accidents
- Human factors principles
- International Criticality Safety Benchmark Evaluation Project (ICSBEP) overview

Sandia Manager Course

- Review of NCS fundamentals
- Summary of process and experimental criticality accidents
- Overview of criticality safety evaluations and DOE-STD-3007
- Conduct of operations
- Design of the 7uPCX critical experiments
- Nuclear instrumentation
- Reactor kinetics
- Subcritical multiplication
- Nuclear criticality safety data and limits
- Overview of the ICSBEP
- Human factors principles
- ANSI/ANS-1 operations
- Criticality safety standards and DOE regulations
- Experiment 1-3 – approach to critical on fuel loading, moderator height and fuel separation
- Experiment 4 – Interior fuel rod removal

Completion Requirements

Attendees must complete an examination at the end of the week with a grade of 80% or better. Certificates for successful completion of the course will be emailed to students after the course is completed. Participation is expected from all course attendees. **PLEASE DO NOT PLAN TO LEAVE EARLY OR YOU WILL NOT RECEIVE A CERTIFICATE.**

Students can also provide feedback on all aspects of the course, including content, instructors, classroom characteristics, etc. Feedback is provided to the Course Coordinator who oversees student feedback resolution with the course points-of-contact.

Course Points-of-Contact

Contact information for the 1-week course is listed in the table below. Pre-course questions should be directed to Doug Bowen and Marsha Henley. Questions during the course can be directed to Doug, Marsha or the course site points of contact.

Doug Bowen Course Coordinator Course Point-of-Contact (Monday & Friday)	(505) 500-7686 (cell) (865) 576-0315 (office)	bowendg@ornl.gov
Marsha Henley Registration Point-of-Contact	(865) 292-4884	henleym@ornl.gov
Juan Delgado NFO/NSF Point-of-Contact	(702) 481-4245 (cell)	Juan.Delgado@nnsa.doe.gov
Loretta Rankin Sandia National Laboratory Class Point-of-Contact	(505) 845-9287	lranki@sandia.gov
Catherine Percher DAF/NCERC Class Point-of-Contact (Mon-Tuesday)	(925) 423-9345	percher1@llnl.gov
Kelsey Amundson DAF/NCERC Class Point-of-Contact (Wed-Thursday)	(505) 665-3833 (505) 551-2632	kamundson@lanl.gov

Prerequisites

This course is designed for Managers with NCS responsibilities, Criticality Safety Managers, Fissile Material Operators, Regulatory Personnel and Process supervisors.

Sandia Hands-on Training Prerequisites

Prior to obtaining unescorted access to TA-V at Sandia National Laboratories, the students **must complete training modules prior to the course**. The Sandia Manager's course point-of-contact will provide registered students the training modules required to attend the course along with instructions to complete them.

DAF/NCERC Hands-on Training Prerequisites

The DAF/NCERC hands-on training class requires students to handle significant quantities of fissionable material

to participate in the hands-on portions of the class, e.g., Planet critical assembly uranium foil hand stacking, handling the plutonium BeRP ball, and Neptunium sphere. To come to the NNSS and handle fissile materials, **Radworker II training (or equivalent training) is required.** For many people, this is the first time they have ever held significant quantities of uranium and plutonium. Thus, Rad Worker II training (or equivalent training) is required to attend the course. Currently, equivalency has been established for Radworker II for the following sites: LLNL, LANL, SNL, Pantex, Savannah River, PNNL, Y-12, ORNL, NFS, AMWTP Idaho, and INL. You will be asked by the course planners to provide proof of your Rad Worker II certification to allow your credentials to be accepted at DAF/NCERC.

Site Specific Information

Sandia Hands-on Training Logistics

Sandia Badge Information

If your badge has not been enrolled in the Sandia system, you **MUST** go to IPOC (Innovation Parkway Office Complex) on the first day. IPOC is located southeast of the Eubank gate. See the Sandia Maps/Directions section below for information on getting to the IPOC from the airport and within the gates.

Meet at the IPOC at 7:15 a.m. on Monday. Someone from TA-V will meet you at the entrance to assist with the badging process. You will request to have your badge put into the Sandia system. You will be asked to supply a 4-digit code to use your badge for access into limited areas.

We will then proceed to the Eubank gate. Your badge will get you through the gate. Take it out of the holder and pass it to the guard. They may check ID for everyone in the vehicle so be prepared if you have riders. Once you are on Pennsylvania, proceed until you see the sign to Tech Areas III and V. Turn right there and proceed to TA-V. The parking lot is just beyond the main double-fenced area. For those so equipped, the lat./lon. of the parking lot is 34 deg 59.959' - 106 deg 32.247'. Building 6577 is east of the parking lot outside the fence. The map labeled "Getting to Tech Area V (TA-V) from all Kirtland AF Gates" in this document shows you how to get to TA-V training building and where to park.

When we are at the critical experiment facility, we will be in a Limited Area which requires an L or Q clearance for unescorted access. The emergency plan at the reactor facilities also requires that anyone who has not been trained on emergency response for TA-V be escorted for safety reasons while in TA-V. One of the first things we will do after your arrival is to provide that training so you can have unrestricted access to TA-V.

Please see the Course Schedule for more information on dates, times, and locations for the course.

Sandia Prohibited Items

As described above, during the class, we will be in a Limited Area (LA). As at all U.S. Department of Energy facilities, each area has a long list of items that are not allowed with the LA being the most restricted. Examples of prohibited items are listed below. Please be aware that **upon entering or leaving Sandia premises, all personnel are subject to search of their persons, hand-carried items, and vehicles.**

Items that are ALWAYS prohibited at Sandia:

- Firearms
- Explosives, pyrotechnics, propellants
- Illegal drugs & paraphernalia, intoxicants
- Other items prohibited by law

Examples of items prohibited in the Limited Area (e.g. during our operations at the critical experiments):

- Personally owned electronic equipment
- Radio frequency transmitting equipment including Bluetooth devices, Wi-Fi devices, and pagers with transmitters
 - *NOTE: If you have personal medical electronic devices such as Bluetooth hearing aids, Bluetooth glucose monitors, Bluetooth insulin pumps, etc. please notify ncspteam@ornl.gov and the person coordinating access to the site.*
- Recording equipment (audio, video, data)
- Computers and peripherals
- Removable computer media
- Cell phones or other cellular network devices
- Portable electronics including hand-held computing devices
- Non-Sandia owned devices

There is a lock box just inside the front door of Building 6577 that you can use.

[Lodging and Dining in Albuquerque](#)

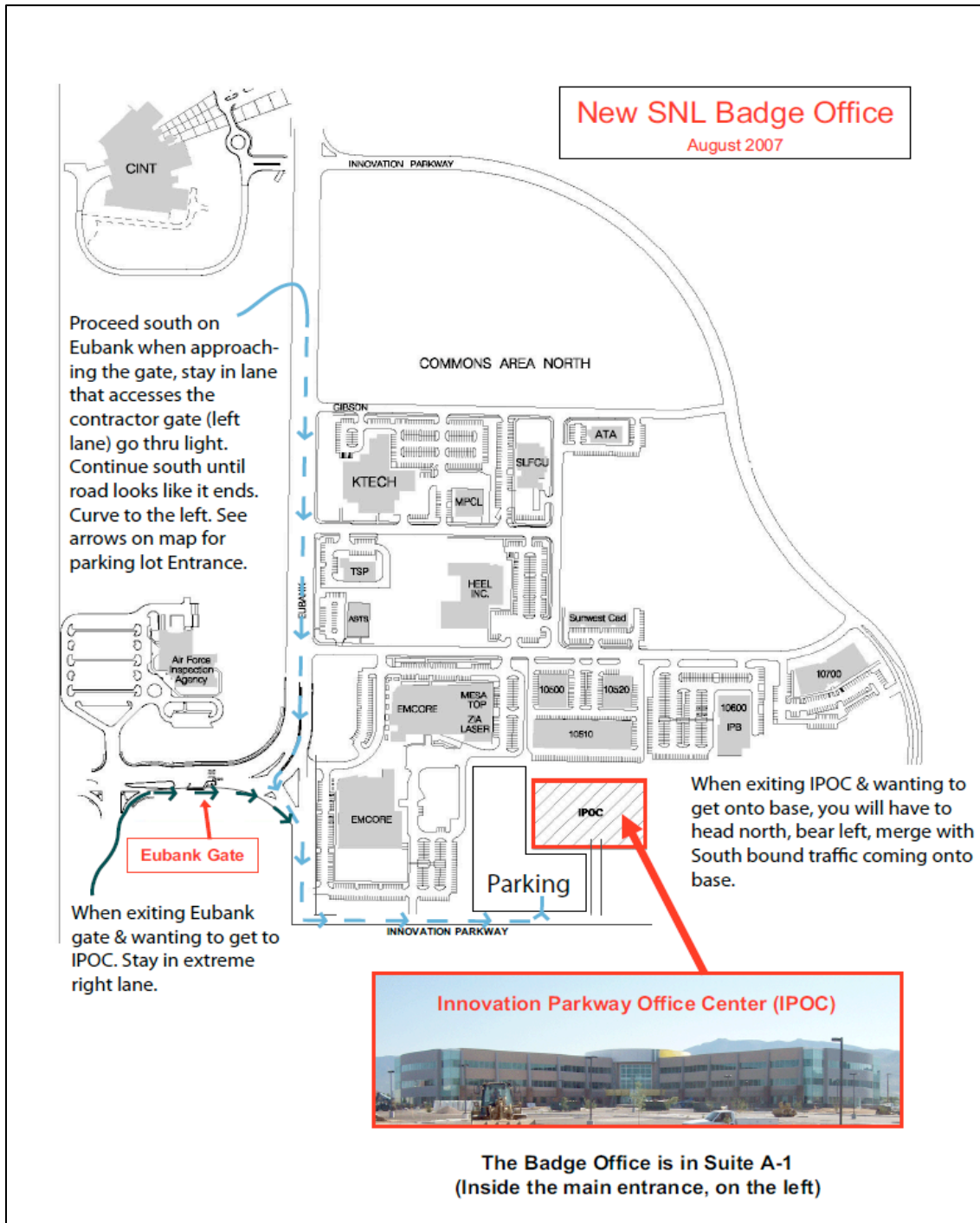
SNL is located on Kirkland Air Force Base a few miles from the Albuquerque International Airport. A wide variety of hotels are available very close to the laboratory. If you need assistance with lodging recommendations, please contact Loretta Rankin at (505) 845-9287.

Sandia Maps/Directions

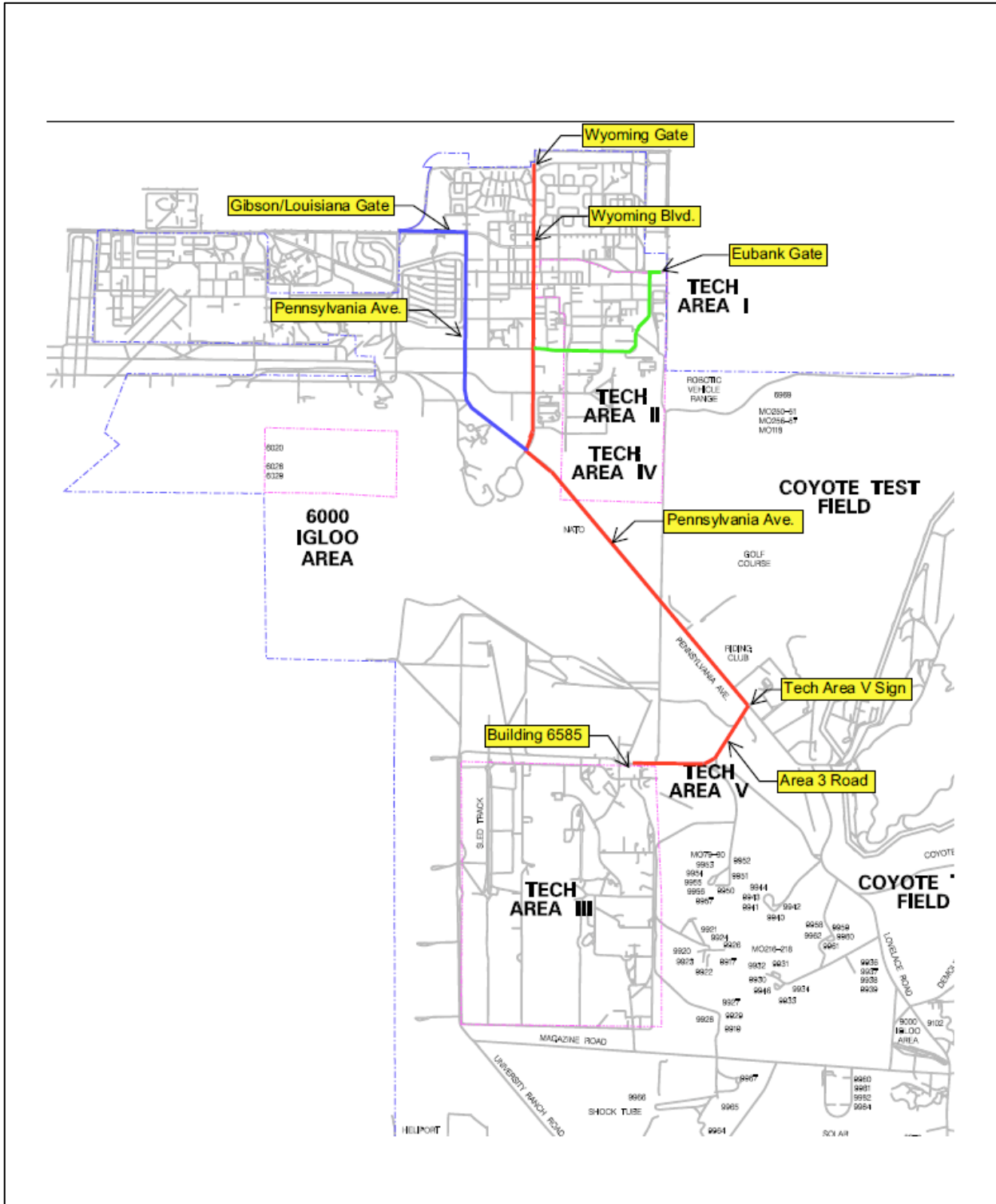
Directions to the Innovation Parkway Office Complex (IPOC) from the Airport

From the Airport, take I-25 north to I-40 east to the Eubank exit. Turn right [south] to the end of Eubank – where Eubank makes a bend to the right [west] just before the base gate. Turn left on Innovation Pkwy, the light just before the gate. The road bends left [east] and then you turn left [north] into the lot in front of the building. Look for the sign for the Sandia Badge Office.

Map of the Sandia Badge Office



Getting to Tech Area V (TA-V) from all Kirtland AFB Gates



Nevada Field Office (NFO)/Nevada Support Facility (NSF) Classroom Training Logistics

The classroom portion of the 1-week Manager/CSO Course is conducted at the NFO/NSF on the Monday and Friday. The course will be executed Tuesday through Thursday at DAF/NCERC.

Location

The address of the NFO/NSF is 232 Energy Way, Las Vegas, Nevada.

Badge Information

Refer to the DAF/NCERC Hands-on Training Course Logistics Badging Section.

Cell Phones and Laptops

Cell phones, even those with cameras, are allowed. However, no cell phones are allowed in cleared buildings or areas. Taking pictures is not allowed inside the security area.

Please bring your personal or work-issued laptop to the classroom. Before the class begins, you will be provided with material you will download to your laptop and use in the class.

Prohibited Articles

Prohibited articles include:

- Illicit drugs
- Firearms
- Explosives
- Stand-alone cameras
- Binoculars
- Spotting scopes
- Telescopes

Traveling to the NSO/NSF

Refer to the DAF/NCERC Travel Logistics Section and Maps.

DAF/NCERC Hands-on Training Course Logistics

General Information

The NCERC is a U.S. Government-owned research center located at the Nevada National Security Site (NNSS). It is operated by Los Alamos National Laboratory (LANL) for the National Nuclear Security Administration's (NNSA) Nuclear Criticality Safety Program (NCSP).

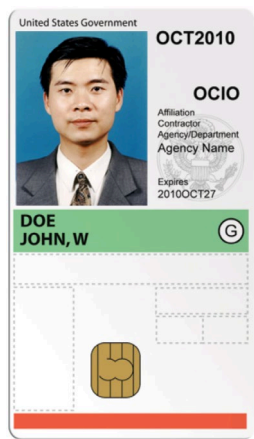
There is no cafeteria at the DAF, so it is recommended that you bring your own lunch and snacks. Refrigerators and microwaves are available in the NCERC control room along with coffee makers and water stations.

Badging

Students need to meet Tuesday morning at 7:00 am sharp at the Mercury Badge Office to allow for enrollment in the DAF security system.

The Mercury badge office (NNS) is located on Mercury highway (take the Mercury exit from US-95 N). The badge office will be on your right, just before the guard station. An escort will meet you at the badge office to assist with badging and answer any questions. Please tell the badge office that you will be going to the DAF and require a PIN number and biometrics setup. Upon completion at the badge office, the escort must call DAF Operations Control and tell them the names of the people that are coming to the DAF.

You will need to bring your HSPD-12 badge (see example figure below) with a working magnetic strip (on the back) and gold chip (on the front). Contact your badge office if you have any questions about the functionality of your badge. Your point-of-contact will let you know if any additional documentation is required.



What an HSPD-12 Badge looks like

Dosimeters and Radiation Doses

We will issue you a dosimeter on Monday morning. You must wear the dosimeter whenever you are in DAF. It should be worn above the waist with the window facing outwards. You will leave the dosimeters at DAF each night. We will collect the dosimeters on Thursday afternoon at the site. You will not need a dosimeter on Friday.

Radiation doses for the class are expected to be low. All critical experiments will be conducted in a shielded part of the facility to protect you from excessive doses. However, you will be handling fissile material, so you will receive some radiation dose. You will not receive more than 10 mrem during the entire week of the class, and your actual dose is likely to be much lower. At the end of the year, you will get a report of your dose from the NNS contractor based on your dosimeter readings.

Prohibited Articles

You will be asked daily if you have any prohibited articles by the guards at the first guard station. The following items are **prohibited** on the NNS:

- Illicit drugs
- Firearms
- Explosives
- Stand-alone cameras
- Binoculars
- Spotting scopes
- Telescopes

The following items are prohibited in the DAF:

- Weapons of any kind (includes knives)
- Key Fobs

- Cell phones (personal **and** government)
- Smart watches and fitness trackers
- Spark producing devices (Lighters)
- Personal computer equipment (including USB drives)
- Radiation Generating Device keys (XRS, Betatron, Neutron Generator)

As a best practice, minimize what you bring into the DAF. Double check your bags and pockets for prohibited items before attempting to come through the Entry Guard Station (EGS). The accidental introduction of a prohibited item can significantly impact to your visit. It is also a best practice to minimize the amount of metal you wear into the DAF. If you have items that are prohibited in the DAF, you can leave them in your vehicle or in one of the lock boxes outside the DAF EGS.

Information on Things to Bring

- Your badge! If you forget your badge, you might miss out on a day or more of the class.
- Composite safety shoes and safety glasses if you have them (not required)
- A lunch for our experimental days (Tuesday, Wednesday, and Thursday). Monday you may bring a lunch or eat in the cafeteria.
- A calculator or laptop with spreadsheet software for homework (please leave in your car if you bring it onsite)

Dress Code

We will be in the lab Monday through Thursday. You need to wear long pants and sturdy, close-toed shoes (tennis shoes, boots, or leather shoes) and safety glasses with side shields. Safety shoes are required in the DAF. You are welcome to bring your own safety shoes, or NCERC can provide safety shoe covers. Keep in mind that steel-toed safety shoes must be removed when passing through the DAF EGS. You can also bring your own safety glasses, or NCERC can provide a pair in you prefer.

Buildings inside the DAF can have large variations in temperatures. Anywhere between 55°F and 80°F is possible. It is recommended that you dress in layers for your comfort. Also keep in mind that the temperature outside at the NNSS can be extreme.

Travel Onsite at NNSS

The last section of this guide includes maps of the NNSS, Mercury, Las Vegas (to locate the Nevada Support Facility), and of the Nevada Support Facility. Most digital maps will not provide directions from Las Vegas to Mercury, NV. You can look for directions to Indian Springs, NV, and continue on US-95 N through Indian Springs for ~19 miles to the Mercury highway exit. Take this exit, and you should see signs notifying you that you are entering the NNSS. Travel Onsite at NNSS

After the badge office, drive through the guard station on Mercury highway. Continue driving through Mercury Base Camp toward the forward areas. The DAF is a large white building that is ~25 mi (25 – 30 min) past Mercury that will be on your left. Unfortunately, the DAF access road is not well marked, so keep an eye out. If you are heading to another NCERC facility, please follow your escort or the directions provided by your point-of-contact.

The NNSS has many interesting sites scattered throughout the desert, but as a visitor, you are not allowed to drive around site seeing. Please only drive to and from the NCERC facility you are visiting. Do not attempt to drive off-road, and do not pick up anything on the site to take for a souvenir.

Obey all posted speed limits on the NNSS. The highways on the NNSS are patrolled by the Nye County Sheriff. They are authorized to issue citations for speeding.

There is also a lot of wildlife on the NNSS. Do not disrupt or feed any of the wildlife. If you happen to see a desert tortoise in the road, wait for it to cross (picking them up can cause them to urinate and dehydrate themselves).

DAF/NCERC Travel Logistics

Travel Information to Las Vegas

The closest airport is Las Vegas Harry Reid International Airport (airport code LAS). You will need to fly in on Sunday (the day before the course starts) as the course will begin early on Monday morning. The course will conclude around 1:00 pm on Friday.

Travel Information to the NNSS (DAF/NCERC) from Las Vegas

Travel to and from the NNSS and NCERC are not provided. A personal or rental vehicle is required. Visitors may carpool if they wish.

The commute between Las Vegas and NNSS is quite long and has spotty cellular coverage, so plan accordingly. Monitor your fuel level during your commute, as no fuel is available after you leave Indian Springs. A best practice is never let your fuel level go below 1/3 of a tank of fuel available.

Indian Springs is a small town between Las Vegas and NNSS (across from Creech Air Force Base) and the speed limit drops from 70 to 45 mph. Many people visiting the NNSS have been pulled over for speeding through this town, so keep an eye on your speed.

Rental Car Information

The rental car facility is offsite from Harry Reid International Airport, so you will need to take a free shuttle. The shuttle picks up outside the doors of baggage claim, there are signs leading to the pick-up location.

Lodging Information

Las Vegas is usually the lodging location of choice for visitors to the NNSS. There are a plethora of hotels, entertainment, and dining options to choose from in Las Vegas. Many of the hotels offer rates below per diem although some do charge add-on “resort fees” which may or may not be reimbursable by your travel department. The travel time from your hotel to the DAF varies depending on where in Las Vegas you stay. Below are some commute estimates, this is for the early morning when there is little to no traffic. Expect the times to be longer on the trip back to Las Vegas, especially if you decide to stay on the Strip.

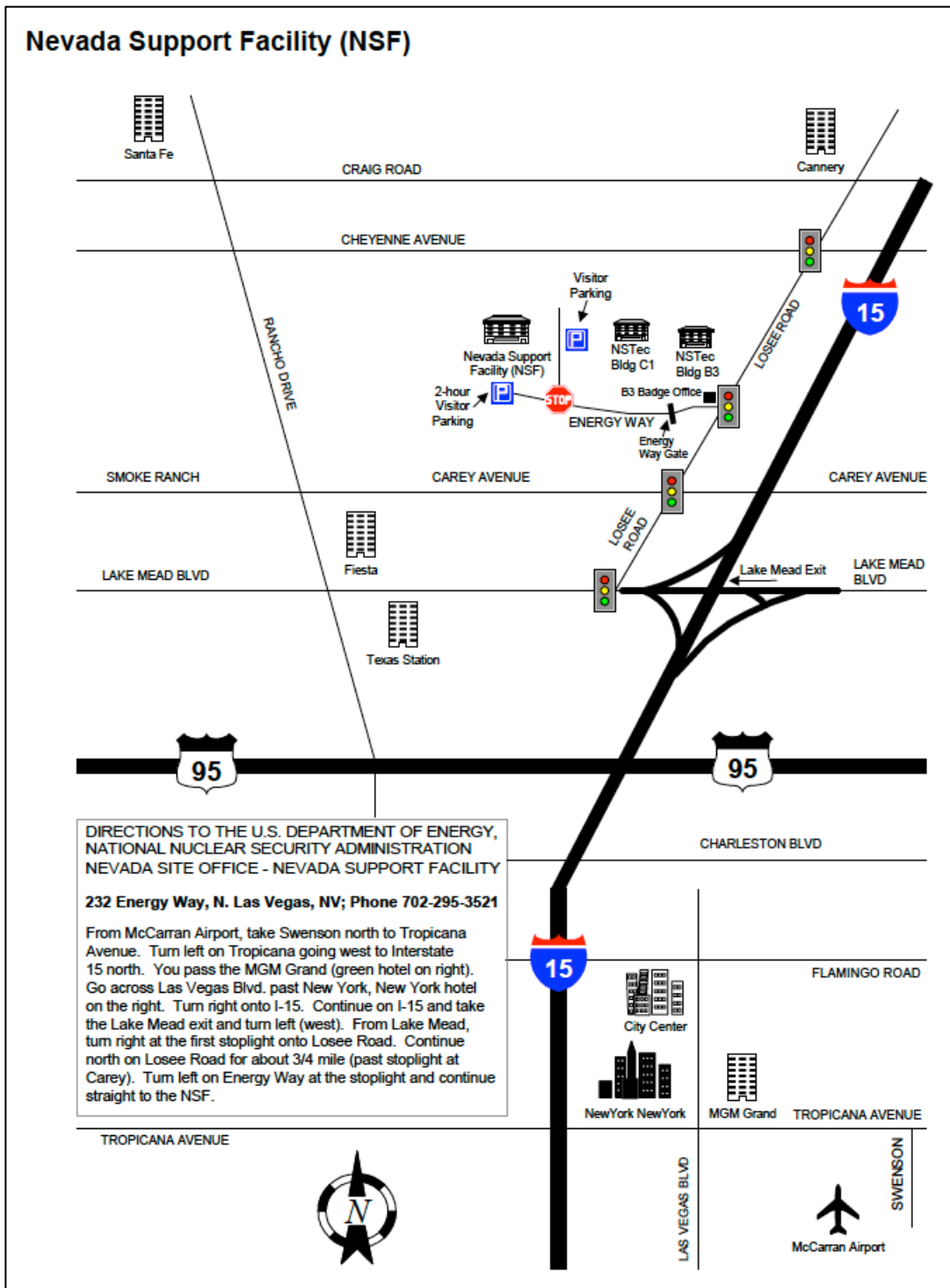
- Las Vegas Strip (Las Vegas Blvd.): Travel time to Mercury is ~75 min and to the DAF is ~100 min.
- North Las Vegas: Travel time to Mercury is ~65 min and to the DAF is ~90 min

The NNSS does have dorm rooms available in Mercury. The rooms are standard motel-type rooms with internet access and cable TV. The Mercury cafeteria is the only option for onsite dining (cafeteria hours are listed below). With your badge, you can freely leave the site 24 hours a day and emergency medical services are available. Rooms are \$40 per night. Email nssshousing@nv.doe.gov if you wish to book a room at the dorms.

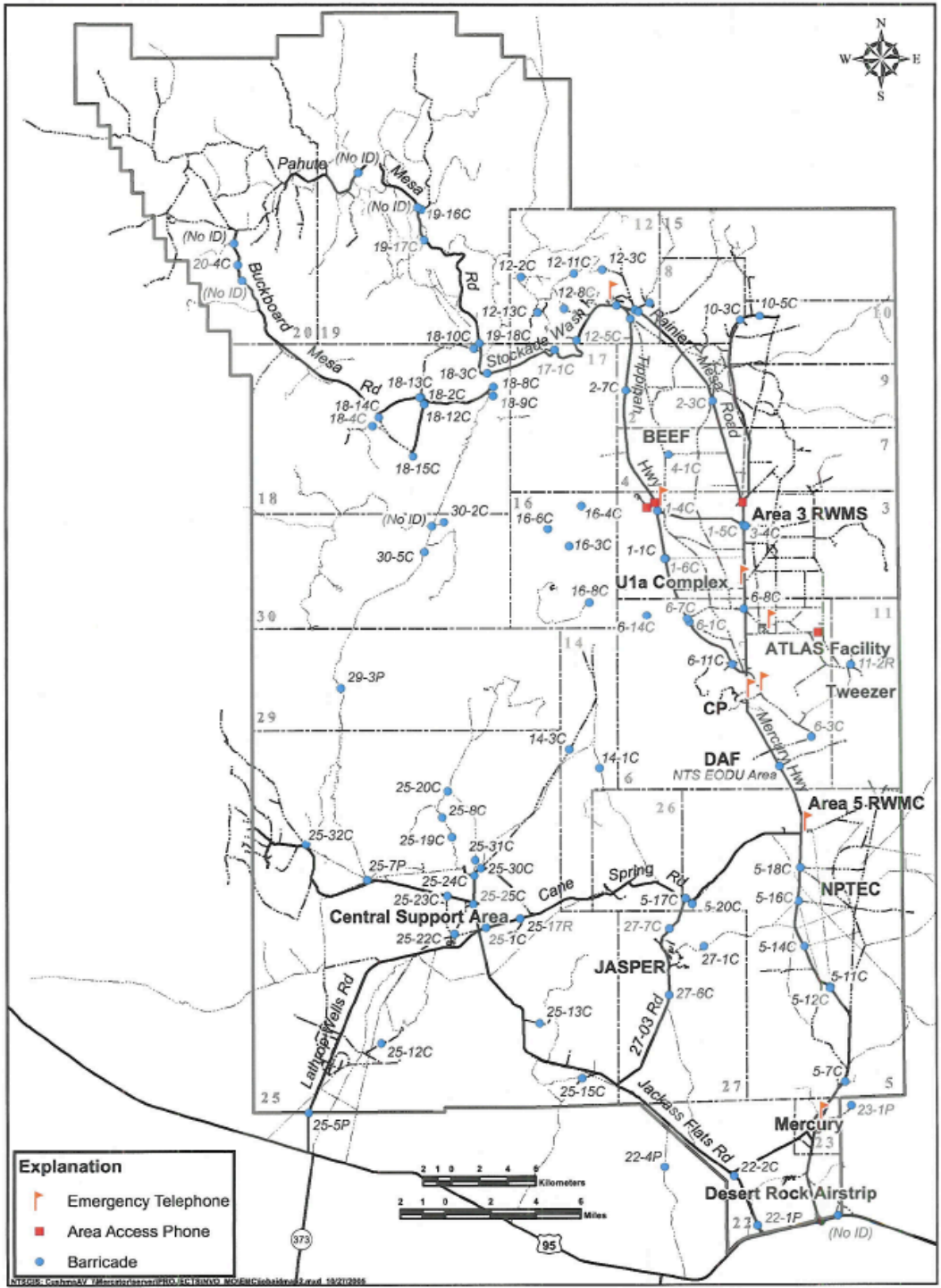
- Breakfast (M-Th): 0530 – 0730
- Lunch (M-Th): 1045 – 1300
- Snack (M-Th): 1330 – 1530
- Dinner (M-W): 1645 – 1900

Maps of NSF/NSO, NNSS, DAF/NCERC and Mercury

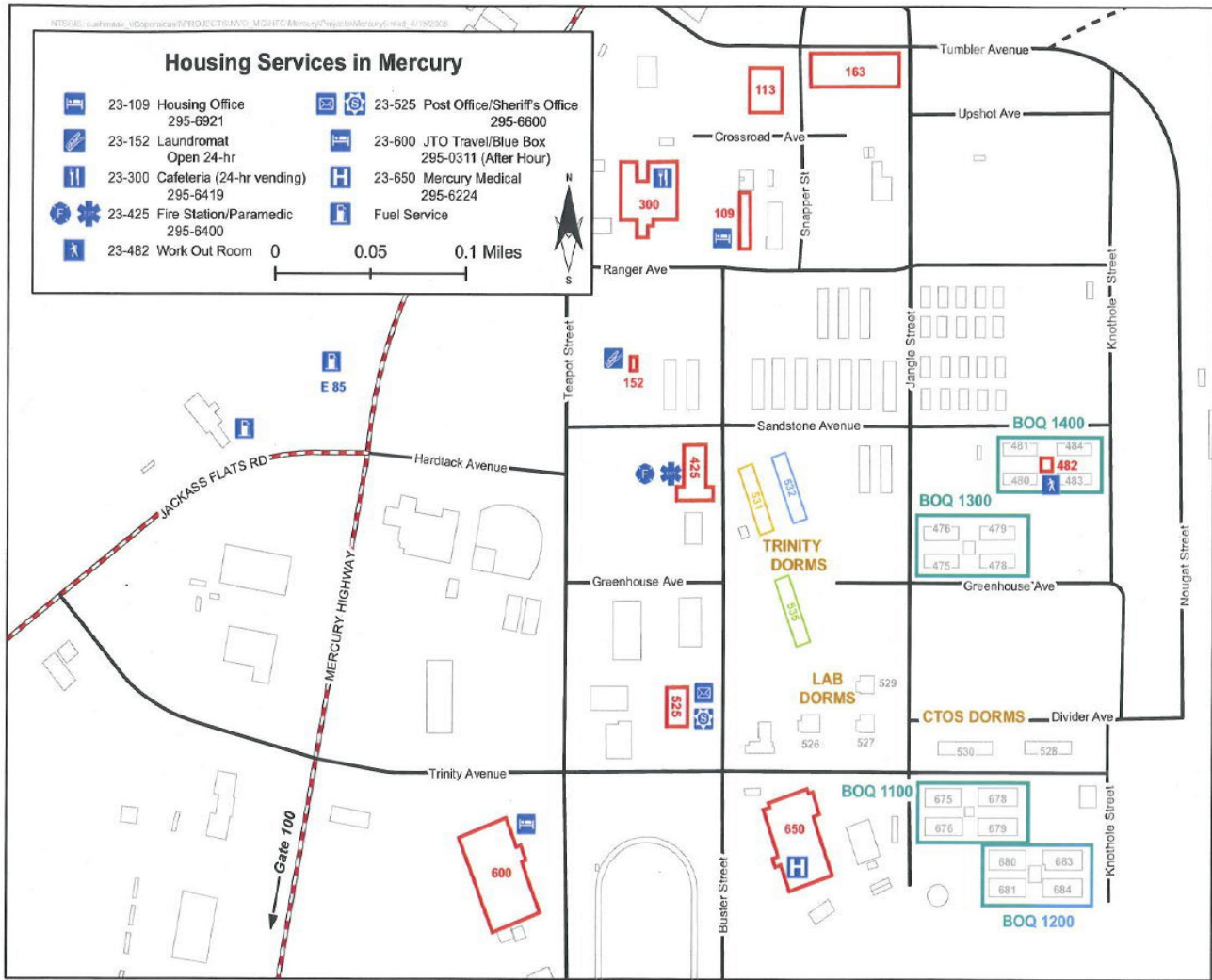
Las Vegas (shows Nevada Support Facility (NSF))



Nevada National Security Site (NNSS) Map (Mercury and the DAF)



Mercury



Nevada Support Facility (NSF)

