

Navy Drug Testing Labs

Standardization, certification ensure quality of testing

From Navy Drug Screen Lab Jacksonville

NAS Jacksonville is the home of one of three Navy Drug Screening Laboratories (NDSL). The others are located in Great Lakes, Ill. and San Diego. These labs support the Navy's "Zero Tolerance" endeavor by providing legally defensible and scientifically accurate testing of service member urine specimens for the presence of controlled substances and illegal drugs.

Each specimen is collected and processed using standardized procedures ensuring uniform testing principles regardless of which laboratory performs the analysis. Standardization of testing procedures also allows the efficient processing of specimens - an important consequence of the Navy's Drug Testing Program when considering that the NAS Jax drug-screening lab processes approximately one million urine specimens annually.

Despite the large numbers and necessity for reasonably quick turn-around time for reporting results back to commands, laboratory officials are uncompromising regarding the forensic integrity of the testing process.

When the laboratory reports a specimen has tested positive, the lab is confident the results will withstand both legal and scientific challenge.

This confidence stems from the constant examination and review of the testing process. For example, each laboratory's processes and performance are inspected and reviewed three times a year by civilian and military experts in the fields of toxicology and forensic drug testing.

Additionally, each laboratory must undergo a rigor-



Bobbie Long
pours urine samples
into tubes for testing.

ous annual certification process conducted by the Armed Forces Institute of Pathology (AFIP). The AFIP, a world-renowned scientific institute and home of the Armed Forces Medical Examiner, provides quality assurance and quality control support to all DoD certified drug-testing laboratories.

This support is evidenced in many unique ways. First, the AFIP monitors the testing performance of each of the laboratories by sending monthly "urine challenge sets."

These control specimens are meant to test the labs ability to properly identify a drug or drug metabolite in addition to accurately measuring the compounds concentra-

tion.

The AFIP also sends the labs test specimens disguised as service member samples (blind) complete with appropriate packaging and chain of custody documentation. The laboratories report the test results of these fake member specimens and AFIP monitors the results. Since the inception of this program in the 1990s, the laboratories have never reported an AFIP negative specimen as "positive."

The testing process at the laboratories begins when service member urine specimens arrive at the laboratory. The specimens are collected via direct observation by trained urinalysis observers in the commands and are delivered to the laboratory by all practical means.

"We accept samples from the U.S. Postal Service, FEDEX, UPS, DHL and all other mail courier services," said Lt. Cmdr. Darryl Arfsten, executive officer of NDSL Jacksonville, "We will even accept walk-in deliveries as long as the specimen is properly packaged and sealed."

Specimens arriving at the lab are inspected for container damage or evidence of tampering. "The packages are inspected with particular attention to the condition of the box seals," Arfsten explained.

"The seals should be intact with the command's Urinalysis Program Coordinator's (UPC) signature printed across the taped box seams," he stated. "If the seals have been broken or the UPC signature is missing, the lab reports those discrepancies back to the originating

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command and depending on the severity of the discrepancy, decides whether or not to test the sample. The lab makes every effort to test all specimen arriving at the lab even those with discrepancies."

After the package has passed this inspection, the lab technicians unpack the urine specimens and carefully check that all bottles in the box correspond to the sample entries written on the accompanying chain of custody form (DD 2624). The bottles are then removed and inspected with the technicians noting any specimen container issues, such as broken bottle tamper evidence seals, missing, incorrect or incomplete social security numbers on the bottle labels or DD 2624s, leakage of urine, etc. "Basically this means any error or irregularity that deviates from what is expected," noted Arfsten.

Important to this process is the careful recording on chain of custody paperwork, by the laboratory technicians, of all inconsistencies observed. "Everyone who touches the specimen and everything that is done to the urine is recorded on chain of custody forms, all the way from the means of shipment and date the specimen arrived at the lab, tests performed, disposition of the specimen after testing, etc.," stated Arfsten.

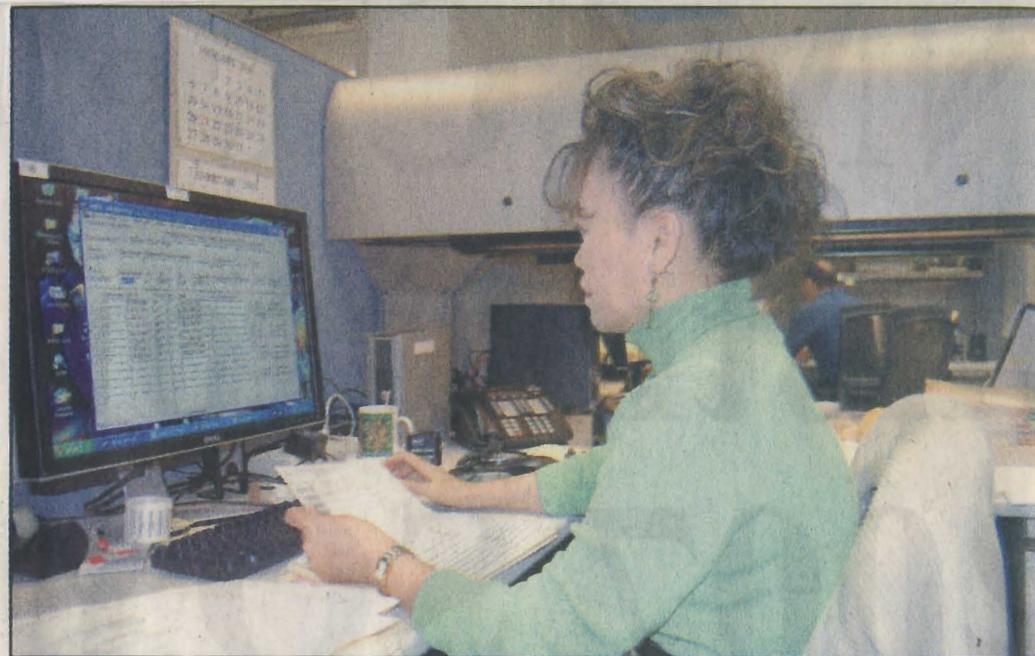
After the specimens are unpacked and inspected, the lab technicians assign a laboratory accessioning number (LAN) to the member's urine specimen. The LAN is a unique identifier, in bar code form, that corresponds to the members' social security number, local batch number assigned by the UPC and the date the urine was collected at the command. Identical LAN labels are affixed to a test tube and the chain of custody form. The technician then pours a small portion of the member's urine into the test tube.

"The technician opens and pours only one service member's specimen at a time," said Dr. Jim Evans, technical director of NDSL Jacksonville.

After pouring the urine specimen, the technician caps the member's specimen bottle before pouring the next urine specimen into its corresponding test tube.

Urine specimens are then screened, on a high-speed clinical analyzer, for evidence of specific types of drugs. All service member specimens are screened for the presence of marijuana, amphetamines and methamphetamines, cocaine and heroin. A portion of all specimens submitted for testing are also screened for the presence of PCP, codeine and morphine, oxycodone and oxymorphone.

For a specimen to screen positive, the drug amount has to be present at a concentration that is equal to or higher than the cut-off value established by the Department of Defense (DoD). Urine controls, prepared by the laboratory with known concentrations of drug, are tested before and after the member samples and must give the expected results to accept the screening run. Specimens that do not contain evidence of drug at concentrations at or above the DoD cut-off are discarded and a negative result reported back to the command. "About 99 percent of all specimens submitted to NDSL Jacksonville screen negative in the initial screen and are reported as such back to the command," continued Evans.



Roslyn Quiles enters all the names and social security numbers of every sample that enters the lab into the computer. "No one ever realizes it, but half of the screening process is entering all the information into the computer," said Navy Drug Screening Lab Jacksonville Executive Officer Lt. Cmdr. Darryl Arfsten.



Stedra Stillman squirts methanol into the positive urine samples to separate the drugs from the urine.

If a specimen screens positive in the initial test, technicians go back to the service member's bottle and pour another portion of the specimen into a new test tube labeled with the same LAN. The specimen is then tested again, using the same technology as the initial test, with the exception that test tubes containing water are placed between specimens to detect possible drug "carry over contamination." "Carry over is theoretically possible when a specimen containing a high concentration of illicit drug or metabolite becomes coated with some residual drug and passes some of the drug from the high concentration sample to the next in line on the screen analyzer," said Arfsten. "This is very rare and is easily detected if the drug is present in the tubes of water. In those cases, we will retest the member's specimen that follows the contaminated water blank by going back to the member's specimen bottle, re-pouring a new portion of urine and incorporate the new tube into a test not containing the specimen with the high drug concentration."

At the completion of the screen and rescreen, the analytical results undergo extensive review by drug testing experts. If the specimen is negative in the rescreen as with the initial screen, the specimen is reported as a negative back to the originating command. If the specimen is positive, technicians go back to the service member's bottle and pour another portion of the original specimen into a new test tube labeled with the same LAN.

The specimen is then analyzed for the specific drug in a third confirmatory test by chemical extraction and gas chromatography-mass spectrometry (GC/MS). "GC/MS is the gold standard in forensic urine drug testing," explained Evans. "GC/MS identifies a drug by its chemical and molecular properties that are unique to that drug. The concentration of drug is also determined in the confirmatory process."

Interestingly, detecting the mere presence of the drug in urine by GC/MS does not satisfy the DoD criteria for calling a drug specimen positive. "The amount of drug in urine has to equal or exceed the DoD cut-off concentration for the specimen to be considered positive," added Arfsten. "Even then, the specimen must have tested positive in all three tests (screen, rescreen and confirmatory) and passed scrutiny in numerous reviews by drug testing experts prior to being certified as a positive result and reported to the originating command." This certification, which is made by a senior chemist, is the final seal of approval necessary prior to reporting the specimen as a positive. If the final certifying official has any doubt as to the accuracy, scientific validity or legal defensibility of the test results, the specimen is reported as negative in favor of the service member.

Despite ongoing outreach by the drug labs to inform service members about the drug testing process in the DoD, it appears that not everyone is getting the correct information. "There are many drug testing myths that persist," stated Lt. Cmdr. Tom Bosy, commanding officer of NDSL Jacksonville. "Two such myths are that the service member specimens are only screened for a single drug or that member samples are pooled with the analysis conducted on this pooled urine."

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QM2
Nicole
Beatty



Lynne Freeman checks the labels and puts them in numerical order.

Another misconception is that over-the-counter (OTC) cold medicines can cause someone to test positive for amphetamines or other drugs screened for by DoD. "In some cases taking large amounts of OTC cold medicine may cause a specimen to be presumptively positive in initial screen tests because the screening tests, while very sensitive, are somewhat less selective with chemicals found in cold medications as they have chemical structures similar to amphetamines or methamphetamine," explained Evans. "However, these specimens are negative in follow-on confirmation analysis by GC/MS because GC/MS is able to discern the structural difference between the OTC chemicals and illicit drugs tested for by the DoD."

Another common misconception is that someone will test positive for marijuana, simply by being next to someone who is smoking marijuana. "Passive inhalation of marijuana smoke which results in a positive urinalysis is highly unlikely, but possible," confirmed Arfsten. "Experiments with humans have shown that under extreme exposure conditions produced in a laboratory setting, it is possible to have a level in urine that exceeds the DoD cut-off concentration. However, marijuana smoke concentrations necessary to produce these results were very difficult to achieve."

One myth that has some truth to it is that the ingestion of poppy seeds can lead to a person testing positive for morphine. "Is it possible? Yes," admits Arfsten. "But it's highly unlikely because you'd have to ingest a very large amount of poppy seeds to cause a positive result."

But, as noted by Bosy, it is not up to the drug testing lab to determine if a positive drug test result is due to intentional illicit drug use or environmental or unknowing exposure. "When the lab reports a positive result to a command, the lab is confident that the results are scientifically accurate and legally defensible. Having said that, it is ultimately up to the commanding officer to determine how the member came in contact with the drug and how the drugs got into their urine specimen," he said. "The experts at the lab can assist as consultants when presented with scenarios whether feasible or not that the service member was exposed unintentionally to certain drugs."

There are times when drugs in a service member's urine specimen are due to ingesting prescription medications for treatment of a medical condition. A review of the member's current prescriptions by laboratory experts can assist the command in making a determination of whether the member's use of the drug could be excused.

The downward trend in the number of positive drug test results reported by the NDSLs per year seems to suggest that the Navy's Drug Testing Program is having its intended effect of deterring illicit drug use. The positive drug rate has decreased from 7-10 percent in the early 1980's to less than 1 percent today. Whether the decrease is a result of less drug use by service members or better tactics used by drug abusers to reduce their chances of testing positive, is not known.

Navy biochemists at NDSL Jacksonville have total confidence in the ability of the drug laboratories to produce accurate testing results. "People forget that Navy biochemists are Medical Service Corps officers and have to submit to random drug testing just like everyone else in the Navy. The biochemists here are required to send their urinalysis samples to NDSL San Diego. We have full confidence that our specimens will be tested with the utmost care, forensic integrity and scientific accuracy," said Lt. Arman Ghodousi, director of operations of NDSL Jacksonville. "We work with the process every day, and believe me, the system is one of the best in the world."



Sonny Cole uses the GC/MS to determine which drugs and how much of those drugs are in the positive urine samples.



Phil Murray examines and stamps the DD 2624, the paperwork that accompanies the urine samples at the Navy Drug Screen Lab Jacksonville.