NEW ZEALAND
FOREST OWNERS ASSOCIATION

PLANTATION FORESTRY CODE OF PRACTICE
ELIMINATING DRUGS & ALCOHOL FROM THE WORKPLACE

Urine and oral fluid drug testing: similarities and differences
Position comparison: August 2008

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Urine
Urine is produced by the kidneys and mainly contains water, waste products from metabolism and electrolytes. Urine is a route for excretion of drugs and their metabolites.

Oral fluid
Liquid produced in the mouth predominately by the salivary glands. It mainly contains mucous and water but does also contain compounds such as drugs.

History

Urine	Oral fluid
▪ Is well studied, documented and used for last 30 years for workplace drug testing. ▪ Many peer reviewed publications have been taken into consideration in developing the "best practice" protocols in the AS/NZS standard and other international guidelines.	▪ New in workplace drug testing and research mainly in last 5-10 years. ▪ Major international studies (Rossita Studies) examined a variety of oral fluid devices and their ongoing findings are continuing to be released. The 2006 conclusion was that oral fluid screening devices were not robust enough yet to be used for workplace testing (particularly for the cannabinoid THC). This position has not changed.

Standards

Urine	Oral fluid
▪ Joint standard AS/NZS4308: 2008 “Procedures for specimen collection and the detection and quantitation of drugs of abuse in urine”. ▪ The drug classes covered are: Amphetamine-type substances Benzodiazepines Cannabis metabolites Cocaine metabolites Opiates Other drugs can be detected & reported ▪ AS/NZS 4308:2008 includes: 1. Scope & definitions 2. Specimen collection, storage, handling & dispatch 3. General laboratory requirements 4. Laboratory screening procedures 5. Laboratory confirmatory procedures 6. On-site screening procedures 7. Verification of performance of on-site devices ▪ Variations from AS/NZS 308:2001 – On-site drug screen option – Devices must be verified – Dilution tests mandatory at collection – Other integrity tests (for adulteration) recommended – Screen-only laboratory option – Accreditation of on-site screening agents – Party pills (BZP) included	▪ Australia Standard (only) AS4760: 2006 “Procedures for specimen collection & detection & quantitation of drugs in oral fluid”. ▪ The drug classes covered are: Amphetamine-type stimulants Cannabis Cocaine & metabolites Opiates ▪ AS 4706:2006 includes: 1. Scope & definitions 2. Collection, storage, handling & dispatch 3. On-site initial testing 4. Laboratory initial testing 5. Confirmatory testing procedures

Sample collection

Urine	Oral fluid
▪ Unwitnessed collection using trained (& certified) collectors, commonly in the health sector. Precautions are taken to minimise tampering or substitution. Separate bathroom facility and privacy to complete chain-of-custody documentation. ▪ Specimen is easy to obtain and split into two specimens. The 2nd referee ("B" specimen) is stored at the laboratory and available for reanalysis on request of the donor. ▪ Urine is a biological substance and appropriate health and safety precautions have to be followed.	▪ Witnessed collection using trained (& certified) collectors. Mouth cavity has to be checked for the presence of foreign substances. The donor should not have drunk fluid within 15 mins prior to collection. ▪ Variety of devices can be used for collection. The swab that absorbs oral fluid is preferred. Spitting into tube is not recommended. ▪ Research has shown that many collection devices are not suitable especially for cannabis testing as this drug is unstable in the devices. ▪ Collection requires a room for privacy. ▪ Two separate specimens must be collected for sending to the laboratory. ▪ Frequently the referee (or "B" sample) is hard to obtain especially if the person has a dry mouth. ▪ Many drug users will have problems even providing 1 specimen as certain drugs cause dry mouth. ▪ Using a substance to stimulate the saliva flow substantially dilutes the drug concentration in oral fluid thus skewing a result which may result in a false negative. ▪ Oral fluid is a biological substance and appropriate health and safety precautions have to be followed.

Drug detection time

Urine AS/NZS 4308 cut-off concentrations	**Oral fluid** AS 4760 target concentrations
Cannabis ▪ 8-24 hrs for casual use (< weekly). ▪ 5-10 days for daily user (1-2 cigarettes/day). ▪ 14-20 days after chronic use (>5 cannabis cigarettes/ day over a long period). Other drugs: 1-4 days	Cannabis ▪ "Minute-few hours", for cannabis. ▪ Currently available on-site screening devices will detect for less than 1hr after use. ▪ Some on-site devices will not detect THC at all as they have the wrong antibody. ▪ Screen target concentration (in laboratory): 1-2 hours. ▪ Confirmatory target concentrations: 2-6 hours. Amphetamines, cocaine, opiates: 12-24 hours

Testing

Urine	Oral fluid
▪ Laboratory AS/NZS 4308:2008 testing requires the laboratory(s) to be accredited to the standard. Testing involves screening by immunoassay and confirmation of any non negative screen results before reporting. The confirmatory methods must use gas chromatography/mass spectrometry or gas (or liquid) chromatography/mass spectrometry/mass spectrometry. ▪ AS/NZS 4308:2008 allows for specimens to be initially screened using on-site devices provided: – Devices have been verified by an accredited AS/NZS 4308 laboratory or its equivalent. – Collecting agency is accredited to conduct on-site tests to the AS/NZS 4308 requirements. – Collecting agent discloses to the client limitations of on-site screen devices (eg inability to detect BZP). – Positive & negative controls are conducted at each collecting site immediately prior to the testing on a given day and after every 25 screen tests conducted on the same day. – Controls are also conducted on each new lot number. – All specimens screening not negative are sent to the confirmatory laboratory and only reported after confirmation. – Collectors may request that the not negative specimen proceeds directly to confirmatory testing at the laboratory. – The collecting agency belongs to an external proficiency testing programmes. – The collecting agency has access to an expert analytical toxicologist. ▪ Detects either the parent drug(s) and/ or the metabolite(s) of the drug(s).	▪ Laboratory-based testing similar to urine testing, ie immunoassay screens followed by gas chromatography/mass spectrometry or gas (or liquid) chromatography/mass spectrometry/ mass spectrometry. ▪ AS4760 allows for on-site initial testing. However, to date no on-site testing devices can achieve the sensitivity required to detect the target concentration for cannabis as listed in the draft Australian Standard, ie 25 ng of THC per millilitre of oral fluid. ▪ Hence the majority of cannabis positives will be missed. ▪ The standard requires that: – Selection of a suitable collecting device be done in consultation with the accredited laboratory performing screening and confirmation tests. – Selection of suitable on-site initial testing devices should also be done in consultation with the accredited laboratory. – All screen positives are sent to the confirmatory laboratory and only reported after confirmation. ▪ Detects parent drugs and some metabolites.

Cannabis testing

Urine	Oral fluid
Tests for the presence of THC-Acid, the main product found in the urine after use of THC.	Tests for THC, the main active ingredient of cannabis. Results reflect residue in the mouth after smoking and not blood levels. Many of the "On Site" devices currently marketed in NZ have the wrong antibody for THC, ie they have the THC-Acid antibody. Hence they will not detect any cannabis use.

Cut-off concentrations versus target concentrations

Urine	Oral fluid
▪ Cut-off concentrations exist and are documented in the standard for both the screen and confirmatory tests. ▪ Reflect recent, relatively recent or regular use. ▪ The 2008 standard confirmatory cut-off levels for some amphetamines and benzodiazepines have been lowered. ▪ Benzylpiperazine (BZP or party pills) has been included in the 2008 standard and has a confirmatory cut-off of 500µg/L.	▪ Target/ nominated concentrations are in the standard. ▪ The initial test target concentrations reflect very recent use of a drug. For THC it is 25 ng/mL and this is too high to cover the time of chronic impairment after use of cannabis which is 4-6 hours (see detection times below). ▪ The standards committee recognised this inadequacy but were required to introduce a target concentration which on- site screening devices could conceivably meet. ▪ To date, no on-site test device is sensitive to meet the target concentration for sensitive enough to detect amphetamines, cocaine and opiates. ▪ The December 2007 employment court judgement in the MUNZ versus TLNZ case recognised this lack of sensitivity for THC and recommended that urine testing was still the most appropriate form of testing for cannabis. ▪ Laboratory based screening and confirmation (using the confirmatory target concentrations ie 10ng/ml for THC) allow for greater sensitivity. ▪ However the turnaround time for reporting results is 1-3 weeks and the cost is significantly higher than urine.

Specimen integrity interference (adulteration/substitution)

Urine	Oral fluid
▪ Possible, but the AS/NZS 4308:2008 requires that: – Collecting agents must conduct dilution tests and are advised to also conduct other specimen integrity tests. – Where specimen integrity is suspicious, the donor provides another specimen and both specimens are forwarded to the laboratory for further testing. – Laboratories must conduct dilution tests and should conduct other tests for specimen integrity (eg acids, alkalis, oxidants, other chemical). ▪ Substitution is harder to detect and is partially covered by monitoring temperature of freshly collected sample. ▪ Concentrations/ drug clearance can be affected by altering the urine pH. This will be detected in pH tests.	▪ Not studied, but substitution is probably harder especially if the mouth is checked prior to the witnessed collection. ▪ However, artificial oral fluid available in chemist shops. ▪ International guidelines exist for verifying the specimen although they were not included in the AS4760 standard. Contamination such as altering the acidity of the oral fluid by sucking on a lemon just prior to collection is also possible but not studied.

Disadvantages

Urine	Oral fluid
The concentration of the urine affects the results, ie the more water you drink, the more dilute the urine is and hence any drug levels are lower. There is no dose – concentration relationship.	▪ NZ Employment Courts have ruled that oral fluid testing is not sufficiently sensitive and reliable for workplace drug testing particularly for cannabis. ▪ Low volume collected, so retesting of primary specimen is often not possible. ▪ Target levels in the AS4760:2006 are a "first cut" and will need to change in the future as methods become more sensitive. ▪ Some laboratories will have problems in analysing specimens to the required levels. ▪ If oral fluid production is stimulated (and some products are available to do this) then the concentration of the drug is diluted and the results of drug tests are affected. ▪ There are problems with cannabis testing (details in previous sections). ▪ Cost of laboratory testing is are high and reporting times much longer than urine testing.

Advantages

Urine	Oral fluid
▪ NZ employment courts have accepted urine testing as reliable for workplace programmes. ▪ Used extensively, well studied. ▪ Indicates "risk factor" but not 'how much at risk" a person was at the time of collection. ▪ Used for pre-employment, random, reasonable cause, post-accident, post rehabilitation.	▪ Witnessed collection. ▪ A positive result indicates use within a short time prior to collection. Hence a strong indication that a person was at risk at the time of collection. However will not test long enough for THC to cover the risk period. ▪ Some drug levels (not cannabis), can be related to blood concentrations. ▪ Good when quick result is desired eg post-accident, reasonable cause but if an onsite screen is conducted it must also be followed up with full laboratory testing regardless of the results from the initial test. ▪ This is because of high rate of false negatives for cannabis. ▪ Not suitable for pre-employment or random testing.