DRUG TESTING ADVISORY BOARD

OPEN SESSION

December 12, 2006

Agenda Item: Welcome/Roll Call/Opening Remarks

MR. STEPHENSON (Chair): I would like to welcome you to a long overdue open session of the Drug Testing Advisory Board. This is our first opportunity to get together since we are in a new fiscal year and have had the funds to actually be able to travel the members of the Board and we hope that today is a lot of good information in terms of the handouts and the wall posters and the availability of some people to talk about issues that are on those posters during the breaks.

If you are a member of the public and would like to make a public comment, please sign up. We will allocate the available time among those individuals who have an interest in making a public comment.

DR. BUSH (DWP): Just to follow-up on what Bob said, we do plan to have four Drug Testing Advisory Board meetings this year, that is what we have always had, we have been able to accommodate it with budget allocations and finances in the past, its worked well for us and our charter allows that and states that clearly, so subject to availability of funds we are planning those four meetings. It was interesting that after the March meeting last year, remember our fiscal year starts October 1 so we convened a face to face December meeting, successfully convened the March meeting, that was fine, and shortly thereafter that is when we found out that was it, that was all the money there was, so we didn't even get a chance to talk to folks about that when we had convened at that March meeting. Stay posted and we will get the word out as things go along.

The Drug Testing Advisory Board charter has been renewed. It was renewed on June 9, 2006, along with the other SAMHSA National Advisory Councils. The Board charter expires June 15, 2008. That is the term of the charter. The charter is on our website and there are a few copies back there at the table should you wish to pick up a paper copy.

We have two new Board members. Two of our previous Board members, Dr. Reed and Dr. Fochtman, terms ended this past October. We are in the process of getting two new Board members. They are not sitting at the table today with us because the paperwork is not yet done that gives them the honor and privilege of being a special government employee and traveling under our travel orders and then representing the government on those days that they serve on the Drug Testing Advisory Board. I'll give you their names. Dr. Louis Baxter is one of our new Board members and Dr. Robert Turk is the other one. They will be at the table the next time we meet, paperwork always takes, no job is finished until the paperwork is done, that's just the way it is.

Note: There was a roll call for the Board members sitting at the table.

Agenda Item: HHS Update

DR. BUSH: Concerning the status of the Guidelines, back on April 13, 2004, the Department of Health and Human Services issued two Federal Register notices. One of

those notices was a revision to the existing Mandatory Guidelines for Federal Workplace Drug Testing Programs that encompassed much more detail in that Federal Register notice concerning specimen validity testing.

Slide 1 – Final Workproduct Withdrawn from OMB on June 30, 2006

The second notice, issued on the same day, was a proposal for a revision to the Mandatory Guidelines which included proposals on using alternative specimens for drug testing, specimen validity, testing for each type of specimen proposed, point of collection testing proposed for urine and oral fluid, proposed the establishing of cutoffs for the alternative specimen drug testing, and cutoff changes for some of the urine drug tests. This notice was issued on April 13 and was open for public comment for 90 days. We had 285 commenters, this is pretty much a review of the history, we received many, many comments from each of those commenters so it summed up and data based out to more than 2,000 comments.

Slide 2 and Slide 3

If you go to the URL that is mentioned there on the slide, I will read for the record, http://www.reginfo.gov/public/do/eohistreviewsearch, if you go to that website, under the first field you click on executive order reviews completed, choose Department of Health and Human Services, select calendar year, that is our current year, soon you'll have to click on 2006, and then click on submit, scroll down the page, and SAMHSA because it's listed alphabetically SAMHSA is at the very bottom of that page, and you will see that on June 30, 2006, a final rule that was submitted for review was withdrawn. That is all we can say about that at this time.

MR. STEPHENSON: The bottom line here is that it was the proposed final rule that was withdrawn, not the proposal and not the underpinning architecture together with the body of public comments that was withdrawn, it was simply a final work product that was at that point. Because we are where we are in the process there is really nothing else we can say at this time.

DR. BUSH: I would like to reiterate the proposal stands as it is, it is out there alive and well as published on April 13, 2004.

Something else has happened since we last met. Our Federal Custody and Control Form has been reauthorized for use, it is OMB approved until September 30, 2009. A link to that notice is on our workplace.samhsa.gov website. It is interesting that it sounds so simple, the custody and control form has been reauthorized, but when we submit information to OMB for them to entertain and discuss with us the reauthorization of the use of this form, it is not just the form that they are looking at, they are looking at sections B and C in the laboratory inspection checklist, this is information that upon inspection time laboratories are asked to provide to the program for evaluation. The most basic of forms, the laboratory application to even become certified, be evaluated to become certified, is part of this document package, and these are part of the package because we are asking the public to provide information and we have to quantify in some measure the response and the amount of time it takes to complete those forms. The form is really DOT and HHS, DOT federally regulated industry programs and HHS Federal employee drug testing programs that use this form.

There have been no changes to this form, no changes to the information that was requested by and from OMB. We do allow and have to report to them our efforts in stepping into a more electronic format and we do that as part of our presentation package to OMB. The form is still a paper form and will continue that way for the foreseeable future, still a 5 part form, no different than it was before.

Bob referred to some posters, some presentation materials that we have placed on the walls, taped on the walls. These are posters that have recently been presented by authors, by first authors, second authors, staff, who attended the Society of Forensic Toxicologists meeting, their annual meeting that was held in Austin, Texas, in October. Because the subject matter is of interest to members of the public attending this meeting, we took the opportunity to hang up the posters and provide you copies of those materials. I will read you the titles.

Evaluating Workplace Drug Testing Results From a Member Review Officer Data Source.

Preliminary Observations of the NLCP Oral Fluid Pilot Performance Testing Program, Confirmatory Analysis of THC, Opiates, and PCP.

Preliminary Observations of the NLCP Hair Pilot Performance Testing Program Part II, Confirmatory Analysis of Opiates, Phencyclidine and Marijuana.

Influence of Basic pH on Federal Regulated Drugs in Urine at Room Temperature.

We plan to have program staff at the posters, just like we do at the Society of Forensic Toxicology meeting, program staff at the posters during breaks and on occasion to be able to speak with you about those posters. There is a lot of information on them and discussion is a good thing.

Agenda Item: Department of Transportation (DOT) Update

MR. ELLIS (DOT): I am representing the Office of Drug and Alcohol Policy and Compliance in the Office of the Secretary of Transportation. This group has asked me to provide a brief update in terms of what's happening at the Department as far as our testing program is concerned.

The Department currently oversees through its various agencies testing program that involves somewhere between 10 and 12 million regulated transportation workers and involves probably somewhere around 675,000 to 700,000 regulated employers. Obviously we have a fairly important stake and continue to rely on our friends and colleagues at the Department of Health and Human Services, SAMHSA, for the certification of laboratories which is obviously a very critical element in our program. We also rely on HHS to establish for us for our testing program the scientific and technical issues regarding the drugs we're testing for, cutoffs, and the laboratory analysis itself. Consequently our interest is there and continues to grow.

We do want to express our thanks for this invitation from Bob and Donna and the staff, we appreciate and value the spirit of cooperation and integrity shown by HHS in its assistance to our program and in the quality and credibility of the laboratory certification process. We always continue to be grateful as well not only to Donna's group, but also to RTI in the investigation of laboratory issues as they come up in our program. Again, thanks very much for your continued invitation and thanks very much for your continued support of our program.

Most of the things I am going to talk about today, probably no dramatic new news but just as kind of a reminder of what has been happening with us. Most of

you are aware that last June we lost the director of our office, the Secretary's office, our office, the Office of Drug and Alcohol Policy and Compliance, are the stewards of 49 C.F.R. Part 40, which established collection, laboratory, medical review, substance abuse professional standards for all the DOT agencies and the testing of their regulated employees.

Our director, John Bobo was promoted by then Secretary Manetta to be deputy administrator for the Research and Innovative Technologies Administration, that was a great thing for John, we were very sorry to lose him, and now John is of course the acting director of that important agency. In the interim, until a new director is appointed, our deputy director Jim Swart is now acting as the Acting Director of our group.

In terms of an update on some of the things that have been going on in our office, most of you are also aware that last December 2005, we closed our Notice of Proposed Rulemaking period of comments on our urine specimen validity testing rule. Unfortunately we have been unable to yet publish a final rule and our ability to close out this very important regulation is right now being held up by the Continuing Resolution and budget issues. We do rely to some degree on expertise and consultants and right now, in the evaluation of comments, and right now that's being held up pending the budget issues. As soon as that gets resolved in hopefully the spring we will be able to go to closure with our final urine specimen validity rule.

Most of you are also aware that we had a new regulation on adding marriage and family therapists to the groups of individuals who can provide substance abuse professional or SAP services, that was effective September 22, 2006, and added a valuable group of professionals to those who are credentialed or licensed and perform SAP services.

We are also in the process of finalizing an interim final rule, there is a new breath tube in our alcohol testing program that's been approved by the National Highway Transportation Safety Administration, or NHTSA, to be put on their screening device conforming products list. Our regulations require not only that it be published by NHTSA on its list but we also have to ensure that our regulation, 49 C.F.R. Part 40, contain regulations on its operations. We are in the process of establishing those regulations to ensure that when the device is put on the conforming, finally put on the conforming products list by NHTSA, when that's finally published that we will in fact also either before or soon after have regulations for its use in the industry.

Other than that, I do not have a lot to report other than to remind everybody that to get on our email automatic notification list you can find that on our website, www.dot.gov/ost/dapc, and there is an opportunity for you to sign up to get automatic email notifications and be kept up with what the latest is as far as DOT is concerned.

Agenda Item: Nuclear Regulatory Commission (NRC) Update

MR. McCUNE (NRC): Greetings from the Nuclear Regulatory Commission. By contrast of our DOT friends to put our program in perspective at last count we had approximately 102,000 employees subject to our 10 C.F.R. Part 26 fitness for duty programs which is roughly five orders of magnitude less than the number of companies that the DOT has subject to theirs. Nevertheless we take the business of making sure that those who are operating nuclear reactors very seriously.

When you law saw your NRC friends we were toiling away with our update, most recent update to 10 C.F.R. Part 26 in over two decades primarily due to the

excellent advice from the Drug Testing Advisory Board and the science and assistance from our HHS friends. We have incorporated specimen validity testing which we feel is primarily in the area of drug and alcohol testing, the major thrust of the program. Currently the schedule is to have the final rule to the commission within a few months, Ms. Barnes unfortunately could not make it, she has been embroiled if you will in some last minute tweaking of the rule.

One of the things that is new primarily because the NRC is building nuclear reactors, many of you have heard, for the first time in several decades. The technical staff came to wonder what kind of drug and alcohol testing program should there be for those sensitive employees who are constructing nuclear reactors. I will be very frank to mention that at the outset and it continues to this day the industry perspective is that until nuclear fuel resides on site there really isn't the safety concern or security concern.

The technical staff in the Office of Nuclear Security and Incident Response, including myself, believe that there are things that an adversary could do during the construction process, before fuel arrives, that could be exploited after the reactor is fully built therefore providing some sort of a vulnerability. This has been a very contentious issue, right now we're focusing on what requirements should apply to what employees at what time. The concept that we came up with that has been rolled out in numerous public meetings is along the lines of those who are security forces, QA personnel, and other supervisors in sensitive positions would be in a full-up fitness for duty program and they would be responsible for observing others. But I will tell you that I'm not sure that that will ultimately be how the requirements in our Subpart K Fitness for Duty for Reactors Under Construction ultimately pans out.

This is primarily due to the fact that most of the thinking in the NRC is along the lines of probabilistic risk assessment outcome to any possibility of resultant reactor core damage. Given that there isn't a reactor core on site obviously until fuel arrives the analysis set that is inherent in the NRC process is really not applicable in this case and so we're working to try to come to a reasonable agreement whereby we can show adequate protection during the construction of nuclear reactors in such a way that it's not overly cumbersome to the general public and the utility community.

Switching to our fitness for duty data reporting update we have a requirement in the current 10 C.F.R. Part 26 that licensees will report twice a year with their drug and alcohol testing rates positives by difference categories of workers. Obviously they're aggregated so that we don't run into any privacy issues. The rates for marijuana positives has remained stable, that is to say that within the last decade that testing rate has comprised 45 to 55 percent of all drug positives and so we really don't see in this latest round of reporting any statistical anomalies.

We are trying as we briefed last time in March of this year to transition from a hard copy data reporting system whereby licensees send us letters with up to 20 pages of tables to a web based data reporting system that would be not only less cumbersome for the industry but would also be much less cumbersome for the NRC staff. We have purchased two servers, we are at the point where within the next 4 months we should have certification from our Office of Information Services and so we expect within the next year that the NRC will transition to a web based reporting system.

Agenda Item: Department of Defense (DOD) Update

COL SHIPPEE (DoD): As most of you know DOD runs its own testing program, we do

not come under DHHS as far as cutoffs, we have the luxury of doing observed testing therefore we don't have to go through the validity hoops that you all have to do in the civilian testing.

We have 6 drug labs that we run within DOD, there are 2 Army, 3 Navy, and one Air Force that I oversee. We have made these joint DOD testing laboratories, we have standardized across the board, this has been an effort that's been ongoing for years. We have reached the final vision this year, we are actually moving different services within the labs, in fact LCDR Dave Lesser who is in the audience here, Navy Commander just took over the Army Ft. Meade lab. I see this as critical to getting the most out of the taxpayer's money of moving further to make these labs a true DOD asset.

Again, they do about 4 million specimens a year on the military side, deployment we have been pleased to see less than one percent positive. We are testing about 35 percent, it's a challenge particularly with the Army and the Marines to do their testing but as a Vietnam Vet it gives me comfort to see the ground commanders take drug testing very serious.

If you look at the history, 1972, the DOD ran an amnesty program, 16,000 Army soldiers came forward with a heroin problem. Could you imagine if we had that problem in Afghanistan where they are knee deep in heroin now? There is no doubt about it that DOD testing program has proven to be a combat enhancer.

On the civilian side we have about 130,000 testing designated positions. About ten years ago the decision was made to bring that in-house. I was commanding Ft. Meade at the time, boy was I naïve. It has been a painful process because that is the only laboratory in the country that holds dual certification. Those of you that run labs, imagine running two labs in one building, they come under two different regulatory rules. I think computers allow us to do some of that, there's different cutoffs being run in the building, different internal standards, its been a challenge. They get inspected five times a year, three DOD and two civilian, probably the most observed lab in the country.

We're looking at three, four new initiatives I guess you'd say. We're very interested in oral fluid testing, not for active duty as the commanders would like me to do, I just don't think oral fluid will stand up to our justice system in court. However, I am interested in our accession testing where the soldier comes to the 65 MEPS testing stations around the country and is given a lab based assay which at the moment goes to the Navy Great Lakes Lab, we're thinking oral fluid may have a place there and we're running a pilot project, we also think we have an opportunity to add to the science. I think oral fluid, the screening tests look good to me so that side of it I think has been worked out, so we're moving forward where the individual would come into the military accessioning, you're given a urine sample, it would go up, be tested normally, that would be what would be to determine whether he comes in or doesn't come in. The oral fluid would be given a project number, the Social, and sent to AFIB to test that would be able to match that up. So hopefully in another six, seven months we'll have a nice parallel study that will be able to present some data.

We are also very interested, if you look at the Administration's strategic plan, they talk about high school drug testing. ONDCP who I work with very closely, as you may or may not know, Director Walters, this is one of his initiatives and we've decided to approach DOD education to start looking at high school drug testing. We've just started that, we have had some pushback, had some heated debate, I was naïve in this too, I never realized how sensitive and emotional this topic can get. If anybody would like to talk to me about that after I'd love to talk to you because ONDCP, I am a convert in that, I firmly believe that that's the way to go, I think DOD should take the initiative

like it did in workplace drug testing and set an example there.

The last thing is we went over to Britain, we've always worked with the Brits pretty close, they come to our joint service meeting every year, we traveled over there this year along with the Norwegians were there, the Irish were there, we're trying to get more of an international military, the EU is more interested in testing their military. While we were there, it's very interesting with the British, Bob, you may know this, they don't have a DEA, they don't have a SAMHSA, the Army, Navy contracts with a laboratory, the laboratory sets the cutoffs, they run everything, it is all done through the lab, it is a very interesting situation, very professionally run. On Wednesday, we were over there the last time it was 97 degrees, we jumped in an un-air-conditioned car, they said would you like to go see a urine draw, we went yeah, we'll just be polite, sure, we'll go watch urine get drawn, we've seen this before. Within 10 minutes we were all, I had two lab commanders with me plus all the service program managers, we were amazed.

One of the things is they use a single chain of custody like you do in the civilian side which we use a multiple chain of custody, you get 12 specimens on the chain of custody in the military which we've not liked over the year. But the big thing we saw was they pull up an A & B bottle and they pour a screening tube at the same time, right there in front of the observer. It's capped, tamper evident tape, sent to the lab, so it comes to the lab with a pre-assigned session number, it is bar coded, and it goes right on to screening. If I could do that I could cut 70 percent of my labor out of my processing section. We were looking at these high speed expensive processing none of which we liked, I was trying to figure out how I was going to get the damn money to pay for these things, and it's very interesting, here's a lot tech approach to what looked like a high tech problem, and so we're looking that over now. The National Guard is very interested in this and they're starting to run a pilot program on that now.

MR. STEPHENSON: These are great updates, this is the kind of thing that is nice to have as an enhancement to what we do in the civilian world and we value the collaboration and support that the DoD military, the Uniform Service Program, has always had for this program.

DR. BUSH: We are a little ahead of schedule here and it looks like the next presentation on the agenda is going to be the pilot performance testing PT program for hair.

Before Dr. Mitchell makes his presentation I'm going to pull up one slide for you because we're still in a pilot mode, definitely still in a pilot performance testing mode. I know we've talked about this before, but we really want to emphasize where we're at. The labs aren't certified yet and we don't have a performance testing program pretty much ready to go and certification, laboratory certification mode.

But a lot of people, a lot of laboratories, they're interested in presenting their data and comparing it and so we were asked by one of the laboratories doing oral fluid testing at the time so we gave this caveat, and I'm going to read it (from Slide 4, first presentation):

"This is a caveat given when asked by a participating laboratory to present their data, this applies to both hair testing and oral fluid testing at this time: Data are from the National Laboratory Certification Pilot Performance Testing Program for Oral Fluid that is still under development and may not yet accurately portray the characteristics of an oral fluid test. Data are used with permission in the Department of Health and Human Services (HHS) for comparative purposes only. The data do not constitute any recommendation either expressed or implied by HHS of any product cited

in this poster. Viewers of this information are cautioned of the limited utility of comparing the performance of one participant against the mean group performance at this time."

We really want people to understand this, every time information is presented in this room or outside of this room we are still working to develop the final product that is going to pass muster. That's the context I want establish before Dr. Mitchell's presentations.

MR. STEPHENSON: One thing I'll say is that this particular statement is also going to appear in the minutes of the Drug Testing Advisory Board and as a part of the formal record and it is done for a very specific purpose. I do not need to connect the dots for you but the point is this is a developmental program, we need the collaboration of all of the participants working together to drive the science and improve the precision and accuracy of what we're doing and it becomes a disservice to the participants and at how some of those results might be used by those who wish to measure them by a yardstick that's still under development.

Agenda Item: Pilot Performance Testing (PT) Program for Hair

Note: The PowerPoint slides for the following presentation are attached at the end of the transcript.

Slide 1 – Title

DR. MITCHELL (RTI): The NLCP has been involved in the pilot PT programs for hair and oral fluids for several years now and for those that were here in March you'll remember that we gave some important information about the progress of the programs. At that time it would appear from the data that we had that the program was not making a lot of progress. We are really excited because what we did was we went in and reorganized the program, put in new initiatives, and we've seen astounding results. And that's what we wanted to see. And so this morning I'm going to for those that were not here or since its been what, almost nine months since we had our meeting, I'm going to go through and do some reviewing but we'll get to the good part toward the last of the presentation.

Slide 2 – Objectives

But today the objectives of this talk is to review the PT requirements so we can keep those in our mind as to what the present proposed guidelines contain as the requirements for both hair and oral fluid, and specifically we're going to deal with the requirements as they apply to hair in this talk. We're going to review the design and the results of the pilot PT program that we presented at the March DTAB, a short review. We're going to review the design and results of what we like to call it the new program, the new pilot PT program within the NLCP. And then we'll compare the results from that, from the most recent cycles of PT to the proposed guidelines and then give some, disseminate some of the future plans that we have in the program.

Slide 3 – Evaluation of Performance Testing and Certification of Hair Testing Laboratories

First, we are going to go through the evaluation of the program and the proposed guidelines as they were released for public comment back in April 2004. In the guidelines the question is asked what are the PT requirements for an applicant laboratory to conduct hair testing. At this point in time that's what we're looking at, do we have laboratories that will be able to meet the initial requirements, that is to become certified.

Slide 4 – Section 9.6 (I)

The subparts of that says that an applicant laboratory that seeks certification to conduct hair testing must satisfy the following criteria on three consecutive sets of PT samples. The first one is have no false positives and we know what that means, that they must identify correctly the analytes that are in the PT samples. Secondly, they must not only identify them correctly but they must identify 90 percent of those challenges for each analyte in the three sets.

Slide 5 – Section 9.6 (II)

Going a little bit further they must also quantify the results such that 80 percent of the quantifications that they give are within plus or minus 20 percent of the group mean or the reference mean or plus or minus two standard deviations of that mean. Going a little bit further, refining it, if they aren't within the 20 percent then they cannot have a value in which the quantification goes beyond 50 percent of the group mean.

Slide 6 – Section 9.6 (III)

And the last one is a little bit more specific looking at each analyte that the laboratories are testing for, they must quantify at least 50 percent of the total drug challenges, that is the total challenges within that sample for that analyte, within plus or minus 20 percent or plus or minus two standard deviations of the reference mean.

Now the interesting thing about these guidelines is that these five parameters that we have are all set to look at accuracy and precision. For example when we talk about the no false positive that means that all of the identifications of drug must be accurate or it doesn't meet the program standards.

The second one says that not only must what they identify be accurate but they must identify at least 90 percent of the challenges that are presented to them. And so that's the first two.

The next one is the 80 percent, or say that 80 percent of the challenges must be within 20 percent or two standard deviations of the mean. So here we're now combining accuracy, that is the plus or minus 20 percent, as well as the precision, 80 percent must be within that limit.

The fourth requirement within these guidelines also addresses accuracy and precision in that it puts an outer limit on the variance that a laboratory can have on a sample that does not the criteria of 80 percent within plus or minus 20 percent of the mean.

And the final one that we just talked about also talks about accuracy and precision for each individual analyte, that is that a lab can have, must have at least 50 percent of the quantitations within plus or minus 20 percent of the mean and that's for the individual analyte.

Slide 7 – Accuracy and Precision

So we explained accuracy and precision, I just thought at the last, in the March, I just thought I would try to relate that exactly to what the guidelines are trying to do, they're trying to control the accuracy as well as precision of the laboratories that are under certification, or attempting certification, or that are certified.

Slide 8 –Pilot Hair PT Program: Review of Cycles 9 thru 11

Slide 9 – Pilot PT for Hair: Cycles 9 thru 11

So let's go to the review of the material, the data that we presented in the March 2006 DTAB. In this particular cycle, and we presented nine through 11 in hair and the reason we presented that is it covered all of the analytes that the laboratories were using, that are contained in the proposed guidelines. We can see that these are the six different analytes, classes of analytes that we're looking at, and we have them kind of put together by either the type of compound they are or their source. And for each one of these we presented, have presented to the laboratories three concentrations at 50 percent of the cutoff, the cutoff, and at 200 percent of the cutoff for one that was above the cutoff level. The reason for this is that we have found that it's important that laboratories have the ability to go above and beyond, excuse me, above and below the cutoff in order to ensure accuracy around the cutoff.

Slide 10 –Pilot PT of Hair: Cycles 9 thru 11

In these cycles the labs were only asked to do confirmatory testing, the testing occurred in the time from July through December 2005, there were three shipments that were sent, we had nine participants, and the analytical results or the results of their analysis, that is how they performed relative to the theoretical reference mean as well as how they performed relative to one another was not provided until after the final cycle which was cycle 11.

Slide 11 – Laboratory Performance (I): Cycles 9-11

Now looking at a comparison of the results to the guideline requirements we found that none of the laboratories had a false positive. But we have a caveat there, the analytes were directed for confirmation by analyte class and therefore they knew what analyte should have been in that particular sample and as a result we would not expect a false positive under those circumstances.

When we go to the 90 percent identification we found only two laboratories were able to meet that criteria. And there was a caveat to this that we broke it down a little bit further in that we found that analytes which laboratories had experience in analyzing under other programs such as the urine programs, they tended to do better in those analtyes than in analytes which were going to be relatively new under the proposed guidelines. And you can see that under the normal analytes that they had experience with five laboratories met the 90 percent criteria. And under the new analytes which are contained in the proposed guidelines 2 laboratories met this criteria.

Slide 12 – Laboratory Performance (II): Cycles 9-11

When we got to looking at accuracy plus precision we started to have some problems. We found that none of the laboratories quantitated 80 percent of the analyte challenges within 20 percent of the group mean. We also found that all of the laboratories had one or more of 50 percent connotation errors. And no laboratory quantitated 50 percent of all the individual challenges within 20 percent of the group mean.

Slide 13 – Pilot Hair PT Program Review of Performance Since March 2006 Cycles 12-17

When we looked at this it was very devastating to us because we know that the laboratories had put a lot of effort into it, we knew that we had put a lot of effort into it, and so it meant that there had to be some changes. Let's go through what those changes have been.

Slide 14 – Current Efforts Toward Achieving Accuracy and Precision

One, first we obtained a commitment from the laboratories to use the future hair PT program, pilot PT program, to develop and prove testing accuracy and precision, we got the commitment from each of the participants. We as a program committed the future cycles to the resolution of the sample and laboratory variation.

Because of the issues associated with communications results we developed a webcast meeting which would allow us to provide feedback as soon as possible after each PT event. And in these meetings we were able to discuss exactly what was happening with what we were seeing, what we thought problems were, and got feedback back from the laboratories and even suggestions on how to improve the program overall.

Slide 15 – Continuing Efforts Toward Achieving Accuracy and Precision

We reviewed the test results with the participating labs and again encouraged the group development of improved methods and that did happen, laboratories who had problems often got suggestions from their peers and also they got increased attention from the NLCP in helping them to solve issues that they had within their testing protocols. And that of course increased the dialogue between the NLCP and the participating laboratories.

And last but not least we went out to NIJ, reached out to them, and we were able to obtain a grant from them to facilitate the development of appropriate calibrators and control materials. And that grant was just given to us this year, in the fall of this year, and we're in the process now of developing those materials through an NIJ grant. And we think that once the laboratories have standards that they can depend upon, that give them an idea or at least show them what the target is, that this will improve the system overall.

Slide 16 – Current Project – Study Design

Now under the new design one of the things that was a complaint by the

laboratories was that we were trying to do too many analytes at a time within a cycle. So the decision was that we would include fewer drug analytes in each of the samples, that we would have the laboratories analyze them more than once, and this time it's going to be five replicate analysis of each sample under five different calibrators, and this would allow us to look, and the laboratory itself, to look at its variation on a particular sample. And we were going to send the labs the samples about once a month.

In the hair testing we set up three sets of samples and these samples were sent out, a group of them every month, such that in three months we went through each of the three sets of samples and we plan to do this four times so in the end the laboratories will have analyzed each sample four times.

Slide 17 – Current Project – Study Design

Now this design will allow us to look or has allowed us to look at the reproducibility and repeatedly within and between laboratories, in other words we're going to look at the precision between the laboratories and within the laboratories. It also allows us to do the results, look at the results and discuss that with the laboratories through the webcast meetings each month, and to date we have complete analysis on 3 sets, of the 3 sets of samples twice, in other words they have been, the laboratories have analyzed each of the samples within these sets 2 times. We are currently in the middle of the third round.

Slide 18 – Current Project – Study Design

The participants in the program, we have six active and one beginning, we had a new lab come in about a month ago and they are in the process of bringing themselves up to speed. We do not think that it's fair to throw a new lab in to the mix without them having shown that they can at least meet the same standards as the other participants because then it makes the whole system look bad.

The samples that we use are hair that has been fortified with drug as well as hair from drug users, and each of these samples have been analyzed and we have in the case of the NLCP produced we have both theoretical and reference values, for the drug user of course we just have the reference values.

The cycles for hair contain four samples each, there were two that contained amphetamines, that is amphetamine, methamphetamine, ecstasy, MDA and MDEA, and two containing THC. We had four cocaine samples which contained cocaine, benzoylecgonine, cocaethylene and norcocaine. And then in the third cycle we had three that contained opiates, which means 6-acetylmorphine, codeine, morphine, and one with phencyclidine (PCP). The samples as I said before are confirmed 5 times under 5 different calibrators, and generally the concentrations are in the range of 1.5 to 3 times the proposed, the cutoff concentrations proposed by the Guidelines.

Slide 19 – Methamphetamine

I'm going to take a few minutes and explain this slide very slowly so that we understand what is contained on the slide. And the reason because about the next ten plus slides are going to be in the same format. You can see at the top of the slide we have identified the analyte that we're talking about, in this case methamphetamine. Below it we have the theoretical concentration. You can see just below the theoretical

concentration we have the words initial analysis and second analysis, the initial is the first time the lab saw this sample, the second analysis is the second time that they saw the analysis. Under that we're going to have the results from each one of those determinations by the lab.

You can see that the vertical axis on this graph is the concentration of the drug, or the measurerand as its now called in the world of ISO, and it's going to be in picograms per milligram of hair. Along the Y axis or the horizontal axis we see listed the coded identification for each of the laboratories. Now we use these codes because in these types of publications we really, the idea is not to point out a specific lab or to draw attention to a specific lab and have that known because we're trying to improve and we want our participants to feel that they're not going to be singled out either in our webcast meetings or in meetings like this, we want them to keep trying to bring their analytical methods into the standards that are necessary for laboratory to be certified by HHS.

The red lines will identify, and I meant to point this out, identify the group mean. And we have a new parameter that we haven't introduced to you before, the purple area that's presented in these charts indicates what we call the 95 percent confidence interval, that means based upon the analytical data provided by the laboratories we can say statistically that 95 percent of the analyses of this sample now and in the future should fall within this area. We also have put on top of this the plus or minus 20 percent requirement that is in the guidelines. And so let's very quickly go to the initial analysis.

As you can see from the initial analysis we had some fairly large variation as witnessed by the confidence, 95 percent confidence intervals. You can also see that for methamphetamine at 450 picograms per milligram that on the second analysis we did see improvement by the laboratories of the fact that the 95 percent interval has been decreased. Now it's not exactly where we wanted, what we want to see is for the 95 percent confidence interval to either overlap or be within the plus or minus 20 percent. If we can get that, that we know that on those, that the laboratories are approaching the precision and accuracy that would be necessary for certification as a system.

Again the group mean here as you can see was on each side of the theoretical mean, the first time it's 439, slightly below the theoretical, and the second time it was 513 which was above the theoretical concentration.

Slide 20 –Methamphetamine

Going to methamphetamine at 900 picograms per mil we can see that the confidence intervals here are about the same, both on the initial analysis and on the second analysis, we didn't see a lot of improvement in the methamphetamine at this concentration as we can see. The group means, however, even though the data was scattered was fairly near to the theoretical concentration of 900 picograms per milligram.

Slide 21 – Cocaine

Going to another analyte, cocaine, this is one of the astounding things that we saw in this program, this is one of the success stories. We see on the initial analysis of this that the variance among the laboratories was very wide as witnessed by the 95 percent confidence interval on the right of the slide. However, on the second analysis look at what happened. All of the laboratories are within the 95 percent except for one lab, and we also see that they're within the plus or minus 20 percent. So we have not

seen this before in the program, and it was very gratifying to see this. Now granted the concentration is high, it's about 20 times, 20 plus times the cutoff, but it says we can reach precision, it's just a matter of working with the labs, the labs working together to reach it.

Slide 22 – Cocaine

Going to the second one at 750 picograms per mL, we can see that the intervals are about the same, a little bit less on the second analysis, the group means are a little bit below the theoretical but not alarmingly so. And look at what we see, the first time they were fairly close as far as the plus or minus 20 percent and the 95 percent confidence interval, the second time they overlap, that's where we want to be as a system in order to proceed with a certification program.

Slide 23 – Cocaine

Cocaine, theoretical at 1500 picograms per milligram, and it says calculated without Q and what we're saying there is that we had one laboratory that was so far out away from the group mean that we removed him from the second analysis because that's where they stick out, as you can see on the left hand side under the second analysis they're much below, outside or below the 95 percent confidence interval. When we look at this we can see there's been improvement by the confidence interval, we can also see again cocaine, our laboratories have done very well, they have been able to do it, have the plus or minus 20 percent and the 95 percent confidence level overlap just where we would like them to be. They might be able to improve even more than that and get it inside but this is acceptable to the program at this point in time so we have had improvement with cocaine.

Slide 24 – Benzoylecgonine

With benzoylecgonine, with the drug user hair, fairly high concentration, we see that we did get improvement on the second analysis even though the concentration is very high, however, we're not meeting the plus or minus 20 percent goal that we would like. I'll settle for the improvement right now, we'll get the other as time goes on. And benzoylecgonine is a little bit harder in some respects to analyze.

We do have as you can see from the individual lab results in the second analysis that the laboratories are tightening up their CVs, you can see that with both the grouping, several of the laboratories have tightened up and looking very well.

Slide 25 – Benzoylecgonine

Benzoylecgonine, we dropped it down, the concentration in this sample down to 75 picograms per milligram. Now in the guidelines they require, the current proposed guidelines require in order for a sample to be called positive there must be cocaine present as well as BE at 50 or greater, 50 picograms per milligram or greater. And so now we're approaching the cutoff and what we see is we're still having some problems in sensitivity in accuracy down at the lower levels. And this is to be expected because we're reaching limits or we're striving for limits that never have been obtained in the system before this.

I'm not discouraged by that, I think that the first analysis tells you that we were doing pretty good, it's just something that the laboratories needed to work on in their benzoylecgonine procedure. And we'll see what happens in the next analysis.

Slide 26 – Morphine

Going to morphine, we can see that we had tremendous improvement between the initial analysis and the second analysis in the 95 percent confidence level. We again we had one lab that was outside the, significantly outside the performance of other labs and we removed its results from the second analysis. But yet we still have a ways to go in order to meet the plus or minus 20 percent but we do definitely see improvement here.

Slide 27 –Morphine

Morphine at 600, and again without, the data is presented without lab Q in the second analysis, we can see that there was an improvement for morphine at the 600 picogram per milligram level. And we also see that the plus or minus 20 percent is still, how about this, the 95 percent confidence level is not where we would like it to be as far as within the plus or minus 20 percent. But we did see improvement on the sample between the initial analysis and the second analysis.

Slide 28 – Morphine

Morphine at 300, now we're getting down to the cutoff, the first time we can see between the first and second analysis the laboratories did improve. Lab Q seemed to be still having some problems on this particular set. Again, overall though the labs did improve and we're moving down toward the 20 percent requirements with the 95 percent confidence level.

Slide 29 – PCP

PCP, looking at a concentration 450 picograms per milligram in the initial analysis the 95 percent confidence interval was much greater than it was in the second, we can see that the mean on the second analysis is approaching theoretical, it's getting very close, we still have a little bit of work to do to bring all the laboratories within the plus or minus 20 percent. But we do have, if you notice we do have several laboratories that are falling within that plus or minus 20 percent.

Slide 30 – THCA

The last one which is the THC metabolite which is present in hair at very, very low concentrations. This one is about 15 times, the concentration in the sample is about 15 times the proposed cutoff of 0.05 picograms per milligram. We can see that between the initial analysis and the second analysis we have had improvement, the group means are pretty close to theoretical, they're not bad at this point in time of the reference value that we had. But we still need to work toward reducing the variation between the labs, we can see that by the scatter of the points between the labs that is the issue and if we can solve that then we can bring the laboratories closer to the plus or minus 20

percent with the 95 percent confidence interval.

Slide 31 – THCA

Looking at 1.5 picograms per milligram, which is three times the proposed cutoff, we see we had some problems on the second set. On the first analysis the laboratories, the confidence interval was less than what we got with the second analysis. And again we're looking at going to very low levels of this particular analyte. The reason we chose this analyte is because it is a true metabolite and is evidence, or its presence is at this time there's no other known source for THC other than a metabolite. You see that we still have a ways to go but I'm sure that we can solve this problem as well as the others.

If you go back to the urine and think about when we started urine what was the one analyte that the labs had the most problems with, it was this one. And there's several reasons for that, one, it has some stability issues, so calibrators and controls are an issue. It takes, it's only now that the laboratories have gotten their means down within plus or minus 15 percent of the group mean and it's only after how many years, 20 years, about 20 years, oh my goodness, but its taken a long time. Part of it's the laboratories' issue, and part of it at least with the urine was the sample issue, the PT sample, and it very well could be part of the problem with this. But that is one of the things that we're looking at within this program, how much of the problem is lab problem, how much is the material that they're given to analyze, and we can't forget that, especially us, the people that are making that, we have to remember that.

Slide 32 – Evaluation of Laboratory Precision by %CV

Let's look at some other positive results that we can glean from this data, we looked at the number of laboratories with coefficient of variations less than ten percent. If you'll remember from, well, if you've been here for the past few years we've talked about CVs, coefficient of variation, it's nothing more than the standard deviation divided by the mean and changed to percent, in other words it's within, the standard, the variance is within ten percent of the mean. And for methamphetamine we see that we had two laboratories that were able to reach this criteria, cocaine we had three of the six laboratories, BZE only one lab was able to meet that, morphine two of the laboratories, PCP and THC also only one of the laboratories had their variance within their lab down to the point that it was ten percent or less of the coefficient of variation, which is really great, I mean I didn't think from past that we would have this many labs that were able to do this and so I find that very encouraging.

Slide 33 – Evaluation of Laboratory Improvement in Precision by %CV

Another thing that's encouraging is how many of the laboratories improved between the initial cycle and the second cycle, or initial analysis and second analysis. You can see on methamphetamine we had two out of the six, cocaine two out of the six, benzoylecgonine two out of the six, morphine one, only one of the six, PCP two, and with THC it's still a problem, we really didn't see significant performance improvement. That doesn't mean that there may not have been a lab there that was doing well, what we're looking at is improvement overall by laboratories.

Slide 34 – Laboratory Performance (I)

Okay, let's look at how the results from these cycles compare to the guideline requirements. We see that we had no false positives, of course the same caveat exists as well, we did tell them what was in it so they should not have identified cocaine as something else if we told them cocaine was in there. But again I don't think that from the data that we have seen I don't believe that anyone identified anything incorrectly.

This time all of the laboratories identified 90 percent of the analytical challenges, of analyte challenges over the three, well, in this case one cycle, we only looked at the second cycle for this. All of the laboratories in cycle two identified 90 percent of the analyte challenges.

Slide 35 –Laboratory Performance (II)

Two laboratories identified 80 percent of the analyte challenges within 20 percent of the group mean. All of the laboratories had one or more 50 percent quantitation errors, so we still have that as an issue. And all but one laboratory quantitated 50 percent of the individual analytes within 20 percent of the mean.

Slide 36 – Laboratory Performance Summary

This is how it looks, the results look compared to March, compare the March analysis. We can see that in all categories except for the 50 percent quantitation errors we have labs that have met the requirements. All of the laboratories identified 90 percent of the analyte challenges, two labs 80 percent, within 20 percent of the mean, and five of the six laboratories quantitated 50 percent of the individual analytes within 20 percent of the mean. Now that to me is very encouraging, after years and years of work it shows that these laboratories can do and will be able to do, with additional work, will be able to meet the requirements of the guidelines but it's going to take some additional work from all of us.

Slide 37 – Conclusions

Conclusions, comparison with the lab results from cycles 15 to 17 to the requirements of the program requirements demonstrate a systemic improvement under the current study design. And currently several of the participants approach the overall precision and accuracy that will be required of certified laboratories. The prediction intervals for most analytes except for THC suggest improvement in the precision of the laboratories as a whole.

Slides 38 – Conclusions

The precision and accuracy of most participants has significantly improved for some analytes. And one that, this may be seen to be self serving but I'm proud of it, that the communication discussion within the group, we're now acting as a group toward working toward a goal which is to achieve the requirements within, that are contained within the guidelines. And it has shown itself by improvement in the performance of most of the laboratories.

The other thing that we did draw from this is that the fortified hair

materials appear to be stable for at least 3 months because we have the laboratories, overall we'll have, when we're finished with this program we'll be able to look at the analysis for a particular preparation for almost a year, over a year's time.

Slide 39 – Future Plans

What are our future plans? Well, we're going to continue this particular phase of the program and in that we'll be analyzing the data and promoting our dialogue with our participant laboratories. We'll continue to use the webcasting meetings, we thought we might discontinue them but we felt with the progress that we would make it would be dumb to remove it at this point in time, it wouldn't be a good move, we need to keep the communications going, we need to talk about where we want to go and what our problems are and what it's going, what is going to be necessary for us to reach those. And of course we're going to continue efforts to improve precision and accuracy and part of that of course is trying to develop some reference material that can be used by the laboratories, I think that would be a tremendous aid to the labs at this time. Unlike urine it doesn't exist, there are places that are providing calibrators and controls for the labs so you would expect everybody that's using those calibrators and controls to come into a very tight system. There are some labs, some places that are producing some oral fluid samples at this point in time and so all of this, if we can get the standards that are necessary for the labs to analyze the samples available I think that overall this will improve also.

Slide 40 –Disclaimer

A disclaimer, I'm going a little beyond what Donna said, this is a pilot program and while we use this we use the proposed guideline requirements to look at the performance, that's for us to analyze where we are. This HHS and the NLCP have to do this analysis and if we didn't we would be remiss in our duties to the government to provide an alternate matrices when it's certified they can do the job that we intend it to do. We also have to do this so we can look at the feasibility of providing the PT materials that will be necessary for this program. And we still have issues associated with the hair they're clarifying, as the labs become more precise in their analysis we can better evaluate the PT samples.

Now we discourage the use of the information from these results for any type of commercial or indication of commercial use and the reason for that is these samples are very controlled, the concentrations are controlled, it's nothing like the types of samples or the variation in samples that would be sent to laboratories under a certification program. In our certification program laboratories can expect to get at least four to five challenges for each analyte, each challenge being at a different concentration. Here we're working with just one concentration, keeping it simple, at a time, so that we know where we are and that we can work with it. So for that reason we recommend that laboratories be careful in what they say about their participation in this program.

MR. STEPHENSON: I want to thank you very much, again everybody in the audience, members of the Board, the magic that appeared on the slides between initial analysis and second analysis is the magic of teamwork and thought and collaboration, it's the effectiveness of how the information was communicated from RTI to the member labs and how the participating labs took that information and spent their time and their money

to further participate and improve, it was a demonstration of how a whole system can improve and it has absolutely been driven by a group process but led by RTI, we're extremely pleased with this and we're extremely proud of the performance that RTI has done in the development of this. Thank you.

COL SHIPPEE: There's no washing procedure used in any of this, right?

DR. MITCHELL: There is no washing procedure at this point in time, that's correct.

DR. COLLINS: Actually I thought the agreement between the theoretical and the lab was excellent and I'm sure preparing the samples is fairly challenging except one sample, there was a morphine sample that looked like the theoretical was 600 and the labs were about 200, you think that's a sample issue or --

DR. MITCHELL: We're looking at that at this point in time, with some additional analysis I think that will clarify. I'm not sure why there was that difference at this point in time but that was only a reference value that was, that was the theoretical value that we had up there.

The thing that you've got to remember about hair, it's not like urine, you can't just put the analyte in and say okay I put in this much and I had this number of mils therefore the concentration is so many nanograms or whatever per mil. In the process here you're trying to get analytes to go into the hair and the only way that you can determine the amount that went in is by analysis and so immediately after our preparation of the sample it's sent off to a reference lab for analysis. And so whether it's the reference value or whether there was some error somewhere else I don't know and we are looking into this. But it is what it is, if we made a mistake we made mistake, if we didn't. The process of preparing these samples, I wish there was another procedure or method that we could use independent of the laboratories to determine the theoretical concentration, we've looked at some of the more advanced, NMR methods and things like this, they're not sensitive enough to work at the levels that we have to work at with hair.

DR. BUSH: Just to add on a little bit to that, remember hair, preparing hair testing performance materials or calibrators of any type is just a yeoman's job, it's difficult to say the very least. Remember when the National Institute of Standards and Technology prepared their standard materials how high in concentration they had to go to ensure repeatability of the analysis and the concentration determination. This has been an issue over time, I think Bruce Goldberger had these issues in the state of Florida when he was taking a look at preparing hair testing performance material and calibrators, people in Europe have the same thing, so we're all in it together and it is very difficult and you're doing a great job so far because we're at such tiny and low concentrations.

DR. MITCHELL: And that's great. I'd like to recognize Dr. Jeri Ropero-Miller, who is the lead in the hair, she's made significant improvements in the process of preparing these samples and she's much better than I do when I was doing this, so she has really improved it and I'm very pleased with what we're seeing in these samples that she and her group are preparing at this point in time.

Agenda Item: Pilot Performance Testing (PT) Program for Oral Fluid

Note: The PowerPoint slides for the following presentation are attached at the end of the transcript.

Slide 1 – NLCP Oral Fluid Pilot Performance Testing (PT) Program Update

DR. MITCHELL: In this presentation you'll notice that as Bob said, a lot of the material that will be presented is presented in exactly the same manner as we presented for hair, in the same sequence, and so I'm hoping that will simplify our ability to look at it, your ability to look at it and your ability to understand, you're already familiar with the format and there are some differences between hair and oral fluid and I think the differences though are small except for the matrix with hair being a solid matrix which you have to force something into and oral fluid being a liquid matrix which is a little bit easier to work with.

Slide 2 – Objectives

The objectives of this part of this presentation will be the same as the objectives of that of hair, review the PT requirements from the proposed guidelines of April 2004, review the design and results of the oral fluid pilot PT program that was presented in the March DTAB, review the design and results of the oral fluid, of the current oral fluid PT program that's been ongoing since March DTAB, and compare the results of that one to the proposed Guidelines of April 2004 and disseminate the future plans.

Slide 3 – Evaluation of Performance Testing and Certification of Oral Fluid Testing Laboratories

Slide 4 – Section 9.6

First, we'll go into the proposed guidelines as they were released for public comment in April of 2004. Remember we're dealing with Section 9.6, what are the PT requirements for an applicant laboratory to conduct oral fluid testing. First the laboratories as they enter into the certification process will have to satisfy these requirements on three consecutive PT cycles, one, they must have no false positives. They must correctly identify 90 percent of the total drug challenges over the three sets of PT samples.

Slide 5 – Section 9.6

They must correctly determine the quantitative values for at least 80 percent of the total challenges to be within plus or minus 20 percent or plus or minus two standard deviations of the reference mean. And they must have no quantitative errors on a drug concentration that differs by more than 50 percent from the calculated reference mean.

Slide 6 – Section 9.6

Last but not least, the laboratory must be able to identify and quantify 50 percent of the total drug challenges for a single analyte within 20 percent or plus or minus two standard deviations of the reference mean.

Slide 7 – Accuracy and Precision

Accuracy and precision, we talked about that, and again very briefly the accuracy and precision is reflected, or the requirements for accuracy and precision is reflected in the guideline requirements. Accuracy in identification such as no false positives, identifying a certain number of those that are presented to the laboratory. Precision in that they must not only accurately identify and accurately quantitate their limits that are set, if they have a variance from the standards that are set then there's also an upper boundary that the lab can have and that is the 50 percent errors. So we have the requirements, both the minimum standard and the standards which if a laboratory has a problem or exceeds those standards then there's going to be some type of remedial action, in worst case there can be, their certification can be in doubt at that point in time but not before we try to take care of it.

For initial certified laboratories, laboratories that fail the PT side are always required to go back and start over and have three consecutive cycles in which they meet the requirements.

Slide 8 – Pilot Oral Fluid PT Program Review of Cycles 4 Thru 6

Slide 9 – Pilot PT for Oral Fluid (Cycles 4 thru 6)

So let's go through, review the oral fluid PT program results for cycles four through six which were presented at the March 2006 DTAB. Again these were the cycles in which we could look at all of the analytes over multiple cycles. This is necessary in order to look at some things that we needed to look at such as variation within the laboratories and things of this nature. You can see that we have very similar analytes to those that we saw in hair, we have amphetamine, methamphetamine, MDA, MDMA, which is ecstasy, everybody is familiar with that, MDEA, we have cocaine, benzoylecgonine, two that we don't have are cocaethylene and norcocaine which are included in the hair. The opiates are the same, we have 6-acetylmorphine, codeine morphine, we have PCP, and then we have THC which is the parent drug rather than the metabolite which is THCA. Now one of the problems with THC, you think THCA is unstable, well THC is even more so because it has almost all hydrophobic, that means it doesn't like to be in an aqueous solution, and oral fluid is aqueous so it does present some problems and you have to take measures to overcome that instability.

And if you'll remember one of the points that we made in March was that THC, we had a lot of problems with the stability in the oral fluid samples.

The concentrations in these samples were 50 percent of the cutoff, at the cutoff, and 200 percent except for THC, coke and BE which were 300 percent of the cutoff that's proposed in the April guidelines, April 2004 guidelines.

Slide 10 – Pilot PT of Oral Fluid (Cycles 4 thru 6)

Again, we are only looking at confirmatory testing, the samples were shipped a little bit earlier than what we were looking at in the hair, we were in the

October 2003, January 2004, each set consisted of 21 spiked oral fluid samples and each challenge we gave the laboratories two milliliter aliquot of neat oral fluid that had been spiked with the appropriate analytes. We had 12 participating labs and as we did with the hair the results of the analysis was provided to the labs at the end of the study which was after cycle 6.

Slide 11 – Laboratory Performance (I) Cycles 4-6

In comparison, again no false positives, the laboratories were able to identify the samples but with the caveat that they were directed for the particular drug. We had one laboratory that identified 90 percent of the analyte challenges over three cycles. And you'll see below that that according to the analytes that were involved the number of labs that met this criteria varied. Again most of the laboratories that were involved, the participants that were involved in this had been involved in urine testing and that's pretty obvious because the analytes that they would normally analyze in urine they did pretty good, ten of the 12 participants if you only looked at those analytes would have met this criteria. When we look at the new analytes, the cocaine, the MDMA, MDA, MDEA and THC, not THCA, the metabolite, only one lab met this criteria. If we took out THC, we did that just for our analysis, removed it from the criteria, we found that two labs. So the THC really didn't have any more effect on the performance of labs than the other new analytes.

Slide 12 – Laboratory Performance (II) Cycles 4-6

We did have one lab that quantitated 80 percent of all analyte challenges within 20 percent of the group mean. Again, looking at the particular analytes, the old analytes, the urine, ones that are common with urine, seven labs met this criteria. Looking at the new analytes only one lab met this criteria and without THC two of the labs met the criteria.

Slide 13 – Laboratory Performance (III) Cycles 4-6

Two of the laboratories had no quantitation error greater than 50 percent of the group mean and we can see that that too was dependent upon the group of analytes that we were looking at. The normal urine analytes, 5 labs met this criteria, for the new analytes only three labs met this criterion, but overall only two labs were able to do that.

Slide 14 – Laboratory Performance (IV) Cycles 4-6

And the last one, no laboratory quantitated 50 percent of all individual analyte challenges within 20 percent of the mean. This was somewhat dependent upon the analytes that we were looking at, the best we could do was two labs met this criteria, if we only looked at the analytes, the urine analytes and we removed morphine and 6-am from consideration because of the variability that we thought was due to sample problems, but still we only two that were able to meet it on the other analytes. And on the new analytes only one of the labs met this criterion.

Slide 15 – Pilot Oral Fluid PT Program: Review of Performance Since March 2006 (Cycles 10-15)

Just as with hair, these results were an eye opener to all of us, it made us realize that the program needed to change, needed to change drastically, and so we instituted the new program for oral fluids just like we did for hair. We obtained commitment from the participating labs to use future hair, the pilot, excuse me, the oral fluid pilot PT program resources, to develop and improve the testing accuracy and precision. We committed future cycles to the resolution of sample and laboratory variation and we developed the webcasting meeting to provide feedback to the laboratory as soon as possible after each PT event.

Slide 16 – Continuing Efforts Toward Achieving Accuracy and Precision

During these webcast meetings we would review the test labs, the test results with the participating laboratories. We encouraged group development to improve the methods and to provide solutions to analytical problems. Since there's more labs within this group we had more discussion, some laboratories actually offered up their procedures to other laboratories, things that they thought worked to increase the accuracy and precision within their lab.

Slide 17 - Continuing Efforts Toward Achieving Accuracy and Precision

Had quite a bit of dialogue between the NLCP and the individual labs trying to encourage the exchange of solutions. We also within the NLCP talked to the individual labs and worked with them, one of the instances, we had a lot of variation on some of them so we were able to get from each of the participating labs the lots and materials that they were using for the standards and then we went through to make sure that there wasn't a factor of a problem with a lot that was being produced or being offered for sale by one of the commercial vendors. And also we're working toward the development of appropriate calibrator and control materials for oral fluid also.

Slide 18 – Current Project – Study Design

The current project design, again it was redesigned as of May of 2006 because of the variation that we saw in the oral fluid testing laboratories. And with each cycle we included fewer drug analytes, we had five replicates of, required five replicates of each of the samples to be produced by the laboratory. And we sent to the labs a set of samples about every four weeks.

We had 3 sets of samples just as we did with the hair, we repeated these cycles every 3 months, in other words at the end of 3 months they would have tested all 3 sets and they would be ready to begin the 3 sets again. And we anticipate 4 separate rounds of these samples within the laboratories.

Slide 19 – Current Project – Study Design

Again, the design allows us to analyze for precision and accuracy within and between labs. It also allows us to discuss in more detail the overall results in the individual labs, individual results for the labs more frequently in time to give the labs a chance to correct it before they see the next sample three months later, approximately three months later. Now so far these three sets of samples have been analyzed by the

participating labs twice.

Slide 20 – Current Project – Study Design

We currently have 15 laboratories that are actively participating and we have one laboratory who has chosen not to participate actively, they're working on some procedures trying to bring them up to standards.

The samples, all the samples that we use are produced by the NLCP, the cycles contained two samples each, in the first set had one sample that contained methamphetamine and codeine, the second contained amphetamine and morphine. The second set, one sample contained cocaine and MDA and the other one contained BZE and MDEA. The third set of samples consisted of two samples, one of which contained THC and PCP, the other which contained 6-acetylmorphine and MDMA (ecstasy). We did have the samples screened one time but the main thing was that we confirmed the samples 5 times under 5 different calibrators. The concentration of each compound or each analyte was one and a half times the proposed screening cutoff, and the samples again were provided as neat oral fluid to the laboratories.

We're going to go through the data from these laboratories and there's one thing I need to straighten out, I misspoke, I was calling the interval that we were dealing with, the one that was in purple but it'll be in a different color on these to distinguish oral fluid from hair, but I said it was a confidence interval, it's not, it's a prediction interval, like I said I misspoke, which means that it predicts that any analysis done on these samples in the future would be within, 95 percent of those analysis would be within those limits.

Slide 21 – Amphetamine

Again we are dealing with amphetamine is the analyte at the top, theoretical concentration of 75 nanograms per mil. The vertical axis is the concentration of the measure N or the analyte and nanograms per milliliter, and along the horizontal axis we have the coded identification of each laboratory that's participating. You can see that the green line represents the group mean, the prediction interval is indicated here as kind of a vanilla color. And the plus or minus two percent is going to be in green.

Now you can see on the initial analysis the green is off just a little bit but the prediction interval is very close to the plus or minus 20 percent values. When we go to the second analysis we can see that we are still pretty close but there was not a lot of improvement with this analyte. The 95 percent prediction interval is outside of the plus or minus 20 percent.

Slide 22 – Methamphetamine

Going to methamphetamine, we can see that between the first analysis and the second analysis the prediction interval has decreased whereas the group means are very close to theoretical. And when we look at the plus or minus 20 percent limits we see that they were very close in the initial analysis of methamphetamine, in the second analysis they coincide which is I said before is what we want to see, we want to see that prediction interval come inside the plus or minus 20 percent.

Slide 23 – MDMA

MDMA, ecstasy, theoretical 75, we look at the prediction intervals, we can see that between the initial analysis and the second analysis in this sample there was a great deal of improvement, really great. And when we look again we see that we have overlap between the 95 percent prediction interval and the plus or minus 20 percent, in fact this time the lines are slightly inside the plus or minus 20 percent.

Slide 24 – MDEA

MDEA, we see that again between the initial analysis and the second analysis we've had improvement of the system overall in individual laboratories. We can see that the plus or minus 20 percent was inside of the prediction interval in the initial analysis but once we go to the second analysis the prediction interval is now inside the plus or minus 20 percent limits, which again is an improvement and it's a tremendous improvement toward meeting the standards that we want to meet.

Slide 25 – MDA

MDA, the last of the amphetamines, again we see some improvement between the initial and the second analysis. We also see improvement by the fact that the overlap between the prediction interval and the plus or minus 20 percent requirements.

Slide 26 –Cocaine

Moving to a new analyte, a new class, to cocaine. On the initial analysis we can see that subsequently there was an improvement and on the second analysis of the prediction interval, and we can see that in both of them that they are very close to the plus or minus 20 percent requirements. You can see on the second analysis it's even better, they actually overlap, so that's cocaine at 30.

Slide 27 – Benzoylecgonine

Looking at benzoylecgonine, benzoylecgonine has been a problem in oral fluids and we can see that between the initial analysis and the second analysis that we've had an improvement in the prediction interval, we can also see that for this particular sample the prediction interval, 95 percent prediction interval, is closing in on the plus or minus 20 percent requirement, it's getting very close.

Slide 28 – Codeine

Codeine, for some reason codeine has been easy for the oral fluid labs, they even from the beginning have had pretty good results with this and we can see, we had improvement by the prediction interval between the initial analysis and it improved even more, we went well inside the plus or minus 20 percent requirements in the second analysis.

Slide 29 –Morphine

Morphine is one that we've had problems with as far as sample stability.

On the initial analysis we had a great deal of variation as you can see, we were worried when we got those results that we were having problems with our sample again. When we sent that sample out again for second analysis we can see that the group improved as far as the 95 percent prediction interval and it's well inside the plus or minus 20 percent requirements, which means at least 30 day stability on the morphine in these samples now which is quite an improvement over what we had seen in previous samples that were produced as part of this PT, pilot PT program.

Slide 30 -6-AM

6-acetylmorphine, we can see the prediction intervals appear to be about the same, the only difference is the concentration, mean concentration dropped a little bit. And in both cases we can see that the prediction interval, I mean the prediction interval and the 20 percent requirements are very close to one another indicating that we're reaching the types of limits that we want or we desire in our laboratory's performance.

Slide 31 – PCP (all labs)

Phencyclidine, we went back backwards on phencyclidine a little bit, we couldn't get too cocky with the results that we were getting from the others. The PCP, the performance on the initial analysis was a little bit better by the prediction interval than the second analysis, we can see from the prediction from the 20 percent, that also shows that the prediction interval is outside the plus or minus 20 percent. But it's something I think that we can overcome especially if we take out the one lab whose results were outside of the others.

Slide 32 – PCP Without Lab O in Second Analysis

Now in this particular case we had a reason for taking that out, there was a problem identified in the laboratory results and so we actually had an actual problem that could be identified and with that result and so we were doubly justified in removing from the group and what we see is that when we remove that result the results for PCP are now inside the plus or minus 20 percent interval, so it was that one that was causing us the, as a system, for the system to seem to be out of control.

Slide 33 – THC (all labs)

We go to THC, remember what I said about THC, it is an issue as far as stability, when we saw these results we were somewhat concerned about the THC but one of the laboratories said that they had used, they had not changed their controls even though the previous results from the initial cycle had indicated an issue with their calibrators.

Slide 34 – THC Without Lab W in Second Analysis

We removed Lab W from the results, and I'll show that right here, and when we removed them we can see that with THC now on the second analysis we have an overlap between the 95 percent prediction interval and the 20 percent which means that the laboratories had a tremendous improvement again with this analyte. And it

appears that our, while we may be losing a little bit of the THC it's a uniform loss if that is occurring, of course it'll take additional analysis for us to be able to understand that.

Slide 35 –Evaluation of Laboratory Precision by %CV

Okay, let's look, after seeing those positive results let's see what we can say about the individual labs and their performance on the various analytes. With amphetamine, cocaine, PCP and THC 14 of the 15 laboratories had CVs which were within ten percent, which shows precision within the laboratories. On methamphetamine and morphine 13 of the laboratories were within ten percent and with BE 12 of the laboratories were within ten percent. So that means we have a system in which the laboratories that are internal variation has reached some, has improved tremendously, and is approaching that that we see in the urine drug testing laboratories.

Slide 36 - Laboratory Performance (I) (Cycles 13 – 15)

Let's compare it to the guidelines, to Section 9.6A. Okay, we found that there were no false positives, we also found that 14 of the 15 labs identified 90 percent of the analyte challenges over three cycles.

Slides 37 - Laboratory Performance (II) (Cycles 13 – 15)

12 of the 15 laboratories quantitated 80 percent of all analyte challenges within 20 percent of the mean. You can see in the breakdown that the differences between the new analytes and the previous urine analytes, that the disparity is much less now, we're reaching parity between those two, it's not so important as to which analyte that they are analyzing for.

Slide 38 - Laboratory Performance (III) (Cycles 13 – 15)

We had 13 labs that had no quantitation error greater than 50 percent of the group mean. And again, the differences between the analytes has lessoned here in which parity has been achieved, so the new analytes and the old analytes we're seeing similar performance in the oral fluids.

Slide 39 – Laboratory Performance (IV) (Cycles 13 – 15)

11 of the 15 labs quantitated 50 percent of all the individual analyte challenges within 20 percent of the reference mean. Here we're looking at precision based upon each of the individual analytes and 11 out of 15 is quite an improvement, you can see that there's a little bit of difference between the two analyte classes, I mean the two analyte groupings, that is the urine versus the new, but it's not really that significant at this point in time.

Slide 40 –Laboratory Performance Summary

How do they compare? How does this compare to March? We can see all red, red is signifying that laboratory performance is acceptable during cycles 13 through 15. That doesn't mean that all labs met it but we at least had some labs. And you can see

that 14 of the labs met the 90 percent, 12 the 80 percent requirements, 13 of the 50 percent quantitation errors, and 11 with the 50 percent of the individual analytes being correctly quantified within 20 percent. So this is quite an improvement too over the laboratories from what we had seen and what we presented in March versus what we're presenting today.

Slide 41 – Conclusions

Conclusions we've reached from this is that comparison of lab results from cycles 13 through 15 to requirements of the guidelines demonstrate dramatic overall system improvement under the current study design. With the current sample sets most of the participants demonstrated the precision that will be required of certified laboratories for confirmatory testing of neat oral fluid. The prediction intervals for all analytes except amphetamine demonstrated the marked improvement in the precision of the laboratories.

Slide 42 – Conclusions

The within and between laboratory precision has tightened to the point that most participants would have a 95 percent probability of meeting the 20 percent requirements, that is quantifying within plus or minus 20 percent. And again the communication discussion results I think has been very effective within the oral fluid, I have to praise the laboratories for their willingness to work with one another, to work as a system to improve the system to improve one another. The neat oral fluid PT samples we've seen appear to be stable for three months and especially with the THC and the morphine.

Slide 43 – Future Plans

Future plans, we're going to continue the current project through May of 2007, we will begin an assessment of performance of the oral fluid laboratories with samples that contain analyte concentrations at .4, one, and up to ten times the proposed cutoffs. We also will start looking at the assessing the effects of common interfering compounds and other compounds that are potentially present in the mouth. One of the big ones that we have yet to do is assess initial testing of the samples, we concentrated on what we thought was going to be the hardest and if Ron Shippee is correct we shouldn't have any problems with initial testing.

We also will begin assessment of the current collection devices, that's somewhere down the road as I told you in March, that was in the future and we still maintain that as something for the future to be done.

Slide 44 – Disclaimer

I want to present the same disclaimer or similar disclaimer for those laboratories that are testing, are participating in the oral fluid pilot PT program. The reason this disclaimer is there is because this pilot PT program in no way represents the type of samples by composition, number, or any other thing that we might put into the PT program when we start certification and so it's not a true representative of what will be required of a certified laboratory or for a lab to become certified. And so for this reason

we recommend that laboratories be very, can't think of the word I want to use right now but they be very cautious in what they say about, represent from these results. These results are used by us, the NLCP which consists of RTI and SAMHSA, to evaluate our progress and the testing industry's progress toward the requirements for certification, for future certification.

MR. STEPHENSON: This again shows that there is a process in place, it's dynamic, I think for everybody in this room today the reason we presented these two rounds of PT results was to give you a sense that this is a living, breathing process with improvement happening and without doing it in this environment it would be very hard for many people to assess what is actually happening to drive the entire system towards improved performance. And where we're not dealing with the proficiency of an individual lab we are dealing with the overall proficiency testing system that would be used to help monitor the day to day performance of any labs that might become certified in the future.

Beyond that we need to pay attention to issues related specifically to the window of detection, both the limitations and the unique values that exist among the different specimens that we're looking at in the alternative arenas. And also to pay attention to one of the comments that John had made that we are going to be looking at collection devices because in oral fluid this is a major issue. We made the world as simple as it could possibly be with the oral fluid, that world might not be so conveniently simple in the future and as everybody knows it's an issue that in the real world even today is an issue of concern in some arenas.

At this time, let's go ahead and move on to the next one which we had an interesting segue here because the next presentation is going to be evaluating workplace drug testing results from a medical review officer data source. This is the most important ingredient that when we develop these standards and we have proficiency and precision in testing itself we still need to know what does it mean, what is the proper interpretation of results. This has been a major undertaking of ours to try to link the lab data together with the sequential assessment by medical review officer functions and to get a sense of what we need to put in place in order to comprehensively look at everything that comes out of our system.

Agenda Item: Evaluating Drug Testing Results from a Medical Review Officer Data Source

Note: The PowerPoint slides for the following presentation are attached at the end of the transcript.

Slide 1 – Evaluating Workplace Testing Results from a Medical Review Officer (MRO) Data Source

MR. CANGIANELLI (The Walsh Group): I am going to give you some information on the background and introduce where the data came from and then Mike will pick up at slide number nine and carry it forward. I'd like to also recognize Andy VonBrandt who did most of the work on this, we stole Andy from First Advantage back last year and he was instrumental in developing that database over there and understands it inside and out and if there are any really technical questions that you all might have as a result of this I think Andy or myself or Mike can probably come up with an answer.

Slide 2 – Introduction

In the way of introduction, this presentation provides an overview of the relationship between workplace drug testing results and the MRO verified results which have long been warranted. In 2003 there were indices from several large labs representing seven million specimens reported and they reported positive rates of 2.5 percent for the federally regulated workforce and about five percent for the non-regulated workforce. Now we all know that these indices do not accurately represent illegal drug use rates largely because they contain the blind QC samples and they include drug positive results that have an alternative medical explanation.

Slide 3 – Objective

The objective of the analyses was to evaluate the relationship between workplace lab reported drug test results and the MRO verified results.

Slide 4 – Background and History (I)

In the way of background and history this was a vision that actually Mike Walsh had way back in 2001 and we would work with First Advantage which was Employee Health Systems back in those days to try to get access to their database, that ultimately became reality in 2003 when we teamed with RTI in a proposal to develop this MRO database under the SAMHSA/NLCP contract. Finally in 2003 we obtained a subcontract from NLCP as part of that contract to develop the MRO database and a primary effort was designed to utilize Employee Health programs, later First Advantage's data.

Slide 5 – Background and History (II)

The first database was received in 2004 and it represented basically EHP and SAMI's MRO data for the year 2003. After that time EHP was bought out by First Advantage and there were several other acquisition that came under that and the database has slowly grown since that time. We have 2004 and 2005 data and we've done some analysis on the 2004 data and just beginning on the analysis on the recently completed 2005 data. We completed the integration of this 2003 and 2004 data input in September and finally the poster was presented at the SOFT in October of this year.

Slide 6 –Methods (I)

The methods, the records for drug testing in 2003 were transferred from MRO into a database in accordance with HIPAA regulations. Need to identify the fact that we did not get any personal identification information as part of this process, if we needed to go back and get data on an individual we could go back to First Advantage and obtain that but the database entirely neutral that we have in our computer system.

There were 164,000 plus federally regulated specimens and about 667,000 non-regulated specimens, a little under a million in each year and that has held pretty much true for each of the subsequent years that we've obtained databases for 2004 and 2005. And these specimens are records from about 6000 companies, 5923, that were tested at 19 certified laboratories. There are actually 40 laboratories in the database but

we only used the data from 19 because most of the other laboratories were really ones and twos, very small numbers and they did not affect the overall data analyses.

Slide 7 – Methods (II)

Specific donor information was not included as I indicated, this was in accordance with our IRB and again the HIPAA regulations. All links to donor identification were broken prior to transfer. The agency and blind QC samples were excluded, they weren't excluded in the transfer of the data, they were excluded by us after we got the data, we could go in and find those and were able to exclude them, and then only the urine data were examined. Records included donor demographics, employer information, collection site information, lab results, and then the MRO determinations.

Slide 8 – Data Elements (I)

There were two major files actually that we obtained, one was the demographic file from First Advantage, the drug test results file, and it contained all these data elements that I've indicated here. It's interesting to note though that were able to identify a good location on the donor, which you'll see presented in a map a little later on, 91 percent of the time. As you can well imagine all the elements in this data file were not populated 100 percent of the time so there was an exorbitant amount of cleaning that had to be done and manipulating of the data in order to get it into an analysis state. However about 90 to 91 percent of the location information was very good, you'll see in here that there was a data element for the industry code and that industry code was not very well populated, about 15 percent of that information was obtained. However, we feel that we can go back and get that if it's necessary.

Slide 9 – Data Elements (II)

These are some of the other files we got, the lab information file is part of the MRO drug test results key, the name of the drug tested, the quantitation was available about 35 percent of the time I think in most of these cases, the screening cutoff for the panel, the confirmatory cutoff for the panel, and the lab results for each drug. We had reject information which we analyzed and some of that's going to be presented by Mike when he gets up here and as I indicated the industry code and industry name information was not very well population but we think that we can go back by taking the individual company names and doing a further analysis of that, we can determine what the industry code might be and reassert that data at a later time if we need to.

Slide 10 –Data Summary

This is a repeat of the information, about 6,000 employers, the total number of labs that are in the analyses were 19, again the number of specimens involved were 164,000 regulated and 667,000 non-regulated of which only 137,913 were donors and for the non-regulated 634,145 were donors. The reason that is a smaller number is because that there were some of these that showed up as second, third, and fourth tests for the same individual, so there were about 30,000 of those that showed up in there more than one time.

Slide 11 – Geographic Distribution of Donor in Study

DR. BAYLOR (RTI): This slide depicts the geographic distribution of donors in the study and you can see they're categorized into five different number of specimen categories the largest being about 24,000 to 100,000 for which there were 11 states and the smallest being 175 to 2,800 which there were ten states, Idaho, Montana, Wyoming and the Dakotas are five of those ten states as well as Maine, Vermont, and New Hampshire I believe and Alaska make up some of the others that were sparsely represented.

Slide 12 – Reasons for Testing

I'm going to get into some busy slides, these slides were relatively easy to explain on a poster, a little more challenging to draw relationships with the pie cuts on the screens. This particular slide compares the reasons for testing, on the left side we have the regulated specimens and on the right side we have the non-regulated specimens. And you can see for the regulated specimens there's about an equal distribution between those specimens tested randomly and those for pre-employment, pre-employment being about 45 percent, random about 47.5 percent. On the non-regulated side with no impetus to perform random testing that number for random drops down to about 7.5 percent and pre-employment is about 84 percent of the specimens tested.

A lot of the smaller categories, return to duty, similar but again return to duty is a slightly larger percentage in the non-regulated. The follow-ups are slightly larger in the regulated industry, the for cause about a two fold increase in the non-regulated. Periodic very similar as well as post-accident.

And this is much of what one might hypothesize and certainly anecdotal information led us to believe and we quoted much of this type of a distribution but this is the first time that an actual database has actually borne out the data to support those observations.

Slide 13 – Percentage of Lab Positives Reversed by MRO

If we look at the percentage of lab positives reversed by MROs, we've always said in some of the clinical categories or those, especially opiates, amphetamines, benzodiazepines and barbiturates that was probably a significant number of lab positives reversed by the MRO. This particular slide depicts regulated and non-regulated, again with the regulated to the left and the non-regulated to the right, and you can see that there's about 5.4 percent reversals in the regulated and about 18.5 percent reversals in the non-regulated. And we'll look at this in a little more detail in the next couple slides. Lab positives that are cancelled, .1 percent and .11 percent. And the verified positives, the reciprocal would be about 81 percent in the non-regulated and about 94.5 in the regulated.

Slide 14 – MRO Verified Positives and Reversals as a Percent of Total Specimens Tested

Let's make things really complex, we'll look at the upper panel which is the pre-employment and the lower panel is random as far as the two predominant reasons

for drug collections, and then we'll look at three columns essentially, we'll look at the regulated specimens, we'll look at the non-regulated that are the HHS five drug panels only, and we'll look at the non-regulated which have the expanded drugs, or all drugs.

Going across looking at pre-employment you can see that we see a significant number, we have 2.25 percent drug positives out of the 3.69 percent of non-negatives. We use the term non-negatives to refer to those drug positives and those other non-negative results that would be invalid result, substituted and adulterated.

The other non-negative, we have 1.37 in the regulated, in the other non-negative results, and you can see the reversals growing as we go across this slide from 0.07 percent to 0.28 percent to 0.75 percent. The drug positives go at a 3.33 percent and the pre-employment non-regulated five drug panels up from a 2.25 in the regulated five drug panel to 3.47 with similar positivity rate in the non-regulated all drug.

You see similar trends in the random collection as we go across with the other non-negative results being about 1.5 percent of the 2.66 percent others with the negative of 97 percent in the random regulated five drug panel. And that other non-negative result goes down to 0.55 percent of the 3.79 percent in the pre-employment five drug only.

The positives are about one percent of the non-negatives from the regulated, that goes to 2.94 percent in the random five drug non-regulated and a similar three percent non-regulated all drug panels.

MR. STEPHENSON: The bottom line is this is the kind of thing that when you start to tease out the data and look at it over time is exactly where you need to have a good understanding about where policy is going, what it is that you're getting out of your medical review officers that are being trained, what is it that they are contributing to the process, what are we as a society learning about this in the workplace areas that we're doing the testing. Mike is our best technical presenter that we've got and you can see that it's a little cumbersome to go through but he has a way of being able to go to the bottom line at the end of this. So if a couple members of the Board pull out some questions and see if you can tweak his capacity for giving good answers on the fly we'll see how this goes, so it's something to look forward to at the end.

DR. BAYLOR: The common thread I think in these slides is that the negative rate is 96, is about 96 percent all the way across in pre-employment and very similarly in the random. And the other, or the non-negative, runs about 3.5 to four percent as you go across in the pre-employment and about, a little more variability in the random pool.

If the system is working we should see reversals and with the non-regulated all drugs you would envision that those reversals would be at a greater rate and certainly from the regulated five drug to the pre-employment or just the regulated five drug panels you can see that the reversals do grow to significantly larger in the non-regulated all drug, and we'll look at that in a little more detail.

Again, this confirms a lot of what you would theoretically hypothesize as far as what you should see going on if in fact your system is working and if in fact the review process of this system is identifying and interpreting the alternative explanations for the presence of a drug or metabolite in a urine specimen.

Slide 15 – Comparison Between Lab Findings and MRO Verifications Showing Distribution of Positives and Other Non-Negative Specimens

We'll now take a look at the comparison between the lab findings and the MRO verifications and look at the distribution of positives and other positive drug results and other non-negative specimens. We have again to the left and right the regulated versus the non-regulated and in the upper panel we have the results as reported by the lab and in the bottom panel we have the results as reported by the MRO to the employers. What we are looking at here is the difference between the lab results and those reported by the MRO which would take into account the reversals.

And again we have an other or a non-negative rate of about 2.07 percent in the regulated reported by labs and about 4.5 percent in the non-regulated reported by labs in the two upper panels. I hesitate to get my laser pointer out and try to laser both sides of this, or to step out in front and try to laser.

In the reported by the MRO you can see in the regulated industry that administrative cancellations and the, the administrative cancellations take out a significant number of the positives as well as the reverse. The reversals by the MRO are significantly smaller in the regulated reported by MRO category which is the medium blue as opposed to the 0.78 percent of the 4.67 percent in the non-regulated reported by MRO to the employer in the lower right pie cut. And again your smaller pies are exploding out from the small other non-negative slice from the overall and detailing where that percentage of other non-negatives, how that breaks out in the other categories. And some of the new categories above and beyond the adulterated, substituted and invalids that are reported by the laboratory and the rejected, we have the administrative cancellations to verify adulterated, the verified substituted, the verified positives as well as cancelled by MRO for the invalid result and cancelled by MRO which is a pass-on from the rejected specimens that the laboratory rejected for testing.

So again, a significant amount of data in these slides, a significant amount of comparisons from the reported by lab to the reported by the MRO and then from the regulated to the non-regulated, for which you do have a copy of the poster and with a magnifying glass you'll be able to clearly see.

Slide 16 – Percentage of Lab Positives Reversed by MRO (by Drug Class)

Looking at the percentage of lab positives reversed by MRO by drug class, again using a bar graph here looking at the regulated versus the non-regulated, we have the percent of the reversals in the blue bar, the verified positives are represented by the red or burgundy bar in the different drug classes, they go from the amphetamines, cocaine, marijuana, opiates and phencyclidine on the regulated side, and we have the additional drug classes of an expanded opiate panel generally, barbs, benzodiazepines, methadone and PCP on the non-regulated side. You can see that represented here are additional drug classes and to further complex the picture you also generally have different cutoffs associated with non-regulated in the areas of amphetamines, possibly opiates, and as far as the two common drug classes between the regulated five drug panel and the non-regulated overall.

In the amphetamines there's about 18.5 percent that are cancelled or reversed by the MRO as opposed to 43.5 percent of the amphetamines. In many cases the non-regulated amphetamine class may be an extended panel of confirmation compared to the amphetamine and methamphetamine defined in the regulated testing.

Similar in cocaine, only .12 percent reversed and .1 percent in the non-regulated. Looking at marijuana, again very similar, 0.23, 0.22 percent. Opiates, similar

in the regulated and non-regulated with non-regulated slightly higher at 80.5 percent. PCP, 100 percent for the very few PCPs that are identified.

Getting into the other drug classes and non-regulated testing you have about 84 percent of the barbiturates reversed, 75 percent of the benzodiazepines, 64 percent of the methadone, and about 73 percent of the PCP. Again, very similar to what one would theoretically hypothesize to be occurring under medical officer review assuming that they are taking into account and properly identifying the alternative medical explanation and have a valid prescription or valid medical use for the drug or its metabolites to appear in the urine.

Slide 17 – Summary of Positives and Negatives from the Laboratory Versus MRO Verified Positives and Reversals

This slide more or less summarizes in a table form the positives and negatives from the laboratory versus the MRO verified positives and reversals and it's kind of the mathematical back calculation for accountability. And again we have to the left the regulated and to the right the non-regulated, the upper panel they reported by lab and the positives reviewed by MRO. Again, we started out with 164,432, in the regulated arena to the 667,751 in the non-regulated arena, of which we had a 97 percent negative in the regulated to a 95 percent in the non-regulated, and a positive rate of about 1.7 percent in the lab reported regulated to 4.23 percent in the laboratory non-regulated. And the other reported non-negative results, or other reported results about 0.3 percent to 0.45 percent.

Looking down at the positives reviewed by the MRO approximately 8.09 percent reversal rate, or about five percent of the lab positives comparing to a 0.78 overall of all tests performed reversal rate in the non-regulated representing about 18.5 percent of the lab positives. The verified positives were about 1.6 percent in the regulated versus 3.4 percent in the non-regulated giving you a negative rate of 94 percent of lab positives versus 81 percent of the non-regulated lab positives were verified positives reported by the MRO to the employer. And of drug positives that were cancelled we had approximately one percent in the regulated, 0.1 percent, and 0.1 percent of the lab positives were cancelled in the non-regulated arena.

Slide 18 – Conclusions

In conclusion, the federally regulated testing seemed to focus equally on pre-employment and random testing as we saw early on with about 45 percent balance while the non-regulated primarily seemed to focus on as far as the reason for test pre-employment with significantly less random testing being performed. There were a significant number of laboratory positives results which were reversed during the MRO review process which I think is the observation and the assumption one would envision and certainly indicative of the review system by the medical review officer of laboratory results is working.

Slide 19 – Conclusions

In the federally regulated testing the reversals seemed to be due primarily to legitimate medical explanation for the presence of opiates and amphetamines as far as the regulated side, in the non-regulated side you had a significantly greater number of

MRO reversals due largely to a higher amphetamine reversal rate as well as reversals for barbiturates and benzodiazepines.

Where do we hope to go in the future? Well, Leo thought we were going to present the rejected reason codes but we haven't, we left those out of this particular poster and presentation so certainly the reasons for rejection by the laboratory is one area that we will be focusing on. We are certainly carrying this on to the 2004 data and 2005 data where you get some differences in definitions of adulterated substituted consistent with changes in the programs for which the regulated testing represents as you go from the creatinine cutoff lower and the definition of substitution changing from calendar year 2003 through calendar year 2004, through November 2004 when the updated SVT guidelines as we refer to them went into effect. I believe next week we'll start looking at the 2004 data in a fashion similar to the 2003 data as we work on the 2005 data.

I would like to acknowledge the invaluable effort and contribution of Dr. Jim Ferguson, medical review officer, who has helped us significantly in the process of trying to get this pulled together.

MR. STEPHENSON: Thank you, Mike. And Leo, thank you very much for the presentation, again this is a tremendous area. Did anyone take notes? Have they got their key questions figured out for Mike?

COL. SHIPPEE: This is painful to go through I know but extremely important, this was a nice job. Every year we're asked how do we compare with the civilian side and I guess Quest data and then I always have to put the caveats in when we go back to Congress, so this is really nice, I can use this. You think with DOD we'd have a little bit of a handle on it but we don't, trying to get the MRO data back from the services has been a real challenge, and you're right, Bob, it affects policy because we added oxycodone to a panel last year, now the labs are complaining because they're overwhelmed, there's a lot of oxycodone being used legally we think, so getting the MRO result back, because now they want to drop it, well I can't change policy without having the MRO results. So again, painful work but it really is necessary to do.

MR. STEPHENSON: Thank you for raising that, the bottom line here is that one of the pieces that I believe is available although we didn't present it here, we talked about, we excluded the blinds, program generated blinds, but that's also an important issue to look at, what do we have and by percentage, by regulated industry, by type of employer, what is actually being done by the programs themselves, the people who are the employers, to do some of that submission of testing material, what are they doing to follow-up with. That's the kind of thing that's really important. If I'm not mistaken I think also you have some data in the system that addresses both oral fluid and hair specimen.

DR. BAYLOR: That's also true.

MR. STEPHENSON: The idea is that although we are not there yet there is also some guidance that's out there in the real world about how to interpret some of these results that even as you begin to look at your oral fluid we may be able to help focus a little bit what does it mean because all of this is about proper interpretation of results and that real world environment that's out there is one that's teaching us a lot person by person.

MR. ELLIS: Did you look at the data as far as the breakdown of what constitutes Federal

tests, whether that's a lot of those tests were DOT versus Federal employees versus NRC people?

MR. CANGIANELLI: Most of the federally regulated are in fact DOT tests, we had very few if any federally regulated tests included in that package. Andy is shaking his head, there were none in there.

DR. BUSH: No Federal employee.

MR. CANGIANELLI: No Federal employee I meant.

DR. BAYLOR: Was there NRC? No, there was no NRC, no Federal employees, so this is almost all DOT, well it is all DOT.

MR. STEPHENSON: Well one of the issues that comes up then is that when you look at the difference between the regulated industry which basically represents DOT and the non-regulated industry and the fact that almost all the testing in the non-regulated area is pre-employment to me that's a signal that the industries that are employing drug testing are simply gatekeepers of people coming in and are missing a lot of bang for the buck in terms of what they should be doing and what message they should be sending to their workforces about continued observations and concerns once an individual becomes an employee, and that you really have not done all of the kind of things that would be appropriate to do. So this is one of those kinds of data points that can go out for use in other settings that can be helpful for people to look at and pay attention to over time.

COL SHIPPEE: Now I've got all, I will have by the end of the year 95 percent of the DOT coming to one lab and access to the central MRO, I'll be able to add your database in this too.

MR. STEPHENSON: If you'd be willing to do that we'll accept it, we'll take it in a positive way and work with your MROs to help develop a standard input form. You may also get some other feedback that could be helpful that could help your MEPS testing in terms of some of the profile characteristics you're looking for that are very predictive of what becomes a good employee or a good soldier.

Agenda Item: External Contamination of Hair with Cocaine: Evaluation of External Cocaine Contamination and Development of Performance Testing Materials

Note: The PowerPoint slides for the following presentation are attached at the end of the transcript.

Slide 1 – Title Slide

DR. STOUT (RTI): As Bob mentioned, this is the results of a study that we conducted at RTI, looking at external contamination of hair with cocaine, particularly as it relates to construction of PT materials. I want to acknowledge my co-authors on the paper, Drs. Jeri Ropero-Miller, Mike Baylor, and John Mitchell.

Slide 2 – Disclaimer

I also need to acknowledge that this was work done under our contract with Department of Health and Human Services. The views and opinions expressed in here are those of the authors and not necessarily those of SAMHSA or HHS.

This paper also was published in October in Journal of Analytical Toxicology. There are copies of this that were available around the table, so if you haven't picked up one, they were over there.

Slide 3 – Background

Just a little bit of background here. We have a lot of data to crawl through here. Two papers in particular prompted looking at this work. One was by Romano and others, published in 2001, where they had four individuals who contaminated their hair using powdered cocaine they distributed on their hands and then rubbed it through their hair. They then evaluated these hairs over a ten-week period to see if they could get cocaine off, and found that using a couple of different contamination procedures they were unable to get the cocaine off this hair.

Another paper by Cairns and others published in 2004 also looked at this issue using a slightly different model for contamination of hair. They determined that they were able to distinguish the externally contaminated hairs using wash protocol and some other decision criteria to be able to determine the contaminated hair.

We have got two essentially conflicting reports, though not necessarily on all points. Part of what prompted the work was to try and see what parts that we could reproduce.

Slide 4 – Objective

The objective of this was an evaluation of the dynamics of external contamination of hair with cocaine and specifically for the Federal drug-free workplace programs. We needed to do this in order to develop performance testing materials that can help us be able to evaluate the hair testing industry's decontamination procedures that are currently being used. We also wanted to evaluate the reporting criteria that were contained in the proposed Federal guidelines that were published for public comment back in April of 2004.

Slide 5 – Study Time Line

As it was kind of a complicated study, we will walk through the time line here so you have an idea of when the various events occurred. What we called time zero on some of the plots, or what we refer to as C in some of the tables, is the time that we contaminated the hair, so that will be the time point that we start everything from.

One hour after we contaminated the hair, that is when we took the first samples from the hair materials that we had. After that sampling we had a synthetic sweat solution that we applied to those hairs. Then we let the hair dry, so approximately six hours after contamination, about four hours or so after the sweat application, the hair was visibly dry, and then we took another set of samples from all of our hair locks.

At the one day time point we shampooed the hair. We used baby shampoo to shampoo the hair in order to mimic a hygienic treatment of the hair. Once that was

dry, approximately three hours or so after the shampooing, again samples were taken at that time point.

Then the hairs were shampooed on every weekday night, and on day seven again we took samples. Then for days 14 through 17 the same thing occurred. We shampooed it every weekday night and we took samples once a week at the end of that.

Slide 6 – Procedure

The procedure for this. We took 15 milligrams of cocaine hydrochloride, that is 15 milligrams pictured in my hand there, and that was then distributed on the palm surfaces of the hands. We had a 12-gram lock of hair. We had 5 different types of hair. This is hair type four of the five we were using that is pictured here, so you have an idea of the relative size of these things. All of the hairs that we used were verified to be free of cocaine and any other cocaine metabolites prior to the contamination studies.

The cocaine we used in this study was pharmaceutical cocaine. We confirmed that this cocaine had about 0.6 percent cocaethylene and about 0.1 percent norcocaine present in the cocaine.

It is known that pharmaceutical cocaine has these amounts present in it as a byproduct of manufacturing. In conversations with the DEA, John Casale, who is the one that originally published that pharmaceutical cocaine contains cocaethylene, conversations we started with him about a year ago and have continued since have indicated that there is the possibility of the presence of cocaethylene and norcocaine present in illicit cocaine. This may be upwards of 2 percent cocaethylene and upwards of 5 percent norcocaine present in some street cocaine.

Slide 7 – Procedure

Once we had the cocaine distributed on the hands, then handled the hair lock for about five minutes to distribute the cocaine onto the hair. The hair throughout the entire study was maintained loose. We didn't bind it or clip it together on one hand or anything like that; it was just maintained loose throughout the entire study. It was stored under filter papers and was on clean lab paper in a laboratory that we had not previously handled cocaine in the laboratory. All the surfaces of the laboratory were washed down prior to any of these procedures, and we had new laboratory blotter papers that we spread on all the bench top surfaces that we used for this, and changed that regularly throughout the procedure.

Slide 8 – Procedure

After one hour, after this point of contaminating, that is, when the first samples were taken from each of the hair locks. After we collected those samples, then we wet the hair to the point of runoff with the synthetic sweat solution, just using a spray bottle there, spraying down the hair. This would be to mimic somebody having sweated on the hair.

Again, this was stored loose under filter papers open to ambient laboratory air until it was dry by inspection. That took approximately three hours for it to dry out. Then the hair was sampled after it dried out.

Slide 9 – Procedure

The hair was shampooed. We wrapped it in a little gauze container to keep the hair together. We applied about a milliliter of baby shampoo to it and then massaged it under warm water for about a minute, and then it was copiously washed with warm tap water. Blotted the hair dry and allowed it to dry open to ambient laboratory air, and it was dry in three or four hours. The hair was sampled after that first shampooing, and then it was sampled weekly for the ten weeks of the study period.

Slide 10 –Procedure

We did a variety of decontamination strategies to each of the hairs. One of them that we did was an extended phosphate buffer wash as described in Cairns et al. that was published in 2004. In every extent possible we matched the conditions described in that paper. This included the temperature that it occurred at, the buffer volume to hair ratio, the fact that there was an abrupt momentum change as the hair was on the shaker, so it hit the end of its strike and traveled a little distance and struck an object before it moved back. We had shaking rates of about 120 beats a minute.

Because we were using much larger quantities of hair in this than were described in Cairns and others, we had to use a larger vessel to hold all this and maintain the same ratio of buffer to hair. So we were concerned that the hair was able to freely move within that solution. You can see pictured here, the hairs didn't clump, they were able to move around in that solution.

Slide 11 – Procedure

As I mentioned, we had five different hair types. They ranged from blond hair all the way up to a very dark brown hair. Four of them came from Caucasian females. All of them were young females. The hairs hadn't had any chemical treatments done to them. They hadn't been dyed, they hadn't been burned, they hadn't been chemically straightened, anything like that.

The first number in parentheses there is the Schwartzkopf scale number. It is just a number to indicate the relative color of the hair. The second number there is the determination of the total melanin content of the hair. This was a method that was modified from Robert Kronstrand's method. The hairs were dissolved in a tissue solublizer and then the melanin was estimated by spectrophotographic method. We ranged from about 6.6 micrograms of melanin per milligram of hair all the way up to 57.4 micrograms per milligram of hair.

There was also a concern that the hairs were of relatively similar conditions in terms of the wear of the hair. We evaluated this by scanning electron microscopy. We can see the images of the five different hair types here that were judged to be pretty similar in the amount of wear that they had. These came out of a more extensive study and washing effects on hair by scanning electron microscopy that has just recently been accepted for publication in Forensic Science International.

Slide 12 – Sampling Procedure

If we take one of these hairs as an example here, for each of the time points we took 400 milligrams out of that big lock of hair and then we cut that up in small pieces of one centimeter, and then mixed that thoroughly in order to have a homogenous

sample to go to each of the various procedures in each of the various laboratories. From that we took a 120-milligram subsample, and one of these 120-milligram subsamples was decontaminated at RTI via extended buffer wash procedures as described in Cairns and others published in 2004.

Out of that we split it into three subsamples that went to three analytical laboratories. We had three commercial hair testing laboratories that do hair testing on a regular basis. All these laboratories were compensated for their analytical work. They all had an opportunity to see the protocol before we started, and they had an opportunity to comment and question on the protocol before we started and before they committed to the protocol.

We had another 120-milligram subsample that we took out of that subsampling, and each of these three individual laboratories was allowed to use whatever their decontamination procedure was that they normally use in their laboratory. So we had three separate subsamples that went to those labs.

Two of the laboratories used varieties of methanolic decontamination procedures, one laboratory used an extensive aqueous phosphate buffer decontamination.

The last 120-milligram subset was one that we didn't decontaminate, and the laboratories were instructed not to decontaminate, so they weren't decontaminated in any fashion. Split that into three, sent it to the three laboratories.

Slide 13 – Sampling Procedure

When things were shipped, we collected up all the samples, collected up the samples from the other five hairs. These were randomized. Each of the laboratories received 195 actual samples to analyze. Each shipment that we sent contained blind negative and blind positive materials that were inserted into each of these shipments to go to the laboratories. Everything was then randomized and submitted to the laboratories in blinded fashion.

Slide 14 – Blind Positives and Negatives

So if we look specifically at the blind negatives and positives, each laboratory received 47 blind control materials, which gave us about a 19 percent blind positive rate within the samples that went to the laboratories. Out of those there were 22 positives. Four of them came from known drug user hairs and 18 came from manufactured PT materials that we had been using in the pilot PT program. Twenty-five of them were negative materials. These were made from the five hair types before any of the contamination procedures had occurred, and were packaged up at that point.

Slide 15 – Sample Packaging

These were all packaged so that typically, laboratories received one blind positive and one blind negative with materials that they were asked to decontaminate, another blind positive and negative with materials that they were asked to not decontaminate.

All of these samples were then packaged up in aluminum foil. They had a three-digit number that was put on the package, and then they were put in a ziplock bag like this. Blind QC materials were packaged in the same fashion. As of this point we have not decoded which were actual samples and which were blind materials and what all

the samples were to any of the participating laboratories.

Slide 16 – Cocaine Results by Decontamination Treatment

These are arranged by all the hair types. These are by decontamination treatment, so we have got one line representing those samples that were not decontaminated, one representing those that were decontaminated by the laboratory, and one that we decontaminated. Each of these points is the mean of 15, 5 hair types and 3 laboratories. The laboratories were treated as repeated measures in all the statistical models.

One thing to note here, these results are noted here as nanograms per milligrams, not picograms per milligram.

If we expand out the first few time points, since they are cramped here, the first time point here labeled is the hairs before they were contaminated, so this would reflect the hairs before any cocaine came anywhere near them. You can see uniformly they were below any detection of cocaine. The point here is, the hair samples after they had been contaminated but prior to any sweat treatment or any kind of moisture coming near the hair.

This point here represents the hair samples after the sweat treatment, and this point here is after the first shampooing of those hairs.

One thing to note here is, this point here for those samples that were decontaminated at RTI immediately after they were sampled but prior to any sweat treatment of the hair, are the only samples that had cocaine levels that were below detection limits or over zero. Those same materials that were one hour after contamination, not those that were decontaminated at RTI, but that same material if they were shipped to the laboratories now had substantial quantities of cocaine that were still present on the hair, even after laboratory decontamination.

Slide 17 -- Distribution of Cocaine Concentrations found in Laboratory Decontaminated Hair Samples pg/mg

Another way of looking at these data, if we spread them out, going across this way we have got the presentation of the data going across the entire study period from days zero to 70. The ones in the C column, these are samples from the one hour after contamination but before sweat treatment, as for after sweat, these are the samples after contamination and after sweat in this column.

Running down here, these are broken out by each of the five hair types, and then these are broken out by the three participating laboratories that provided the results.

The numbers that are here in pink, these are all ones that were greater than 5,000 picograms per milligram. These are all presented as picograms per milligram, so anything in pink would have been at least five times the 500 picogram per milligram proposed Federal cutoff. Everything in blue would have been greater than a 1,000 but less than 5,000, so it would have been something less than five times the cutoff. Those that are in gray would have been less 1,000 but more than 500 picogram per milligram cutoff for cocaine.

So you can see across the entire period that for many of the hairs the 15 milligram cocaine contamination resulted in levels greater than ten times the proposed Federal cutoff almost across the entire study period. For some of the hairs it was the

entire study period.

Slide 18 – Benzoylecgonine Results by Decontamination Treatment

Looking at benzoylecgonine, a metabolite of cocaine. This is by decontamination treatment. We have a very similar pattern to that of cocaine, where those that were not decontaminated had the highest contaminations. Those that were decontaminated at the laboratories had the next lowest contaminations of benzoylecgonine, and those that were decontaminated at RTI had the lowest contaminations.

If we expand out the first few time points in the same pattern in the time points, the time point that were decontaminated after sampling, the one hour post contamination point prior to any sweat treatment were the only samples that were decontaminated to the point where benzoylecgonine was not detectable. Those same materials shipped to the laboratories and spent between five and 30 days before they were decontaminated, now have benzoylecgonine in substantial quantities present here.

One other thing to point out here is a fairly large variation in those samples that were decontaminated in the laboratory, particularly in comparison to those that were decontaminated at RTI. So this does seem to suggest that laboratory contamination does add -- as you would expect, because they are very different methods -- is going to increase the variability in the results we are getting back. This is important on the PT side, as we have had struggles with the variability in the system of laboratories.

Slide 19 – Cocaethylene Results by Decontamination Treatment

Cocaethylene results follow a real similar pattern to the others. This time point, post contamination prior to any sweat, decontaminated immediately after sampling, are the only ones that were decontaminated to at or near limits of detection. Same materials shipped to the laboratories, decontamination not occurring until five to 30 days after contamination, cocaethylene is now strongly present. A similar pattern to that we see with cocaine and benzoylecgonine.

Slide 20 – Cocaine Results by Hair Type, Decontaminated by Laboratories

If we look at these in a little bit different fashion, look at them by each of the five hair types. Now each point in here is a mean of three, the repeated measures by each of the three laboratories as broken out by each of the five hair types, you can see there is not really a particularly clear pattern relative to hair color.

Slide 21 –Cocaine Results by Hair Type, Decontaminated by RTI

Do note that we had a larger variation here, particularly when we compare that to those that were decontaminated at RTI. We now see there is much smaller variation, but we also see in this case some differences that are significant relative to the various hair types.

Again, this isn't particularly clear, it isn't particularly well related to what the actual color is. We can see here that hair type four, which was a dark brown hair, had substantially higher cocaine concentrations over the entire study period than say one of the blond hairs.

Slide 22 – BE/COC Ratio by Decontamination Treatment

However, when we start looking at other components here, and we look at the ratio of benzoylecgonine to cocaine, which is one of the criteria in the proposed Federal guidelines, we see an increase in this ratio over the entire study period. That increase was not significantly different between the decontamination methods, but it was a significant increase over the study period and it was linear over the study period. At approximately day 21, it exceeded the 0.05 criteria as listed in the proposed Federal guidelines.

Slide 23 – BE/COC Ratio by Hair Type Laboratory Decontaminated

If we look at this ratio by hair type, we get a different picture. Here we have got the blonds, that are significantly higher and increase significantly faster than all of the darker hairs. So again, this is not a clear picture of how this relates to hair color; there is something else going on here other than just simply hair color.

These two points here are where benzoylecgonine was not reported as detected by any laboratories, so that would make the ratio go to zero. So those were ones that were decontaminated by the laboratories, a similar pattern for those that were decontaminated at RTI.

Slide 24 – Positive Results by Proposed Federal Guidelines

Now, the last objective we had was to evaluate these results relative to the proposed Federal guidelines. These are as they were published in the Federal Register in April of 2004.

There are two ways you can call a sample positive. One is cocaine present greater than or equal to 500 picograms per milligram and benzoylecgonine present greater than or equal to 50 picograms per milligram, and benzoylecgonine to cocaine ratio of greater than or equal to 0.05. I will refer to this as the 500/50/0.05 criteria in the rest of the talk.

The other way a hair sample could be called positive is to have cocaine present greater than or equal to 500 picograms per milligram and cocaethylene present greater than or equal to 50 picograms per milligram or norcocaine present at greater than or equal to 50 picograms per milligram. We call this the 500/50 criteria.

There are no other criteria under the proposed Federal guidelines. There are no other metabolites, there are no other metabolite ratios, and no other mathematical decision criteria that are available under the proposed Federal guidelines to determine a positive or non-positive.

Slide 25 – Distribution of Samples Positive by the 500/50/0.05 Criteria

If we break these out and look at these data, these are all of the samples that would have been called positive by the 500/50/0.05 criteria. We have broken this out by laboratory, so we have laboratories one, two and three running along this axis, and then we have the decontamination strategies running along this axis, where we have those that were decontaminated at RTI, we have those that the laboratories decontaminated, the maroon bars, and then the blond bars were those that were not decontaminated either by

RTI or by the laboratories.

On this axis we have a simple number of samples that would have been called positive by this criteria, so you can see the number on each of the bars is the total number of samples that would have been called positive.

Out of that, there were 148 samples that would have had some kind of decontamination, either RTI or the laboratory, the 148 samples that would have been called positive out of all the laboratories in these groups. If we take everything, including those samples that weren't decontaminated at all, there would have been 235 samples that would have been called positive. This is by the proposed Federal guidelines.

A couple of things to note here in how this is distributed. There is a small or no difference between those samples that the laboratories decontaminated or that weren't decontaminated at all. If we look at these in terms of the percentage of samples that would have been called positive in each of these groups, there would have been 65 total samples. So we see a range now from 13 percent of the samples in this grouping, which was laboratory two, that they decontaminated, all the way up to 60 percent of those samples that would have been called positive, those that were decontaminated by laboratory one as an example here.

Another thing to point out here is that the positive rate between labs appears to be independent in this case of either decontamination strategy or the decontamination strategy used by the laboratories. Again, something else is going on here.

We will look at these data another way. The first thing we will look at are those that are not decontaminated, so the next thing I am going to show you is those data broken out in a different fashion here.

Slide 26 – Distribution of Positives by 500/50/0.05 Criteria by Day x Lab x Hair Type Not Decontaminated

If we look at these over the course of the entire study period, this is real similar to what we had before. We had the study period progressing across here, same thing in this column labeled C for those samples one hour after contamination but prior to sweat treatment. We have the AS column, those after sweat treatment. We have the hair type running down this column, and we have each of the three individual laboratories broken out in this column.

Those that are highlighted in blue, those are the samples that would have been called positive by the 500/50/0.05 Federal criteria. So any blue box would have been called positive. Over here in this column we have the grand total of samples that would have been called positive, so there is a substantial number of samples that would have been called positive. These are all samples that are not decontaminated.

Another thing to note is, hair types three and five both reported by laboratory 2 are the only samples that would not have been called positive at some point during the study period.

Slide 27 - Distribution of Positives by 500/50/0.05 Criteria by Day x Lab x Hair Type Lab Decontaminated

If we look at the e same thing for those that were decontaminated by the laboratories, you see fewer samples would have been called positive, but there still are quite a few samples that would have been called positive. Here, only hair types 4 and 5,

again as reported by laboratory 2, are the only hairs that would not have been called positive at some point during the study period.

Slide 28 - Distribution of Positives by 500/50/0.05 Criteria by Day x Lab x Hair Type (RTI Decontaminated)

Lastly, those that were decontaminated at RTI, the fewest samples would have been called positive. Here only hair type three as reported by laboratory two would not have been called positive at some point during the study period. So it was fairly variable results.

Also, you will see that there are samples that would have been called positive for most every hair type sometime over the entire study period, except if you look here at the first two time points. Remember, these samples that were decontaminated immediately after sampling but before the sweat treatment were the only samples where cocaine, benzoylecgonine, cocaethylene were not detectable. You can also see that these are early in the time scale, and if you recall, the linear significant increase in the benzoylecgonine to cocaine ratio over the study period, you will see most of the samples are being called positive later in the study period as that ratio rises over the course of the study period. It is consistent with that rise in the ratio.

Slide 29 – Distribution of Samples Positive by the 500/50 Criteria

If we look at the cocaine to cocaethylene ratio, so the same setup here. We have the laboratories on one axis, the decontamination strategies on another, but right off you can see there are much higher numbers that would have been called positive by the 500/50 criteria.

You can see here that we ranged between 35 percent of samples in this case, laboratory 3, that were decontaminated at RTI, all the way up to 73 percent of the samples that would have been called positive by the 500/50 criteria, those reported by laboratory 2 that were not decontaminated at all.

So here we have 182 samples that had some kind of decontamination that would have been reported positive. Or if we take everything, it would have been 303 samples that would have been reported as positive by cocaine CE out of all the samples analyzed. So there is overall a much larger number of samples that would have been called positive by the cocaine/CE criteria than the 500/50/0.05 criteria.

Slide 30 – Distribution of Positives by 500/50 Criteria by Day x Lab x Hair Type (Not Decontaminated)

Another thing to point out here is there was more of a notable difference between each of the decontamination strategies than there was with the 500/50/0.05 criteria. So take the same breakout, looking at these samples in a different fashion, look at non-decontaminated ones first, similar presentation of this. You can see that there are a fairly large number of samples that would have been reported positive. There are samples over the entire study period that would have been reported positive, and for those that were not decontaminated, every hair would have been called positive at least some point during the study period.

Slide 31 - Distribution of Positives by 500/50 Criteria by Day x Lab x Hair

Type (Lab Decontaminated)

For those that the laboratory decontaminated, only hair type two as reported by laboratory two would not have been called positive by the 500/50 criteria at some point during the study period.

There are fewer samples here that would have been called positive in total for those that were decontaminated by the laboratories.

Slide 32 - Distribution of Positives by 500/50 Criteria by Day x Lab x Hair Type (RTI Decontaminated)

If you look at those decontaminated at RTI, most of note here is, these samples one hour post contamination prior to sweat treatment, decontaminated at RTI were the only ones that didn't have detectable cocaine, benzoylecgonine, cocaethylene present. You can see in this case, every hair type had at least one place that it would have been called positive by all three laboratories.

One other thing to point out here is, in comparison to the benzoylecgonine based criteria, the latter part of the study period with cocaine, cocaethylene, there are some, but there are fewer samples that would have been reported positive in the latter part of the study period. So cocaethylene which was in the original cocaine as deposited on there, decreased over the time as it is washed out with the hygienic treatments. It is consistent with this not being generated on the hair or around the hair, but it was there at the start and declined over the study period, resulting in fewer positives later in the study period instead of the other way around.

Slide 33 – Effect of "Wash Criterion" on Positive Results

One other thing we evaluated was the effect of reported wash criterion on positive results. All the decontamination solutions, we retained all of those decontamination solutions. The final wash solution was analyzed by a mass spectro technique for cocaine, cocaethylene or cocaine and benzoylecgonine.

Then we applied as described in Cairns and others in 2004 the wash criterion decision criteria. This is, to take the concentration in the hair and subtract off five times the concentration determined in that final wash, and then that value is compared to the Federal decision criteria.

Slide 34 – Effect of "Wash Criterion" on Positive Results

If we break those out, we have got the two different Federal criteria, the two different ways it can be called positive under the Federal guidelines. We have before the criterion, after the criterion.

Here by the 500/50/.05 criterion we have these samples we had analyzed, ten samples that would have been called positive before the application of this wash criterion, those same ten samples after the application of that mathematical decision criteria would have been called negative against the proposed Federal guidelines. However, if we look at the cocaethylenes, it would have been 29 samples originally called positive before the application of the wash criterion. After, 28 of those samples still would have been called positive. And cocaethylene and norcocaine was not detected in any of the wash solutions, so that wouldn't have changed these results if we had looked

at norcocaine.

Slide 35 – Conclusions

External contamination here with powdered cocaine hydrochloride, which did contain trace amounts of BE, cocaethylene, norcocaine, resulted in the presence of cocaine, benzoylecgonine and cocaethylene and to a lesser extent norcocaine. This was all resistant to removal to a ten-week period by a model hygienic treatment and by laboratory decontamination.

Contamination of the surface of the hair may result in the incorporation of these analytes into the hair without the wetting of the hair. We have gone over several times the fact that only those hairs that were decontaminated at RTI immediately after sampling, that one hour point after decontamination, were the only ones that could be decontaminated back to a point where cocaine and the other metabolites were not detectable.

Application of a wash criterion in conjunction with metabolite ratios, so the whole enchilada here, using all these criteria, may be able to distinguish external contamination, in this circumstance though, potentially only for benzoylecgonine. Definitely additional studies are going to be necessary to validate effectiveness of wash criteria and ratios, what ratios are useful, what wash criteria are useful.

We definitely are going to have to continue the PT program with the participation of all the laboratories in order to develop robust methods that all laboratories can use reproducibly for decontamination of hair samples.

Slide 36 - Conclusions

Large variability in our results from samples decontaminated by laboratories using different decontamination strategies. They used very different decontamination strategies. This suggests that reinstating the use of decontamination strategies in the PT program is going to result in increased variability. As we discussed, we discontinued a number of years ago now having the laboratories decontaminate PT materials in an effort to try to isolate where variability is in the analytical process.

This is some indication here that if we were to reinstitute the laboratories decontaminating PT materials, our variability is likely to go up from where we have currently managed to get it to.

Analysis of the data suggests differences in positive rates between labs may be independent of decontamination strategy and laboratory decontamination method. This is for that 500/50/0.05 criteria. If you think about this, this may reflect differences in how laboratories generate benzoylecgonine in their analytical processes.

Slide 37 – Conclusions

The benzoylecgonine-cocaine ratio increased in a significant linear fashion over the 10 week study period, and confounded the use of the benzoylecgonine-cocaine ratio criteria to determine a positive sample.

The presence of trace quantities of cocaethylene, norcocaine and cocaine in the cocaine that we used, confounded the use of ratios, cutoffs and some other mathematical criteria, depending on which Federal criteria you are looking at, to distinguish a contaminated sample. The cocaine that we had did have cocaethylene and

norcocaine in it, it was pharmaceutical cocaine. In conversations that we have had over the last year with DEA, there is some evidence to indicate that this may be the case as well with illicit cocaine.

Slide 38 – Conclusions

The study confirms that it is likely going to be difficult to develop a PT sample that will demonstrate that all cocaine analytes that are applied to hair, just dry transfer, will be able to be removed by current decontamination procedures that are used in the industry. Also, there is no simple relationship of concentration of cocaine, benzoylecgonine, cocaethylene or norcocaine with total melanin, suggesting that even in vitro binding, external contamination, application of the drug on the outside of the hair, that that retention of the drug is a simple function of melanin. There is some more complex function going on here involving other components of the hair.

MR. STEPHENSON: Would you just share with us the real source of the hair that was used?

DR. STOUT: We ended up having to pick all females because of the need for large quantities of hair. A 12-gram locket of hair is a lot of hair. I don't think I have ever had 12 grams of hair on my head in my entire life, so to try to get it from males, you are not necessarily going to get a single source of hair that large.

DR. NIPPER: It seemed as I recorded the notes, four out of the five were Caucasian and only one was Asian, and there were no other ethnic or racial groups there. I had heard that African-American hair was also vulnerable to this kind of problem.

DR. STOUT: That may be the case. I have heard those reports as well. Again, it is a volume issue. Trying to get African-American hair is difficult, and then to get a large enough volume of African-American hair is difficult. In large part the volume necessary for this dictated where we had to get hair.

MR. STEPHENSON: Henry, I'm glad you asked the question, because I asked the same question earlier on. It is an issue that we will put on our agenda to acquire and perform. But for the purpose of the first cut, pardon the expression, in this case I think it served a basic purpose, which was to get us started in a protocol and give us a direction. I think we do need to be aware of this, and I think we need to look at gender differences in hair, too.

DR. SHIPPEE: Any thoughts on what a robust effort is going to be?

DR. STOUT: Real good question. I'm not sure I have got a good answer for you.

DR. SHIPPEE: At least one lab I visited seems to think hair treatment is a bigger issue.

DR. STOUT: In terms of chemical treatments of the hair?

DR. SHIPPEE: Straightening.

DR. STOUT: It could well. You look at electron micrographs of what chemically treated hair looks like. It can be quite beat up, which not only is it going to affect how drug goes into hair, but it is also going to affect how it comes out of the hair.

DR. COLLINS: Were the three labs where the procedures that they were using to decontaminate wildly different?

DR. STOUT: Like I say, two of the laboratories used variations of methanolic decontamination. It is fairly specific in the paper there. I forget; one of them was like a five minute spin in methanol and the other one was two different spins in methanol. Look in the paper. Then the third lab was an extended buffer phosphate wash.

MR. STEPHENSON: Peter, from the data that you presented, it seems that there is the observation at least in the past of the incorporation with melanin. But it appears in the intentional contamination, blond hair was as bad as high melanin content hair. Did I understand that correctly? It almost seemed worse in blonds for contamination.

DR. STOUT: At least in these five hairs, you have to remember, these were five hairs, and also, the construction of the study, we placed the statistical power of all the study at decontamination strategy. We didn't design the study to try and be able to say the statistical power differences between hair color. We would need a lot more replication at each of the various hair colors.

But the material that is hair is so variable, it is difficult to get replicate samples from replicate individuals. There is something more going on there than just simply melanin. In this case hair type four had more cocaine over the entire period, but the analysis to cocaine ratio increased faster in the blonds. It may be because benzoylecgonine washed out faster than cocaine over the time period. It may be that benzoylecgonine is generating in situ in the hair once the cocaine is present on the hair. It may be that some of these hairs do that chemistry differently. I don't know.

MR. STEPHENSON: Any other questions? This represents a sincere effort to present this in a broader open forum so we can get it out beyond what had happened at soft, and also to take into account some comments that had come up during and after that presentation in Austin. But I'm sure we will hear a little more this afternoon.

At this point we have what is being proposed as another break. I am going to suggest that we go ahead and break for 15 minutes and then come back at 2:30. Then we will reconvene and finish this up this afternoon. So we are going to close the session right now, and if we all can be back in your seats at 2:30, does that make sense? Thank you.

Agenda Item: Summary of Relevant Legal Cases

Note: The PowerPoint slides for the following presentation are attached at the end of the transcript.

DR. CHAMBERLAIN (Consultant): I am going to change gears here and talk about some legal cases.

My disclaimer is anything I say here is not to be construed as legal advice. That is required by the Bar Association. Of course, I could also say no way, what you

pay for legal advice tells you how much it is worse.

Slide 1 – Legal Cases/Precedents in Drug Testing (Past 15 Months)

Slide 2 – Topics

I say legal cases and precedents. I am going to separate these, and we will talk about that in just a minute. I am going to do a little introduction, just give you an overview of the types of cases we are seeing. I want to mention a little bit about a couple of cases -- and many of you may already know about this, of course -- Frye and Daubert. They come into play because we are talking about a lot of the time scientific evidence here, and so these are the guidelines that are used by the courts for accepting expert testimony or scientific evidence. We will talk about expert testimony, some Constitutional issues. I have broken them out as you can see there.

Slide 3 – Introduction/Background

Case law versus precedents. I hope I don't insult anybody's intelligence, but the law library is the tool of the lawyer, the attorney. Most jurisdictions use precedents to argue a case. Precedents are only those cases that are published in what we call reporters. They are bound copies that you see in your law library. Those cases are appellate court cases, not cases you will hear at the city court or the county court or even in Federal court at the district level.

Then there are appellate court cases that are not published in the reporters. What I am saying here is that the most significant cases and the cases that really mean a lot are those that set precedents, so just keep that in mind.

Most of the cases -- I say 15 months here because I have been looking at cases over the last 15 months and giving reports to Donna Bush at her request, so I have been following these -- most of the cases deal with parental rights and probation. The next most cases that you see are employment cases. In the employment cases I am talking about workmen's compensation too. You see very little about education and sports.

A couple of things I will mention. I still see this. I was an author of a book pre-SAMHSA Federal guidelines, and the key issue was people that didn't follow policy. Number one, an employer didn't set policy and number two, if they set policy they didn't follow it. That really gets a lot of people in trouble. Then we will see cases where people didn't follow mandated guidelines, and that gets them into trouble with being negligent and so forth.

I will talk about Frye and Daubert. These are the -- this case obviously wasn't 15 months ago, but I mention it because it is what set the criteria for the reliability of evidence. For scientific evidence to be admissible in court, it has got to be relevant and it has got to be credible. Relevant just means it has some relationship to the issue at hand, and credibility has to do with competent evidence.

Slide 4 – Frye

Frye was a case that dealt with the pre-polygraph days, in which they tried to determine whether a person was lying by using systolic blood pressure. Out of this case came the concept that for expert testimony to be introduced into evidence or for

scientific evidence to be included into evidence, it has to be generally accepted by the relevant scientific communities, in this case particularly it was the physiologists and the psychologists. It was not at that time. So that was the general guideline. The majority of the people in that discipline had to accept that.

Slide 5 – Daubert (I)

That was it until about 70 years later when we had a case called Daubert, a pharmaceutical case. I won't get into all the in and outs of it, because we could talk about this for two hours. I don't know that I know that much about it for two hours, but it could be talked about for a long time. It had to deal with statistical evaluation of whether a drug caused birth defects.

Now, let me give you a couple of overviews here. I have looked at probably 400 cases dealing with challenges since 1993 in the area of toxicology. Only probably about 40 of those cases deal with drug testing. For the most part, it is Daubert challenges, and again these challenges are usually pretrial in limine, and they usually overcome the challenge with expert testimony, if you lay a good foundation, of course.

I have already said this. These cases deal with admissibility of evidence, that part of admissibility that deals with reliability of evidence and not the weight. The judge is the gatekeeper. They will determine whether it meets credibility standards, and then once it is it is up to the trier of fact. That could be the judge, it could be the jury.

Slide 6 – Daubert (II)

What is required under the Daubert standard? There are four criteria here. Has the underlying theory been tested, has the theory been subjected to peer review or publication, and they are using peer review here just like we would use it in the scientific community, has it been in a peer reviewed article, not just has it been looked at. Has potential rate of error been tested, and is the theory generally accepted by the scientific community.

You say that is even more stringent than the Frye rule, but it is not. Here a minority is accepted. Also, the judge being the gatekeeper can weigh these four factors any way he sees fit. So he is really the gatekeeper of this type of testimony.

So I want you to keep these in mind, these two guidelines. These are Federal cases. Not all states have adopted Daubert. Many states still use the Frye standard, not the Federal courts, but some of the state courts still use it. It has been modified some, but the Daubert standard is in Federal court and Frye is still in some state jurisdictions. Some of the cases I will mention, you will see these two standards pop up.

Slide 7 – Expert Testimony I

Speaking of expert testimony, it is kind of hard to group all these things together because there are a lot of different cases out there. I am just mentioning a few cases I ran across that come to mind.

One of the big ones comes up, and I'm sure some of you have been involved in, is the Sixth Amendment, the right to confrontation, when somebody tries to introduce into evidence a laboratory report saying somebody is positive for a drug or whatever.

The courts in this case will look at several things. One will do a balancing

act. That is, they will look at how necessary is this expert testimony, maybe how far even the expert has to travel and how much of a burden it is on that expert. They will look at that on both sides of the case, whether it be plaintiff or defendant.

In some jurisdictions, some states have very specific statutes that require very specific requirements, like in Tennessee, that if you give an affidavit, that it must be very, very specific requirements before it can be introduced in evidence. Otherwise, the person must appear regardless of how far it is and testify as an expert witness, based on their expertise.

There are cases, people try to say this is hearsay evidence, because they are introducing evidence without the individual there, it is not coming from an individual that has personal knowledge. There are some exceptions to hearsay. One of them is if it is a laboratory report that is normally conducted in general business of the company, it can be introduced in evidence, and if it is non-testimonial. It is a number, it is positive, it is negative, it is a number. You start trying to interpret that number, then it is non-testimonial and therefore you are going to have to require that the expert be present.

Slide 8 – Expert Testimony II

One of the first cases -- these are in no particular order of importance, they are just grouped according to different topics. In this case, this you will see is a published case in the reporter. You will see something like Pacific 2nd, P 2nd, or you will see something like A 2nd which stands for Atlantic 2nd, or you will see something like -- you will see other terms like that. That is a published case in a report, so that sets precedent.

Here, they are saying that if a drug is found in a biological system, be it blood, urine, saliva, hair, whatever, that there is some effect on that individual of that drug. That is all they are saying.

I am also going to mention, there are some of these cases that have ten, 12 issues associated with the case which there are holdings on. Just because I list one or two here of a particular case, that does not mean that is the whole case. It is only those issues that deal with drug testing.

Slide 9 – Constitutional Issues

A U.S. Court of Appeals case, again this is not published. We see this throughout. Remember, I said a lot of cases are either probation cases or parental right type cases. This case said that Constitutional rights of probationers and prisoners are narrowly construed. That is, here they allow for non-confirmed drug test. They wouldn't allow for that in an employment case, especially in a forensic case, but in this case they do. So that is what I am talking about here.

Slide 10 – Statutory Issues

In Welcher v. American Ordnance, everybody knows what an ordnance is, it can be explosives, accelerants, whatever, this is a case in Iowa where an employee -- this is an employment case -- was terminated because he was positive for a drug test. Iowa has a specific statute dealing with drug testing. He complained and said that because he is employed, working in the state of Iowa, that they should have followed the state statute.

The problem was, this is a company that contracts with the Department of Defense. Since they are a contractor with the Department of Defense, they are under Federal guidelines. The Federal guidelines overrule.

Slide 11 – Special Needs Issues

Special needs doctrine. We hear about Fourth Amendment rights, search and seizure rights. You just can't enter someone's home and you just can't start searching them. You hear these coming up a lot in drug testing cases. There are special needs that there is a public interest in, in making sure -- in which you can get around the search and seizure clause of the Constitution.

In this case, and why I quote this case, this is a published case, because there are several cases quoted in here that you can look up that mention some of these special needs, and most of us in this room are familiar with them. Customs officers was one of the cases, other case was Starfighters, another case was student lockers, another case I can't remember, but there are several cases.

There was a case contra that did not allow special needs. This was a statute in a state that tried to mandate drug testing of candidates for high office, and it overturned that statute. That is not a special need.

I think what we are starting to see is people that are trying to get special needs in for random testing of all students in a high school or college and so forth. In my estimation that may be difficult, but we are starting to see that type of thing crop up.

I point out this second case here. There is a fine line here in special needs of stopping motorists to check their car. If the sole purpose is to find out if you have got drugs in your car, is in support of a police function and will not be considered a special needs interest and will not be upheld in court, according to this case. You say, they stop cars at checkpoints for intoxication. Why they can do that is because it is for safety reasons. It is a difference.

If they did it only as a police function, it wouldn't be allowed, so it is important why they set up the roadblock or why they set up the checkpoint.

Slide 12 – Employment Cases (I)

Some employment cases. There are a couple of cases here. Courts are reluctant to overturn agencies, commissions unless they are -- key words -- arbitrary, capricious and abuse of discretion. This also applies -- in fact, the case of Roesch, that had to deal with an administrative law judge. It also deals with workmen's compensation judges, that renders opinions on commissions and agencies.

A court is reluctant -- and you see these overturned many times when a court gets involved in reinterpreting the evidence. As long as the administrative judge or the workmen's compensation judge or the commission or agency, whoever that may be, has some basis, has some facts that are reasonable for them to make that decision, regardless of which way it goes. You see it time and time again. These things are appealed, and they will uphold the administrative law judge or the workmen's compensation judge. I have seen a lot of these cases. These are just two.

Again, I have no cases that are reported. There are probably some old cases down the road, but these are cases I have seen in the last 15 months.

Slide 13 – Employment Cases (II)

Refusal to test for shy bladder. Here are two cases. One case was dealing with a person who just refused to give a sample. They upheld the determination, in this case the transit authority, that if you refuse, that is positive.

In the second case, this was a case of true shy bladder. In fact, a psychologist had determined that this person did have a shy bladder, but the MR overruled that and said he will give him a sample anyway. So the termination was upheld. That is the National Transportation Safety Board. Obviously, both of these are dealing with the Federal guidelines.

Slide 14 – MRO (I)

MRO cases. We are starting to see a few negligence suits crop up against MROs and laboratories. What is happening is, where these crop up is where the MRO doesn't follow the guidelines established by the Federal workplace guidelines. For instance, instead of calling the person that took the drug test to see about a second sample, it is positive, they will call an employer, and they will do things that are not strictly following the guidelines. So we are starting to see negligence suits here. This happens to be one that is still ongoing. We haven't seen the end of this case yet.

Slide 15 – MRO (II)

Again, like we see with workmen's compensation judges and administrative law judges, for the most part the courts will uphold the MRO in his interpretation, as long as he has some facts that will support his determination. He will not go back and re-look at the evidence and overturn the medical review officer typically.

Slide 16 – MRO (III)

This is a deformation suit dealing with a truck driver, in which several laboratories were involved and an MRO. They had a sample, and the laboratory, although -- I'm just telling you the facts; I don't know all the details behind the case, I am telling you exactly what was reported in the case -- the laboratory felt that it was an adulterated specimen. It was sent to a second laboratory. That laboratory thought it was adulterated, but couldn't prove it. They reported that to the employer, the employer considered that a positive sample and they fired the individual. There wasn't a second sample.

So what happened was, obviously this truck driver gets fired for a positive drug abuse, can't find work. Trucking companies don't hire him if he has been fired for a positive drug specimen. So he is claiming that they didn't fire all the guidelines, and so he has brought a defamation suit against the MRO, and I think in this case he has also brought it against both laboratories that had the sample.

Slide 17 – Oral fluid Testing

Other testing. Most of the cases I have talked to earlier have been dealing with urine specimens. Oral fluid testing, I have not seen any cases. I am looking at appellate court cases. There are cases out there that are dealing with a lot more issues than I am showing you, but they are cases at the trial court level. I will mention one trial

court case in just a minute, because it is getting a lot of popular press.

This is interesting. Again, this was not a legal search, this was more of a Google search, but I did see this. This happened in Valparaiso, Indiana, in which the judges dealing with probation have seen a tremendous increase in number of positive specimens for oral fluid test, so they have questioned it, and one judge has ordered urine tests to confirm oral fluid tests, and the other judge has ordered an evidentiary hearing.

This was back at least six months ago, and as far as I know, trying to follow this case and trying to contact this judge, there has not been this evidentiary hearing. Apparently they have the funding to split these samples and check them, but they are having trouble finding a lab that is willing to receive these samples from this judge to check.

So this is ongoing. It is out there. It has no meaning. It is strictly a Valparaiso, Indiana thing that is happening, and no case is associated with this.

Slide 18 – Sweat Patch Testing

Sweat patch testing, one case I ran across. It has been successfully upheld in a Daubert hearing. Some of these cases you see come up, people question some of the techniques based on whether it be sweat testing or whether it be hair testing, and a lot of them have passed these in limine hearings because of the type of techniques that are used, be it RIA, be it GCMS, be it LCMS, whatever, they have passed the test.

Slide 19 –Hair Testing (I)

Here are two cases. The first case is Bass versus Portland Law Enforcement. It is old, but I have put it up here because that was a Frye case. Florida still follows the Frye standard. U.S. v. Bush is a military Court of Criminal Appeals case, and that has successfully met the Daubert challenge. That is a Federal case, being United States Air Force, so the Daubert standard applies there.

Slide 20 – Hair Testing (II)

Here in State v. Kite, this was a court of appeals, but the trial court decision was reversed for not holding the Frye hearing. Typically, you can't go back after you have had a case and you haven't brought up this objection at the trial, the appellate court won't listen to it. But in this case they did. They said there should have been a Frye hearing on this type of testing and there wasn't. So this case is still hanging out there as far as I know, and is remanded back to the trial court, saying hold your Frye, because in this jurisdiction there has been no determination as to whether it meets the Frye test. Kansas apparently is a Frye state.

Slide 21 – Hair Testing (III)

You can see I am seeing more cases on hair testing. It is under technique, and there is a lot of hair testing going on. These two cases, one is an employment case and one is a custody case, and they upheld hair testing as a reliable scientific procedure. One of them is a published case. It was a published case in Nevada Supreme Court. That is the highest court of Nevada.

By the way, I want to caution people. Most of the time the supreme court

is the highest court in the state. When you see New York, don't forget it is the lowest court, so don't get confused, folks. That is what attorneys like to do, is confuse you so you don't know what the heck is going on.

Anyway, just be aware of that. When you see New York Supreme Court that is the lowest court. Then you will see the New York Appellate Court, and they will go on up, so be aware of that.

Slide 22 – Hair Testing (IV)

Coddington, a very recent court hearing. Again, this is dicta. When an attorney says this is dicta, that is not a holding of the court. They are discussing this issue among themselves, among the issues, and it gives you a hint of how the court would hold if that became an issue, but in this case it wasn't an issue.

What they are saying here is, testing of hair is less intrusive, that is, they are getting over the privacy issues.

There is one thing I didn't put here. They are talking about publicly visible hair, if I remember the facts right. So the hair test is less likely to violate the protection against search and seizure and privacy, too. This is dicta and it is not a published case.

Slide 23 – Hair Testing (V)

This is an interesting case. Two labs are involved. One lab did urine testing. It was positive. The second lab did a urine test, it was negative, and then that second lab did hair testing and it was negative. So the first lab is saying, the second lab, number one, their cutoffs on their urine is so high that that is why it was negative. Number two, they used hair, and the hair would be negative because we are looking at current use of drugs, so it supports our contention. On the alternative, this lab is not accredited, because they are a hair testing lab. So you start seeing labs pitting themselves against each other because one is quote accredited and the other one is not in a particular area.

Slide 24 – Hair Testing (VI)

Here in these two cases, the hair test was thrown out. It had nothing to do with the scientific validity of the test. It had to do with the state statute saying that you must follow Federal mandated guidelines. There are no Federal mandated guidelines for hair, so they said you can't do hair testing, or if you did, the results are no good. So you have got to be aware of the statutes in those states and so forth.

Again, neither one of these cases are published cases.

Slide 25 – Hair Testing (VII)

To continue boring you about cases, here is a dicta case, Slaughter v. Dodge. This is a published case, but it is dicta that a positive hair test may not be indicative of a drug in one's system during work hours. The real issue in this case, it ended up getting reversed, not to do with this, but it had to do with, the person was being hired by this dealership, took the pre-employment drug test and for some reason before they discovered that her hair was positive, it was a year later. So they discussed when is

the hair positive, when it is negative and so forth, so this is just what they said in this case.

Slide 26 – Hair Testing (VIII)

This is one case I am mentioning, still in pleadings. It hasn't even been tried. The only reason I mention it, I hesitated mentioning it, but it started out in the courts of Massachusetts. It has to do with nine police officers, or applicants of policemen who are African-American, and it is a civil rights case, saying that hair testing is biased. There have been many other cases, I warn you, there have been many other cases at the trial level that I have not seen going to the appellate level, that these types of claims have been thrown out.

What makes this case interesting is, it is getting a lot of public press. It has been in the press for well over a year. You are seeing some interesting parties join in. The ACLU has joined in. The NAACP has joined in. So if this case goes forward, it could be a real interesting case between experts. Many of you may be testifying, who knows?

The only reason I mention it is because it is getting a lot of press and you may see it. Right now, there are a lot of pleadings going back and forth.

Slide 27 – Hair Testing (IX)

The last hair testing case I will mention is Ohio v. Shoemaker. This is a very interesting case where they did a test on an individual that was negative, and the prosecution wanted to get it in.

I'll give you a little set of facts here. In this case, Shoemaker, a mother, was a marijuana and opiate abuser. She also had an opiate prescription. I don't remember what it was, but it is irrelevant. She took this prescription drug that she had and exchanged it with her son for marijuana. Great family. The son went to a party and to make the long of it short, gave this opiate to one of his buddies who with alcohol and everything succumbed, died the next morning. These were encapsulated opiate pills, timed release, so they sat in the victim's stomach overnight, and with the alcohol it took awhile, and according to the medical examiner he died of acute alcohol intoxication the next morning, even though he had stopped drinking several hours before.

What was interesting in this case is, they used the hair test to determine that the lady had not taken a prescription drug. It was upheld, and said that she had not taken it, and that was evidence to show that she had given it to somebody. That was one of the evidentiary facts in this case. So it was an interesting case to read, kind of a fun case to read. It is not a reported case.

Slide 28 – Summary

In summary, I want to reiterate that this is an overview of testing cases. Some set precedent, very few of them. Most of them do not, but they will tell you how a court will rule or how an appellate court will rule. I didn't draw any conclusions on these cases. This is just exactly what the court said, the way I saw it. I made a couple of editorial comments, but tried to keep them down to a minimum.

I just want to tell you what is out there. There are a lot more cases out there dealing with issues of -- like I said, a lot of it has to do with workmen's

compensation and employment issues and probation. A lot of these issues come up time and time again.

DR. NIPPER: Tom, one of the issues in Nebraska that I found interesting over a number of years is the fact that in our state anyway, the probation testing is uniformly unconfirmed. Positives are not confirmed.

DR. CHAMBERLAIN: You see that a lot, as I mentioned in one of the cases.

DR. NIPPER: I am interested to know whether you have seen any cases from other states that have the same problem, that have edged toward confirmation of positives in those cases.

DR. CHAMBERLAIN: Henry, off the top of my head I can't. I have limited my scope to what cases I have seen. It is interesting that I just happen to come from Nebraska, your state, but I have not.

Like I say, prisoners and probations have very limited rights. They have Constitutional rights, don't get me wrong, they just don't have as many as we do sitting in this room.

DR. NIPPER: In our state, the rebuttal to confirmation is that it wouldn't be positive if there weren't a drug there, and they were told not to have any drugs.

DR. CHAMBERLAIN: Cases I typically see, most of the states I see where there is confirmation allowed, the prisoner or the probationee has to pay for it. That is why you don't see too many of them.

MR. STEPHENSON: This is an interesting point, but it is criminal justice testing as opposed to employment and loss of property rights. It is someone who has lost access to a licensure or to a job or retention of a job if they already have it. That is an area that is a very high standard. It is the protection of that benefit that creates the forensic requirement for what we do.

We do have administrative officers of courts here. I would suggest that there is also a monograph that was put out, a standard guideline for probation or parole service that indicates for forensic testing purposes when it is supposed to go back before a judge. They should do confirmation testing. It is a recommendation. It doesn't require everyone to follow it, but it is a guidance. It creates a standard of adherence that perhaps others would follow.

We have always recommended whenever we did any work with anyone, there are two elements. Number one, you do your screening test, you do your confirmation test, you understand that the test was done accurately and reliably, and then you know how to interpret the results, and you can't do that independently unless you have another entity participating. That is what we commonly call the medical review officer function.

I don't think it makes any difference what class a person is in, is a criminal justice individual or pre-employment or random test or military. The science around this is one thing, and then correct interpretation of results is the second element. That is where we are going to be in what we do.

DR. CHAMBERLAIN: You have got a good point. I have seen time and time again in cases, like you say, something like a job is taken away from an individual, and that state has no statute dealing with drug testing, you will see a lot of cases where they argue that the standard has been set by the Federal government. You are right, many times that argument will hold up. But this is good science, that you must confirm the test, because you are taking away some property right of that individual.

MR. STEPHENSON: We appreciate your update. I think this is an interesting process. I am sure it will be helpful to others who have to deal with these issues maybe on our behalf for the Federal government.

Agenda Item: Public Comments

DR. SOIFER (IPA): I am an associate professor of social work at the University of Maryland-Baltimore. I also wear three other hats. I am the director of the International Paruresis Association, the co-director of the Shy Bladder Institute, and now the vice-president of the American Restroom Association, which I am assuming most of you haven't heard of.

I am actually appalled that despite the fact that almost half of the public comments on the proposed HHS regulations were related to shy bladder, that nothing appears to be happening concerning the issue of accommodation for people with this social anxiety disorder. There are over 17 million people in the U.S. who suffer from this condition.

Based on our legal analysis and various case law, not precedents, it is pretty clear to our 1,000-person organization that the use of only urine tests is discriminatory towards those people who suffer from paruresis. We now know that paruresis is a bona fide medical condition that are classified as a chronic pelvic floor dysfunction, which is actually measurable by neurourologists.

I am here to issue a blunt warning, which is that unless the new regulations if they are issued address the issue of shy bladder, they will be challenged, since there are many thousands of people who are affected by this condition in the workplace, both in pre work test situations as well as random testing. Moreover, with recent changes in Congress, there is a move to hold public hearings on this issue as well.

DR. THISTLE (Psychemedics): I have a few comments to make on the RTI study that was reported on earlier regarding contamination.

The study as we saw involved contaminating hair with 15 milligrams of pure cocaine. Firstly, it is important to remember that it is not necessary to remove all the contamination from samples collected for drug testing. Instead, it is only necessary to be able to identify and distinguish samples that are positive, negative or contaminated. This is no different than with urine testing. It is not necessary to remove adulterants from urine samples, but only to identify when samples are adulterated.

Despite the rather extreme contamination scenario used in the study, as we saw from the slides, when RTI utilized the Cairns wash method practiced by our lab, 65 out of 65 of the contaminated samples tested or were correctly identified as contaminated through the application of the wash criteria and the BE metabolite-cocaine ratio.

RTI's paper demonstrates that effective wash procedures can distinguish even extremely contaminated hair from hair positive due to ingestion when appropriate wash and metabolite drug ratio criteria are applied.

I believe the use of 15 milligrams is not a normal contamination event. It would not be normal to have visible amounts of white cocaine powder on your fingers or hands unless you are in very active cocaine use. It is just as likely that someone who dips their fingers into a pocketful of cocaine or has that amount of cocaine on their hands would also touch their mouth or lips. It is even more likely that they would touch your sandwich or coffee cup at lunch if they worked behind a food counter.

This level of contamination would obviously create positive urine results and call into question every cocaine positive urine result in the Federal program, as it requires far less than 15 milligrams to create a positive urine test.

The matrices of hair, urine and oral fluid do not exist in a vacuum. What is a reasonable contamination scenario for any one of these matrices is a reasonable contamination scenario for all of these matrices. I would expect therefore that we would see 15 milligrams of contamination used in future urine and oral fluid studies, or we should acknowledge now that this is unrealistic. Otherwise, as stated previously, this will call into question every cocaine positive urine result in the Federal program.

We mentioned before, we wanted to see about gender bias in hair. We are going to study those things; good idea. I believe we should also study gender bias vis-a-vis weight perhaps in the urine program that we are conducting. These things don't exist in vacuums. If it is an issue for one, it is going to be an issue for all of them.

In terms of environmental contamination, the difference with hair is, there is a physical barrier and with urine there is not. The study shows that by using proper wash procedures, a laboratory can distinguish samples that have been contaminated.

The results in the study were pooled, with correct results being averaged within correct results because of the pooling, but the individual lab results as well as the results of RTI's use of the Cairns wash shows that wash procedures along with BE-cocaine ratios are effective and work.

Since that was demonstrated that the BE-cocaine ratios and the wash identified the contaminated samples, 65 out of 65 times according to the chart, the only potential question is the role of cocaethylene as an additional alternative metabolic marker.

Let me clarify this. The RTI slide showed that using the Cairns wash criteria and the BE-cocaine ratios, all the contaminated samples that they tested, 65 out of 65 were identified as contaminated. The only potential issue is the role of CE, cocaethylene, as an additional or alternative marker.

Any potential presence of CE as a contaminant is readily resolved by using a cutoff for CE that is above the potential cocaethylene contamination.

Information used by RTI indicated that cocaine from Peruvian labs appears to have cocaethylene present at a maximum level of two percent. More recently, a thousand samples confiscated in the United States and tested by the Massachusetts State Crime Lab found not even a trace of cocaethylene in the samples. Either way, it is a non-issue.

It should be noted that the cocaethylene contaminated samples in this study were reported by our lab as contaminated. We didn't see that in the data up here. In fact, we didn't see a lot of stuff in the data up here. I am wondering about that.

But put in the proper perspective, individual lab results of the study demonstrate two things. The Cairns wash criteria works, and the potential presence of CE as a contaminant, if it is an issue at all, is readily resolved. In this type of contamination scenario, I think if we go forward with this and look at what urine and oral fluid do with 15 milligrams of cocaine, you are going to find that hair will be

demonstrated to be far safer than urine in this regard.

Some of the other things -- and I didn't want to get into the technical stuff, but when we looked at these slides, we saw bars -- and Peter, maybe you can explain, or Ginny if you are going up, you can explain this -- we saw bars of positive results coming from all the labs.

Those weren't the results that we reported. Our results look something like this, in the samples from July 6. The lab interpretation was reported as contaminated, negative, contaminated, contaminated, contaminated, contaminated, contaminated, contaminated, contaminated, contaminated, contaminated, contaminated, contaminated, positive. I could go through all of these, but I think we are going to find that there are only eight samples reported positive that we decontaminated in the entire study. We are wondering where all those positive bars came from.

In one email that was sent, it says in the samples in the RTI experiment that we watched in our lab, the only samples that would have been reported as positive are numbers 238, 351, 399, 459, and I go on for eight more. The rest would have been reported as negative or with the above message that says contaminated.

So anyway, maybe more light can be shed on this, but I think the study as it shows now shows that the wash mechanisms do work, and the only issue left is the CE. That has to be resolved as to whether or not it is an issue at all. If it is an issue, easily resolved.

DR. HILL (Psychemedics): I have been doing hair for something like a quarter of a century.

I wanted to respond to the comment that Dr. Stout said a few times that there is something going on other than color with those five samples. A method that we have been using for years and years is staining with methylene blue. Just intuitively, methylene blue is a water soluble dye that is taken up by porous hair very readily, so we use that as a very relevant indicator of what a drug might do in soaking experiments, for one thing.

We did stain the five hair samples in this study with methylene blue and yes, the first two samples, the blond and the light brown, are highly porous. Generally speaking, in our experience porosity is like the huge indicator of drug uptake. As we published in the JAT Journal in 2005, we can take a hair, perm it and stain it before and after perming or have drug uptake before and after perming, and the effect can be 20 fold in terms of increased uptake by porosity effects. So that is one possible explanation of some of the things we saw in this study. Of course, there is only one sample per hair color in the study, so we can't worry too much about the color effects.

In regard to the bar graphs, we saw three labs, a certain number of positives. I am aware that these are strictly using the guidelines and not the wash criteria. But the conclusion that was drawn was that there is no effect of decontamination on the rate of positives. However, that is oversimplification once again.

When we wash our hair, we wash it, yes, and then we use the last wash to determine our wash criteria. You can't call a sample positive or negative in our lab just by cocaine and BE ratios. We use all of our wash information.

RTI didn't have that information. They only asked for BE and cocaine and the two incidental analytes that were also there. If they are going to do anything, they could only do by the rules of the guidelines, which is fair enough. I just want to make clear that the reason Bill says we reported those all as contaminated or negative is because we have more information. It is what the washing does for us.

What we did propose as a comment after the proposed guidelines came out some years ago, you cannot do hair testing without a decontamination procedure, and some kind of evaluation of the wash and the remaining drug in the digest.

So we object to saying that decontaminated samples were no different from non-decontaminated samples, because there is no comparison in that regard.

That's enough. Thank you.

MR. STEPHENSON: The issue around the hair testing process, what we are doing, I want to keep us on a very positive track of continuing to produce good collaboration and good findings. Based on what we have done here today, I am going to ask members of the Board to think about questions that they would like to have added for the RTI review process and incorporation, and any other members of the public who are here are more than welcome to make some inputs the same way. We will review them and see what we can do about incorporating them, because this is about improving the science and the supportability of this in future situations. I think we need to use all the tools and all the opportunities that are presented to us.

We are learning more and doing more and moving the system faster now than we have for a long time. It doesn't mean that some people haven't done it well in the past, it just means that if we get beyond a single lab, if we get beyond a single entity to do anything in any of these testing areas, we need to look at how to improve performance across multiple participants in the system, and that is what we are doing.

The open session was adjourned at 3:35 p.m.

Attachments:

1 HHS Update Information

2 NLCP Hair Pilot Performance Testing (PT) Program Update

3 NLCP Oral Fluid Pilot Performance Testing (PT) Program Update

4 Evaluating Workplace Results from a Medical Review Officer (MRO) Data Source

5 External Contamination of Hair with Cocaine: Evaluation of External Cocaine Contamination and Development of Performance Testing Materials

6 Legal Cases/Precedents in Drug Testing (Past 15 Months)

Final Workproduct Withdrawn from OMB on June 30, 3006

- Many proposals made on using alternative specimens for drug testing, SVT for each type of specimen; point of collection testing; cutoffs established for alternative specimens; cutoff changes for some urine drug tests
- All issues open for public comment
- 285 commenters responded with more than 2,000 comments
- Notice of Proposed Revisions to the Mandatory Guidelines for Federal Workplace Drug Testing Programs (69 FR 19673)

- Go to this url:
- http://www.reginfo.gov/public/do/eoHistReviewSearch
- Under the first field “Executive Order Reviews Completed”, choose “Department of Health and Human Services”, under “Select Calendar Year”, select “Current Year”, then click on “submit”, then scroll down to the bottom of the page (the Agency is listed as HHS-SAMHSA, so alphabetically it is at the bottom of the page), and you will see:

AGENCY: HHS-SAMHSA **RIN:** 0930-AA12

TITLE: Mandatory Guidelines for the Federal Workplace Drug Testing Program

STAGE: Final Rule **ECONOMICALLY SIGNIFICANT:** No

RECEIVED DATE: 04/04/2006 **LEGAL DEADLINE:** Statutory

COMPLETED: 06/30/2006 **COMPLETED ACTION:** Withdrawn

This is the caveat given when asked by a participating laboratory to present their data; this applies to both hair testing and oral fluid testing at this time:

"Data are from the National Laboratory Certification Pilot Performance Testing Program for Oral Fluid that is still under development and may not yet accurately portray the characteristics of an oral fluid test. Data are used with permission of the Department of Health and Human Services (HHS) for comparative purposes only. The data do not constitute any recommendation either expressed or implied by HHS of any product cited in this poster. Viewers of this information are cautioned of the limited utility of comparing the performance of one participant against the mean group performance at this time."

NLCP Hair Pilot Performance Testing (PT) Program Update

Drug Testing Advisory Board
December 12, 2006

John M. Mitchell and Jeri D. Ropero-Miller

ROCKVILLE, MARYLAND AND RESEARCH TRIANGLE PARK, NORTH CAROLINA

Objectives

- Review of PT requirements from proposed Guidelines of April 2004
- Review the design and results of Hair Pilot PT presented at March 2006 DTAB (Cycles 9 thru 11)
- Review the design and results of Hair Pilot PT since March 2006 DTAB (Cycles 12 thru 17)
- Compare test results to requirements of Proposed Guidelines of April 2004
- Disseminate future plans

Evaluation of Performance Testing and Certification of Hair Testing Laboratories

Proposed Guidelines as released for public comment

(Fed Reg Vol 69 April 2004)

NLCP

Section 9.6 : What Are the PT Requirements for an Applicant Laboratory to Conduct Hair Testing?

a) An applicant laboratory that seeks certification to conduct hair testing must satisfy the following criteria on 3 consecutive sets of PT samples:

(1) Have no False Positive results

(2) Correctly identify and confirm at least 90 percent of the total drug challenges on the 3 sets of PT samples

NLCP

Section 9.6 : What Are the PT Requirements for an Applicant Laboratory to Conduct Hair Testing?

(3) Correctly determine the quantitative values for at least 80 percent of the total drug challenges to be within ± 20% or ±2 standard deviations of the calculated reference group mean

(4) Have no quantitative value on a drug concentration that differs by more than 50 percent from the calculated reference mean

NLCP

5

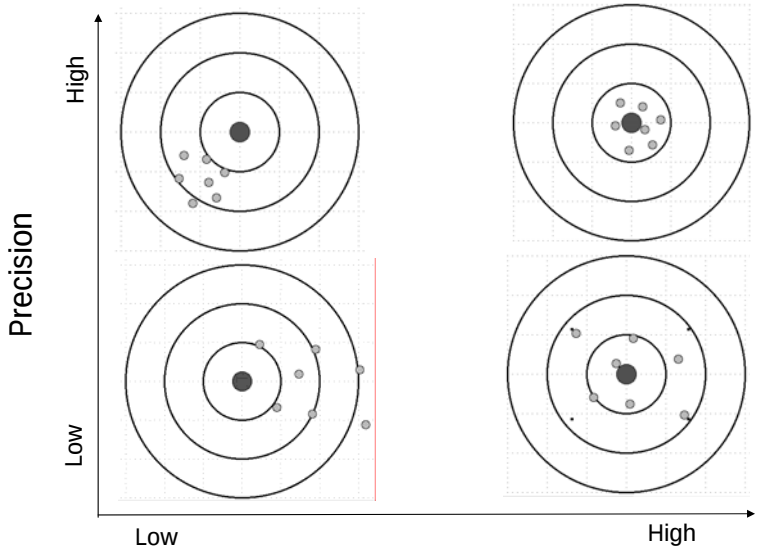
Section 9.6 : What Are the PT Requirements for an Applicant Laboratory to Conduct Hair Testing?

(5) For an individual drug, must correctly detect and quantify at least 50 percent of the total drug challenges within ± 20% or ±2 standard deviations of the calculated reference group mean

NLCP

6

Accuracy and Precision



NLCP

7

Pilot Hair PT Program: Review of Cycles 9 Thru 11

(Presented at March 2006 DTAB)

NLCP

8

Pilot PT for Hair: Cycles 9 Thru 11

- New Production of All Analytes
  - AMP, MAMP, MDA, MDMA, MDEA (1st time all together)
  - COC, CE, NCOC
  - BZE
  - 6-AM, COD, MOR, OXYCOD
  - PCP
  - THCA
- 3 Concentrations for Each
  - 50% Cutoff
  - Cutoff
  - 200% Cutoff

NLCP

9

Pilot PT of Hair: Cycles 9 Thru 11

- Confirmatory Testing Only
- Samples Shipped July - Dec 2005
- 3 Shipments- Alternate Months
- 9 Labs Participated
- Analyses of Results Provided to Labs at End of Study (after cycle 11)

NLCP

10

Laboratory Performance I:

Cycles 9-11

Comparison to Proposed Guidelines
Section 9.6(a)

(1) No False Positives; however all analytes were directed for only confirmation by analyte class (initial testing not conducted)

(2) Two labs correctly identified 90% of analyte challenges over 3 cycles

- For AMP,MAMP,BE, MOR,6-AM, COD, PCP, THCA
  - 5 laboratories met this criterion
- For COC,NCOC,CE,MDMA,MDA,MDEA
  - 2 laboratories met this criterion

NLCP

Laboratory Performance II

Cycles 9-11

(3) No laboratory quantitated 80% of analyte challenges within 20% of group mean

(4) All laboratories had one or more 50% quantitation errors

(5) No laboratory quantitated 50% of all individual analytes within 20% of the mean

NLCP

Pilot Hair PT Program Review of Performance Since March 2006 Cycles 12-17

Current Efforts Toward Achieving Accuracy and Precision

- Obtained commitment from participating labs to use future hair Pilot PT program resources to develop and improve testing accuracy and precision
- Committed future cycles to the resolution of sample and laboratory variation
- Developed webcast meetings to provide feedback as soon as possible after each PT event

Continuing Efforts Toward Achieving Accuracy and Precision

- Reviewed test results with participating labs, encouraging group development of improved methods and solutions to observed analytical problems
- Increased the dialogue between the NLCP and participant labs to produce an exchange of ideas and solutions
- Obtained a grant from NIJ to facilitate the development of appropriate calibrator and control materials

NLCP

15

Current Project- Study Design

- Pilot PT project redesigned as of May 2006 due to high variation in previous hair results
- Each cycle
  - inclusion of fewer drug analytes
  - 5 replicates of each sample
  - sent to the laboratories about every 4 weeks
- Cycle samples
  - 3 sample sets in total
  - repeat every 3 months
  - 4 separate rounds

NLCP

16

Current Project- Study Design

- Design allows analysis of reproducibility and repeatability within and between laboratories
- Results and discussion with laboratories by webcasted meetings every month
- The 3 sets of samples have been analyzed by participating laboratories twice

NLCP

17

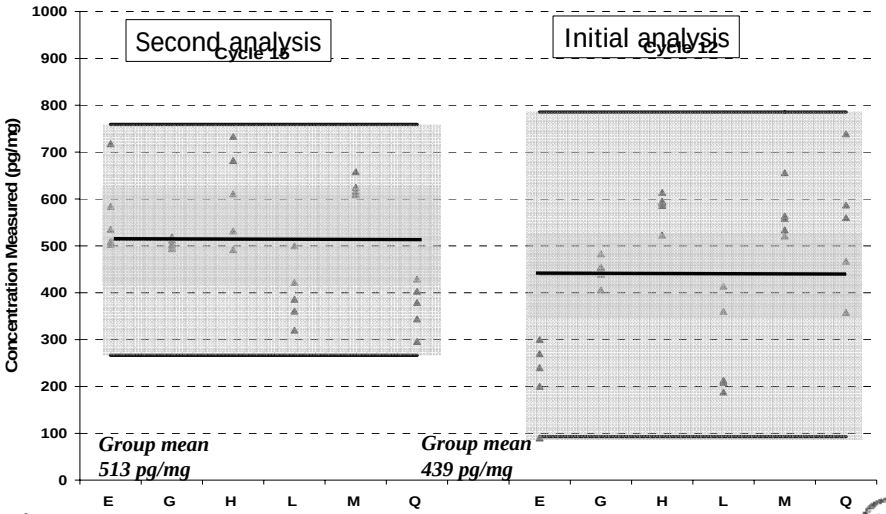
Current Project- Study Design

- 6 (7) laboratories currently participating
- Sample sources
  - NLCP produced
  - Drug user
- Cycles contain four samples each
  - (2) amphetamines (AMP, MAMP, MDMA, MDA, MDEA) and (2) THCA
  - (4) cocaine analytes (COC, BZE, CE, NCOC)
  - (3) opiates (6-AM, COD, MOR) & (1) PCP
- Samples are confirmed 5 times under 5 different calibrators
- Generally, concentrations range from 1.5 to 3.0 times the proposed cutoff concentrations

NLCP

18

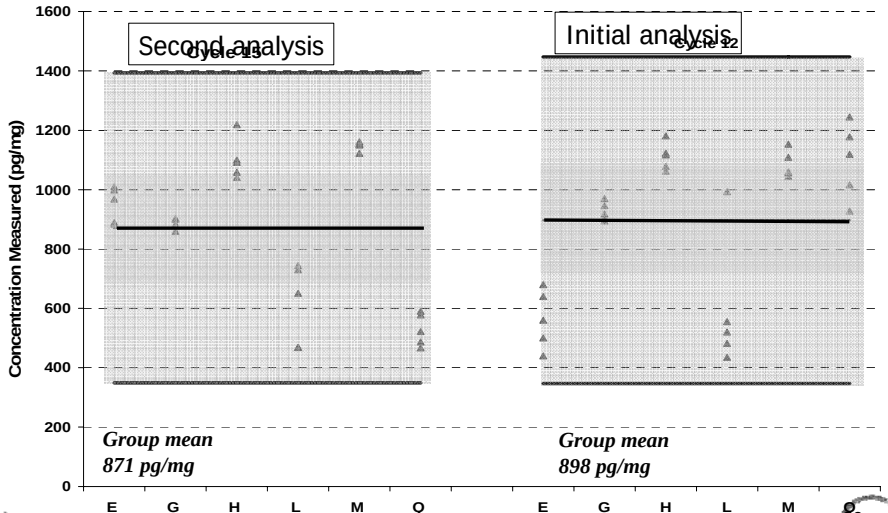
METHAMPHETAMINE
Theoretical 450 pg/mg



NLCP

19

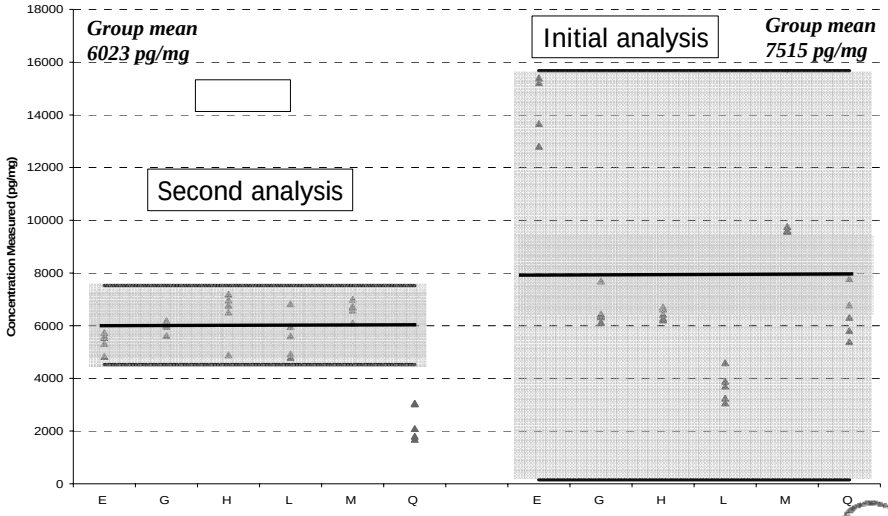
METHAMPHETAMINE
Theoretical 900 pg/mg



NLCP

20

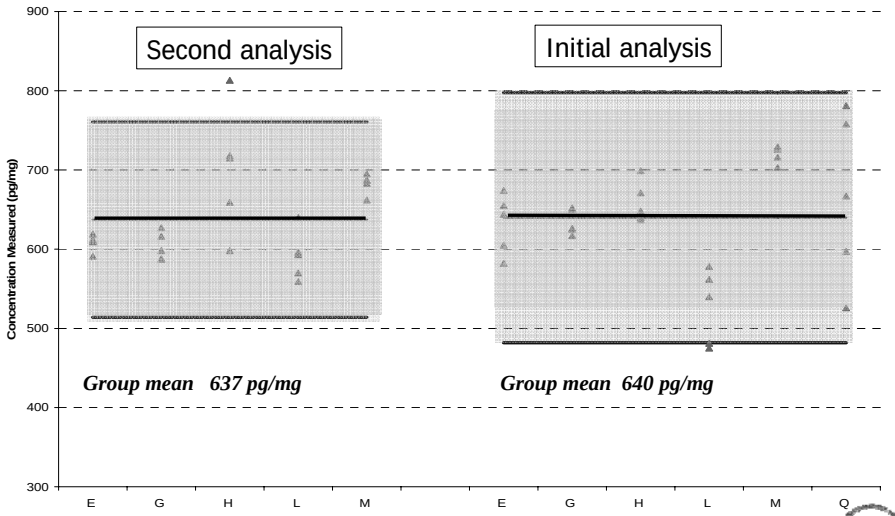
COCAINE
Drug User: *Reference 5770 pg/mg range calculated without lab Q*



NLCP

21

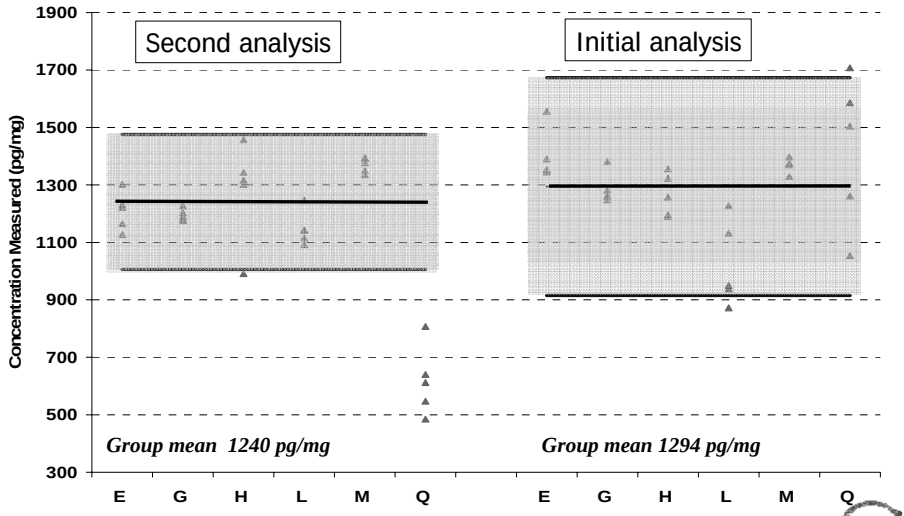
COCAINE
NLCP Produced: *Theoretical 750 pg/mg*



NLCP

22

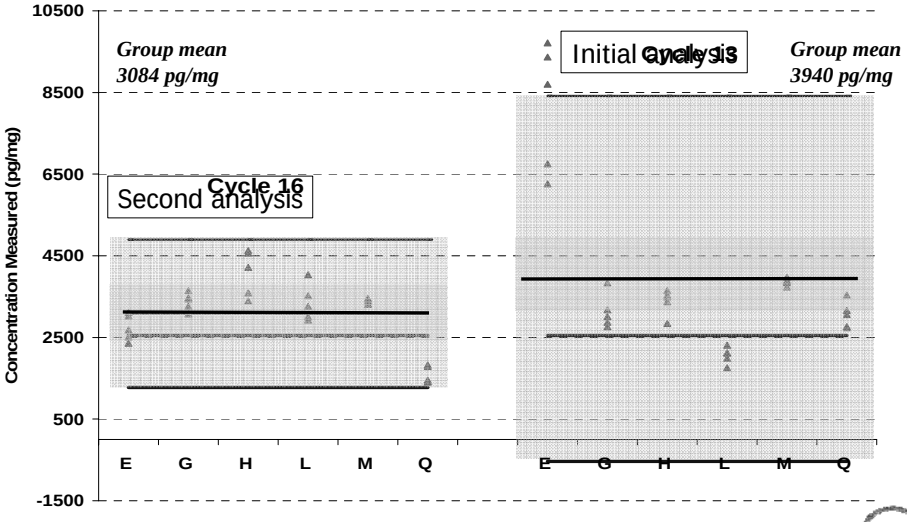
COCAINE
NLCP Produced: *Theoretical 1500 pg/mg range calculated without lab Q*



NLCP

23

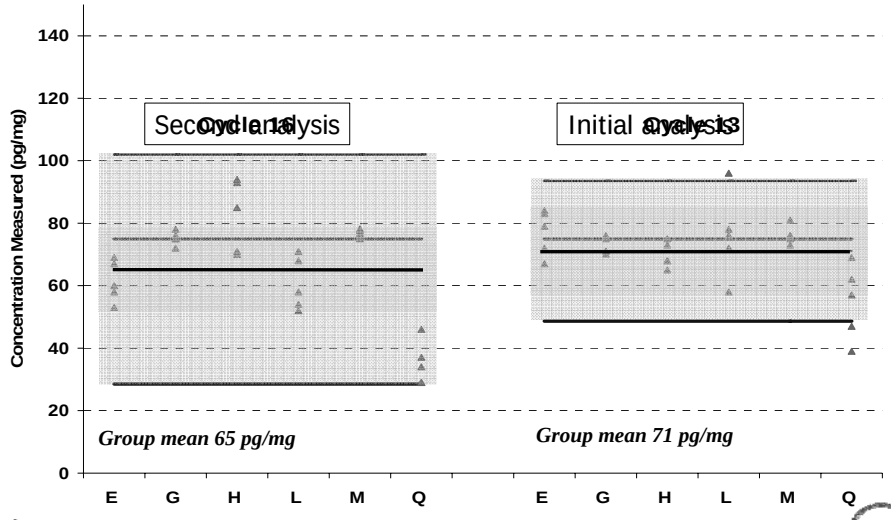
BENZOYLECGONINE
Drug User: *Reference 2547 pg/mg*



NLCP

24

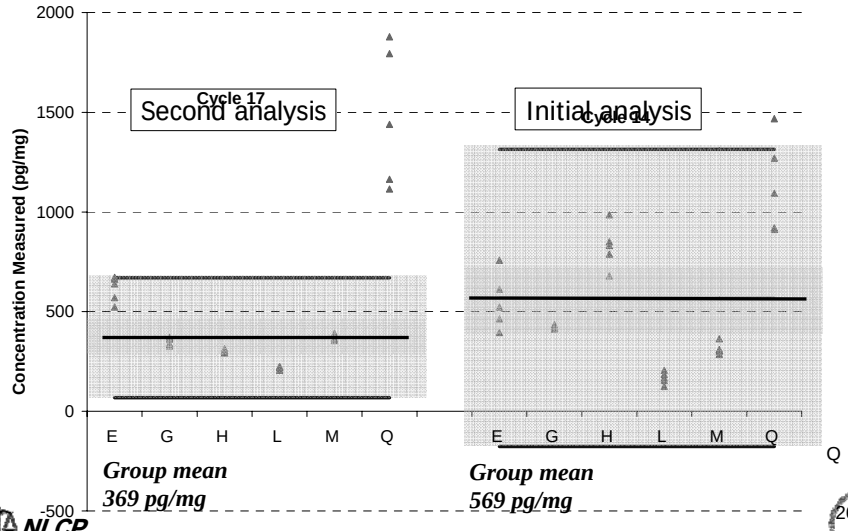
BENZOYLECGONINE
NLCP Produced: *Theoretical 75 pg/mg*



NLCP

25

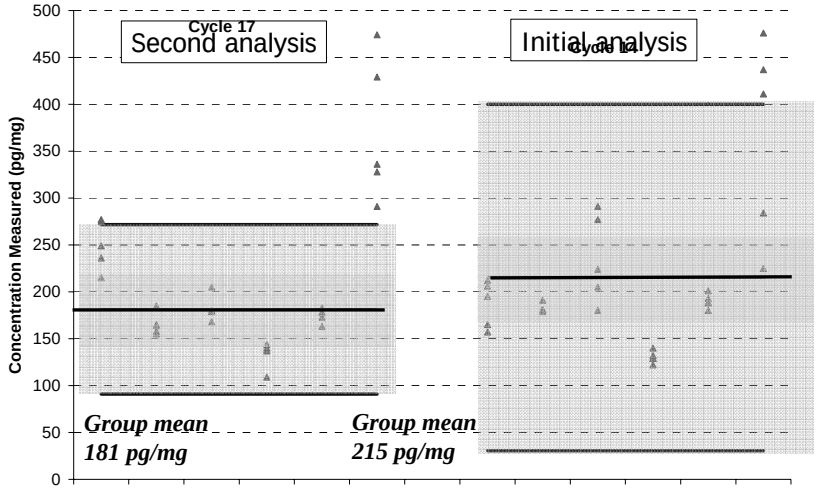
MORPHINE
Drug User: *Reference 630 pg/mg range calculated without lab Q*



NLCP

26

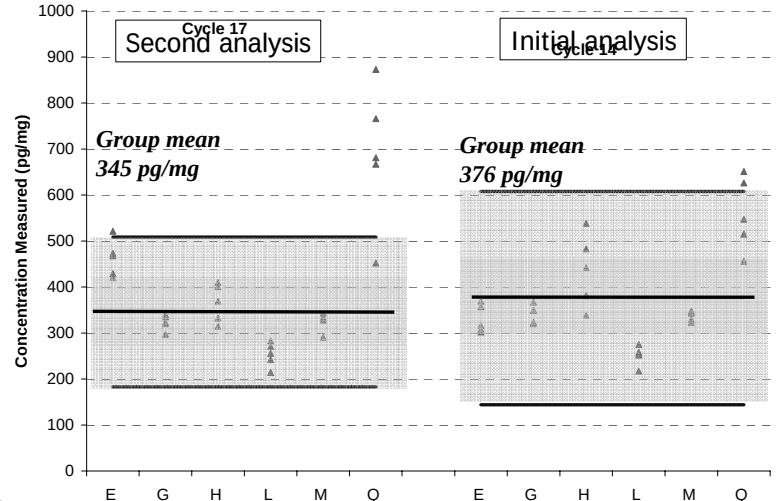
MORPHINE
NLCP Produced: *Theoretical 600 pg/mg range calculated without lab Q*



NLCP

27

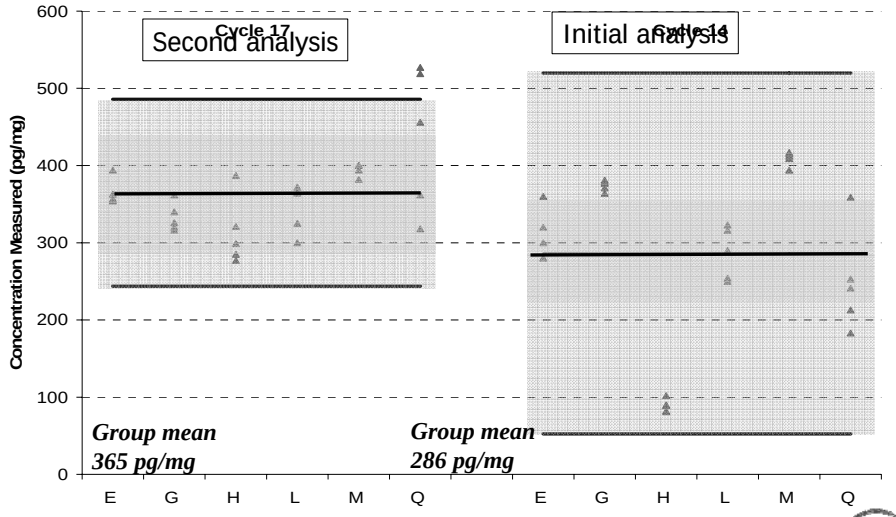
MORPHINE
NLCP Produced- *Theoretical 300 pg/mg range calculated without lab Q*



NLCP

28

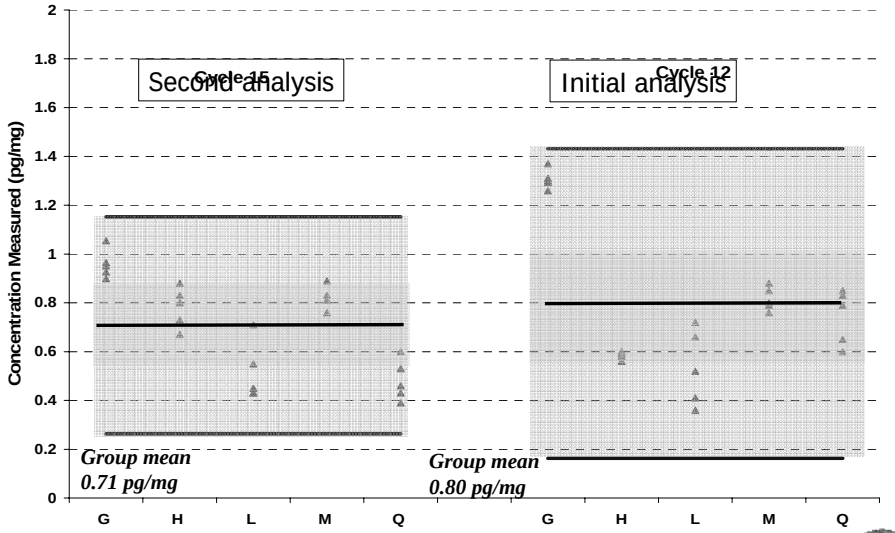
PCP
NLCP Produced: *Theoretical 450 pg/mg*



NLCP

29

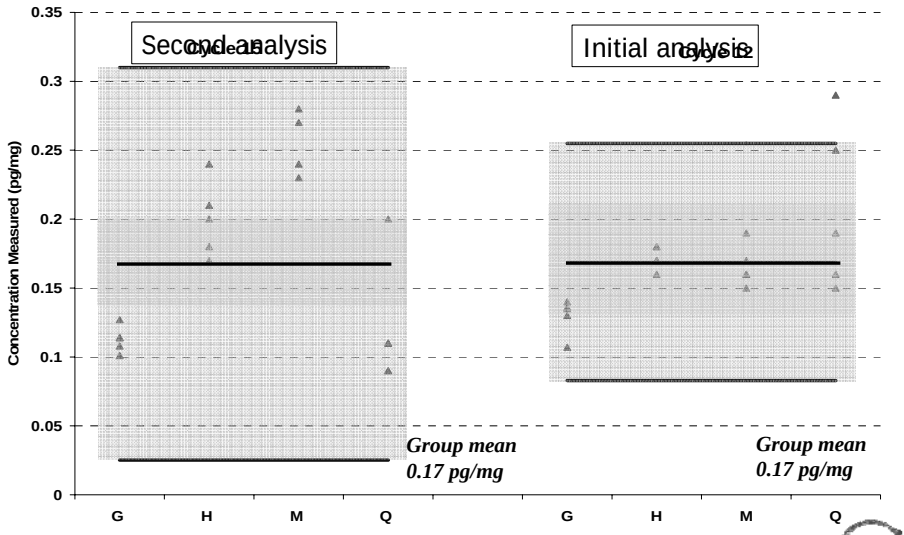
THCA
Reference 0.82 pg/mg



NLCP

30

THCA
Theoretical 0.15 pg/mg



NLCP

31

Evaluation of Laboratory Precision by %CV

- Number of Labs With Less than 10% CV
  - MAMP - 2 out of 6
  - COC - 3 out of 6
  - BZE - 1 out of 6
  - MOR - 2 out of 6
  - PCP - 1 out of 6
  - THCA - 1 out of 6

NLCP

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Evaluation of Laboratory Improvement in Precision by %CV

- Noticeable improvement of %CV from Initial to Second Analysis
  - MAMP - 2 out of 6
  - COC - 2 out of 6
  - BE - 2 out of 6
  - MOR - 1 out of 6
  - PCP - 2 out of 6
  - THCA - 0 out of 6

NLCP

Laboratory Performance I

Cycles 15-17

- Comparison to Section 9.6(a)

Results scored from the second analysis of the PT materials

1) No False Positives; however all analytes were directed for only confirmation by analyte class (initial testing not conducted)
2) All labs correctly identified 90% of analyte challenges over 3 cycles (initial testing not conducted)

NLCP

Laboratory Performance II (Cycles 15 - 17)

3) Two laboratories quantitated 80% of analyte challenges within 20% of group mean
4) All laboratories had one or more 50% quantitation errors
5) All but one laboratory quantitated 50% of all individual analytes within 20% of the mean

NLCP

Laboratory Performance Summary

Lab Performance	Cycle 9-11 N =9	Cycle 15-17 N=6
Number of Labs Reporting False Positives	None*	None*
Number of Labs Correctly Identifying 90% of analyte challenges over 3 cycles	None	All*
Number of Labs quantifying 80% of analyte challenges within 20% of group mean	None	2 labs*
Number of Labs without one or more 50% quantitation errors	None	None
Number of Labs quantifying 50% of all individual analytes within 20% of mean	None	5 labs*

NLCP

* Laboratory performance acceptable

Conclusions

- Comparison of lab results from cycles 15-17 to requirements of Proposed Guidelines of April 2004 demonstrate systemic improvement under the current study design
- Currently several of the participants approach the overall precision and accuracy that will be required of certified laboratories
- The prediction intervals for most analytes (except THCA) suggest improvement in the precision of the laboratories as a whole

NLCP

Conclusions

- The precision and accuracy of most participants has significantly improved for some analytes
- Communication and discussion of results via webcasted conferences soon after the analysis of each set of samples has facilitated improvements in the pilot PT program for hair testing laboratories
- Fortified hair PT materials appear stable for at least 3 months

NLCP

Future Plans

- Continuation of this current project through May 2007
- Continue to analyze the data and promote dialogue with participants through timely webcasted meetings to collectively obtain an enhanced roadmap for future improvements
- Continue efforts to improve precision and accuracy of all laboratories

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[Disclaimer]

- The NLCP Pilot Performance Testing (PT) Program is just that – a Pilot Program
- No labs pass; no labs fail
- This evaluation of each proposed matrix is necessary in HHS' review of proposed standards, the state of the science in the testing industry and the feasibility of providing PT materials
- Use of information from this pilot PT program to present laboratory performance as consistent with requirements in the Proposed Revisions to Mandatory Guidelines for Federal Workplace Drug Testing Programs (69 Fed Reg 19673, April 13, 2004) is inappropriate.

NLCP

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NLCP Oral Fluid Pilot Performance Testing (PT) Program Update

Drug Testing Advisory Board
December 12, 2006

John M. Mitchell and Peter R. Stout

ROCKVILLE, MARYLAND AND RESEARCH TRIANGLE PARK, NORTH CAROLINA

Objectives

- Review of PT requirements from proposed Guidelines of April 2004
- Review the design and results of Oral Fluid Pilot PT presented at March 2006 DTAB (Cycles 4 thru 6)
- Review the design and results of Oral Fluid Pilot PT since March 2006 DTAB (Cycles 10 thru 15)
- Compare test results to requirements of Proposed Guidelines of April 2004
- Disseminate future plans

NLCP

Evaluation of Performance Testing and Certification of Oral Fluid Testing Laboratories

Proposed Guidelines as released for public comment

(Fed Reg Vol 69 April 2004)

NLCP

3

Section 9.6 : What Are the PT Requirements for an Applicant Laboratory to Conduct Oral Fluid Testing?

a) An applicant laboratory that seeks certification to conduct oral fluid testing must satisfy the following criteria on 3 consecutive sets of PT samples:

(1) Have no False Positive results

(2) Correctly identify and confirm at least 90 percent of the total drug challenges on the 3 sets of PT samples

NLCP

4

Section 9.6 : What Are the PT Requirements for an Applicant Laboratory to Conduct Oral Fluid Testing?

(3) Correctly determine the quantitative values for at least 80 percent of the total drug challenges to be within ± 20% or ±2 standard deviations of the calculated reference group mean

(4) Have no quantitative value on a drug concentration that differs by more than 50 percent from the calculated reference mean

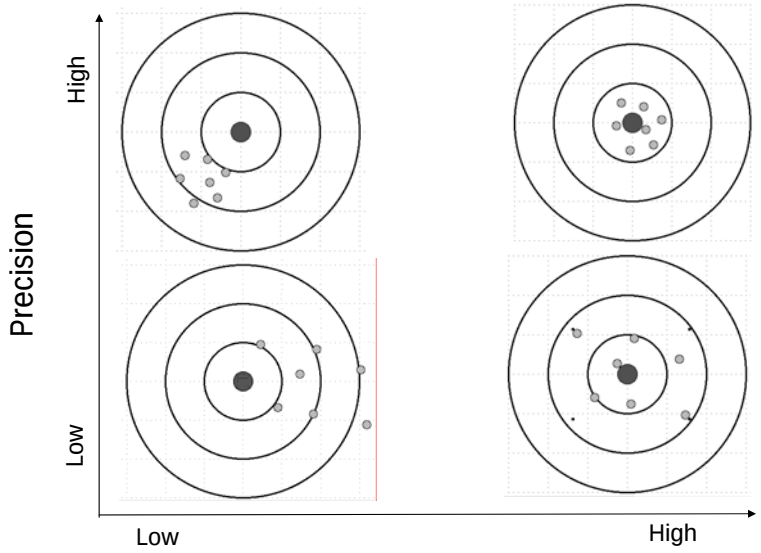
NLCP

Section 9.6 : What Are the PT Requirements for an Applicant Laboratory to Conduct Oral Fluid Testing?

(5) For an individual drug, must correctly detect and quantify at least 50 percent of the total drug challenges within ± 20% or ±2 standard deviations of the calculated reference group mean

NLCP

Accuracy and Precision



NLCP

Pilot Oral Fluid PT Program Review of Cycles 4 Thru 6

(Presented at March 2006 DTAB)

NLCP

Pilot PT for Oral Fluid: Cycles 4 Thru 6

- New Production of All Analytes
  - AMP, MAMP
  - MDA, MDMA, MDEA
  - COC
  - BZE
  - 6-AM, COD, MOR
  - PCP
  - THC
- 3 Concentrations for Each
  - 50% Cutoff
  - Cutoff
  - 200% Cutoff (except THC, COC, & BE = 300%)

NLCP

Pilot PT of Oral Fluid: Cycles 4 Thru 6

- Confirmatory Testing Only
- Samples Shipped Oct 2003 - Jan 2004
  - 21 NLCP spiked Oral Fluid Samples
  - Each challenge: 2 mL aliquot
- 12 Labs Participated
- Analyses of Results Provided to Labs at End of Study (after cycle 6)

NLCP

Laboratory Performance I
Cycles 4-6

Comparison to Proposed Guidelines
Section 9.6(a)

1) No False Positives; however all analytes were directed for confirmation by analyte class (initial testing not conducted)
2) One lab identified 90% of analyte challenges over 3 cycles
   - For AMP, MAMP, BE, MOR, 6-AM, COD, PCP
     - Ten labs met this criterion
     - Without MOR & 6-AM, 12 labs met criterion
   - For COC, MDMA, MDA, MDEA, THC
     - One lab met this criterion
     - Without THC, 2 labs met criterion

NLCP

11

Laboratory Performance II
Cycles 4-6

3) One lab quantitated 80% of all analyte challenges within 20% of group mean
   - For AMP, MAMP, BE, MOR, 6-AM, COD, PCP
     - 7 laboratories met this criterion

     (Without MOR & 6-AM, 10 Labs met criterion)
   - For COC, MDMA, MDA, MDEA, THC
     - One lab met this criterion

     (Without THC, 2 labs met criterion)

NLCP

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Laboratory Performance III
Cycles 4-6

4) Two labs had no quantitation error greater than or equal to 50% of group mean on any of the analytes
   - For AMP, MAMP, BE, MOR, 6-AM, COD, PCP
     - Five laboratories met this criterion (Without MOR & 6-AM, 8 labs)
   - For COC, MDMA, MDA, MDEA, THC
     - Three laboratories met this criterion (Without THC, 5 labs)

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Laboratory Performance IV
Cycles 4-6

5) No lab quantitated 50% of all individual analyte challenges within 20% of mean
   - For AMP, MAMP, BE, MOR, 6-AM, COD, PCP
     - Two laboratories met this criterion (Without MOR & 6-AM, 9 labs)
   - For COC, MDMA, MDA, MDEA, THC
     - One laboratory met this criterion (Without THC, 3 labs)

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Pilot Oral Fluid PT Program: Review of Performance Since March 2006 Cycles 10 - 15

NLCP

Continuing Efforts Toward Achieving Accuracy and Precision

- Obtained commitment from participating labs to use future hair Pilot PT program resources to develop and improve testing accuracy and precision
- Committed future cycles to the resolution of sample and laboratory variation
- Developed webcast meetings to provide feedback as soon as possible after each PT event

NLCP

Continuing Efforts Toward Achieving Accuracy and Precision

- Reviewed test results with participating labs, encouraging group development of improved methods and solutions to observed analytical problems
- Increased the dialogue between the NLCP and participant labs to produce an exchange of ideas and solutions
- Obtained a grant from NIJ to facilitate the development of appropriate calibrator and control materials

NLCP

Current Project- Study Design

- Pilot PT projects redesigned as of May 2006 due to high variation in previous oral fluid results
- Each cycle
  - inclusion of fewer drug analytes
  - 5 replicates of each sample
  - sent to the laboratories about every 4 weeks
- Cycle samples
  - 3 sets of samples
  - Repeated every 3 months
  - 4 separate rounds

NLCP

Current Project- Study Design

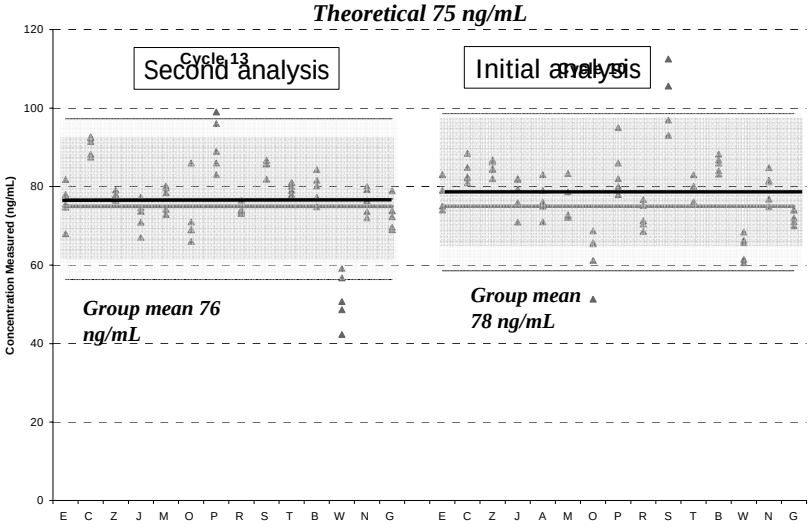
- Design allows analysis of reproducibility and repeatability within and between laboratories
- Results and discussion with laboratories by webcasted meetings every month
- The 3 sets of samples have been analyzed by participating laboratories twice

Current Project- Study Design

- 15 (16) laboratories currently participating
- Sample sources
  - NLCP produced
- Cycles contain two samples each
  - (1) MAMP/COD and (1) AMP/MOR
  - (1) COC/MDA and (1) BZE/MDEA
  - (1) THC/PCP and (1) 6-AM/MDMA
- Samples are screened 1 time and confirmed 5 times under 5 different calibrators
- Concentration for each compound is 1.5 times the proposed screening cutoff
- Samples provided as neat oral fluid

Amphetamine

Theoretical 75 ng/mL



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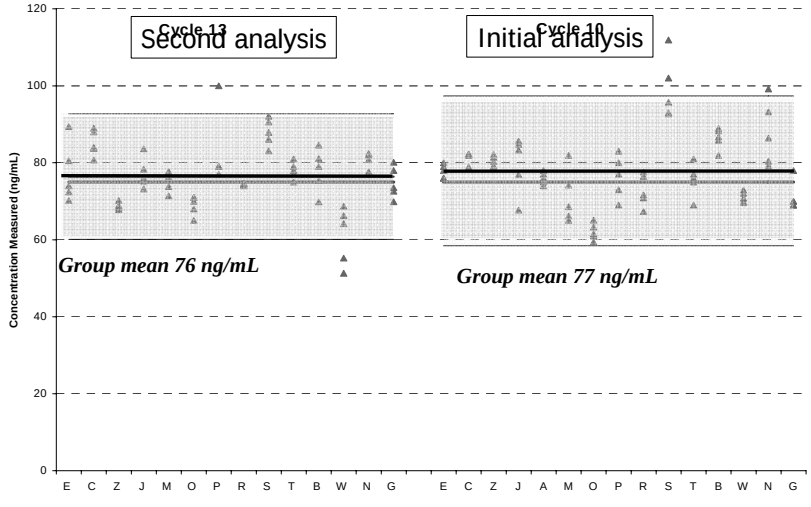
Methamphetamine

Theoretical 75 ng/mL



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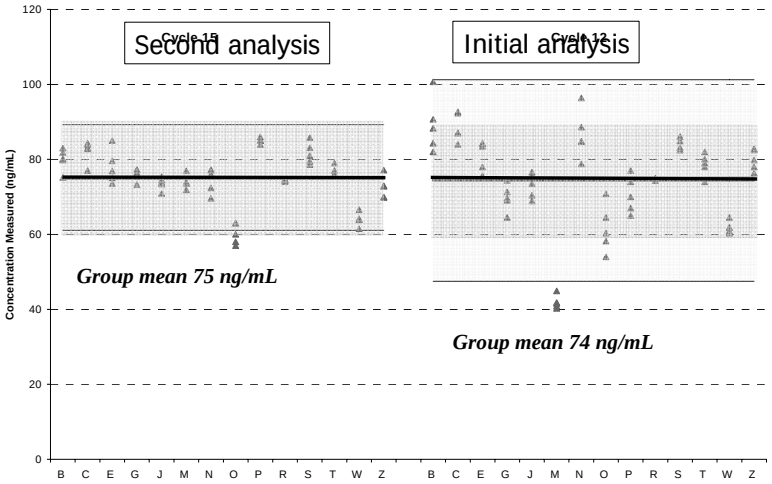
22

MDMA

Theoretical 75 ng/mL



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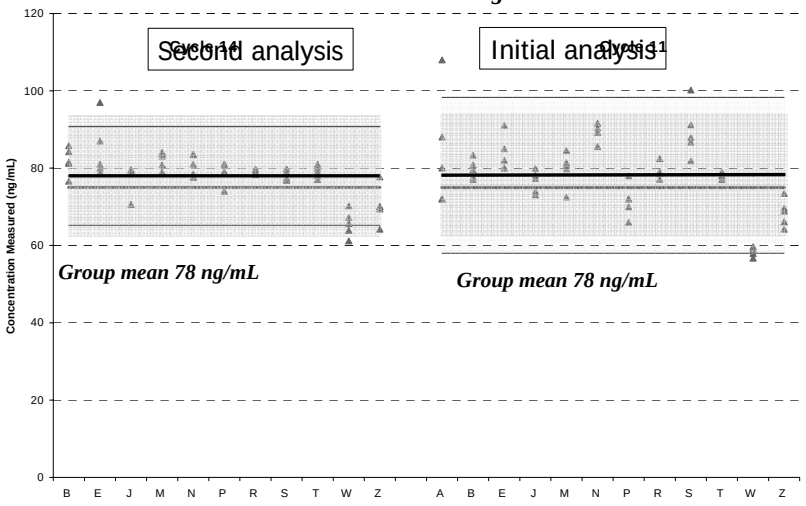
23

MDEA

Theoretical 75 ng/mL



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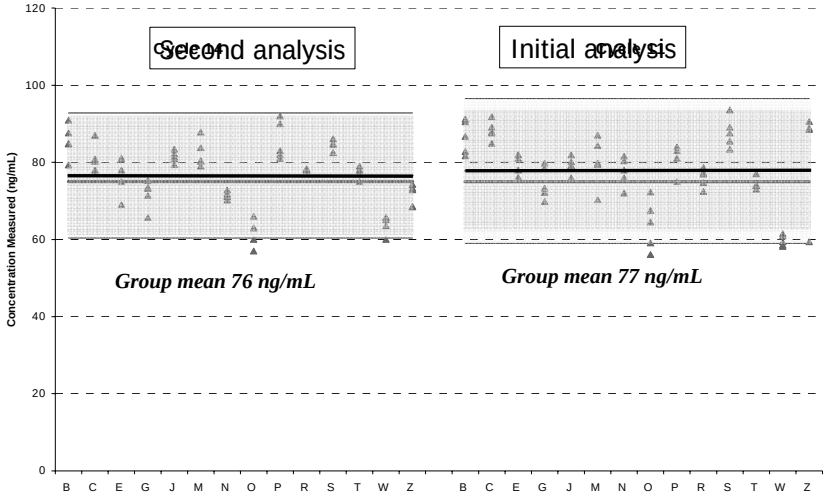
24

MDA

Theoretical 75 ng/mL



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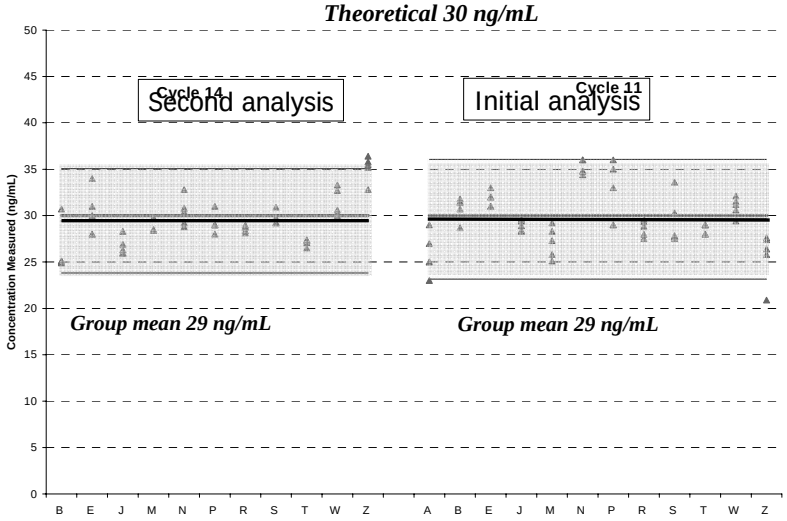
25

Cocaine

Theoretical 30 ng/mL

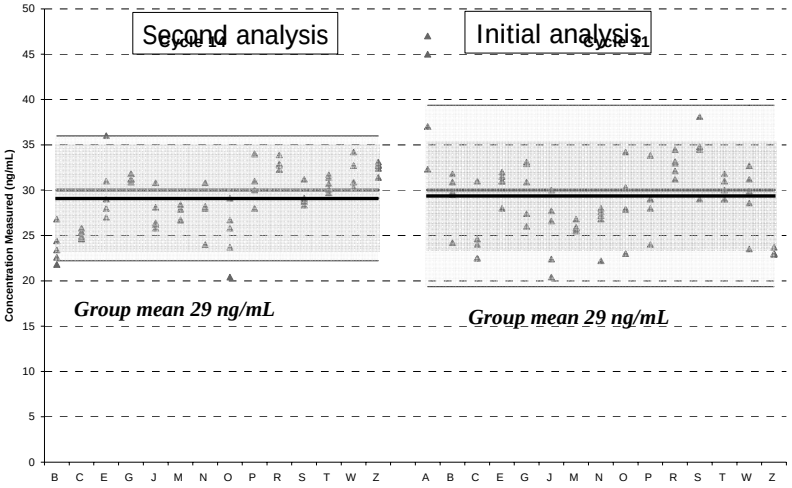


NLCP

26

Benzoylecgonine

Theoretical 30 ng/mL



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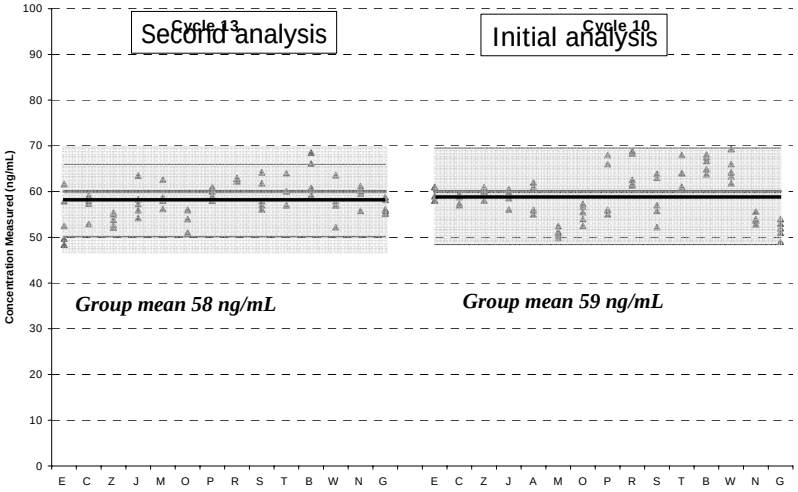
27

Codeine

Theoretical 60 ng/mL



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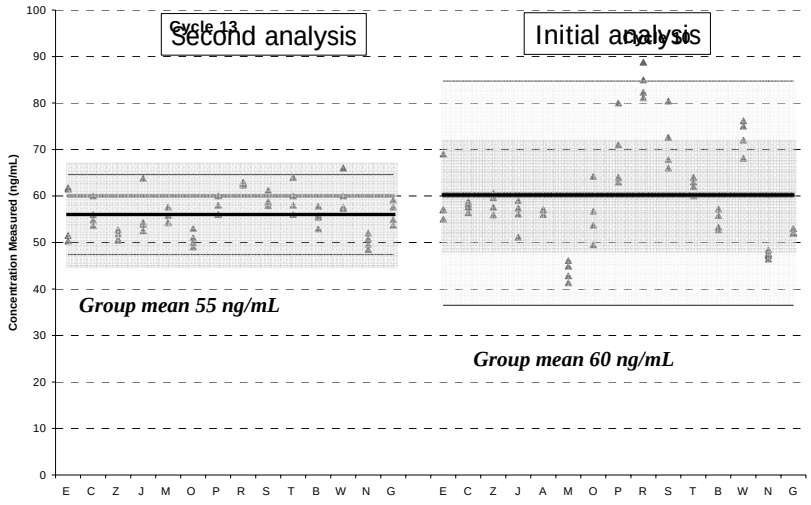
28

Morphine

Theoretical 60 ng/mL



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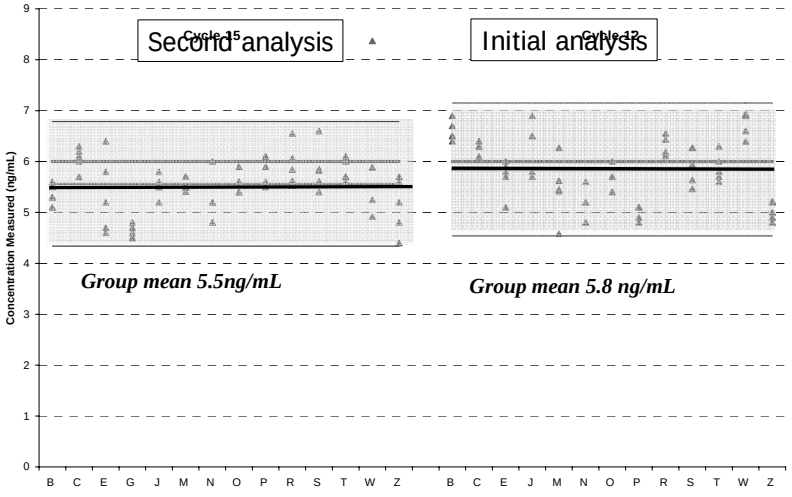
29

6AM

Theoretical 6 ng/mL



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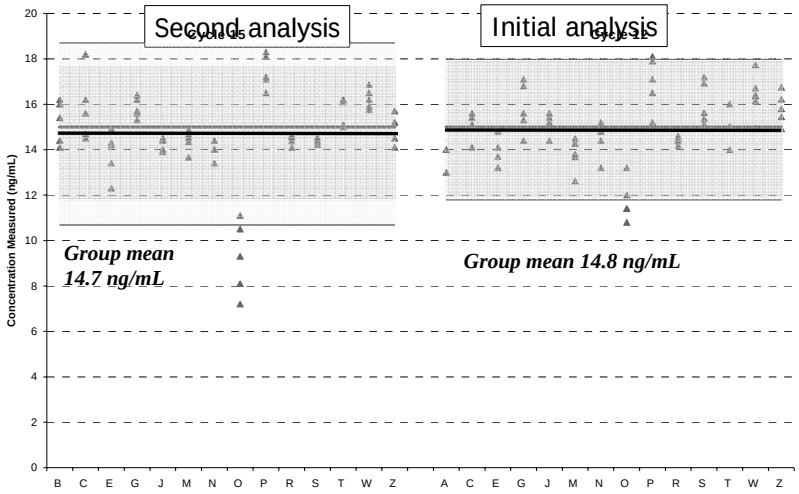
30

PCP (all labs)

Theoretical 15 ng/mL



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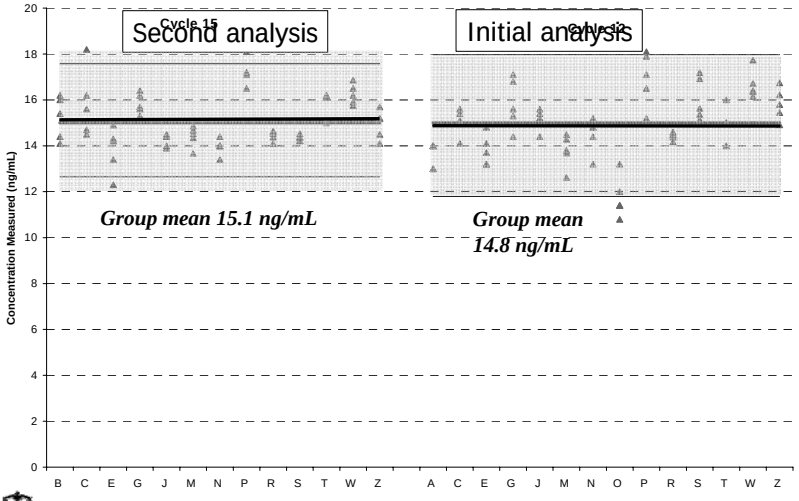
31

PCP Without Lab O in Second Analysis

Theoretical 15 ng/mL



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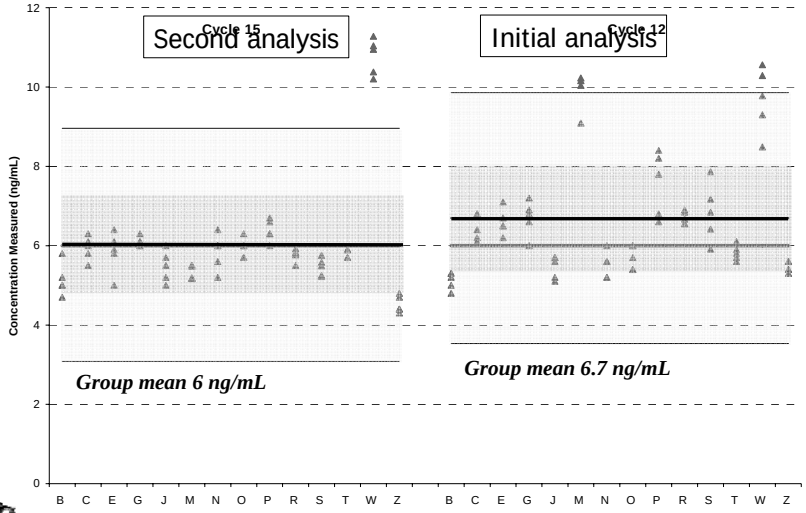
32

THC (all labs)

Theoretical 6 ng/mL



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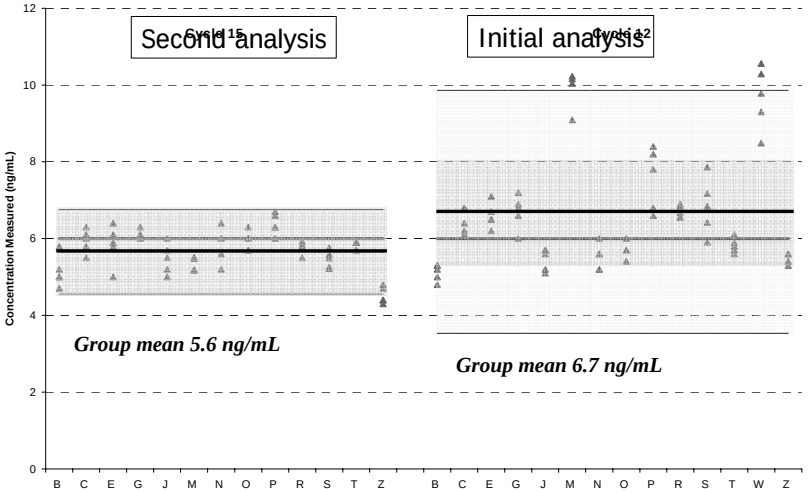
33

THC Without Lab W in Second Analysis

Theoretical 6 ng/mL



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Evaluation of Laboratory Precision by %CV

- Number of Labs With Less than 10% CV in the most recent analysis
  - AMP - 14 of 15
  - MAMP - 13 of 15
  - COC - 14 of 15
  - BE - 12 of 15
  - MOR - 13 of 15
  - PCP - 14 of 15
  - THC - 14 of 15

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Laboratory Performance I Cycles 13-15

Comparison to Section 9.6(a)

Results scored from the second analysis of the PT materials

(1) No False Positives however all analytes were directed for confirmation by analyte class

(2) 14 of 15 labs identified 90% of analyte challenges over 3 cycles

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Laboratory Performance II (Cycles 13 - 15)

- (3) 12 of 15 labs quantitated 80% of all analyte challenges within 20% of group mean
  - For AMP, MAMP, BE, MOR, 6-AM, COD, PCP
    - 14 of 15 labs met this criterion
  - For COC, MDMA, MDA, MDEA, THC
    - 11 of 15 labs met this criterion

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Laboratory Performance III (Cycles 13 - 15)

- (4) 13 labs had no quantitation error greater than or equal to 50% of group mean on any of the analytes
  - For AMP, MAMP, BE, MOR, 6-AM, COD, PCP
    - 13 of 15 labs met this criterion
  - For COC, MDMA, MDA, MDEA, THC
    - 14 of 15 labs met this criterion

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Laboratory Performance IV (Cycles 13 - 15)

- (5) 11 of 15 labs quantitated 50% of all individual analyte challenges within 20% of reference mean
  - For AMP, MAMP, BE, MOR, 6-AM, COD, PCP
    - 11 of 15 labs met this criterion
  - For COC, MDMA, MDA, MDEA, THC
    - 13 of 15 lab met this criterion

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Laboratory Performance Summary

Lab Performance	Cycle 4-6 N=12	Cycle 13-15 N=15
Number of Labs Reporting False Positives	None*	None*
Number of Labs Correctly Identifying 90% of analyte challenges over 3 cycles	1 Lab*	14 Labs*
Number of Labs quantifying 80% of analyte challenges within 20% of group mean	1 Lab*	12 Labs*
Number of Labs without one or more 50% quantitation errors	2 Labs*	13 Labs *
Number of Labs quantifying 50% of all individual analytes within 20% of mean	None	11 Labs*

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* Laboratory performance acceptable

Conclusions

- Comparison of lab results from cycles 13-15 to requirements of the proposed Guidelines of April 2004 demonstrate dramatic overall system improvement under the current study design
- With the current samples sets, most of the participants demonstrate the precision that will be required of certified laboratories for confirmatory drug testing of neat oral fluid
- The prediction intervals for all analytes except amphetamine demonstrate the marked improvement in the precision of the laboratories

Conclusions

- Within and between lab precision has tightened to the point that most participants would have a 95% probability of meeting 20% requirements
- The communication and discussion of results via webcasted conferences soon after the analysis of each set of samples has facilitated improvements in the pilot PT program for oral fluid testing laboratories
- Neat Oral Fluid PT materials are stable for at least 3 months

Future Plans

- Continue the current project through May 2007
- Assess performance with samples that contain analyte concentrations at 0.4, 1 and 10 times proposed cutoffs
- Assess the effects of common interfering compounds and other compounds potentially present in the mouth
- Assess initial testing of samples
- Assess the performance of current collection devices

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[Disclaimer]

- The NLCP Pilot Performance Testing (PT) Program is just that – a Pilot Program
- No labs pass; no labs fail
- This evaluation of each proposed matrix is necessary in HHS' review of proposed standards, the state of the science in the testing industry and the feasibility of providing PT materials
- Use of information from this pilot PT program to present laboratory performance as consistent with requirements in the Proposed Revisions to Mandatory Guidelines for Federal Workplace Drug Testing Programs (69 Fed Reg 19673, April 13, 2004) is inappropriate.

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Evaluating Workplace Testing Results from a Medical Review Officer (MRO) Data Source

Leo Cangianelli
THE WALSH GROUP (TWG), PA
and Mike Baylor
CENTER FOR FORENSIC SCIENCES
RTI INTERNATIONAL

Introduction

1. **This presentation provides an overview of the relationship between workplace drug results and MRO verified results which has long been warranted**
2. **2003 indices from several large labs representing 7M specimens reported positive rates of 2.5% for federally regulated workplace and 5.0% for non-regulated workplace**
3. **Such indices do not accurately represent "illegal drug use rates"**
   - **Include "blind" QC samples**
   - **Include drug positive results that have an alternative medical explanation**

Objective

Evaluate the relationship between workplace lab reported drug test results and MRO verified results

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3

Background and History I

May 2003

- **TWG teamed with RTI in proposal to develop MRO database under the SAMHSA NLCP contract**

November 2003

- **TWG obtained a sub-contract under the NLCP contract to develop MRO database**
- **Primary effort designed to utilize Employee Health Programs (later First Advantage data)**

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4

Background and History II

November 2004

- **First database received containing EHP/SAMI MRO data**

September 2005

- **Completed data integration of 2003/2004 data input**

October 2006

- **Poster presented at SOFT 2006**

Methods I

- **Records for drug testing in 2003 were transferred from the MRO into a database**
  - **164,432 federally regulated; 667,751 non-regulated specimens**
- **Specimen records from 5,923 companies tested at 19 certified laboratories**
- **Specific donor information *was not included*; all links to donor identification were broken prior to transfer**
- **Agency and blind QC samples were excluded**
- **Only urine data examined**

Methods II

Records included:

- **Donor demographics**
- **Employer information**
- **Collection site information**
- **Lab results**
- **MRO determinations**

Data Elements I

FADV Drug Test Results File

MRO Test Result
Donor ID Code
Donor Area code + exchange
Employer ID
Key to industry
Employer City
Employer State
Employer Zip
Employer Area code + exchange
Reason for test
Whether DOT test or Not
Date specimen collected
Collector City
Collector State
Collector Zip
Collector Area code + exchange
Lab Name
Date result received at FADV
Drug Test Panel 1
Specimen type for panel 1
Drug Test Panel 2
Specimen type for panel 2
Reject code
Date reported to Employer
Indicator if retest was required
Indicator if specimen Retested

Data Elements II

FADV Drug List / Reject / Industry Files

File = FadvDrugList

MRO Drug Test results key (Cross ref. key)

Name of drug tested

Quantitation (if available)

Screening cut off for panel

Confirmatory cut off for panel

Lab Result for each drug

File = EhpRejec

Reject Code

Reject Reason

File = Industry

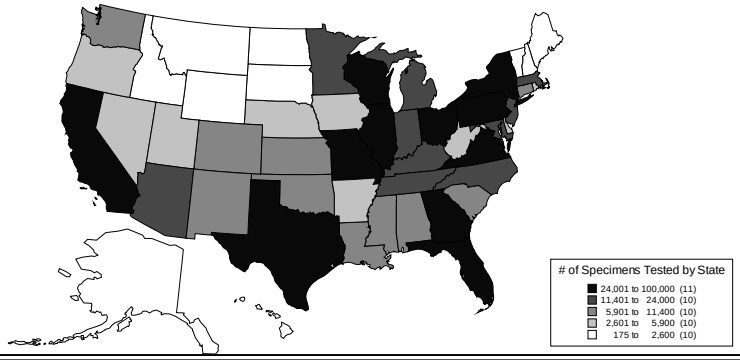
Industry Code

Industry Name

Data Summary

Section 1. Data Summary		
Overview		
Total # of Employers	5,923	
Total # of Labs	19	
	Regulated	Non-Regulated
Specimens Tested	164,432	667,751
Donors	137,913	634,145

Section 2. Geographic Distribution of Donors in Study



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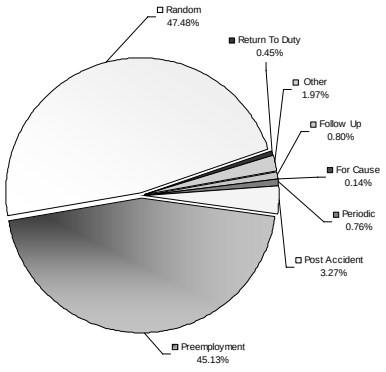
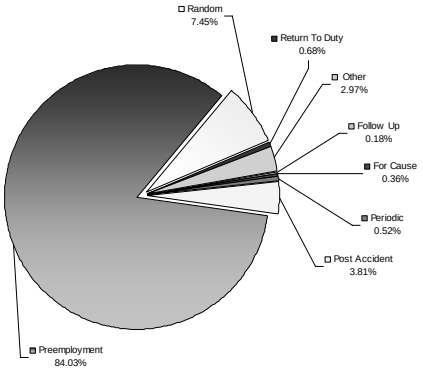
Section 3. Reasons for Testing

Regulated



Non-Regulated



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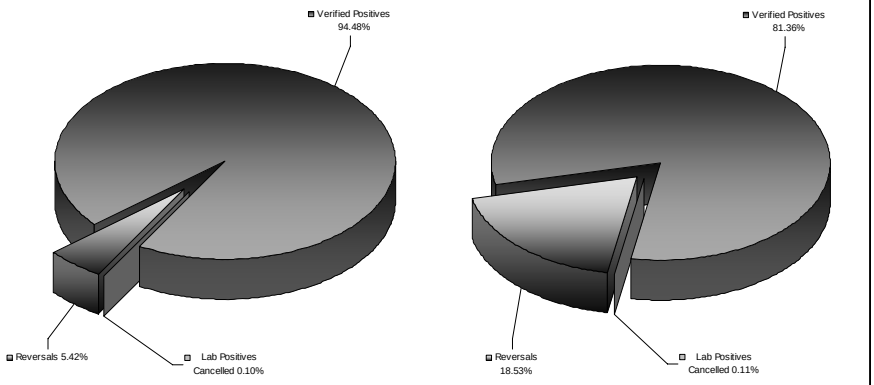
Section 4. Percentage of Lab Positives Reversed by MRO

Regulated	Non-Regulated



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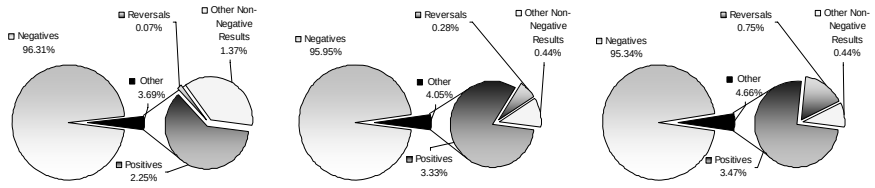
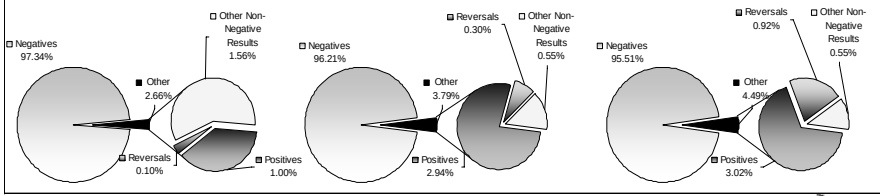
Section 5. MRO Verified Positives and Reversals as a Percent of Total Specimens Tested

Regulated	Non-Regulated (HHS-5 Drugs Only)	Non-Regulated (All Drugs)

Preemployment



Random



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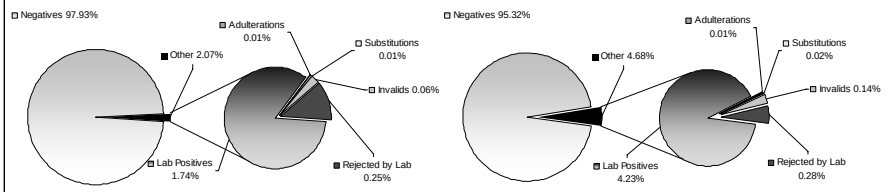
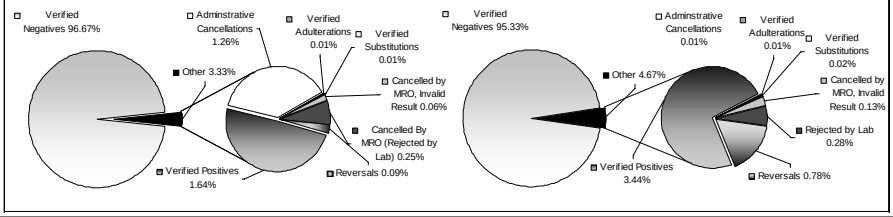
Section 6. Comparison Between Lab Findings and MRO Verifications Showing Distribution of Positives and Other Non Negative Specimens

Regulated	Non-Regulated

Reported by Lab



Reported by MRO



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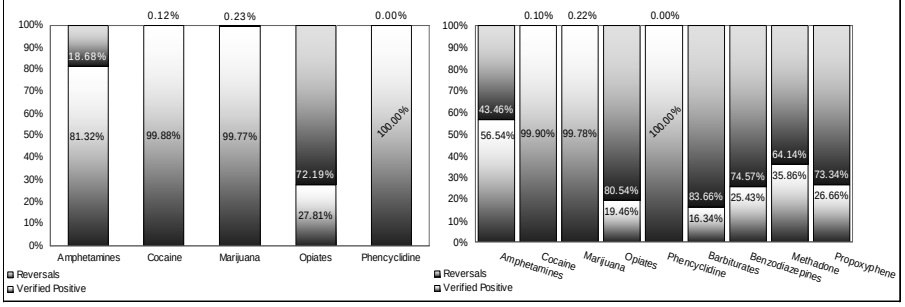
Section 7. Percentage of Lab Positives Reversed by MRO (by Drug Class)

Regulated	Non-Regulated



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Section 8. Summary of Positives and Negatives from the Laboratory Versus MRO Verified Positives and Reversals

Regulated				Non-Regulated			
Reported by Lab							
	Total	% of All Tests Performed			Total	% of All Tests Performed	
Specimens Tested	164,432			Specimens Tested	667,751		
Negatives	161,024	97.93%		Negatives	636,501	95.32%	
Positives	2,861	1.74%		Positives	28,227	4.23%	
Other Reported Results	547	0.33%		Other Reported Results	3,023	0.45%	
Positives Reviewed by MRO							
			% of Lab Positives				% of Lab Positives
Reversals	155	0.09%	5.42%	Reversals	5,230	0.78%	18.53%
Verified Positives	2,703	1.64%	94.48%	Verified Positives	22,966	3.44%	81.36%
Drug Positives Cancelled	3	0.002%	0.10%	Drug Positives Cancelled	31	0.005%	0.11%

Conclusions

1. **Federally regulated testing focused equally on pre-employment and random testing, while non-regulated was primarily pre-employment with very little random testing**

2. **A significant number of laboratory positive results were reversed during the MRO review process**

Conclusions

3. **In federally regulated testing, this appeared to be due primarily to a legitimate medical explanation for the presence of opiates and amphetamines**

4. **In non-regulated testing, a significantly greater number of MRO reversals were observed due largely to higher amphetamine reversals (43.46% vs. 18.68%) as well as reversals for barbiturates (83.66%) and benzodiazepines (74.57%)**

External Contamination of Hair with Cocaine: Evaluation of External Cocaine Contamination and Development of Performance Testing Materials

Peter R. Stout, Jeri D. Ropero-Miller,
Michael R. Baylor and John M. Mitchell

Center for Forensic Sciences

Research Triangle Park, NC

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- **This presentation was developed [in part] under contract number 277-2003-00044 from the Substance Abuse and Mental Health Services Administration (SAMHSA), U.S. Department of Health and Human Services (HHS). The views, policies, and opinions expressed are those of the authors and do not reflect those of SAMHSA or HHS.**
- **Paper is published in the *Journal of Analytical Toxicology* 30(8):490-500 (Oct. 2006)**

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2

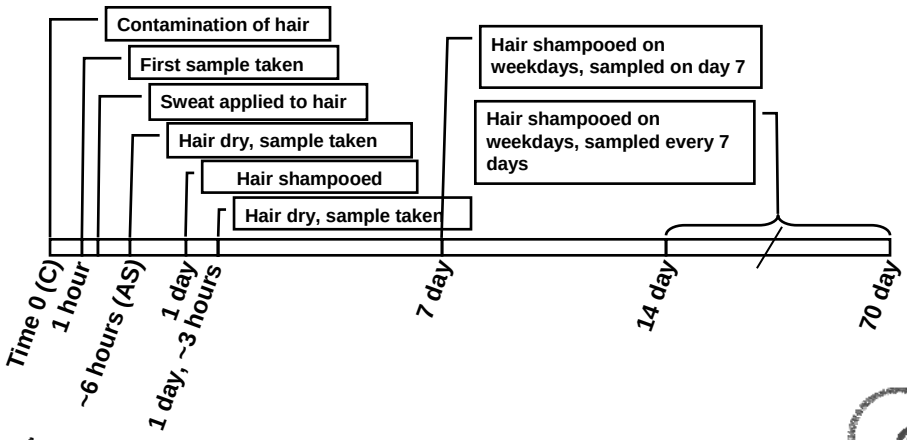
Background

- G. Romano, N. Barbera and I. Lombardo, Hair testing for drugs of abuse: evaluation of external cocaine contamination and risk of false positives. *Forensic Science International* 123 (2001) 119-29.
- T. Cairns, V. Hill, M. Schaffer and W. Thistle, Removing and identifying drug contamination in the analysis of human hair. *Forensic Science International* 145 (2004) 97-108.

Objective

- An evaluation of the dynamics of external contamination of hair with cocaine (COC) for Federal Drug-Free Workplace Programs.
- This characterization was necessary to develop performance materials that could evaluate the hair testing industry's decontamination procedures.
- Evaluate the reporting criteria contained in the proposed Federal Guideline published for public comment in April, 2004 (see disclaimer at the end of the presentation).

Study Time Line



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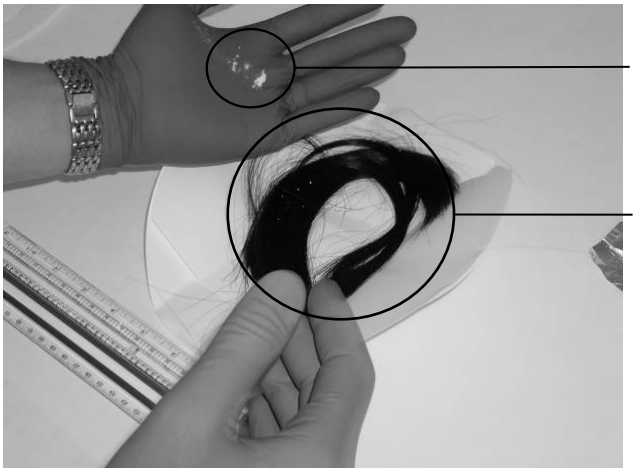
Procedure



15 mg cocaine HCl, to be distributed on hands

12 g hair lock, hair type 4 of 5 pictured

Hair verified to be COC free before contamination

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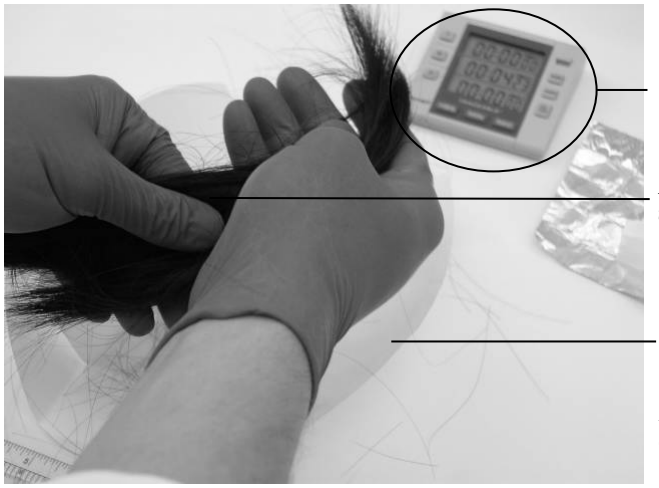
6

Procedure



Cocaine distributed on hair for 5 minutes

Hair maintained loose throughout the study

Hair stored under filter paper on clean lab paper in a lab where drug not previously handled

Hair sampled 1 hour after contamination with drug

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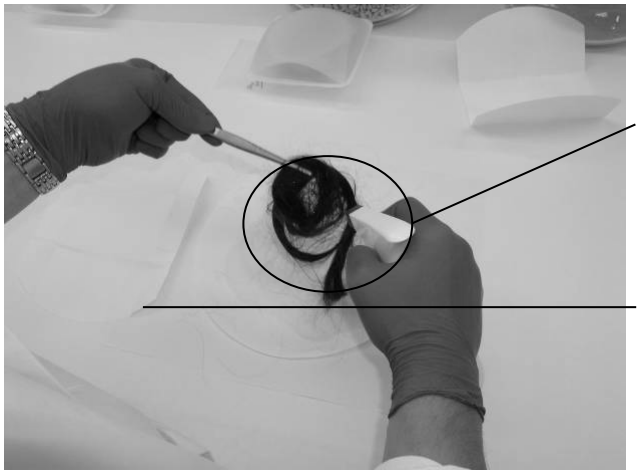
7

Procedure



Hair wet to the point of run off with synthetic sweat solution

Stored loose under filter paper until dry by inspection (~3 hours)

Hair sampled after hair had dried

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8

Procedure

Hair shampooed every weekday evening using baby shampoo for ~1 minute in warm water in a gauze wrapping.

Hair blotted dry and allowed to air dry. Hair was dry by inspection in ~4 hours.

Hair sampled after first shampooing and then weekly for the 10 week study period.

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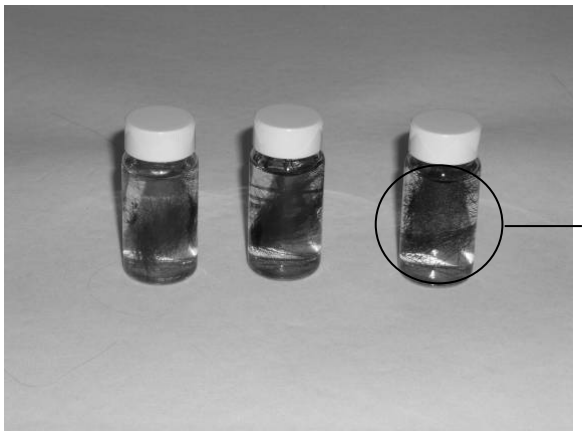
Procedure



Samples decontaminated at RTI, matched to every extent possible to Cairns et al (2004)
-Temperature
-Buffer volume to hair ratio
-Abrupt momentum change
-Shaking at 120 bpm

Samples were able to move freely in solution and not clump during shaking.

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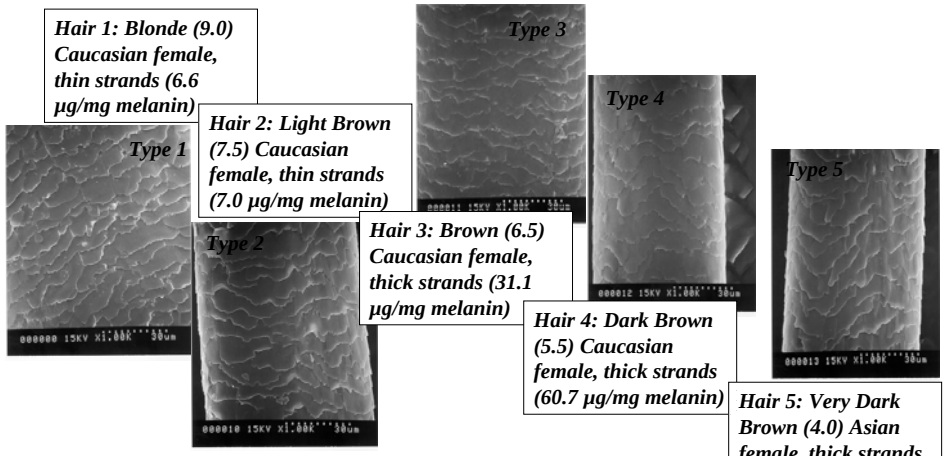
Procedure



Hair 1: Blonde (9.0) Caucasian female, thin strands (6.6 µg/mg melanin)

Hair 2: Light Brown (7.5) Caucasian female, thin strands (7.0 µg/mg melanin)

Hair 3: Brown (6.5) Caucasian female, thick strands (31.1 µg/mg melanin)

Hair 4: Dark Brown (5.5) Caucasian female, thick strands (60.7 µg/mg melanin)

Hair 5: Very Dark Brown (4.0) Asian female, thick strands (57.4 µg/mg melanin)

NLCP

Sampling Procedure

At each sample point, ~400 mg of hair sampled from lock and homogenized (cut into 1 cm pieces and mixed 5 minutes)

~120 mg subsampled for decontamination at RTI using Cairns et al. (2004) extended buffer wash

~120 mg subsampled for individual lab decontamination

~120 mg subsampled for no decontamination prior to analysis

Lab 1 *Lab 2* *Lab 3*

Lab 1 *Lab 2* *Lab 3*

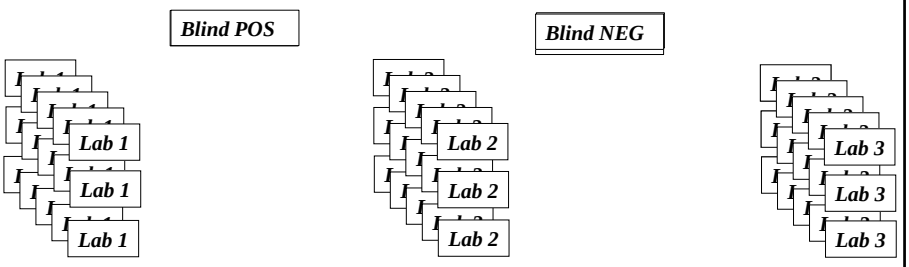
Lab 1 *Lab 2* *Lab 3*

NLCP

Sampling procedure

Samples from each treatment and each hair type shipped to laboratories for analysis each week. Each lab analyzed 195 samples.

Each shipment contained blind negative and blind positive samples. Samples submitted in randomized fashion.



NLCP

Blind Positives and Negatives

- **Each lab received and analyzed 47 blind controls over the study (~19% blind rate)**
  - **22 positives**
    - **4 from known drug user hair**
    - **18 from manufactured PT materials**
  - **25 negatives**
    - **Made from the 5 hair types**
    - **Prepared and packaged before contamination procedure**
- **Packaged so that labs typically had a positive and negative blind with samples to be decontaminated and samples not to be decontaminated**

NLCP

Sample Packaging

- **Hair packaged in aluminum foil with 3 digit, randomly assigned ID number**
- **Foil packets placed in zip lock bags**
- **Blind QC materials packaged identically**
- **To date, sample and blind identities have not been disclosed to participating laboratories**

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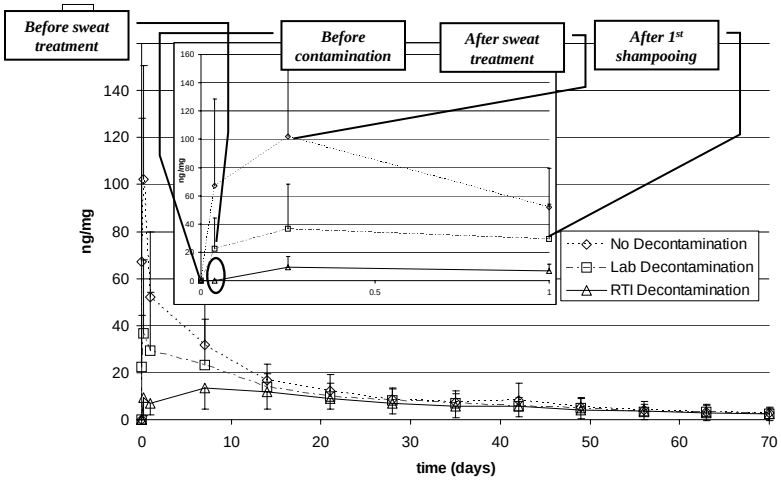
Cocaine Results by Decontamination Treatment



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Distribution of Cocaine Concentrations found in Laboratory Decontaminated Hair Samples pg/mg

hair #	Lab #	C	AS	Day 1	7	14	21	28	35	42	49	56	63	70
1	1	79,055	38,339	58,177	52,513	14,158	12,634	7,473	5,320	3,258	2,666	1,076	652	
	2	28,160	4,520	8,290	17,230	9,110	6,000	4,550	3,470	1,680	970			
	3	41,909	66,599	84,801	76,184	18,461	12,433	8,580	5,736	4,919	2,408	874	625	
2	1	8,377	31,128	30,966	15,739	8,604	5,655	3,169	2,917	1,781	1,018			1,919
	2		1,240	4,040	3,620	4,870	3,090	2,190	2,050	1,340				
	3	14,726	49,853	56,089	23,582	10,262	5,455	3,778	3,304	3,157	798			
3	1	3,823	16,736	14,556	11,246	11,889	11,283	6,897	5,948	5,576	4,423	2,594	2,254	6,331
	2	1,390	4,700	4,740	5,750	9,210	6,080	5,790	5,240	4,090	2,970	2,210	2,250	1,490
	3	7,133	32,042	19,484	12,809	12,039	9,605	6,160	8,415	4,826	4,147	2,630	2,507	2,124
4	1	38,177	81,729	45,899	31,989	16,614	23,627	11,684	7,845	10,907	12,418	9,272	7,611	3,379
	2	12,410	24,210	19,110	25,290	22,680	8,190	16,980	15,150	12,230	10,290	8,980	8,750	6,560
	3	46,946	109,977	54,310	36,454	29,095	14,551	19,853	14,319	13,519	13,165	9,159	9,144	7,003
5	1	16,377	22,404	15,623	10,884	12,836	9,919	7,680	6,251	6,923	6,208	5,151	3,720	
	2	7,120	6,900	5,350	7,650	11,250	8,700	8,250	7,630	5,980	3,400	3,810	3,680	3,180
	3	30,538	57,327	18,996	15,898	13,748	8,574	7,289	8,473	6,239	8,121	3,591	4,682	3,864

NLCP

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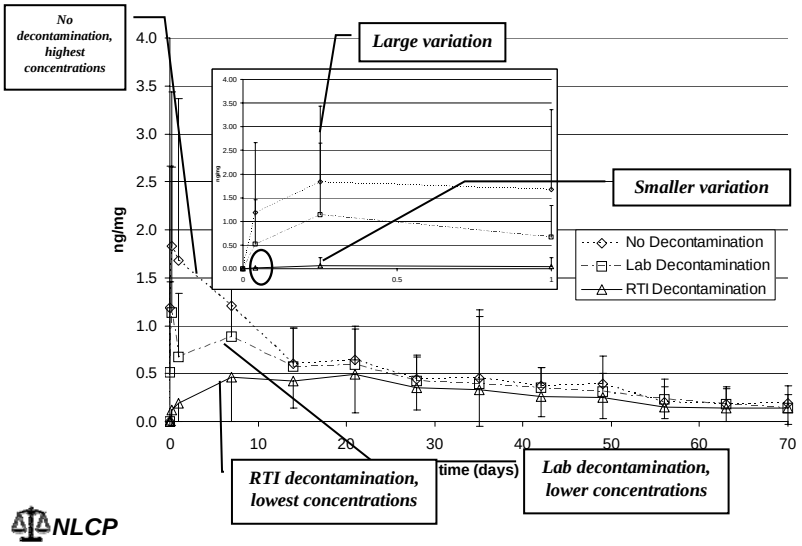
Benzoylecgonine Results by Decontamination Treatment



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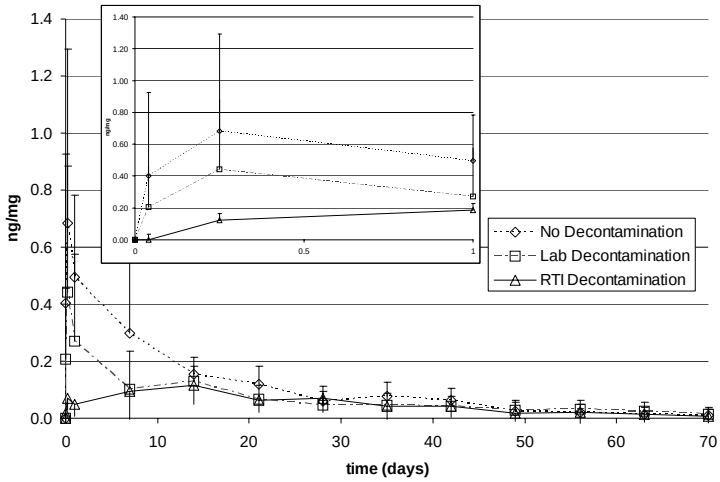
Cocaethylene Results by Decontamination Treatment



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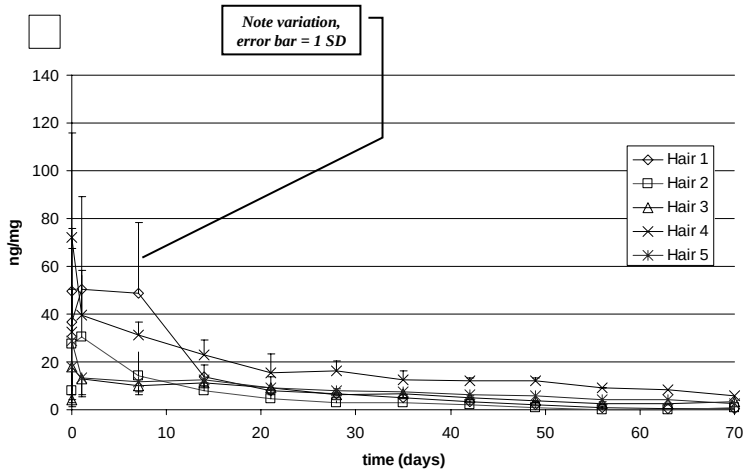
Cocaine Results by Hair Type, Decontaminated by Laboratories



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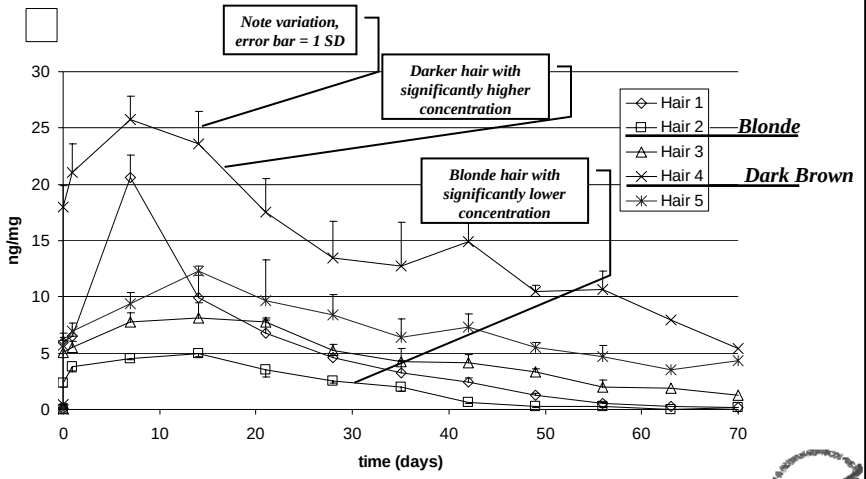
Cocaine Results by Hair Type, Decontaminated by RTI



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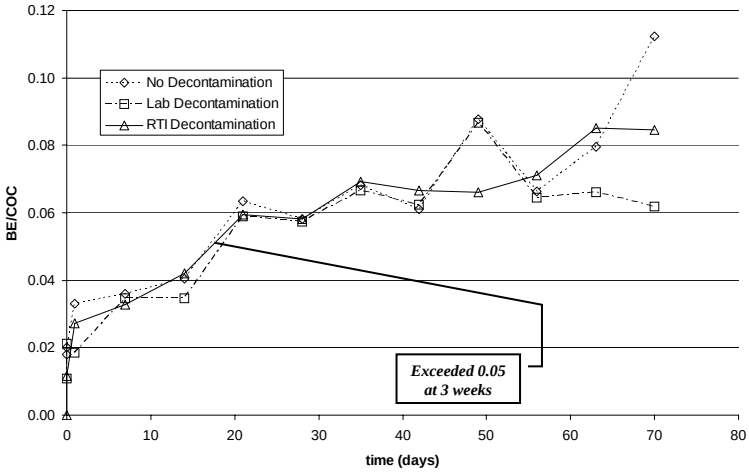
BE/COC Ratio by Decontamination Treatment



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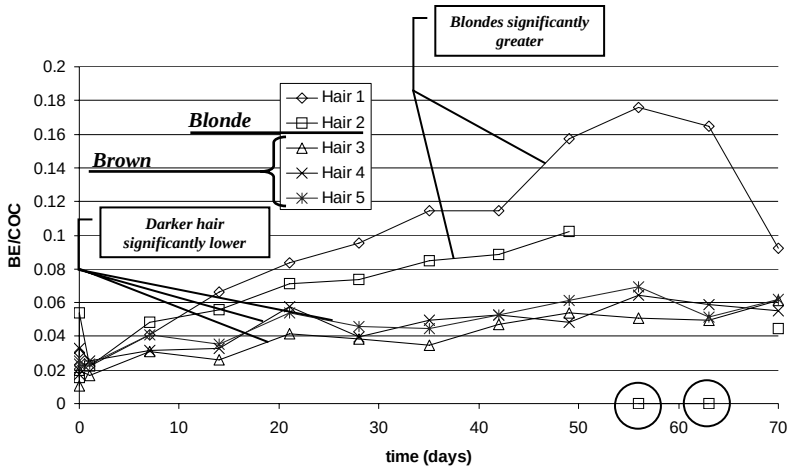
BE/COC Ratio by Hair Type Laboratory Decontaminated



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Positive Results by Proposed Federal Guidelines

- **Federal Register Vol 69, April 2004**
- **Sample contains: cocaine ≥ 500 pg/mg *AND* BE ≥ 50 pg/mg *AND* BE/COC ≥ 0.05**
  - **(500/50/0.05 criteria)**
- **Sample contains: cocaine ≥ 500 pg/mg *AND* CE ≥ 50 pg/mg *OR* NCOC ≥ 50 pg/mg**
  - **(500/50 criteria)**
- **No additional criteria under the proposed regulations (e.g. other metabolites or metabolite ratios, other mathematical decision criteria)**

NLCP

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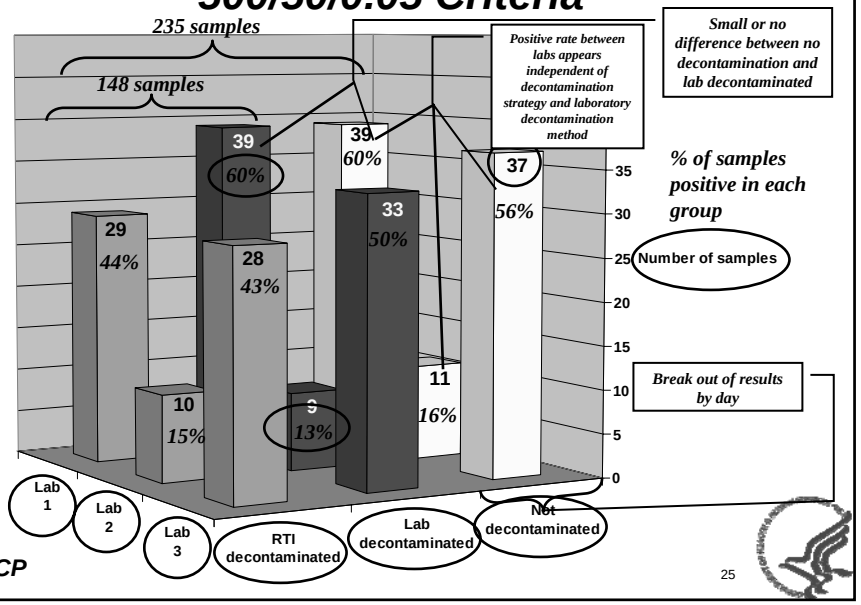
Distribution of Samples Positive by the 500/50/0.05 Criteria



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Distribution of Positives by 500/50/0.05 Criteria by Day x Lab x Hair Type Not Decontaminated

Day

Hair #	Lab #	C	AS	1	7	14	21	28	35	42	49	56	63	70	Grand Total
1	1				■	■	■	■	■	■	■	■	■	■	10
	2						■	■	■	■	■	■	■		7
	3		■	■			■	■	■	■	■	■	■		12
2	1							■	■	■	■				7
	2							■	■	■					2
	3					■	■	■	■	■	■				7
	1						■			■	■		■	■	5
3	2														0
	3	■									■			■	6
4	1				■						■	■	■	■	8
	2												■	■	2
	3			■			■	■			■			■	5
5	1				■		■	■	■	■	■	■	■	■	9
	2														0
	3			■		■	■	■	■		■			■	7

Samples from 1 hour after contamination prior to sweat

Samples from after sweat treatment

Indicates a sample positive by 500/50/0.05 criteria

NLCP

Distribution of Positives by 500/50/0.05 Criteria by Day x Lab x Hair type Lab Decontaminated

		Day													
Hair #	Lab #	C	AS	1	7	14	21	28	35	42	49	56	63	70	Grand Total
1	1				■	■	■	■	■	■	■	■	■		9
	2						■	■	■	■	■				5
	3	■				■	■	■	■	■	■	■	■		9
2	1				■	■	■	■	■	■	■			■	8
	2						■		■	■					3
	3		■			■	■	■	■	■	■				7
3	1						■			■	■		■	■	5
	2										■				1
	3							■			■	■	■	■	5
	1				■		■	■	■	■	■	■	■	■	9
4	2														0
	3						■			■		■	■	■	5
	1				■		■	■	■	■	■	■	■		8
5	2														0
	3						■	■		■	■	■	■	■	7

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Distribution of Positives by 500/50/0.05 Criteria by Day x Lab x Hair Type RTI Decontaminated

		Day													
Hair #	Lab #	C	AS	1	7	14	21	28	35	42	49	56	63	70	Grand Total
1	1				■	■	■	■	■	■	■	■			8
	2						■	■	■	■	■	■			6
	3			■		■	■	■	■	■	■	■			8
2	1				■	■	■	■	■	■					6
	2								■						1
	3			■		■	■	■	■						5
	1									■	■		■		3
3	2														0
	3							■	■		■				3
4	1				■		■	■	■				■		5
	2												■	■	2
	3			■	■		■	■	■		■			■	7
5	1				■		■		■	■	■		■	■	7
	2								■						1
	3						■	■	■		■			■	5

NLCP

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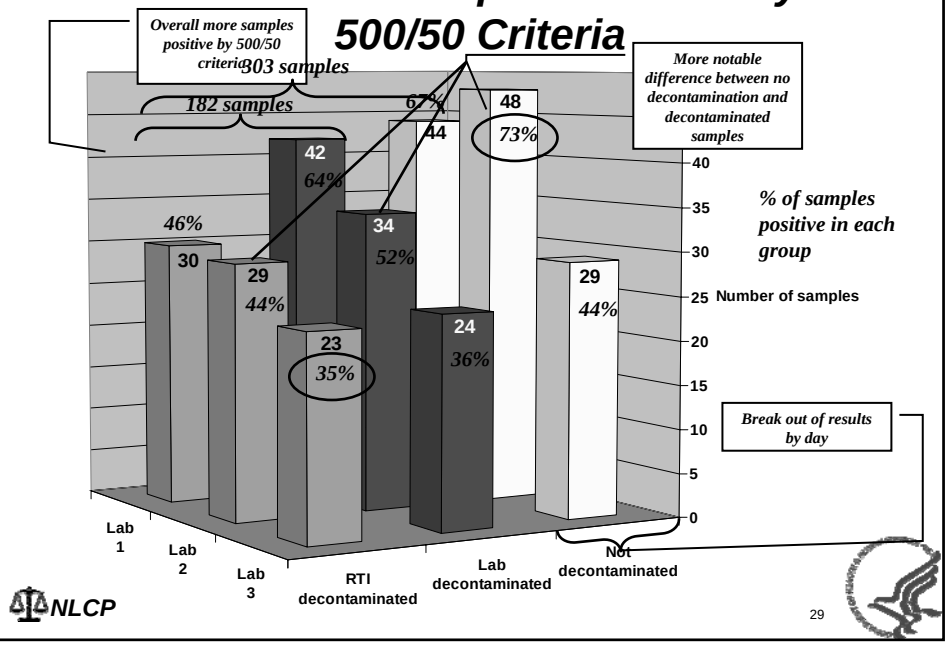
Distribution of Samples Positive by the 500/50 Criteria



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Distribution of Positives by 500/50 Criteria by Day x Lab x Hair Type Not Decontaminated

		Day													
Hair #	Lab #	C	AS	1	7	14	21	28	35	42	49	56	63	70	Grand Total
1	1	■	■	■	■	■	■	■	■	■					9
	2	■	■	■	■	■	■	■	■	■					9
	3			■	■	■	■	■	■	■					7
2	1	■	■	■	■	■	■								6
	2	■	■	■	■	■	■	■							7
	3			■	■	■	■								4
3	1	■	■	■		■	■	■	■	■					8
	2	■	■	■	■	■	■	■	■	■					9
	3			■	■	■			■	■					5
4	1	■	■	■	■	■	■	■	■	■	■	■	■		12
	2	■	■	■	■	■	■	■	■	■	■	■	■	■	13
	3	■		■	■	■	■		■	■					7
5	1	■	■	■		■	■	■	■	■		■			9
	2	■	■	■	■	■	■	■	■	■	■				10
	3			■	■	■	■		■	■					6

NLCP

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Distribution of Positives by 500/50 Criteria by Day x Lab x Hair type Lab Decontaminated

		Day													
Hair #	Lab #	C	AS	1	7	14	21	28	35	42	49	56	63	70	Grand Total
1	1	■	■	■	■	■	■	■	■						8
	2	■	■	■	■	■	■	■							7
	3		■	■		■	■		■						5
	1	■	■	■	■	■	■								6
2	2														0
	3	■	■	■		■									4
3	1		■	■		■	■	■	■	■					7
	2		■		■	■	■	■	■						6
	3				■	■	■								3
4	1	■	■	■	■	■	■	■	■	■	■	■	■		12
	2	■	■	■	■	■	■	■	■	■	■	■	■	■	13
	3	■	■	■		■				■	■	■	■	■	9
5	1	■	■	■		■	■	■	■	■		■			9
	2	■	■		■	■	■	■	■	■					8
	3	■	■			■									3

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Distribution of Positives by 500/50 Criteria by Day x Lab x Hair Type RTI Decontaminated

		Day													
Hair #	Lab #	C	AS	1	7	14	21	28	35	42	49	56	63	70	Grand Total
1	1		■	■	■	■	■	■							6
	2		■		■	■	■	■	■						6
	3		■	■	■	■		■	■						6
2	1		■			■									2
	2				■										1
	3					■									1
3	1		■	■	■	■	■	■							6
	2				■	■	■	■	■						5
	3		■			■		■							3
4	1		■	■		■	■	■	■	■	1	1	1		10
	2		■		■	■	■	■	■	■	1	1	1	1	11
	3		■		■	■		■	■	■		1			7
5	1		■	■		■	■	■		■					6
	2				■	■	■	■	■	■					6
	3		■			■	■	■	■	■					6

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Effect of "Wash Criterion" on Positive Results

- **All decontamination solutions were retained from 65 samples that were decontaminated at RTI**
  - **The final wash solutions were analyzed by GC/MS for COC, CE, NCOC and BE**
- **Applied as described by Cairns et al. 2004**
  - **[Concentration in hair] – 5 x [concentration in last wash]**
  - **This value compared to Proposed Federal Criteria**

Effect of "Wash Criterion" on Positive Results

Proposed Federal Criteria	# samples positive BEFORE "wash criterion"	# samples positive AFTER "wash criterion"
500/50/0.05	10	0
500/50	29	28

Conclusions

- External contamination of hair with powdered COC HCl resulted in the presence of COC, BE, CE, and to a lesser extent NCOC that was resistant to removal over 10 weeks of model hygienic treatment and laboratory decontamination.
- Contamination of the surface of hair may result in the incorporation of analytes into the hair without wetting the hair.
- Application of wash criteria in conjunction with metabolite ratios may distinguish external contamination.
  - Additional studies will be necessary to validate the effectiveness of wash criteria and ratios.

Conclusions

- Large variability in results from samples decontaminated by laboratories using different decontamination strategies suggests that reinstating the use of these strategies will increase the variability in the current pilot PT program.
  - Laboratory decontamination previously discontinued in the pilot PT program due to large variability in reported results.
- Analysis of the data suggests that the differences in positive rates between labs may be independent of decontamination strategy and laboratory decontamination method.
  - This may reflect differences in laboratory generation of BE during the analysis of hair samples

Conclusions

- **BE/COC increased over the 10 week study confounding the use of the proposed BE/COC ratio cutoff.**
- **The presence of trace quantities of CE and NCOC in the COC used in the study confounded the use of ratios, cutoffs, and other mathematical criteria to distinguish a contaminated sample.**
  - **Pharmaceutical cocaine used in the study had 0.6% CE as a byproduct of production.**
  - **Illicit cocaine may contain up to 2% CE and 5% NCOC.**

Conclusions

- **It will be difficult to develop hair PT samples that will demonstrate that all cocaine analytes applied to hair by dry transfer can be removed from hair by current decontamination procedures.**
- **No simple relation of concentrations of COC, BE, CE, or NCOC with total melanin suggesting that the *in vitro* binding and retention of drugs is a complex function of melanin and other hair components.**

Legal Cases/Precedents in Drug Testing

(Past 15 Months)

R. Thomas Chamberlain, J.D., Ph.D.

Consultant – Tampa, Florida

1

Topics

- Introduction
- *Frye*
- *Daubert*
- Expert Testimony
- Constitutional Issues
- Statutory Issues
- Employment Related Issues
- MRO
- Oral Fluid Testing
- Sweat Patch Testing
- Hair Testing

2

Introduction/Background

- Case law versus precedents
- Parental Rights and Probation
- Education/Sports and Employment
- Setting Policy and Following it
- Not Following Mandated Guidelines

3

Frye

Frye v. U.S., 293 F. 1013 (1923)

- Systolic BP deception test
- "Generally accepted" in the field in which it belongs

4

Daubert I

Daubert v. Merrell Dow Pharmaceuticals, 509 U.S. 579 (1993)

- *Daubert* challenges have mostly been overcome in challenging expert testimony
- *Daubert* only applies to the admissibility of evidence not the weight

5

Daubert II

- Key requirements
  - 1) Has underlying theory been tested ?
  - 2) Has theory been subjected to peer review or publication ?
  - 3) Has potential rate of error been tested ?
  - 4) Is theory generally accepted by scientific community ?

6

Expert Testimony I

Right to confront and cross examine
- Balancing act
- Affidavits – look at state law
- Hearsay exception – regularly conducted business records
- Non-testimonial evidence

7

Expert Testimony II

Rogers v State, 971 P2d 599 (Wy. Sup. Crt.) January 2006
- Positive drug test versus effects of drugs
- "Logically inseparable"

8

Constitutional Issues

Louis et al. v DOC Nebraska, (U.S. Crt. App.) February 2006
- Constitutional rights of prisoners/probationers narrowly construed
- Non-confirmed drug tests do not violate 'due process'

9

Statutory Issues

Welcher v American Ordnance, (Iowa App.) January 2006
- Federal statutes apply even though a state statute is contra

10

"Special Needs" Issues

- Courts continue to uphold 'special needs' interest that gets past search and seizure challenges (See *Commonwealth of Pennsylvania v. Beaman,* 880 A. 2d 578, (2005))
- 'special needs' not upheld in roadside checkpoints when sole purpose was to catch drug abusers (See *USA v. Scott,* US Crt App., Ninth Cir., 2005)

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Employment Cases I

Legg v Felington et al., (Sup. Crt. App. Of WV) October 2005

In the Matter of Roesch, (Sup. Crt. NJ, App. Div.) August 2006
- Courts reluctant to overturn agencies or commissions unless 'arbitrary, capricious and an abuse of discretion'

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Employment Cases II

- Refusal to test or 'shy bladder' usually upheld as a 'positive' (*Kwok v. NYC Transit Authority,* US Dist., SD NY, 2001 and *King v. NTSB,* US Crt App., Eighth Cir. 2004)

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MRO I

Drake v LabCorp, (U.S. Crt. App., 2nd Cir.) July 2006

- Negligence suits cropping up where MRO does not follow federal guidelines (labs also)

14

MRO II

Ithaca v Civil Svc Employee Assoc. (NYAD, 3 Dept.) January 2006

- Courts look at MRO much like a WCJ
- Usually do not overrule decision if it appears reasonable

15

MRO III

Shrout v TFE, (Ky. App. Crt.) July 2005

- Defamation suit when no second sample collected on a positive and MRO contacted employer

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Oral Fluid Testing

Oral fluid tests have come under scrutiny in at least one jurisdiction – Valparaiso, IN

- One judge has ordered urine tests to confirm oral fluid tests and another judge has ordered an evidentiary hearing

17

Sweat Patch Testing

U.S. v Stumpf, 54 F. Supp. 2d 972, (U.S. Dist. Crt.) March 2006

- Sweat patch testing was successfully upheld in a *Daubert* hearing

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Hair Testing I

Bass v FL Dept. Law Enforcement, Dec. 1993

U.S. v Bush, (USAF Crt. Crim. App.) June 2006

- Hair testing successfully met *Frye* and *Daubert* challenge

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Hair Testing II

State v Kite, (Kan. Crt. App.) August 2005

- Trial court decision reversed for not holding a *Frye* hearing

20

Hair Testing III

Nev. Employment Security Dept. v Holmes, 914 P2d 611 (Nev. Sup. Crt.) April 2006

In Re Adoption of Baby Boy L, (NY County Crt.) March 2006

- Upheld hair testing as a 'reliable scientific procedure'

21

Hair Testing IV

Coddington v Evanko, (U.S. Dist. Crt. Ala.) September, 2006 (dicta)

- Testing of hair less intrusive than urine
- Hair tests less likely to violate protections against search and seizure

22

Hair Testing V

Billingsley v LabCorp, (U.S. Dist. Crt., Ala.) March 2006

- Case pitting "urine-vs-hair-vs-accreditation"

23

Hair Testing VI

Tate v Freehart, (Crt. App., 6th Dist., CA) September 2006

Allen v DISA, (ED Louisiana) March 2006

- Hair testing thrown out when state statute required following DHHS guidelines

24

Hair Testing VII

Slaughter v Dodge, 107 P. 3d 1165 (Colo. App.) August 2006 (Dicta)

- That a positive hair test may not be indicative of a drug in one's system during work hours

25

Hair Testing VIII

Jones et al v City of Boston, in pleadings U.S. Dist. Crt.

- Case where civil rights are being brought up regarding hair testing of "police officers and applicants of color"
- Issues of civil rights and interpretation of hair testing results

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Hair Testing IX

Ohio v Shoemaker, (Ohio App., 3rd Dist.) October 2006

- Use of hair test to prove one had not taken prescription drugs for an extended time

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Summary

- Presentation provides an overview of drug testing cases over the past 15 months
- Conclusions purposely not drawn
- Editorial comment to cases or issues not provided

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