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PDR
AC81-2

For: The Commissioners

From: Victor Stello, Jr.
Executive Director for Operations

Subject: PROPOSED RULEMAKING - FITNESS FOR DUTY PROGRAMS

Purpose: To obtain Commission approval to publish a proposed rule for comment.

Background: In a December 16, 1987, Staff Requirements Memorandum (SRM), the Commission requested the staff to prepare a SECY paper containing a proposed fitness for duty rule. The SRM indicated that the paper should address the need for random testing as well as alternatives to this form of testing. The guidance also noted that the proposed rule should (1) to the extent appropriate, not displace the good features of the industry's efforts, (2) address the "tracking" of personnel who have been discharged for drug-related reasons, and (3) establish uniform requirements for testing and collection of data.

Discussion: The staff's proposed rulemaking package is provided as Enclosure A to this paper. The following summary briefly describes the major elements of the proposed rule:

Scope: The proposed rule would apply to operating nuclear power plant personnel. Construction sites and other licensed activities (non-power reactors, fuel facilities, materials, etc.) are not addressed in the rule at this time. The Federal Register Notice (FRN) requests public comments on the extent to which fitness for duty requirements should be applied to these activities. The FRN especially requests comments on construction and pre-operational testing activities.

People Covered: At operating plants, the rule would apply to:

- All persons with unescorted access to protected areas.

- All licensee and contractor personnel required to respond to the licensee's Technical Support Center

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(TSC) or Emergency Operations Facility (EOF) in accordance with licensee emergency plan and procedures.

The rule would not apply to NRC employees, law enforcement officials, or emergency fire or medical personnel. The proposed rule states that NRC employees suspected of being unfit for duty are to be provided with escorted access and that the appropriate Regional Administrator is to be immediately notified.

Drug Testing: The proposed rule includes the following testing:

- For new employees and contractors, testing prior to the initial granting of unescorted access to protected areas or assignment to other activities within the scope of the proposed rule.

- For cause, and following some events (defined in the rule) caused by human performance failure.

- Follow-up testing for personnel returned to duties following a first case of involvement in drugs.

- Random testing at a rate equal to 125 percent of the work force subject to such testing within any 12-month period. While the level of testing exceeds that planned for the NRC staff, the 125 percent rate is consistent with that planned by the Department of Transportation for airline, railroad, and trucking activities. This rate would provide a high probability that about 75 percent of the workforce would be tested in a particular year.

In accordance with the Commission's guidance, staff reviewed alternatives to random testing as an essential element of fitness for duty programs, as well as alternatives to urine sampling as a method of testing. As described in the FRN (Enclosure A, pages 28-41), staff has concluded that (1) no other fitness for duty program elements provide the deterrence and detection features of random testing, and (2) there are currently no practical and effective alternatives to urine testing. If the Commission accepts the staff recommendation that some level of random testing is an important element of fitness for duty programs at operating nuclear power plants, then options exist for establishing the frequency or amount of testing. To date, staff has not identified any professional studies defining an optimum or minimum level of random testing which would significantly deter drug use and also provide a reasonable probability of detecting use.

Management Actions: The rule provides that any confirmed positive drug test will result in removal from activities within the scope of the proposed rule and denial of unescorted access to protected areas. Management is also expected to consider presumptive positive results of initial screening tests and determine if similar, but earlier, action is warranted. The person may be returned to duties following referral to an Employee Assistance Program and a determination (by both management and medical officials) of fitness. The person would be subjected to a special schedule of follow-up testing on a random basis.

A second confirmed positive test result would require that the person be removed from activities within the scope of the proposed rule and denied unescorted access to protected areas for a minimum of three years. The proposed rule does not speak to discharge or termination of employment.

Alternatively, the Commission could adopt a policy in which persons would be permanently removed from nuclear activities within the protected area following the first confirmed positive drug test. Staff believes that a policy which provides one chance for rehabilitation of offsite drug users represents a reasonable and suitably conservative approach.

The first incidence of the sale, use, or possession of drugs within protected areas onsite would result in the removal from activities within the scope of the proposed rule and denied unescorted access to protected areas for a minimum of five years. The proposed rule does not specifically address the offsite sale or possession of drugs, since that conduct does not represent evidence of actual use. Staff assumes that licensees who become aware of these activities will utilize for-cause testing and the provisions of their access authorization policy in making decisions in these cases.

Tracking of Personnel: The Commission requested that the proposed rule address the "tracking" of personnel who have been discharged for drug-related reasons. The staff has addressed this by including the following provision:

"Prior to the initial granting of unescorted access to a protected area or the assignment to activities within the scope of this part to any person, the licensee shall complete a suitable inquiry to determine if that person was, in the past, removed from such activities or denied unescorted access at any other nuclear power plant in accordance with a fitness for duty policy. If such a record

is established, the new assignment to activities within the scope of this part or granting of unescorted access must be based upon a management and medical determinat of fitness for duty and the establishment of an ap ate follow-up testing program,..." Assignment to ac es covered by the scope of this rule cannot be made for three years following removal for two confirmed positive test results, and for five years for any past onsite involvement with drugs.

This inquiry would be conducted in conjunction with the background checks which are conducted as part of the access authorization program (53 FR 7534).

Testing Standards: The proposed rule requires that urine sample collection procedures and laboratories used to confirm initial screening tests meet the "Scientific and Technical Guidelines for Federal Drug Testing Programs" developed by the Department of Health and Human Services (HHS). Laboratories used for initial screening tests (often located onsite) would not have to meet these standards.

Cutoff levels for screening and confirmation tests would conform to the proposed HHS standards except in two cases. The rationale for these exceptions is provided in the FRN (Enclosure A, pages 52 and 53).

Employee Assistance Programs: The proposed rule requires that EAPs be established and that persons found to be unfit for duty (for example, a positive drug test) be referred to an employee assistance program prior to being returned to duties. As an option, the Commission may determine that the EAPs should not be mandated by Federal regulations. Nuclear safety would be served by assurances that persons unfit for duty are removed from nuclear safety activities until a medical and management determination is made that they are fit to return. On the other hand, a Federal rule requiring drug testing and sanctions for drug use should perhaps also include provisions for employees to receive assistance with fitness problems.

Other Program Elements: The proposed rule also includes general performance objectives similar to those contained in the Commission's present Policy Statement, as well as requirements for:

- The establishment of written policy and procedures.

- Training for supervisors and employees.

- Contractor programs.

- Provisions for employee appeals and the protection of personal information.

Program Elements Not Included: The proposed rule does not: (a) apply to individuals who perform work while escorted, (b) apply to individuals who perform engineering or quality assurance work outside protected areas, (c) include provisions for licensee audits of program effectiveness, (d) include the collection of program performance data (for example, statistics on test results), or (e) include requirements for additional reporting of fitness for duty cases to NRC. The FRN includes a request for comments on the need to include requirements in these areas.

The Nuclear Utility Management and Resources Council (NUMARC) briefed the staff on the actions they are taking to achieve greater industry uniformity subsequent to the Commission briefing on December 1, 1987. The NUMARC working group on fitness for duty is developing a supplement to the EEI Guidelines which will address such matters as testing cutoff levels and management actions to be taken in fitness for duty cases. The staff also met with representatives of four unions[1] so that they could convey their concepts on an effective approach that could be taken by the Commission. The unions expressed concern with any requirement which would include random testing. The content of both of these dialogues was considered by the staff during the development of the proposed rule.

The Office of the General Counsel has no objection to the publication of the proposed rule for comment. There are, however, several areas of legal uncertainty that should be further considered before a final rule is promulgated. OGC anticipates that most, if not all, of the significant legal issues will be raised in public comments, and will be addressed in the staff's response. As the Commission is aware, there are several cases in federal courts dealing with drug testing issues. The Supreme Court has already agreed to address some of the issues. It is unlikely that a ruling by the Supreme Court will be available before June 1989.

[1]The four unions were: The International Brotherhood of Electrical Workers, The International Union of Operational Engineers, the Oil, Chemical and Atomic Workers Union, and the Building and Construction Trades Department of the AFL-CIO.

Recommendations: That the Commission:

1. Approve publication of the proposed rule as set forth in the FRN, that would add a new Part 26 to require a licensee authorized to operate a nuclear power reactor to implement a fitness for duty program (Enclosure A).

   Certify, in order to satisfy the requirements of the Regulatory Flexibility Act, 5 U.S.C. 605(b), that this rule, if promulgated, will not have a significant economic impact on a substantial number of small entities. This certification is included in the enclosed FRN.

3. Note:

   a. That the notice of proposed rulemaking in Enclosure "A" will be published in the Federal Register allowing 120 days for public comment.

   b. That, in accordance with 10 CFR Part 51, the staff has prepared an environmental assessment and a finding of no significant impact which is included in the FRN. The proposed rule is insignificant from the standpoint of environmental impact.

   c. This proposed rule contains information collection requirements that are subject to review by the Office of Management and Budget. Upon Commission affirmation, formal request for OMB review and clearance will be initiated. OMB review may take 60-90 days from the date of publication in the Federal Register. Therefore, such requirements will be made effective only after that period. If approval is denied by OMB, the Commission will be notified.

d. That a public announcement will be issued (Enclosure C).

e. That the Subcommittee on Nuclear Regulation of the Senate Committee on Environment and Public Works, the Subcommittee on Energy and Power of the House Committee on Energy and Commerce, and the Subcommittee on Energy and the Environment of the House Committee on Interior and Insular Affairs will be informed (Enclosure D).

f. That ARM will send copies of the proposed rule to all affected licensees and other interested persons following Commission approval for publication of the proposed rule.

g. That the Chief Counsel for Advocacy of the Small Business Administration will be informed of the certification and the reasons for it as required by the Regulatory Flexibility Act.

Scheduling: Recommend affirmation at an open meeting.

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for Operations

Enclosures:
A - Notice of Proposed Rulemaking
B - Regulatory Analysis
C - Draft Public Announcement
D - Draft Congressional Letter

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*SEE PREVIOUS CONCURRENCES

OFC	:RSGB:DRIS:NRR	:RSGB:DRIS:NRR	:DD:DRIS:NRR	:D:DRIS:NRR	:A/ADT	:D:NRR
NAME	:LBush:mkm*	:RAErickson*	:BKGrimes*	:JGPartlow*	:TTMartin	:TEMurley
DATE	:3/18/88	:3/18/88	:3/18/88	:3/18/88	:3/ /88	:3/ /88

OFC	:NMSS	:OGC	:RES	:CRGR	:EDO	:EDO
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NUCLEAR REGULATORY COMMISSION

10 CFR Part 26

Fitness For Duty Program

AGENCY: Nuclear Regulatory Commission.

ACTION: Proposed rule.

SUMMARY: The Commission is proposing to create a new part to its regulations to require licensees authorized to operate nuclear power reactors to implement a fitness for duty program the general objective of which is to provide reasonable assurance that activities associated with nuclear power plant operations are carried out in an environment which is free of the effects of alcohol and drug abuse. The rule would, with limited exceptions, apply to all individuals granted unescorted access to protected areas, and to any licensee or contractor personnel required to respond to the licensee's Technical Support Center (TSC) or Emergency Operations Facility (EOF) in accordance with licensee emergency plans and procedures. Under the proposed rule, testing for impermissible drug use would be conducted prior to authorizing unescorted access to protected areas or assignment to other activities within the scope of the proposed rule, randomly for such licensee and contractor personnel, after certain operational events, based on reasonable cause, and to verify continued abstention. In addition, the proposed rule provides for other basic fitness for duty program elements such as the development of written policy and procedures, provisions for the training of supervisors and employees, standards for drug testing, management actions, and requirements for employee assistance programs and appeal procedures.

DATES: Comments should be submitted by (120 days after publication). Comments received after this date will be considered if it is practical to do so, but assurance of consideration cannot be given except as to comments received on or before this date.

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ADDRESSES: Comments should be sent to: Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555, ATTN: Docketing and Service Branch. Hand deliver comments to: Room 1121, 1717 H Street NW., Washington, DC between 7:30 a.m. and 4:15 p.m.

FOR FURYHER INFORMATION CONTACT: Loren Bush, Reactor Safeguards Branch, Division of Reactor Inspection and Safeguards, Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission, Washington, DC 20555, Telephone: (301) 492-0944.

SUPPLEMENTARY INFORMATION:

Background

On August 5, 1982, the Commission published for comment a proposed rule to require licensees to develop and implement written procedures concerning fitness for duty (47 FR 33980). Seventy-three responses containing 310 comments were received and considered during the Commission deliberations on the proposed rule (51 FR 27872). Subsequently, in recognition of initiatives and commitments made by the industry to develop and self-manage fitness for duty programs, the Commission decided to defer implementation of the rule, to issue a policy statement to further encourage such self-improvement (51 FR 27921), and to reconsider the need for rulemaking after evaluating the experience gained under the industry program. The Commission's Policy Statement on Fitness for Duty of Nuclear Power Plant Personnel was published in the Federal Register on August 4, 1986 (51 FR 27921). Ten respondents commented on the policy statement (SECY-87-64). On December 1, 1987 the Commission was briefed by the Nuclear Utility Management and Resources Council (NUMARC) and the NRC staff on the experience gained to date and on the status of implementation of the Commission's fitness for duty policy statement.

Discussion

The Commission recognizes and appreciates the significant efforts already undertaken by NUMARC, the Institute of Nuclear Power Operations (INPO), the

Edison Electric Institute (EEI), and each nuclear power reactor licensee in developing and implementing fitness for duty programs for nuclear power plant personnel. Much progress has been made through the industry efforts in achieving an environment in which nuclear power plant operations are free of the effects of alcohol and drugs. Nevertheless, the Commission's evaluation of experience gained in the 18 months since the policy statement became effective indicates that rulemaking is now appropriate to achieve further improvements through the establishment of requirements for random drug testing and the imposition of uniform industry standards in matters such as the testing cutoff levels used to determine drug use and the actions to be taken by licensees when persons are determined to be unfit for duty.

The proposed rule takes into account the many positive aspects of existing industry programs while providing for more uniform program standards, with due regard to both public and worker safety and the rights of individuals. In developing this proposed rule, the NRC staff considered public comments received in response to the 1982 proposed rulemaking and the 1986 policy statement. The staff also considered industry experience reported to the Commission, together with lessons learned by the staff in evaluating the effectiveness of utility fitness for duty programs, from assessing reported drug related incidents, and from similar rules being developed by other Government agencies.

The Commission also considered whether the proposed rule should be applicable to persons having access to information requiring protection, such as national security information, safeguards information, or proprietary information. The Commission believes that determinations of eligibility for access to protected information based on the current 10 CFR Part 10, or the proposed Nuclear Power Plant Access Authorization Program policy statement published on March 9, 1988 (53 FR 7534), will provide a suitable mechanism to protect that information from those individuals whose trustworthiness may be in question.

In considering the minimum requirements of this proposed rule, the Commission has decided to require certain programs that could be viewed as rightfully being left to the discretion of licensee management in structuring their programs to meet fitness for duty objectives, dealing with employees, and in

establishing their benefits. For example, the Commission proposes to require that licensees maintain Employee Assistance Programs and that individuals be trained in the health hazards of drug and alcohol abuse. The Commission seeks comments as to whether these program elements should be in the rule or included as recommendations in implementing guidance.

In addition, the Commission has preliminarily decided not to include several matters in the rule. These matters are summarized in Appendix A to this Federal Register Notice. The Commission seeks comments as to whether these matters need to be added to the rule or included as recommendations in implementing guidance. In this regard, Public Citizen (a public interest group) submitted a letter on June 4, 1987, petitioning the Commission to amend its regulations to require licensees to report: (1) all instances of drug and alcohol use by personnel while on duty, (2) the details of fitness for duty programs, (3) the results of rehabilitation programs, and (4) the results of drug testing programs. This letter was not noticed due to the moratorium on rulemaking on fitness for duty established by the Commission's Policy Statement (51 FR 27921). However, NRC staff communicated with Public Citizen and informed them of the Commission's intent to address the issues raised. The Commission will address this request in conjunction with its consideration of public comments provided in response to this proposed rule.

The Commission also seeks comments on the following:

1. What practical alternatives to random testing, not discussed herein, exist that provide equivalent deterrence and detection of drug use?

2. What rate of random testing provides an acceptable probability of detection and adequate deterrence? What should be the basis for any future modifications in the rate for random testing?

3. Are the cutoff levels proposed for initial screening tests and confirmatory tests appropriate? Is a cutoff level for alcohol of 0.05 percent blood alcohol appropriate?

4. Are there any additional quality control measures or appeal procedures that should be considered to protect the rights of individuals being tested?

5. How long should a person be barred from performing activities within the scope of the proposed rule following removal under the fitness for duty policy, and under what circumstances should reinstatement be allowed? How long should records of this removal be retained to facilitate future employment decisions?

6. Finally, the Commission is especially interested in receiving comments on the extent to which NRC regulations on fitness for duty should address other regulated activities not currently within the scope of this proposed rule. Regulated activities being considered for rulemaking or a Commission statement of policy include:

   - The construction and pre-operational testing of nuclear power plants prior to the issuance of a license and the loading of nuclear fuel.

   - The operation of non-power reactors used in academic, research, and commercial applications.

   - Fuel cycle facilities involved in the possession and processing of plutonium or uranium in highly enriched, low enriched, or natural uranium forms.

   - The utilization of nuclear materials in other activities such as radiography, product irradiation, radiopharmaceutical production, nuclear medicine, uranium milling activities, production and use of various sources, and radioactive waste disposal activities.

While fully supportive of programs to address the national problems of drug and alcohol abuse and to provide for the health and safety of individual workers, the Commission's policy on the regulation of fitness for duty programs for persons involved in the above activities will primarily be based upon considerations for the safety of the public and fellow workers. The Commission

does not intend to impose unnecessary additional requirements in those work situations where the effects of drug or alcohol abuse will have little public safety impact. If sufficient controls in the form of designed safety margins, automatic safety systems, inspection, or tests already provide reasonable assurance that individual human failures in performance caused by the effects of drugs or alcohol will not pose a threat to safety, then the additional burdens of required fitness for duty programs need not be imposed.

In the matter of requirements for fitness for duty programs at nuclear power plants undergoing construction and pre-operational testing, the Commission requests views on: (1) the relative safety significance of the wide variety of specific construction steps and crafts involved, (2) the extent to which the controls described above do or do not tend to provide adequate identification or mitigation of individual failures in performance in these areas and, accordingly, (3) the nature and extent of any fitness for duty program elements which should be applied to these activities. An example might be the welding of reactor primary system boundaries, structures and supports, and safety related systems, as opposed to balance of plant welding.

Options Considered

In developing this proposed rule, various options were considered covering the following subjects:

I. Impairment and reliability.

The use of alcohol and drugs can directly impair job performance. The effects of alcohol, which is a drug, are well known and documented, and therefore, are not repeated here. Drugs such as marijuana, sedatives, hallucinogens, and high doses of stimulants could adversely affect an employee's ability to correctly judge situations and make decisions (NUREG/CR-3196, "Drug and Alcohol Abuse: The Bases for Employee Assistance Programs in the Nuclear Industry") available from the National Technical Information Service. The greatest impairment occurs shortly after use or abuse, and the negative short-term effects on human

performance (including subtle or marginal impairments that are difficult for a supervisor to detect) can last for several hours or days.

The problem with determining impairment is that there are many degrees of physical and mental impairment, some of which cannot be detected by current methods. Furthermore, a positive urine test does not establish that an individual is currently subject to any physiological or psychological effects of a drug. The most direct measurements of current impairment are obtained from tests of fluid in brain tissue, followed by tests of blood serum. Although a positive urine test may not indicate current impairment, it can provide a reasonable belief and conclusion that the person was, or will at some point be, impaired or marginally impaired.

For these reasons, the actions taken by employers in response to drug use are typically based on "reliability" determinations, rather than observable evidence of impairment. Use, sale, or possession of illegal drugs, whether on or off the job, raises doubt about the general reliability of the individual to properly perform activities that require scrupulous adherence to rules and procedures. Similar doubts can be raised about individuals who use or possess alcohol on the job in violation of company policy. In addition, it would be difficult to establish impairment as the basis for action where use has not occurred, e.g., for possession or sale of drugs.

The question of reliability is, however, based upon a well-founded assumption that the use of the drug or alcohol results in impaired motor and mental functioning. The assumption that the use of illicit drugs and the misuse of alcohol can cause significant on-the-job impairment is well-founded in the scientific literature. The following provides a summary of the research literature on drug use and impairment for the five drug types for which random drug testing is required (marijuana, cocaine, opiates, phencyclidine, and amphetamines).

A. Marijuana

1. Background.

Frequent smoking of marijuana is associated with a decline in social, mental, and perceptual skills. Marijuana intoxication impairs motor vehicle driving skills such as motor coordination, eye tracking skills, and perceptual functions (Schwarz and Hawks, 1985). Marijuana intoxication impairs sensory/perceptual performance such as hearing and vision (Murray, 1986). Marijuana intoxication can shorten attention span, impair motor skills, decrease manual dexterity, and impair motor steadiness (Murray, 1986; NUREG/CR-3196, 1983).

Marijuana intoxication impairs cognitive and performance tasks (Fehr and Kalant, 1983). Studies have shown forms of cognitive impairment such as interference with learning, impaired numerical reasoning, and interference with the transfer of information from short-term to long-term memory and susceptibility to distraction or stress (Murray, 1986; NUREG/CR-3196, 1983). The larger the dose, the greater the perceived subjective effect of a "high" and physiologic indexes, such as increased heart rate (Blum, 1984). Research has clearly demonstrated that the degree of impairment in individual subjects is dose related, i.e., the greater the dose, the greater the degree of impairment (Chesher, 1986).

There are significant differences between casual and heavy users of marijuana. In one study, casual users of marijuana made five times as many errors on a divided-attention task when they were smoking an ad libitum dose of marijuana as they did when they were smoking the placebo. Heavy users did not show any increase of errors in the ad libitum dose condition. A similar study comparing casual and heavy users showed that heavy users displayed more hostility, poorer work adjustment, and worse interpersonal relations than did the casual users. (Murray, 1986).

The effects of marijuana intoxication on social interaction varies. Some subjects become withdrawn; other subjects more aggressive. Marijuana intoxication generally affects social behavior and interaction in a variety of measurable forms, a fact with some implications for crew as well as individual

performance.

The effects of marijuana intoxication on vehicle driving performance demonstrated that those who were intoxicated had worse composite driving performance than those who were not intoxicated. The study also showed that even small doses of marijuana impaired driving ability (Klonoff, 1974; Fehr and Kalant, 1983).

The effects of marijuana on aircraft pilot performance showed that marijuana can produce residual behavioral effects 24 hours after ingestion. Simple performance measures returned within baseline levels in a relatively short time; highly complex skilled performance aspects of the task showed deficits 24 hours after ingestion (Yesavage et al., 1985; Walsh, 1987). Hangover effects of marijuana induce significant residual subjective and behavioral effects at least nine hours after smoking (i.e., the next morning) (Chait et al., 1985; Walsh, 1987).

Relatively low amounts of marijuana combined with alcohol can have serious disruptive effects on performance (Sutton, 1983; Ross and Ross, 1985). On some tasks, the effects of combined alcohol and marijuana have shown an antagonistic or less than additive reaction between the two drugs. Low doses of marijuana combined with alcohol produced an antagonistic effect; high doses of marijuana combined with alcohol produced additive effects. The effects produced by these drugs singularly and in combination produce qualitatively and quantitatively different effects (Chesher, 1986). Another study concluded that both marijuana and alcohol had significant effects on driving performance, and the effects were particularly detrimental when both drugs were combined. Marijuana effects were more rapid than those of alcohol and somewhat less severe for most tasks (Peck et al., 1986).

Combining alcohol with marijuana can significantly impair cognitive and task performance. Studies of airplane pilot performance in simulated flight demonstrated that pilots made significant major errors (becoming lost or stalling) and minor errors (altitude and heading deviations) in performance, even though they knew they were under the influence of marijuana and attempted to compensate for the effects (Janowsky et al., 1976; Ross and Ross, 1985). Similar driving simulator studies showed major performance decrements (ability

to maneuver, negotiate curves, following another car, passing a car, etc.) (Smiley et al., 1981; Moskowitz, 1985). Performance decrements are also noted for handsteadiness, execution of movements, and body sway (Moskowitz, 1985). A battery of cognitive tests also revealed performance decrements that were additive when marijuana and alcohol were combined (Chesher, 1986).

Based on a variety of actual and simulated driving performance under the influence of marijuana, the study notes that subjects intoxicated on marijuana appeared to realize that they were impaired and compensated for this impairment on task performance whenever they could. Such compensation is obviously not possible in unpredictable or emergency situations (Smiley, 1986).

One study notes that when the subject is intoxicated due to marijuana, even though the subjective feeling of being "high" may no longer be present, performance decrements may still exist, possibly lasting several hours. Thus an operator may be impaired without realizing that his or her performance is still being affected by marijuana intoxication (Blum, 1984).

Factors such as dosage, degree of impairment, and age and experience of the operator must be considered when generalizing from clinical results to work settings. (Fehr and Kalant, 1983). Other factors for consideration include the type of task to be performed and the environment in which it is performed.

Studies of the long-term or chronic effects of marijuana use on behavior are sparse. However, one study notes that heavy chronic cannabis users exhibit behavior labeled as "amotivational syndrome". Characteristics of amotivational syndrome include apathy, reduce drive and ambition, impaired ability to carry out complex tasks, failure to pursue long-term plans, reduced tolerance to frustration, diminished communication skills, neglect of personal appearance, and sluggish mental responses. These characteristics are not specific to chronic cannabis use; they are found with a number of psychoactive drugs, primarily those of a sedative-hypnotic nature. These characteristics of chronic cannabis use may be more appropriately labeled "chronic cannabis intoxication" (Fehr and Kalant, 1983).

Lasting effects of marijuana use may impair the transfer of new information into long-term memory storage (Fehr and Kalant, 1983). There is increasing evidence that long-term, chronic use of marijuana may lead to adverse health effects in the individual (Cohen, 1986). However, empirical evidence linking the effects of chronic use to decreased performance is not as well developed as are the acute effects of recent use or intoxication. Marijuana can induce acute memory impairment which directly affects learning through a dysfunction of normal storage and retrieval mechanisms (See discussion, Walsh, 1987).

2. Physical Signs of Abuse.

Symptoms of marijuana drug use are chronic fatigue and lethargy, chronic dry irritating cough, chronic sore throat, chronic conjunctivitis (red eyes), or dilated pupils (Blum, 1984).

3. Tolerance and Withdrawal.

Tolerance to cannabis is complex. It is known that tolerance to tetrahydrocannabinol (THC) develops with prolonged use. Novice users have a moderate degree of tolerance which actually decreases with repeated use. Tolerance then increases with heavy use. There is no definitive evidence that chronic users require increasing amount of THC to maintain the same effects. Experienced users do withstand higher doses than novices, though, and it is evident that chronic marijuana users develop tolerance to the effects of THC (Agurell and Hollister, 1986; Blum, 1984).

Withdrawal symptoms after marijuana intoxication are mild, such as lassitude or mild headache. Withdrawal symptoms after chronic marijuana use is halted (e.g., headaches, stomach cramps, feelings of lassitude) are attributed to psychological dependence (Murray, 1986).

4. Discussion.

The studies to date have focused upon the observable short-term effects of marijuana intoxication. These studies of marijuana intoxication show

significant effects on cognitive and physical task performance. The findings are not entirely conclusive; there are inconsistencies, for instance, on the findings regarding memory and learning. This is attributed to the methodology of the studies as well as the unique characteristics of cannabis, which is a complex psychoactive substance. The majority of studies suggest, however, that the more complex a physical, cognitive, or behavioral task becomes, the greater the likelihood that detectable marijuana intoxication will significantly affect or impair performance. Certainly, the performance of both routine and emergency-related tasks in a nuclear power plant would usually qualify as complex.

Long-term studies of chronic marijuana use are less conclusive. This is attributed to the general inadequacy of reported data in clinical studies; poor sample size; and a lack of adequate differentiation between intoxication, withdrawal, and residual change. There is also an absence of before-and-after longitudinal studies of regular users (Fehr and Kalant, 1983). Evidence is accumulating that marijuana may also have long-term health effects which directly affect performance, such as impaired memory (Murray, 1986). Long-term adverse health effects due to chronic use such as physiological damage are increasingly evident (Cohen, 1986).

Cultural and socioeconomic factors may influence the definition and identification of adverse effects, especially those related to complex emotional or cognitive functions (Fehr and Kalant, 1983). For example, impaired cognitive and task performance due to marijuana intoxication is more likely to be recognized in a control room operator than a janitorial worker.

Cannabis use is usually combined with tobacco and alcohol, and less frequently with cocaine, phencyclidine (PCP), and other drugs. When combined with other drugs, the effects of cannabis on the user can be influenced by the other drugs; cannabis can also affect the reaction of other drugs in the system (Fehr and Kalant, 1983).

Marijuana is known to impair human intellectual judgment, short-term memory, and psychomotor function, e.g., driving an automobile (Murray, 1986). Research

of the complex psychoactive and behavioral effects of marijuana has somewhat limited and qualified conclusions. It is known, however, that marijuana can significantly impair performance during intoxication. Impairment due to hangover effects, chronic use, and withdrawal are also possible.

B. Cocaine

1. Background.

Cocaine is a central nervous system (CNS) stimulant. Cocaine has many behavioral and pharmacological properties which are similar to amphetamines (Fischman, NIDA Research Monograph #50, 1984). Cocaine primarily affects brain functions. Cocaine can induce feelings of euphoria, relieve fatigue and boredom, and produce effects which are similar to local anesthetics (Washton and Gold, 1987). Given cocaine's recent arrival as a major drug of abuse, cocaine psychopharmacology and studies of the general behavioral effects of its consumption by human beings are not as well developed as studies of other drugs of abuse (Jones, NIDA Research Monograph #50, 1984). Methods of consumption and amounts of dosage vary widely. Cocaine consumption has risen dramatically in the United States throughout the 1980s. Cocaine is listed as second among the top 20 controlled substances in 1980, or a percentage increase of 253 percent for emergency room mentions in a 6-year period (Frank, 1987). Cocaine is a powerful drug; single doses have been known to induce seizures (Washton and Gold, 1987).

2. Effects on Performance.

The primary physiological effects of cocaine are cardiovascular: heart rate, blood pressure, and body temperature are significantly raised following ingestion (Byck, 1987). The effects caused by cocaine are relatively short in duration. Cocaine heightens mental stimulation (Jones, NIDA Research Monograph #50, 1984). Many cocaine users believe that cognitive and task performance is heightened under the influence of cocaine. Studies do not support this contention (Fischman, NIDA Research Monograph #50, 1984). Subjective mood profiles of subjects under the influence of cocaine revealed heightened

confusion; anxiety; friendliness; vigor; elation; arousal; and positive mood, i.e., moods characteristic of stimulant or amphetamine use (Fischman, NIDA Research Monograph #50, 1984).

Cocaine intoxication dramatically affects vision. Studies demonstrated that vision is impaired during cocaine intoxication, e.g., subjects reported increased sensitivity to light, halos around bright objects, and difficulty focusing the eyes (Siegel, 1987). During one study which measured driving performance of subjects while intoxicated on cocaine, 100 percent of the subjects reported lapses of attention while driving and ignoring relevant stimuli such as changes in traffic signals (Siegel, 1987). Cocaine can increase irritability, hyperexcitability and startle responses (Davis, 1985; Seigel, 1987). Sudden sounds such as horns or sirens caused violent responses in intoxicated subjects, (i.e., rapid steering or braking effects while driving an automobile).

Studies have demonstrated that cocaine intoxication interferes with tasks involving the acquisition of new behavior patterns which require learning; cocaine intoxication causes performance decrements in the acquisition of new behavior patterns (Fischman, NIDA Research Monograph #50, 1984). Impairment in learning has been evidenced in the first 10-15 minutes after intravenous administration of cocaine; these effects are seen only in the short-term immediately after administration (Fischman 1984; Walsh, 1987).

The belief that cocaine enhances work performance because Inca Indian workers chewed coca leaves and supposedly worked harder is not supported by recent research. The subjective perception of working harder is present, yet there is no measurable improvement in performance (Fischman, NIDA Research Monograph #50, 1984). Keep in mind that current routes of administration (intravenous, nasal, smoked) and dose concentrations are much more intense in effects than chewing coca leaves and may preclude an accurate comparison other than anecdotal observations.

Tests which measured subjects' hand-grip strength and reaction time under the influence of cocaine showed no significant enhancement or decrement in performance (Fischman, NIDA Research Monograph #50, 1984).

Substantial data do exist that demonstrate cocaine's similarities to amphetamines in that performance in non-sleep deprived subjects is neither enhanced nor impaired with normal dosages; these drugs are effective, however, in returning sleep-deprived subjects to pre-deprivation performance levels. For example, inhalation of up to 96 mg of cocaine allowed a sleep-deprived subject to return to pre-deprivation performance levels (Fischman, NIDA Research Monograph #50, 1984).

Cocaine is often used with other drugs such as alcohol, opiates, or CNS depressants. Polydrug use with cocaine can affect complex performance; however, specific performance effects have not been adequately studied (Byck, 1987). Cocaine use with alcohol may mask alcohol's effects, i.e., a person may feel sober and alert under the influence of cocaine and alcohol though he or she may be significantly impaired (Stone, et al., 1984; Seigel, 1987).

Depression is symptomatic of withdrawal or abstinence from cocaine abuse. This is coupled with irritability, anxiety, hypersomnolence, episodic unconsciousness, and attentional dysfunction and ataxia during the initial phase. Cocaine smokers in one study reported impaired driving during this time; several were involved in separate collisions resulting in major injuries (Gawin and Kleber, 1986; Siegel, 1987).

3. Physical Signs of Abuse.

Psychological and behavioral symptoms of cocaine abuse are marked by irritability, decreased or dysfunctional attention, restlessness, hypervigilance, paranoia, and hallucinations (Siegel, 1987). Chronic or habitual use produces unacceptable irritability, paranoid and delusional thinking, and other unpleasant effects (Jones, NIDA Research Monograph #50, 1984). Cocaine psychosis may occur with prolonged high-dose cocaine use (Fischman, NIDA Research Monograph #50, 1984).

Acute physical symptoms of cocaine use include increased blood pressure and heart rate, hypertension, blurred vision, increased muscle tension, tremors, palpitations, slurred speech, dysarthria, thirst, anorexia, mydrisis, increased body temperature with sweating, headaches, dizziness, nausea, and diarrhea (Siegel, 1987).

4. Tolerance and Withdrawal.

Tolerance develops quickly in cocaine users. The effects on the central nervous system which are sought for the cocaine "high" are rapidly lessened in frequent or regular cocaine users (Washton and Gold, 1987). In a recent study, the subjective euphoric effect increased in intensity to a peak one hour after intravenous cocaine injection, then declined toward the baseline at four hours despite the presence of constant plasma cocaine levels. This rapid tolerance development is acute in persons who use cocaine on a regular basis. Tolerance development is quantified as an exponential process based on the findings of the study (Ambre et al., 1988). This acute tolerance development accounts for the progressive alteration of the cocaine concentration/effect relationship in individuals (Ambre et al., 1988).

Symptoms of withdrawal from cocaine can occur even with relatively high doses of cocaine still present in the user's system. Due to acute tolerance development, increasing the frequency or size of the doses fails to produce the desired effects. The euphoric effects are consistently replaced by dysphoria and global sensations of "feeling bad" (Ambre et al., 1988).

Withdrawal following complete cessation of cocaine use is marked by disturbance and changes in sleep patterns. One study suggests that these changes are inadequately explained by the term "psychological dependence" (Jones, NIDA Research Monograph #50, 1984). These withdrawal symptoms pose a strong negative incentive that makes it very difficult to quit using cocaine as long as the drug is available (Jones, NIDA Research Monograph #50, 1984; Jones in Washton and Gold, 1987). Further use following withdrawal can produce irritability, paranoia, delusional and confused thinking, and other unpleasant effects leading to a cycle of ceasing and resuming the use of cocaine known as

the "run" (Jones in Washton and Gold, 1987). The nature of cocaine abuse in the workplace will presumably be cyclical within individuals over time (DuPont in Washton and Gold, 1987).

5. Discussion.

Acute tolerance development and severe and unpleasant withdrawal symptoms pose a two-fold problem for cocaine users: increasing amounts of cocaine are required to maintain the euphoric "high" which becomes harder to achieve; and cessation of cocaine use is a difficult and painful withdrawal process which casts serious doubts upon terming addiction to cocaine as merely "psychological dependence."

Acute tolerance development hinders accurate studies of cocaine effects on cognitive and task performance. Many single-dose studies have been conducted yet their applicability to regular users (e.g., multiple use on a daily basis) is questionable. Cocaine has been much less studied than other drugs of abuse such as marijuana or heroin. This is partly due to the pharmokinetics of the drug itself, and partly due to the inattention given to the drug until the late 1970s, when cocaine became very popular.

Cocaine is a relatively fast-acting drug and is quickly metabolized and excreted from the body. Peak effects are usually experienced 10 to 20 minutes after ingestion, and total effects last no more than 40 to 50 minutes (Walsh and Yohay, 1987). Cocaine's effects are similar to amphetamines in that it stimulates the CNS and produces feelings of euphoria. It has been shown that cocaine does not significantly enhance performance nor does it always create significant performance decrements in normal dosages; however, acute tolerance development definitely complicates the concentration/drug effect equation, thus precluding many general statements on dose/effect, i.e., "normal" dosages and consequent effects of cocaine are difficult to define. As with amphetamines, cocaine use appears to return sleep-deprived subjects to normal pre-deprivation performance levels.

Cocaine causes paranoia and aggressiveness. Cocaine abusers tend toward violence, suspiciousness, and paranoia. There are serious implications for users of cocaine in the workplace at all levels. Social interaction is presumably worsened by cocaine use. Cyclical "runs" of cocaine use by a worker create withdrawal and recurrent use symptoms such as irritability and lassitude followed by the previously mentioned symptoms of chronic use. Thus, while the immediate effects of the drug on the central nervous system may not necessarily cause impairment, the overall effects on the individual and his or her interaction with others are likely to create performance problems in the nuclear power plant setting. The behavioral effects of cocaine during all phases of use-- intoxication, hangover, dependence, and withdrawal-- directly and indirectly impact performance.

C. Opiates

1. Background.

Opiates, or opioids, encompass natural drugs derived from the opium poppy and synthetic drugs which posses distinct chemical structures but similar pharmacological characteristics to natural opium products The term "narcotics" is used to describe this class of drugs (Woolf, in Bennett, Vourakis, and Woolf, 1983).

Opioids are used both for medical treatment and personal (recreational) reasons. Opioids primarily affect the Central Nervous System (CNS). Opioids are among the most effective drugs known to relieve pain. Common effects include mood changes, mental clouding, or more commonly, euphoria. Natural opioid drugs include opium, heroin, codeine, and morphine. Synthetic opioids include hydromorphone (Dilaudid), oxymorphone (Numorphan), oxycodone (in Percodan), hydrocodone (in Hycodan), methadone, propoxyphene (Darvon), meperidine (Demerol), and other synthetic variations. Though these various opioids have subtle differences in the duration of effects, withdrawal patterns, and absorption, the pharmacologic characteristics of these drugs can be described for the group as a whole (Woolf, in Bennett, Vourakis, and Woolf,

1983). Opioids are ingested in a numerous ways -- intravenously; orally; nasally; and smoked.

Heroin is first among the top 20 controlled substances based on national estimates of emergency room mentions, a 108 percent increase since 1980; codeine combinations and Percodan (licit use) are listed as fifth and fourteenth (Frank, 1987).

2. Effects on Performance.

There are many known effects of opioids. Opioids produce mental clouding, promote faulty judgment, reduce hunger, induce feelings of euphoira, reduce the ability to concentrate, reduce sex drive, produce drowsiness, produce apathy, reduce activity, and reduce aggressive drives (Woolf, in Bennett, Vourakis, and Woolf, 1983).

Cognitive and psychomotor performance are generally impaired by narcotic-like drugs, although the duration and extent of impairment depends on the type of opioid, the dose, and the experience and drug history of the user. Ingestion of low to moderate amounts produces a short-lived feeling of euphoria followed by a state of physical and mental relaxation which persists for several hours (Walsh and Yohay, 1987).

Use of other drugs with opioids can produce additive effects: combining alcohol with opioids produces marked sedation and respiratory depression due to the sedative effects of these drugs on the CNS; this can lead to unconsciousness or death (Woolf, in Bennett, Vourakis, and Woolf, 1983).

3. Physical Signs of Abuse.

Opioid use may produce side effects of drowsiness, constipation, nausea, vomiting, and orthostatic hypotension (Woolf, in Bennett, Vourakis, and Woolf, 1983).

Characteristics of opioid users include pupillary constriction, depression, apathy, or lethargy. Flu-like symptoms are common symptoms of opioid withdrawal, e.g., watery eyes, nausea and vomiting, muscle cramps, loss of appetite, and other symptoms (Blum, 1984).

4. Tolerance and Withdrawal.

Selective tolerance may develop with opioid use; tolerance may develop to one effect of an opioid but not to others (Woolf, in Bennett, Vourakis, and Woolf, 1983). Tolerance decreases rapidly following cessation of the drug. Chronic users may abstain from opioid use for short periods of time to regain the "high" which they lost due to increased tolerance.

All opioids are physically and psychologically addictive. All produce withdrawal symptoms with individual differences in type and severity. The degree to which addiction occurs varies among the opioids. Withdrawal symptoms can be violent. For instance, withdrawal from morphine produces the following symptoms in order of severity and progression (4 to 10 weeks) after cessation of drug use: runny nose, extreme yawning, nausea, vomiting, diarrhea, sweating, cold/hot flashes, aching joints, muscles, and bones, twitchings tremor, muscle spasm, elevated temperature, goose flesh, dilated pupils, blurred vision, high blood pressure, restlessness, anxiety, irritability, increased respiration, and insomnia (Woolf, in Bennett, Vourakis, and Woolf, 1983).

If an opioid user is addicted and tolerant to the effects of one opioid, he or she will usually be tolerant to another. If one opioid is substituted for the effects of another, then withdrawal symptoms will follow that of the substitute drug. This phenomenon is the basis for switching opioid addicts to opioids with less severe withdrawal effects, such as methadone, in order to detoxify the addict (Woolf, in Bennett, Vourakis, and Woolf, 1983).

5. Discussion.

The opioids are a large class of drug primarily derived from the poppy. Opioid drugs are either natural or synthetic. Opioids affect central nervous system functions, primarily acting as a pain reliever, or, in larger doses, a hallucinogen. Cognitive and psychomotor performance are generally impaired during opioid intoxication. Opioids are physically and psychologically addictive, with severe withdrawal symptoms during abstention, lasting up to 4-10 weeks (Woolf, in Bennett, Vourakis, and Woolf, 1983).

Particular attention should be given to licit use of opiod-based products on the job such as pain relievers or other prescription and over-the-counter drugs. Sufficient dosages can impair on-the-job performance, especially when combined with other drugs such as alcohol (Moskowitz, 1985).

D. Phencyclidine

1. Background.

Phencyclidine, commonly known as PCP, was first introduced in 1957. It is now a major drug of abuse and is listed as eighth among the top 20 controlled substances based on national estimates of emergency room mentions (Frank, 1987). PCP has a variety of effects on the central nervous system (CNS), making an adequate classification of the drug difficult. It is best understood as a hallucinogen (Holbrook, in Bennett, Vourakis, and Woolf, 1983). PCP can cause central nervous system stimulation and depression with a great deal of variability depending upon the dose and type of PCP. PCP intoxication begins several minutes after ingestion of the drug and usually lasts up to 8 hours or more (Walsh and Yohay, 1987). PCP is well known for producing unpredictable side effects following intoxication, such as emergence psychosis or fits of agitation or excitability. Intoxication in low doses of 5 to 20 mg of PCP resembles an acute confused state (Marwah and Pitts, NIDA Research Monograph #64, 1986). Higher doses in excess of 20 mg can elicit serious neurological, cardiovascular, and psychotic reactions. In fact, PCP-induced psychosis is similar in effects to clinical schizophrenia (Marwah and Pitts, NIDA Research Monograph #64, 1986). There have been relatively few studies on the behavioral effects of PCP on humans due to the pharmokinetic aspects of the drug and the

volatility and unpredictability of the side effects of PCP. Also, PCP's popularity as a drug of abuse is relatively recent. However, there are sufficient clinical studies, criminal cases, and behavioral observations that conclusively demonstrate PCP's erratic and severe behavioral effects.

2. Effects on Performance.

The behavioral effects associated with PCP use are variable and often dependent upon both the person and the environment. Clinical studies have identified four phases of PCP abuse that may appear in successive stages. The first phase is termed acute PCP toxicity. Behavioral effects include combativeness, catatonia, convulsions, and coma, all of which are dose related. Visual disturbances are common; distortions of size and shape and distance perception are common. The first phase may last up to 72 hours. The second phase is characterized by grand mal seizures, coma, and death due to respiratory depression following sufficiently high doses. The second phase may last up to 7 days or longer. The third phase is characterized by schizophrenia which may last a month or longer. The fourth phase is characterized by PCP-induced depression, especially serious due to the high likelihood of suicide at this time (Holbrook, in Bennett, Vourakis, and Woolf, 1983). Performance impairment at any of these levels is highly probable. Clinical cases have documented the severe debilitating physical and psychological effects of PCP abuse and the extremely unpredictable behavioral effects which the drug causes Persons under the influence of PCP may precipitate life-threatening situations due to the disorienting and hallucinogenic effects of PCP intoxication (Holbrook, in Bennett, Vourakis, and Woolf, 1983).

Studies have also demonstrated that PCP can also elicit behavioral effects in users similar to barbiturates or other sedative/anesthetics (Balster, NIDA Research Monograph #64, 1986). It is obvious that heavy users of PCP would exhibit motor signs of intoxication. Task performance requiring motor coordination such as driving an automobile would be significantly disrupted by PCP (Balster, NIDA Research Monograph #64, 1986). In fact, several fatal accidents involving PCP-intoxicated drivers highlighted severe coordination impairment, acute confusional state, and an inability of the intoxicated driver

to think abstractly or make rational decisions (Lerner and Burns, NIDA Research Monograph #64, 1986).

In combination, PCP significantly enhances the effects of classical depressant drugs, including barbiturates and ethanol (Balster and Wessinger, 1983; Balster, NIDA Research Monograph #64, 1986). Use of PCP and other depressants such as alcohol is a potentially lethal combination which has an addictive effect on PCP intoxication, and may explain some behavioral observations of PCP intoxication (Balster, NIDA Research Monograph #64, 1986).

PCP users have reported unique intoxicating effects of the drug unlike that of other drugs of abuse. However, self-administration studies of PCP reveal that patterns of abuse are similar to barbiturate and alcohol abuse: dosage intake is sufficiently high to cause marked behavioral effects (Balster, NIDA Research Monograph #64, 1986).

3. Physical Signs of Abuse.

PCP intoxication is marked by difficulties in coordination; severe confusional or agitated state; inexplicable mood changes between lassitude and extreme agitation; moods such as suspicion, anger, or terror; and erratic or violent actions (Balster, NIDA Research Monograph #64, 1986; Holbrook, in Bennett, Vourakis, and Woolf, 1983).

4. Tolerance and Withdrawal.

Animal studies have clearly determined tolerance development following continuous use of PCP (Balster, NIDA Research Monograph #64, 1986). Tolerance develops in human subjects with mildly frequent (daily) use (Holbrook, in Bennett, Vourakis, and Woolf, 1983), although long-term implications are not yet fully understood (Jain et al., 1977; Marwah and Pitts, NIDA Research Monograph #64, 1986).

Animal studies have shown dramatic withdrawal symptoms following the termination of PCP use such as vocalizations, hyperactivity, lassitude,

tremors, and in one case, convulsions (Balster, NIDA Research Monograph #64, 1986). These symptoms appeared within 8 hours of abstinence and were most severe at 24 hours (Balster, NIDA Research Monograph #64, 1986). PCP has not been reported to produce physical dependence even with chronic use in humans. However, psychological dependence is reported frequently among chronic users, similar to the rate of tolerance development (Holbrook in Bennett, Vourakis, and Woolf, 1983).

5. Discussion.

PCP is a complex hallucinogenic drug with diverse, and often dangerous or lethal, behavioral effects on humans. The understanding of PCP's physiologic and psychologic effects on humans is still relatively new. It is well known, however, that PCP is an unusually dangerous psychoactive substance with unpredictable behavioral effects.

Long-term adverse health effects of PCP use are significant. Irreversible memory loss, personality changes, and thought disorders have been documented. Spontaneous recurrences of drug effects (flashbacks) are possible. Numerous fatalities due to PCP intoxication have been documented (Walsh and Yohay, 1987). Obviously, these characteristics of PCP intoxication, chronic use, and withdrawal have serious job performance implications. It may be assumed that any use of PCP will significantly impair the abuser's short-term and perhaps permanent cognitive and task performance.

E. Amphetamines

1. Background.

Amphetamines are central nervous system (CNS) stimulants. The term "amphetamine" is generic and applies to the group of synthetic compounds derived from ephedrine (Holbrook in Bennett, Vourakis, and Woolf, 1983). Examples of common trade name amphetamines are Benzedrine (racemic amphetamine); Dexedrine (dextroamphetamine); and Desoxyn (methamphetamine). The behavioral effects of amphetamines are similar to cocaine; however, the two

types of stimulant differ in that amphetamines have a longer duration of behavioral effect and greater toxicity than cocaine (Holbrook; see Bennett, Vourakis, and Woolf, 1983). Amphetamines are found in licit and illicit form. In general, amphetamines stimulate pulse, heart beat, blood pressure, respiration, perspiration, and at higher doses, increase body temperature and basal metabolism (Caldwell, 1980).

2. Effects on Performance.

Amphetamines are widely used to increase alertness and fight fatigue. Studies have shown that in therapeutic doses, amphetamines increase alertness, decrease fatigue, elevate mood, and frequently produce euphoria. Motor activity is increased and physical performance of simple tasks is improved. Sleep patterns are disturbed and total sleep time is decreased (Holbrook in Bennett, Vourakis, and Woolf, 1983). Users of small doses experience a heightened sense of well-being, sharp attentiveness, an increased acuity of reflexes, and idealization (Caldwell, 1980).

The effects of amphetamines on cognitive and task performance are well documented. Amphetamines improve short-term physical performance in a variety of ways, such as vigilance performance (the ability to attend to sensory input); motor performance (swimming, running, etc.); learning or acquisition of motor skills; and reaction time. With controlled doses, the adverse effects on physical performance were minimal (NUREG/CR-3916, 1983). Simple short-term cognitive performance improves with controlled doses, such as performing repetitive tasks which elicit fatigue or boredom; simple math tests; verbal ability tests; learning of visual information; and enhanced ability to read and understand a foreign language (NUREG/CR-3196, 1983). Tests of cognitive tasks requiring relatively more complex skills such as calculus did not show performance changes under the influence of amphetamines (NUREG/CR-3196, 1983). High doses of amphetamines, however, produce experiences of an exaggerated sense of well-being, high energy, restlessness, urgency, overideation, and gross temporal distortion (Caldwell, 1980).

Cognitive and task performance decrements due to amphetamine use on a regular basis are highly likely: "runs" or cycles similar to cocaine runs of abuse and abstinence are also characteristic of amphetamine abuse. Behavioral effects due to these cycles of abuse would directly impact cognitive and task performance. Secondary effects of amphetamine abuse such as hangovers, rebound depressions, and insomnia directly impact cognitive and task performance. Amphetamine abuse among truck drivers is cited as one example (Caldwell, 1980).

Acute tolerance development produces fewer performance decrements in regular users of amphetamines than initial use. One study revealed, however, that after the establishment of chronic tolerance and sustained drug levels throughout a 24-hour period, drug cessation produced the following performance effects: performance impairment initially decreased as the drug level in the subject declined followed by increased impairment as the adverse effects of drug withdrawal - hyperexcitability and/or delirium - appeared (Ellinwood and Nikaido, 1987).

3. Physical Signs of Abuse.

In high abuse doses, gastrointestinal function may be altered, and nausea, vomiting, diarrhea, and cramping may occur. Cardiovascular signs of heavy use include headache, hypertension, pallor, and palpitation. CNS signs of heavy use include hyperreflexia, restlessness, talkativeness, insomnia, violence, and increased libido (Caldwell, 1980). High doses may result in amphetamine psychosis, which resembles a true paranoid schizophrenia in the clinical sense. Amphetamines are considered to have a high abuse liability, i.e., addiction is probable with continued or frequent use (Holbrook in Bennett, Vourakis, and Woolf, 1983).

Stimulant intoxication occurs with increasing doses, e.g., hyperexcitability and deterioration of driving skills (Ellinwood and Nikaido, 1987). Aggression and violence are potential side effects of higher doses of stimulants. Highly toxic doses can induce hallucination, delirium, and delusions (Ellinwood, 1971; Ellinwood and Nikaido, 1987).

4. Tolerance and Withdrawal.

Similar to cocaine, amphetamine tolerance development is rapid (Caldwell, 1980). Chronic use of the amphetamines leads to development of a tolerance to the stimulant and appetite-suppressant effects of amphetamines, even when administered in low therapeutic doses. Chronic abuse leads to high tolerance (Holbrook in Bennett, Vourakis, and Woolf, 1983).

Amphetamines are psychologically addictive. Though no physical withdrawal symptoms occur following abrupt discontinuation of use, psychologic changes may be prominent for several months, such as apathy, long periods of sleep, irritability, depression, and disorientation. Paranoia may follow the first seven days of withdrawal following the abrupt cessation of heavy use; delusions may persist for up to a year (Holbrook in Bennett, Vourakis, and Woolf, 1983).

5. Discussion.

Amphetamines stimulate the CNS and cardiovascular system. Short-term physical and simple cognitive task performance is heightened to a minor degree by the use of amphetamines. Complex cognitive task performance is not heightened by the use of amphetamines. Small and moderate doses of amphetamines enhance cognitive and task performance on specific and simple tasks such as vigilance and psychomotor skills, but these performance enhancement effects decrease considerably as the complexity of the task increases (Ellinwood and Nikaido, 1987). Any performance enhancements due to amphetamine use are outweighed by significant performance decrements due to acute tolerance development, hangover effects, and withdrawal symptoms due to chronic or repeated use; i.e., any short-term gains in cognitive and task performance are outweighed by the adverse performance effects due to regular use of amphetamines and its high potential for abuse.

Secondary effects of amphetamine abuse such as "runs" and withdrawal "crashes" may adversely affect cognitive and task performance. The high abuse potential of amphetamines may lead to addiction if used on a frequent basis. Chronic users of amphetamines are likely to develop tolerance to the CNS effects of

amphetamines as well as psychological dependence. Withdrawal symptoms are psychological and produce a variety of adverse behavioral effects which directly impact cognitive and task performance. Similar to cocaine abuse, the nature of amphetamine abuse in the workplace will presumably be cyclical within individuals over time (Hurst, 1987).

F. Summary

Use of any of the five listed drugs in the preceding discussion can directly and indirectly affect or impair on-the-job performance through intoxication, hangover, dependence, or withdrawal effects.

Emphasis should be placed upon examining all phases of drug use in the workplace, since drug-seeking behavior, administration, acute and chronic intoxication, hangover, and withdrawal phases of drug usage may all have detrimental effects on individual and team performance (Walsh, 1987).

The present ability to predict the behavioral consequences of drug use is limited; the ability to accurately predict the specific behavioral performance of an individual under the influence of a certain drug is minimal (Walsh, 1987).

One applicable measure of drug-induced impairment in the nuclear industry may be injury rates. As one researcher states, "A common but incomplete and poorly understood thread that passes through injury reports is the frequency with which alcohol and drugs are involved" (Walsh, 1987).

There is a multiplicity of variables which complicate the drug dosage/impairment relationship: the type and potency of the drug, patterns of consumption, the individual's physical and psychological characteristics, the environment in which the drug is used, and group interaction. However, three generalizations regarding the drug dosage/impairment relationship may be made: high doses generally have greater behavioral effects than low doses, well-learned tasks are less affected by drugs than novel tasks, and motivation regarding the task is an important factor (Walsh, 1987). Further, the studies

conclusively demonstrate certain behavioral effects of drug use which impair the user in a variety of cognitive, task, psychological, and social performance areas.

A clear relationship has been demonstrated between drug use (non-specific dosage), general behavioral effects, and impairment. It is obvious from the research that use of any of these five drugs or types of drugs alone or in combination has the overwhelming potential to impair workers in the performance of their duties. The question is not whether but how drugs impair performance under given circumstances.

II. Alternatives to urinalysis.

The Commission considered techniques for analyzing blood, breath, saliva, fingernails, and brainwave patterns and concluded that there is no viable substitute for urinalysis in the near future, either technically or practically.

A. Analysis of Blood Plasma.

The analysis of blood has some significant advantages over urinalysis. The main advantage is that there is a much more direct relationship between blood levels of a drug and impairment, since levels in the blood are more directly reflective of effects on the central nervous system. In the case of alcohol, of course, legal limits defining probable impairment have been established in state law. Equivalent standards for other drugs are not generally available, but an analysis of blood can identify the extreme cases where there is no doubt of impairment. However, current data are insufficient to establish cutoff levels to distinguish between impaired and unimpaired (Consensus Report, Nov. 8, 1985). Blood tests are useful in post accident analyses if the subjects can be sampled quickly. Another minor advantage of blood testing is that tests can usually deal directly with the drug of interest, rather than one of its

metabolites (in urine), and may thus avoid some of the problems with cross reaction. 1/

There are problems with testing blood or plasma, however. One of the most significant is the higher level of intrusiveness (Dogoloff and Angarola, 1985). The drawing of blood involves pain and trauma for some; concern with AIDS would heighten the anxiety, though unreasonably. The collection of samples would be more expensive, requiring trained medical personnel (Walsh and Yohay, 1987).

There are also particular substances, such as cocaine, with such a short half-life in the blood that the chances of identifying users through blood tests are substantially reduced (Washton and Gold, 1987). Also, the concentration of metabolites in urine is sometimes higher than the concentration of the drug in plasma, as in the case of amphetamines (Nelson and Moffat 1980, in Amphetamines and Related Stimulants) and cocaine (Washton and Gold, 1987). In general, drugs and their metabolites can be identified over a longer period of time through urinalysis (Washton and Gold, 1987).

B. Analysis of Saliva.

The analysis of saliva is receiving considerable attention. Radioimmunoassay (RIA) procedures for testing saliva exist; also there is a commercial kit available for testing saliva. If technically feasible, the use of saliva would avoid some of the intrusiveness and embarrassment of urinalysis. While clinical studies using saliva have been conducted for a number of years (Caddy, 1984), it currently does not represent a viable alternative to urinalysis (Walsh and Yohay, 1987). Analyses of saliva for purposes of detecting marijuana use, for example, have found that such things as food consumption and mode of ingestion can dramatically affect the ability of assays to detect marijuana use (Hawks, 1982). Also, there is rarely a large enough volume of specimen for confirmation purposes.

1/ Cross reaction occurs when a substance other than the drug or drug metabolite being tested for in a specimen creates a positive test result.

C. Analysis of Hair.

Another drug testing technique involves the use of hair. Hair can be used to identify where there has been a past history of drug use. In fact, it can provide information on drug use over a much longer period than can urinalysis (Baumgartner, Black, Jones, and Blahs, 1982). However, "hair analysis has not been validated extensively enough in clinical studies to make an adequate assessment of its suitability for general drug screening. (Walsh and Yohay, 1987)." (Puschel, Thomasch, and Arnold 1983). This is a very expensive test, which would prohibit its use for a large volume of tests, especially the initial screening tests. A more appropriate application may be for diagnosis of a patient's drug history to design the proper treatment.

D. Analysis of Other Specimens

Other techniques are at the experimental or developmental stages. For example, breathalizers are being developed for testing for marijuana smoking. Generalized tests are being developed for body fluids ranging from sweat to mucous from the eyes. Techniques are being developed to analyze brainwave patterns and eye motion. Analysis of fingernails is also being considered. However, a review of the literature indicates that the technical basis does not yet exist to support a legally defensible, wide scale use of these techniques either for screening or confirmatory purposes. Since urinalysis testing appears feasible in the short run, other techniques will not be considered at this time. The Commission will continue to monitor developments in other testing technologies to determine when and if they offer an improvement over urinalysis.

III. Random Testing and Alternatives.

Random testing, i.e., unannounced drug testing imposed in a statistically random manner, serves two purposes, detection and deterrence. It would appear that any form of unannounced testing that would be administered so that a person completing a test is immediately eligible for another unannounced test would satisfy criteria for deterrence. Several potential alternatives were

considered, including employee awareness, other types of testing (preemployment, for-cause, etc.), reliance on behavioral observations and the Employee Assistance Program, various security measures, and combinations of these alternatives. One goal of the Commission in propos this rule is to bring about a nuclear power plant workplace free from the effects of drug and alcohol use. Such a workplace would ensure, to a large measure, that impairment of function from drug and alcohol use would not adversely affect the safety of nuclear power plant operations. A workplace free from the effects of drug and alcohol use would also help assure the reliability of the nuclear power plant workforce to properly perform activities that require scrupulous adherence to rules and procedures. Random testing is a proven effective means of achieving this goal. The Commission concludes from the following that unannounced random testing is a strong deterrent to drug use, is a necessary element of an effective fitness for duty program, and that no alternative or combination of alternatives would provide an acceptable level of both detection and deterrence.

Systematic data on the efficiency of random testing are only available from the various programs implemented by the Department of Defense. Illicit drug use in the Army has been reported as dropping from 29 percent in 1980 to 11.5 percent in 1986 (Raezer, 1987). In the Navy, rates have been reported to have dropped from 47 percent in 1981 to around 4 percent in 1986 (cited in C & EN; June, 1986). Rates among U.S. Coast Guard personnel are down from 10 percent in 1983 to 3 percent in 1986; this decrease is attributed to a random drug testing program (Bureau of National Affairs, 1987). In all three cases, the reduction was measured by the rates of confirmed positive tests during random drug testing, and the observed decrease in rates followed the implementation of the random drug testing program. This pattern is consistent with what would be expected if random drug testing was to have a strong deterrent effect. Although other factors may be affecting the results, i.e., drug education programs, negative press associated with drug abuse, stringent disciplinary action, and better selection (hiring) process, available data indicate there are substantial reductions in drug use associated with the implementation of a random drug testing program.

The Department of Transportation (DOT) has been the leading federal agency in implementing drug testing programs for private sector employees subject to federal regulatory jurisdiction. None of the agencies in the Department currently requires random drug or alcohol testing, but such requirements are being actively considered through proposed rulemaking.

The Federal Railroad Administration (FRA) has detailed regulations covering alcohol and drug use by railroad employees whose working hours are regulated under the Hours of Service Act (15 U.S.C. 61). Under the provisions of 49 CFR 219, employees are prohibited from using, possessing, or being impaired by alcohol or controlled substances while on duty. Blood and urine samples of employees involved in railroad accidents are to be taken and preserved [2/]. Railroad companies may require breath or urine tests from employees when there is reasonable cause for suspecting prohibited use of alcohol or drugs. Railroads are required to administer a drug test to new employees covered under the Act.

The Federal Highway Administration (FHA) prohibits interstate commercial truck drivers from using amphetamines, narcotics, or any habit-forming drugs, and also requires that they have no current clinical diagnosis of alcoholism (49 CFR 391.41). FHA is preparing a notice of proposed rulemaking that will propose a comprehensive drug control program applicable to all drivers in interstate commerce (See entry in Unified Agenda of Federal Regulations published on October 26, 1987; 52 FR 40630).

The Federal Aviation Administration (FAA) prohibits flight crewmembers from being under the influence of alcohol or drugs. Tests must be taken within four hours of acting as a crewmember when there is reasonable basis to suspect a violation. The FAA has suggested that random and scheduled drug and alcohol testing may be needed for flight and certain ground crewmembers to protect the

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2/ On February 11, 1988, the 9th U.S. Circuit Court of Appeals, in a split decision, ruled that such testing must be based upon reasonable suspicion that a particular worker was under the influence of intoxicants. This decision was inconsistent with all previous Appeals Court decisions; it will be appealed by DOT.

public safety (December 9, 1986; 51 FR 44433). A DOT proposed rule that would require random testing of airline employees involved in flight operations and maintenance has been published in the Federal Register (53 FR 8386).

The U.S. Coast Guard (USCG) is the primary maritime law enforcement agency for the U.S. It has proposed regulations prohibiting operation of a vessel while intoxicated (February 9, 1987; 52 FR 4116). For commercial operators, intoxication is defined to be .04 percent by weight or more alcohol in the blood or when the effect of alcohol or an illegal drug on the operators' manner or behavior is apparent. For recreational operators, the only difference is that the applicable percentage is 0.1 percent. The USCG is preparing a notice of proposed rulemaking covering use of dangerous drugs by merchant marine personnel. The option being considered is a requirement that individuals applying for licenses, certificates of registry, and merchant mariner's documents provide the results of drug tests before issuance or renewal (See entry in Unified Agenda of Federal Regulations published on October 26, 1987; 52 FR 40582). The proposal also addresses the need for random drug testing.

The potential alternatives to random unannounced drug testing are many and varied. They include the following:

- Take no alternative action;
- Testing before employment or badging;
- Periodic drug testing (announced testing)
- "For-cause" drug testing
- Behavioral Observation Program
- Medical Screening
- Employee Assistance Programs (EAPs)
- Access Authorization Program
- Workplace security measures; and
- Employee awareness and education programs.

Although systematic data do not exist to compare the efficacy of these approaches, the literature and the findings of the staff's data-gathering

activities do suggest some advantages and disadvantages for each. These are discussed below:

a. Take No Alternative Action.

The first alternative to random drug testing to be considered is to take no alternative action. This is clearly not a viable alternative. Statistics available on drug use in the workplace indicate that a significant minority of workers have or are currently abusing drugs or alcohol in the workplace (Neuner, 1985). While the exact statistics vary from one source to another, a middle range estimate is that approximately 10-25 percent of American workers abuse drugs and alcohol in the workplace. While the incidence of drug abuse in the nuclear industry can be expected to be lower, based in part on the existing security measures at power plant sites, and the relatively aggressive fitness for duty programs that characterize the industry, the potential for drug and alcohol abuse still exists. The fact that approximately two-thirds of the power plant licensees have not implemented random testing programs, some because of union intervention or prohibition by State laws, suggests that significant reductions in the abuse of alcohol and drugs by nuclear utility employees could be realized when the preventive and deterrent effects of industry-wide random testing programs are realized.

b. Testing Before Employment or Badging.

Testing before employment or badging is conducted by many employers to ensure that individuals who cannot meet fitness for duty standards are not placed into sensitive jobs. Considered by industry as the first line of protection against drug problems, preemployment testing is specifically used to detect and identify the nature of drug use, if any, by job applicants, and to identify abusers prior to hiring. Although screening has focused on drug abuse, most large industrial companies now include tests for alcohol as part of preemployment testing (Willette, 1986). Individuals with positive results generally do not receive further consideration for employment (McClellan, 1984). Preemployment testing is currently the most prevalent type of drug

testing (Harson, 1986). Virtually every nuclear power utility currently employs this type of testing.

Preemployment testing has some disadvantages. As a part of a company's hiring policy, it will certainly be known to most applicants. This knowledge removes any element of surprise, essentially making it an announced test and, therefore, allows applicants to be prepared for the test. A sophisticated or "street smart" drug abuser may be able to avoid detection, and less frequent users may be likely to abstain long enough to guarantee a "clean" sample. Even individuals who regularly abuse alcohol may be able to abstain for the few days necessary to get through an application process. 3/ New testing techniques are in the process of being developed that may be capable of identifying previous (several months) drug and alcohol use. However, these techniques have not yet been refined. Consequently, the ability of preemployment testing to detect substance abusers currently is limited. Even so, licensees report that, typically, 5 percent or more of applicants for employment or unescorted access to a power reactor are tested positive.

The primary disadvantage to using preemployment testing as an alternative to random drug testing is that it in no way addresses substance abuse or dependency problems among the workforce subsequent to employment. Applicants who pass the preemployment testing and become employees may never face testing again. The deterrence factor, implicit in random drug testing programs, is absent. Preemployment testing is probably most effective when it is directed to keeping individuals currently experiencing chemical dependency out of the workforce, and is thus a necessary part of a total fitness for duty program but is not sufficient in itself.

c. Periodic Drug Testing (Announced Testing).

Periodic Testing appears to have few, if any, advantages over random testing. Periodic testing, whether announced or unannounced, may be perceived by

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3/ "Alcoholics" are considered so for their lifetime. "Alcoholics" who abstain are perfectly acceptable employees.

employees as less discriminatory than random testing in that, on a given date all available employees are tested. In a random testing program, some employees are selected at random and tested. Because it may be impractical to test the entire body of employees on any given day, utilities may opt to use a random testing program. Under random testing, some employees may coincidentally be tested more frequently than others, and the utility may be required to prove that the selection process is truly random in response to a legal challenge. If testing is announced and scheduled at regular intervals, however, all employees would be tested equally, at least theoretically.

Further, if selection for random testing is truly random, an employee could, strictly through chance, not be selected for testing for an extended period of time. As a result, employees with substance abuse problems may not be detected in a timely manner, and their abuse problems may increase in severity before they are detected in the random testing program or the behavioral observation program. Periodic testing could ensure that all employees are tested with adequate frequency.

Should the testing be announced, immediate, pronounced disciplinary action could be taken without concern that the action is inappropriately severe, because any employee who cannot remain drug- or alcohol-free for an announced test has a severe substance abuse problem and an obvious disregard for the safety of the public, co-workers, and self.

It is apparent that announced, periodic tests would not identify some drug abusers that periodic or random unannounced testing would identify, and that the deterrent value of announced testing would only be short-term. Announced, periodic testing would be less effective in detecting abuse of drugs that are rapidly metabolized, such as cocaine. It is expected, however, that an announced, periodic program would identify some regular users of prescription drugs, and users of slowly metabolized drugs such as marijuana. Because announced, periodic testing would potentially allow many employees who abuse drugs and alcohol to escape detection, it seems clear that announced tests would be less effective than random tests at identifying and deterring the occasional drug users. None of the industries surveyed in NRC's review of

other regulated industries or those described in literature have adopted this approach.

d. For-cause Drug Testing.

A for-cause testing program has several positive features. In a properly implemented program, when there is cause for a supervisor or co-worker to suspect that an employee is unfit, or the employee has been involved in an on-the-job accident, the employee is given a complete physical examination which includes drug testing. This examination may identify health problems other than drug abuse that have diminished the employee's ability to perform safety related responsibilities. The examination can also include testing for legal drugs of potential abuse, such as alcohol, over-the-counter, and prescription drugs.

A for-cause program may have fewer legal problems than a random testing program because there is a reasonable cause for the test. In a random testing program, the legal justification is that there is a possibility that impaired employees are present who represent a potential risk to the safety of themselves, their co-workers, or the public. However, when a for-cause test is conducted, the employee in question may represent a clear and present danger. Further, if the motivation for testing is the investigation of an accident, the utility has a clear legal and ethical responsibility to do everything possible to identify the cause of the accident to ensure that similar accidents are prevented in the future. There is a large body of legal precedent in support of for-cause testing from various industries with safety concerns including railroads, 4/ transportation companies, and the aviation industry.

A random testing program can be expected to have a stronger deterrence to chronic drug use than would a for-cause testing program. When drug tests are administered to all employees on a random basis, a chronic drug user can expect to, sooner or later, be identified through the program. Some literature on

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4/ See footnote 2.

chronic abusers indicate that they can effectively hide their drug or alcohol problems from supervisors and fellow employees for a considerable length of time. On the other hand, an occasional drug user could hope to escape being detected by a random drug test, especially if both the tests and the employee's drug use are infrequent. In either case, if supervisors are highly proficient in observing probable impairment, the drug abusing employee may have little expectation that he or she could be impaired on duty and avoid a for-cause test. Knowing that fellow workers are disciplined for on-the-job impairment also can be expected to deter employees from being impaired on the job. Therefore, for-cause testing might be more effective in deterring users from being impaired on the job than would a random testing program alone.

There are two principal disadvantages of for-cause testing as a substitute for random testing. First, for-cause testing, as discussed above, is likely to be a less effective deterrent against chronic drug use. Second, if managers are unable to identify impaired employees, for-cause tests will only be administered after a gross indicator, such as an accident, shows that the tests are warranted, i.e., the test is after the fact and not preventive. Therefore, with the exception of post-accident testing, the value of for-cause testing is highly dependent on managers' and co-workers' abilities to identify employees who are impaired and an organizational culture which allows managers to specify testing without disrupting employer/employee relationships or incurring adverse consequences. Thus, supervisor behavior observation proficiency through training and experience, and strong support from company management, is important in the administration of for-cause testing.

While for-cause drug testing is an important element of a fitness for duty program, it does not appear, alone or with behavioral observation, to be an acceptable alternative to random testing.

e. Behavioral Observation Program.

Behavioral observation programs are intended to enable supervisors to detect changes in an employee's behavior and to initiate the appropriate corrective

action, usually a referral to the Employee Assistance Program (EAP) for initial evaluation and for-cause testing.

Supervisory referrals typically occur when a job performance problem becomes apparent. In these cases, the supervisor is responsible for identifying and documenting the job performance decrement. In addition, he or she meets with the employee to describe the problem, to refer the employee to the EAP, and to indicate that continued impaired performance is likely to lead to disciplinary action or termination from employment. The supervisor is discouraged from trying to diagnose the root cause of the problem or from trying to provide any counseling (Trice & Beyer, 1984; Hoffman & Roman, 1984). The EAP counselor takes the responsibility for these tasks and for referring the employee to appropriate resources, as when an employee self-refers to the program. If the employee's job performance does not improve, then disciplinary action is taken.

The training that supervisors receive, usually from the EAP staff, in observing employee behavior may allow them to detect problems that may be missed altogether by a drug screening program or that are obvious to everyone once the problem has reached severe proportions. Whereas a sophisticated and "street smart" drug abuser may be able to avoid detection from drug tests, he or she is unlikely to be able to maintain satisfactory levels of job performance on a day-to-day basis. As a witness to the employee's daily functioning, the supervisor represents a significant opportunity for identifying and removing from duty the employee whose job performance may adversely affect public health and safety.

There are several disadvantages to relying on behavioral observation alone. The primary disadvantage is the reliance on supervisors' behavioral assessment skills to identify persons unfit for duty and on their willingness to confront troubled employees. The reliance on supervisors' behavioral assessment skills can be undermined by the fact that in the course of a regular work day, supervisors have little, if any, opportunity to exercise the skills they have received through training. If training is provided on an annual basis only, the skills can become rusty and heighten any reticence the supervisors may have initially experienced in utilizing these skills. Too, while the behaviors

displayed by an individual intoxicated by alcohol are obvious and recognizable to most, the various effects of a wide spectrum of unfamiliar drugs currently abused can further diminish any confidence in recognizing impairment, or allow impairment to escape notice (Wrich, 1988).

Several barriers to supervisory referral have been identified in the literature. These include (1) the supervisor's desire to help the impaired employee, rather than expose him or her to potential disciplinary action, (2) a belief that the formal system [i.e., the Employee Assistance Program (EAP)] should be used only as a last resort, and (3) the attempt on the supervisor's part to counsel the impaired employee (Hoffman & Roman, 1984). The possibility that an employee could lose his or her job, nuclear safety responsibilities, or unescorted access clearance if found to be unfit for duty may make supervisors in the nuclear industry just as reluctant to refer the employee as supervisors in other similar settings.

A number of program components that can encourage supervisors to make referrals have been identified in the literature. In addition to a clear company policy and strong management support for the EAP, the importance of thorough and ongoing supervisory training has been consistently emphasized in studies designed to identify factors that increase EAP effectiveness (Gregoire, 1979; Morgan-Janty, 1982; Martin, Heckel, & Long, 1984). Providing consultation services by the EAP counselor for supervisors and continued program promotional efforts (e.g., posters and notices in company newsletters) have also been suggested as a means of encouraging supervisory referrals (Hobson, 1981).

While an effective behavioral observation program is an important element of a fitness for duty program, it does not appear, alone, to be an acceptable alternative to random testing.

f. Medical Screening.

A method currently used by one licensee, is to use a medical evaluation for fitness of randomly selected employees to establish a basis for the collection and testing of urine.

The employee is medically evaluated in three areas: chemical use or dependency, physical well-being, and psychological well-being. Chemical use or dependency is established by using eye evaluation techniques covering such items as pupil size, pupil reaction to light, and the ability of the eyes to converge on an object coming toward the nose or to track an object from side to side and around the face. In addition, the condition of a patient's skin, nose and mouth, coordination, and reflex response are evaluated. Some of the evaluation is quite similar to field sobriety tests conducted by local law enforcement agencies. Physical well-being is reviewed through a complete evaluation of vital signs, including blood pressure, temperature, pulse, respiration, and heart rate. A medical history survey is also conducted to determine the current medical status of the employee. Psychological well-being is determined through a question-and-answer session evaluating mental awareness, depression, paranoia, self-esteem, anxiety and job stress, abnormal personality traits, and major life changes.

There has not been sufficient data collected by the licensee using medical screening to establish any statistical significance to the results of this approach, and unfortunately, there is no "control population" established that would provide scientific validity to the findings. Specifically, there has been a relatively low rate of testing and, of those few actually submitting urine specimens for testing, less than one half showed positive.

Since some impairing effects of some drugs (most notably PCP) could be determined long after the drug could be detected in urine, this alternative does have one advantage over random testing alone.

It would seem that a strong behavioral observation program with highly trained and proficient supervisors would have advantages over infrequent medical screening because the supervisor would have opportunities to observe more people more frequently. It would appear that the medical screening alternative would be less effective than random testing at detecting and deterring occasional use of drugs.

Medical screening does not appear to be a currently viable alternative to random testing.

g. Employee Assistance Programs.

A preliminary review of the literature pertaining to Employee Assistance Programs (EAPs) indicates that EAPs can play a significant role in assuring that persons with unescorted access to nuclear power plants are fit to perform their duties. The major advantage of the EAP approach is that the EAP can respond to a broad spectrum of fitness for duty problems, such as psychological stress, that cannot be addressed in a random drug testing program alone. There are several disadvantages to this approach, however, that suggest that the NRC may not want to rely on EAPs alone to assure a workplace free of the effects of alcohol and drugs.

Employee assistance programs have been defined as "systems to provide professional care to employees whose job performance is or may be adversely affected by alcoholism, drug dependence, emotional problems, family difficulties, legal issues, eating disorders, and similar personal problems that not only threaten the employee's effectiveness on the job but also tend to trigger a whole range of health problems" (Blair, 1985). Thus, the EAP alternative is relevant to the entire range of fitness for duty problems.

The EAP literature describes several program elements necessary to the successful resolution of employee personal problems (McGaffey, 1978; Sonnenstuhl & O'Donnell, 1980; Foote & Erfurt, 1981; Phillips & Older, 1981; Roman, 1981; Bierman, 1982; Walsh, 1982; Gam, Sauser, Evans, & Lair, 1983; Wrich, 1988). The "ideal" EAP has been described as including:

- Management support for the EAP in the form of a written policy statement describing the program and explicit written procedures for implementing the program,

- Support for the EAP and cooperation from employee unions,
- Clearly defined job performance standards,
- Well-trained supervisory staff and knowledge of the EAP among employees,
- A recognition by management that performance problems can result from many different causes,
- Program staff who provide problem diagnoses, appropriate referrals, treatment coordination, and follow-up,
- Comprehensive treatment resources,
- Health insurance coverage that is compatible with the EAP or company provided treatment funds.
- A program evaluation process,
- An adequate budget.

Employees typically gain access to EAP services through two routes, self-referrals and supervisory referrals. When the employee self-refers, he or she may contact the EAP counselor directly or seek assistance from a supervisor to make the contact. The EAP counselor then meets with the employee to assess the nature of the problem and to determine what resources are needed to resolve it. The counselor may provide the required assistance in some cases, but more frequently will refer the employee to existing resources in the community. The EAP counselor maintains contact with the employee during the problem resolution phase and often acts as a coordinator between the employee and his or her supervisor while the employee receives inpatient treatment for an alcohol problem, for example, and when the employee returns to work.

As discussed previously under the Behavioral Observation Program, supervisory referrals typically occur when a job performance problem becomes apparent, is responsible for diagnosing the root cause of the problem and for referring the employee to appropriate resources, as when an employee self-refers to the program. If the employee's job performance does not improve, then disciplinary action is taken.

Although the literature suggests that an EAP can serve as a valuable tool in assuring that employees in the nuclear industry are fit for duty, the primary benefit of an EAP lies in the potential it represents for assisting employees to overcome personal problems that are not alcohol or drug related but that may interfere with job performance and frequently lead to alcohol and drug abuse. For example, the psychological stress associated with marital or financial difficulties can impair performance of job responsibilities but will obviously not be detected with drug testing.

The EAP staff is typically responsible for conducting employee awareness training, and for training supervisors in behavioral observation techniques. These are regarded by the NRC staff as important elements of an effective program.

The EAP literature typically discusses program effectiveness in terms of the benefits accrued from program implementation compared to the costs of the program. A number of studies have documented benefits along several dimensions. These dimensions include reduced employee turnover (Gam, Sauser, Evans and Lair, 1981), reduced training and employee replacement costs (Starr & Byram, 1985) reduced employee utilization of insurance benefits (Foote, Erfurt, Strauchy, & Gazzardo, 1978), reduced costs associated with incidental absence (Gaeta, Lynn, & Grey, 1982), and reduced disability payments (Shore, 1984). Although the NRC cannot be primarily concerned with these cost savings to the industry, these data suggest that implementation of an EAP can have significant positive effects on employee availability, and so may improve plant safety indirectly by contributing to adequate staffing.

Of greater relevance to the NRC's concern with public safety are data pertaining to reductions in on-the-job accidents. Rowland Austin of General Motors reports, "We have found that those who participate in the employee assistance program, as a group, reduce their on-the-job accidents upwards of 50 percent" (1983). A study done by the Firestone Tire and Rubber Company found drug users almost four times as likely to be involved in plant accidents (cited in Journal of American Insurance, 1984-85); AT&T found that of 110 participants in EAP, 26 had been involved in accidents in the 2 years before participation and only 5 were involved in accidents after participation (Gaeta, 1982). The U.S. Postal Service also reports that the rate of on-the-job accidents has been significantly reduced since implementation of their EAP (Business Insurance, 1983). To the extent that accidents in the nuclear industry are related to impaired employee performance, the existence and use of an EAP by troubled employees may directly improve the safety of plant operations.

Data are not currently available that directly assess the effectiveness of EAPs in reducing drug or alcohol abuse with objective measures. Therefore, the relative effectiveness of EAP's and random drug screening programs on direct measures of drug and alcohol use cannot be compared.

There are several disadvantages in relying on the EAP approach alone to assure that employees in the nuclear industry are fit for duty. The primary disadvantage of the EAP approach alone is its reliance on supervisors' behavioral observation skills to identify persons unfit for duty and on their willingness to confront troubled employees. (See related discussion on Behavioral Observation Programs.)

There are two additional disadvantages of the EAP approach used alone. First, the deterrent effect thought to result from random drug screening will be absent, although fear of supervisory detection in some cases may serve a similar deterrent function. Second, an EAP without random follow-up drug testing lacks any objective means of ensuring that employees who have entered treatment for drug or alcohol abuse problems have been rehabilitated and can be considered reliable.

While there are drawbacks on the EAP approach alone, the merits suggest that EAP programs would perform a vital role in assuring fitness for duty in the nuclear industry. An EAP's ability to address potential employee impairment caused by problems that are not alcohol or drug related justifies careful consideration. It is also apparent that an EAP can play a significant function in detecting substance abuse problems that may otherwise continue undetected through a drug testing program, as the EAP-trained supervisor can have frequent opportunity to identify on-the-job impairment and a diminishing job performance.

h. Access Authorization Program.

The NRC is considering promulgation of an access authorization program to govern the granting of unescorted access to employees in nuclear power plants. The proposed program, contained in a policy statement issued for public comment on March 9, 1988 (53 FR 7534), would require background investigations, psychological assessments (i.e., testing and interviews), and an ongoing behavioral observation program for employees with unescorted access. The program under consideration would expect that the licensee determine whether the individual considered is not only reliable, i.e., fit for duty, but also can be trusted with access to nuclear facilities. There are a number of advantages as well as disadvantages to this approach when compared to implementing a random drug testing program.

The unique benefit provided by the access authorization program is that the background investigations and psychological assessments are intended to detect an individual with a history of, or potential for, drug or alcohol abuse or other problems that might make him or her unfit for duty before the person is granted unescorted access.

The background investigations and psychological assessments, of course, do not deter drug abuse and would not detect individuals who develop substance abuse problems after they have been granted access. The behavioral observation component of the proposed program is designed to improve the probability that unreliable and untrustworthy persons are detected.

An advantage of the access authorization approach is that the legality of the program is unlikely to be challenged. Background investigations, psychological assessments, and behavioral observation programs, although sometimes controversial in terms of effectiveness, are well accep ed for sensitive positions in various indi stries and types of government service.

The disadvantages of the access authorization approach implemented alone include: relatively weak deterrence to drug and alcohol abuse in comparison to that provided by random drug testing, and it would not provide any preemployment drug testing or ongoing objective assessment of drug or alcohol use.

i. Workplace Security Measures.

This approach to assuring that employees with unescorted access are fit for duty includes such techniques as searches of the workplace. The advantage of this approach over random drug testing is that employees are likely to be deterred from possessing or selling illegal drugs or alcohol onsite to a greater degree than with random drug testing, because these security measures directly detect possession while random drug testing only assesses recent use. The disadvantages are that it cannot establish use of drugs or alcohol, and it cannot address other types of fitness for duty concerns. Therefore, workplace security measures, although important elements to an effective program, should not be considered an adequate substitute for random drug testing.

j. Employee Awareness and Education Programs.

Any fitness for duty program based solely on employee awareness and education about the deleterious effects of drug or alcohol abuse is likely to be ineffective. Behavior is notoriously resistant to change on the basis of knowledge alone. Consequently, this approach is not likely to provide a powerful deterrent to drug or alcohol abuse. As an adjunct to other fitness for duty approaches, however, employee awareness and education can contribute to a drug- and alcohol-free workplace.

An employee awareness and education program is a necessary component of drug testing and employee assistance programs (EAPs). Employees must be informed about the rationale for drug testing and about procedures for making referrals to the EAP. Employee awareness and education also provide further evidence of the seriousness with which management views fitness for duty issues.

In addition to these benefits, an employee awareness and education program can be developed to make use of the troubled employee's co-workers to detect potential fitness for duty problems. With training in behavioral observation, co-workers may be able to spot unusual behavior even before the employee's supervisor notices it. Or, co-workers may hear of drug use, alcohol abuse, or other employee problems that would not be detected by the supervisor until the problem had become so severe that public health and safety had been jeopardized. Although co-workers may be reluctant to report unusual behavior or potentially damaging information in a public manner, the availability of a confidential hotline can encourage them to report and provide management with an opportunity to investigate the problem. Knowing that his or her co-workers are trained to identify aberrant behavior also may serve to deter an employee from substance abuse.

IV. Frequency of Random Tests.

The purpose of random (unannounced) testing is to provide reasonable assurance that employees are fit for duty by identifying current drug users and by deterring drug users from further use or potential users from initial use. The frequency with which an individual is tested is relevant to both the identification and deterrence goals of the drug testing program. Generally, the more frequent the testing, the greater the deterrent effect and the better the detection capabilities. However, very frequent testing may result in unacceptable economic or social costs. Although there is no research upon which the testing frequency may be based, it seems reasonable to assume that:

° Any form of <u>unannounced</u> testing would provide some level of deterrence,

° Deterrence is related to either the actual or perceived probability of detection,

° The actual probability of detection is related to the type of drug, dose, frequency of use, rate of metabolism and excretion from the body, and the frequency of testing.

For example, the probability of detecting the use of marijuana, since it is metabolized slowly, is much greater than for alcohol, which is excreted in a matter of hours. Chronic users of marijuana would probably have the greatest probability of detection.

An individual ingesting a "typical" dose 5/ of marijuana (e.g., one cigarette) once each month would have a probability of detection of about 25 percent if the workforce was randomly tested at a rate equal to 100 percent during the year. More chronic or heavier use (i.e., once each week or 2 or 3 cigarettes each month) would raise the probability of detection to near 100 percent. If the workforce is randomly tested at a rate equal to 75 percent during the year, the probabilities of detection would be about 20 percent and 75 percent, respectively. If the rate of random testing is equal to 125 percent of the workforce, the probabilities of detection would be about 28 percent and 100 percent respectively.

An individual ingesting a "typical" dose of cocaine once each week would have a probability of detection of about 30 percent if the workforce was randomly tested at a rate equal to 100 percent during the year. If the workforce is randomly tested during the year at a rate equal to 75 percent, the probability of detection for weekly use of cocaine would be about 20 percent. If the workforce is randomly tested at a rate equal to 125 percent, the probability of detection would be about 35 percent.

5/ Since there are no quality controls in the drug culture, the quantity and purity of doses vary considerably.

With less frequent testing (e.g., 10 to 20 percent of workforce each year) the probability of detection for an individual becomes unacceptably small even for relatively frequent use. It should be noted that those utilities currently using random testing report between one and two percent positives associated with various rates of testing of the workforce. The DOT proposed anti-drug program proposes that each employer annually test, randomly, 125 percent of all airline employees involved in flight operations and maintenance (53 FR 8368).

To assure an acceptable probability of detection and adequate deterrence, the Commission proposes that random tests be conducted at a rate equal to 125 percent of the workforce subject to random testing in any 12 month period. This rate will provide assurance that approximately 75 percent of the individuals subject to testing are tested within any 12 month period. The Commission recognizes that these rates may need to be increased or decreased, possibly on a site-specific basis, as experience indicates. The Commission invites comments on the proposed testing rate and the basis for any future modifications.

V. Cutoff levels.

The selection of cutoff levels for declaring the result of a drug test to be "positive" and to take some personnel action is as much an issue of policy as science. Whereas the technologies of the test may permit very low cutoff levels under ideal situations, a cutoff level set slightly higher than the lowest that is technically feasible provides generally adequate sensitivity to identify abusers while providing a sufficient buffer to withstand challenges.

Prior to implementing a program to test urine for drugs of abuse, it is important to understand what information urine tests provide and how the results can be interpreted. Simply stated, urine test results provide information about the concentration of particular substances in the urine. The concentration of a drug or drug metabolite in the urine does not provide much information about pharmacologically active drugs in a person's system, nor does it provide information about impairment (Hawks, 1982). The concentration of a drug or drug metabolite in the urine is influenced by several factors; these

include the dose of the drug taken, the route of administration, frequency of use, and the time lapse from drug use to urine collection (Manno, 1986, Hawks & Chiang, 1986). The concentration is also influenced by several factors unrelated to drug use such as amount of liquid recently consumed, time since previous void, time of day (urine is more concentrated in the morning that later in the day), and recent dehydrating exercise. Hence, a positive confirmed test result indicates only that an individual has recently ingested the drug. A positive result does not provide information about frequency of use, pattern of use, addiction, legitimacy of use, or whether the person was under the influence of the drug when the urine sample was collected (Manno, 1986). Similarly, a negative test result only means that a person's urine sample did not have the drug or drug metabolite in sufficient concentration to give positive results (Manno, 1986). It does not necessarily provide information about whether or not the individual has ever used the drug or whether someone currently uses the drug infrequently (Hawks, 1986).

Because of the numerous factors that influence the concentration of a drug or drug metabolite in the urine and the levels of impairment in any individual (see previous discussion under section I, Impairment and reliability), it is not possible within the current state of the art to set cutoff levels that relate to a precise measurement of performance impairment. Research has been initiated and sometime in the future it may be possible to address determination of impairment based on serum analyses.

In developing the cutoff levels recommended in the proposed rule, the NRC considered what levels of the drug would be probably found several days after use and the sensitivities of the various analytical methods available. The NRC also considered the cutoff levels established by the Departments of Health and Human Services (HHS), Defense (DOD), and Transportation (DOT). The NRC recommends adoption of the cutoff levels described in the proposed "Scientific and Technical Guidelines for Federal Drug Testing Programs" issued by HHS on August 14, 1987 (52 FR 30638), except for marijuana and phencyclidine (PCP). In the case of marijuana, the NRC believes, as do some noted authorities in HHS, that there is unreasonable concern about passive inhalation and that lower cutoff levels are appropriate. In the case of PCP, the NRC proposes a higher

cutoff level for the initial screening test than HHS. The proposed level of 75 ng/ml would permit licensees to conduct all initial screening tests onsite should they wish to do so. Onsite testing would enhance safety through a capability to take action earlier, and there would be significant cost savings without adversely affecting safeguards afforded the employees.

The Commission understands that HHS is planning to revise some of the cutoff levels in the proposed Guidelines, i.e., initial screening tests of opiates would be raised from 300 to 320 ng/ml, confirmatory tests of marijuana would be lowered from 20 to 15 ng/ml, and confirmatory tests of amphetamines would be raised from 300 to 500 ng/ml. These revised cutoff levels are acceptable to the Commission should they be incorporated in the final published version of the HHS Guidelines. The Commission also understands that all of the test levels set by HHS are subject to change as warranted by advances in technology or other conditions. Any changes to the HHS Guidelines subsequent to final NRC rulemaking of fitness for duty programs will be considered and appropriate rulemaking taken to amend the NRC rules.

1. Marijuana metabolites.

An issue frequently raised when testing for marijuana metabolites is that a true positive test may result from passive inhalation. The HHS cutoff level of 100 ng/ml for initial screening tests is very unlikely to result in true positives due to passive inhalation. It should be noted that there is some disagreement on the level at which passive inhalation is a problem. While some authorities believe that a cutoff level of 20 ng/ml may be a problem, others believe that a cutoff level of 5 ng/ml would not encounter significant passive inhalation problems. Recent studies indicate that only under the most extreme conditions, i.e., prolonged exposure to high concentrations of marijuana smoke, would passive inhalation lead to a positive result at 20 ng/ml of the Enzyme Multiplied Immunoassay Technique (EMIT) test (Cone, E. J., et al., 1987).

Assay reliability at 20 ng/ml has been raised as another potential problem. Early EMIT tests were capable of detecting 50 ng/ml of marijuana metabolites in urine with 95 percent confidence (Peat, Findle, and Deyman, 1982).

Improvements have been made in the EMIT test, however, and a number of clinical studies indicate that false positives are no longer a problem at the 20 ng/ml level (L. J. McBurney, B. A. Bobbie, L. A. Sepp, 1986). In fact, some studies show an unnecessarily high level of false negatives when higher cutoff levels are used (Kogan, Razi, Pierson, and Wilson, 1986).

The NRC has been informed that the confirmatory test cutoff level for marijuana set by HHS will be lowered from 20, as described in the proposed guidelines, to 15 ng/ml. Gas chromatography coupled with mass spectrometry (GC/MS) can accurately measure at 5 ng/ml with this highly accurate and specific testing method. The NRC proposes a cutoff level of 20 ng/ml for initial screening tests for marijuana, and a cutoff level of 15 ng/ml for confirmatory tests.

2. Cocaine metabolites.

The initial and confirmatory cutoff levels as set forth by HHS (300 ng/ml initial; 150 ng/ml confirmatory) are sufficiently low due to the fact that regular users would test at a much higher level, e.g., 10,000 ng/ml at peak concentration for a normal user of cocaine. DOD has established a new confirmatory c toff level of 100 ng/ml. EMIT tests will remain positive for 18-27 hours after use (Verebey, 1987).

The NRC considered lower cutoff levels and concluded that there are several problems associated with use of a much lower confirmatory level -- 25 ng/ml. The problems primarily relate to sample deterioration. Specifically, the problem exists because the assay technique for cocaine measures by-products of the metabolite, which continue to be released even in properly stored (frozen) urine. A test of the same specimen performed several months later, perhaps due to a legal appeal, could very possibly yield a higher result over time due to the continued release of by-products. The chance of accurate reconfirmation of the identical level at some later date is very slim. This could cast doubt upon the reliability, validity, and quality controls of the testing laboratory. The higher cutoff levels include a significant cushion to assure that sample deterioration is not an issue.

3. Opiates.

The fundamental problem with opiate testing is dietary consumption of substances and the use of over-the-counter drugs that yield true positives (e.g., poppy seeds). Testing someone who took some cough syrup or ate a poppy seed roll prior to the test could yield a true positive that was not due to drug use. For instance, a person who consumed a normal dosage of cough syrup prior to the test could have concentrations of 10,000 ng/ml in their urine. A person who ate a moderate amount of poppy seeds could have opiate concentrations of 1,700 ng/ml.

The cutoff level for initial screening tests for opiates is expected to be set by HHS at 320 ng/ml; with morphine set at 325 ng/ml rather than the 300 ng/ml in the proposed HHS Guidelines. Regular users would have much higher concentrations. For example, a person who has been given morphine as medication would have an approximate level of 4,000 ng/ml; for codeine medication the level would be 2,000 ng/ml.

The NRC considered a much lower confirmatory test level than the 300 ng/ml set by HHS, i.e., 25 ng/ml, but concluded that such a level greatly increases the risk of true positives due to dietary consumption of an opiate, not necessarily illicit drug use. Chronic drug users of opiates would be likely to have much higher concentrations in their systems, e.g., for codeine the level would be 30,000 ng/ml. Also, there would be no discernible physiological effect at 25 ng/ml; further, the technical requirements to assure sensitivity and validity at this level would be very stringent. The NRC proposes to adopt the cutoff levels set by HHS for both initial screening and confirmatory tests. To provide further protection against true positives due to dietary consumption of an opiate, the Commission is proposing that a Medical Review Officer review and interpret positive confirmatory test results as provided in the HHS Guidelines.

4. Phencyclidine (PCP).

A typical user would have concentrations of 500-600 ng/ml. The NRC proposes of a cutoff level of 75 ng/ml for initial screening tests, although the HHS levels

of 25 ng/ml would permit detection for a slightly longer period of time. The NRC-proposed cutoff level, based on the technical limits of the EMIT test, would permit licensees to do all initial screening tests onsite, as many are doing currently. The onsite testing greatly reduces the cost of testing, reduces the probability of errors occurring because the only samples shipped offsite are for confirmation tests. Onsite testing facilitates earlier detection and action concerning an employee who may constitute a potentia hazard to public health and safety.

5. Amphetamines.

The fundamental problem with cutoff level determinations for amphetamines is the potential for cross-reactivity and true positives due to over-the-counter drugs. In light of this, HHS is expected to be raising its cutoff levels from 300 to 500 ng/ml for confirmatory tests. At this time, the NRC will adopt the 300 ng/ml level, and will adopt the 500 ng/ml level should HHS set this level in the final HHS Guidelines. A regular user of amphetamines would have urinary concentrations of 5,000-20,000 ng/ml. Assay techniques should determine both di- and meth-amphetamine use.

The HHS cutoff level of 1,000 ng/ml for initial screening tests is proposed by the NRC for amphetamines. The current assay techniques are sensitive well below this level. However, many over-the-counter substances contain amphetamines; lower initial cutoff levels e.g., 300 ng/ml, may result in 1/3 or 1/4 of the samples showing true positive results due to over-the-counter drug use.

6. Alcohol.

Alcohol is a drug whose effects are well known and documented, yet different jurisdictions have set different levels between 0.05 and 0.10 percent alcohol in the blood at which one is considered <u>legally</u> impaired. Studies have shown that impairment depends on many factors unique to each individual, that impairment can exist at 0.04 or 0.05 percent alcohol in the blood, and that an upper limit of 0.05 percent is reasonable given the impairing effects of

alcohol.

The effects of alcohol may be felt prior to reaching peak blood alcohol concentration (BAC) levels in the body. In one study, researchers found that the time to peak BAC was an average of 24 minutes later than the time to peak alcohol effect (Radlow and Hurst, 1985).

Performance decrements due to alcohol consumption can occur at relatively low BAC levels. One study which measured skills performance (divided attention and information processing) at low BAC levels showed evidence of impairment beginning at 0.015 percent BAC and increased impairment with increasing BAC levels (Moskowitz et al., 1085). One interesting note on this study is that the subjects were 10 males averaging 25 years of age, all moderate drinkers. According to epidemiological studies this group is relatively resistant to the effects of alcohol; thus it is anticipated that greater degrees of impairment at BAC levels between 0.015 and 0.06 percent would typically exist for younger, older, and less frequent drinkers (Moskowitz et al., 1985).

A review of literature on physiological studies of low BAC levels show that the amplitude and velocity of smooth pursuit eye movements and saccadic eye movements are reduced by alcohol. These changes are physiologically significant at a BAC level of 0.05 percent (Linnoila et al., 1986). Smooth eye pursuit and saccadic eye movements have been shown to play a significant role in visual information processing (Flom et al., 1976).

In a recent review of the literature for the aviation industry it was concluded that significant impairment is generally noted at the 0.04 to 0.05 percent

levels and that experience did not compensate for performance degradation resulting from alcohol use. The review also included studies of simulated aviation flight, which showed that decremental effects on performance occurred in terms of aircraft position errors and procedural errors during the approach phase of landing, instrument flight involving standard maneuvers, and other work load measures at all BAC levels between 0.02 and 0.09 percent BAC (Ross and Ross, 1985). Another study (Clayton, 1980) reported significant impairment of driving skills at the 0.04 to 0.05 percent levels, while a more recent study (Moscowitz, 1985) reports significant impairment of perception at even lower levels of blood alcohol.

The FAA prohibits any person from acting as a crewmember of an aircraft while having 0.04 percent by weight or more alcohol in the blood (14 CFR 91.11). In addition, the Council on Scientific Affairs of the American Medical Association has endorsed the 0.05 percent cutoff limit for driving (COSA, 1986). In one recent analysis of the deterrent effects of reducing the legal limits for blood alcohol from 0.08 to 0.05 percent, a 14 percent reduction in fatalities associated with drinking and driving was noted.

Several statements may be made regarding a BAC level of 0.05 percent and consequent impairment:

- BAC levels in general are highly correlated with accident risk and are a major causal factor of serious accidents (O'Hanlon et al., 1986).

- There is growing consensus that a BAC level of 0.05 percent impairs cognitive and task performance in a variety of measurable forms such as skills performance and physiologic indices.

- Performance decrements at low BAC levels (0.015-0.06 percent) in a dose-related manner have been demonstrated (cf. Moskowitz et al., 1985). BAC levels above 0.04 percent are associated with an accelerated risk of causing accidents (O'Hanlon et al., 1986). However, it may be reasonably

assumed that even lower BAC levels (0.01-0.05) percent) potentially increase the risk of accident. Some researchers have recommended that a zero BAC level be established for tasks requiring complex cognitive and physical performance.

° Accident rates among persons with a BAC level of 0.05 percent are significant as measured by automobile accidents, aviation accidents, industry surveys, as well as general population studies, experimental research, and clinical studies.

° Impairment of cognitive and task performance at the BAC level of 0.05 percent and higher has significant implications for power plant safety, and is thus a legitimate concern for fitness-for-duty policy development.

The Commission proposes a cutoff level of 0.05 percent blood alcohol, which is consistent with both expert opinion and the available evidence.

7. Issues with very low cutoff levels.

Current assay techniques can accurately test for substance presence at much lower levels than set by HHS or DOD. However, there are fundamental questions concerning quality controls of applied testing on a massive scale, e.g., test reliability, carryover from one assay to another, and sample handling and storage. For example, the gas chromatography coupled with mass spectrometry (GC/MS) method essentially produces a fingerprint of the drug or metabolite. However, the assay requires an "internal standard"--a deuterated sample 6/ of the drug or metabolite. Some percentage of this added internal standard (approximately 7 percent) will not have been deuterated and will thus show up as a drug or metabolite. This can be subtracted out of the reading but at low cutoff levels this adjustment may exceed reasonable/normal deviations for the test itself. Thus, the purity of the internal standard poses problems for using very low cutoff levels. Also, there is variation in the extraction

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6/ A sample that is deuterated is a pure drug altered in order to increase its molecular weight without changing how the substance behaves under extraction, derivation, or chromotography procedures. The technique involves replacing a few hydrogen atoms on the drug molecule with deuterium atoms.

procedures, and only 75-80 percent of the drug or metabolite may be extracted. The internal standard can be used to adjust for this variation but within limits.

The presence of target substances due to the ingestion of legal substances, or in the case of marijuana, passive inhalation, can be detected through low cutoff levels. These alternate sources for true positive results are important to consider in setting legally defensible cutoff levels.

Finally, technical and legal implications of these issues could pose a problem. For example, THC (marijuana) deteriorates in samples even when stored properly and the cocaine metabolites may increase. The process of establishing low cutoff levels must address the problem of sample deterioration and reconfirmation at a later date. In general, the lower the cutoff level, the more difficult it will be to reconfirm. Although assay technology is sufficiently precise in a controlled and regulated setting, the fundamental issue is whether the technology can be performed at 100 percent of its capability at all times.

A general rule of thumb used by the DOD for determining legally defensible and practical cutoff levels is to double the detection limit of the specific assay technique. That is, the DOD requires that an assay be able to detect concentrations of drug or metabolite in the urine at 50 percent of the set cutoff level. While not "scientific" in its basis, it is probably practical in its anticipation of problems in the legal process.

VI. Number of positive tests.

A significant policy issue associated with fitness for duty programs involves the question of how many confirmed positive tests should be allowed on any one individual before mandating action, such as removal from a safety sensitive job.

One approach is to establish a "zero tolerance" for drugs; any involvement with drugs results in mandatory removal from nuclear safety duties. With this

approach, all violations of policy have equal severity; onsite use would have the same consequences as offsite use. Furthermore, any previous offsite use admitted during Employee Assistance Program (EAP) counseling would also result in mandatory removal, which would have a severe adverse impact on the effectiveness of the EAP.

Another approach is to permit licensees to determine on a case-by-case basis what sanctions, if any, will be imposed. Inconsistencies in the actions taken would probably result at the site level or between licensees, and leave fitness for duty programs vulnerable to challenges through legal proceedings.

The NRC believes public health and safety can be well served if employees are encouraged to voluntarily seek help before their problem is manifested in observable abnormal behavior.

The approach proposed by the NRC is a "zero tolerance" for any involvement with alcohol or illegal drugs within protected areas. Any offsite use of drugs would result in mandatory removal from activities within the scope of the proposed rule until such time as a determination is made that the person is fit for duty. A second positive test would result in the removal from activities within the scope of the proposed rule for a minimum of three years. To ensure that personnel actions are based upon accurate information and to provide safeguards for employees, the NRC proposes final review of test results by a Medical Review Officer as described in the "Scientific and Technical Guidelines for Federal Drug Testing Programs" issued by HHS (August 14, 1987; 52 FR 30638).

Section-by-Section Analysis

To accomplish these objectives, the Commission is proposing to amend its regulations by adding a new Part 26 to Title 10, Code of Federal Regulations. The following section-by-section analysis of the principal sections provides additional explanatory information.

Section 26.2 Scope

This section sets out the Commission's proposal as to the employee and contractor population to whom the regulation, including random testing applies.

The Commission proposes that the rule apply to all persons with unescorted access to protected areas, and to licensee or contractor personnel required to respond to the licensees' Technical Support Center (TSC) or Emergency Operations Facility (EOF). These latter categories of personnel were added because of the potential impact on public health and safety that could arise from human failure on their part.

Section 26.10 General performance objectives

This section is intended to facilitate proper management of fitness for duty programs by establishing clear program goals.

Section 26.20 Written policy and procedures

This section requires the establishment and implementation of written policies and procedures to ensure that all persons clearly understand what is expected of them and what consequences may result from violation of company policy.

Section 26.21 Policy communication and awareness training

This section requires appropriate training to ensure understanding of the policy, how the program will function, and the hazards associated with abuse of alcohol and drugs. This section is intended to ensure that all persons understand and support the program and its implementation.

Section 26.22 Training of supervisors and escorts

This section requires appropriate training of supervisors and escorts to ensure they understand their role in the implementation of the fitness for duty program, to ensure that they are sufficiently skilled to detect conditions that

arise from abuse or presence of alcohol or drugs, and to ensure that the proper action is initiated.

Section 26.23 Contractors

This section requires that contractor personnel be subject to, and abide by, a fitness for duty program. Furthermore, contractors are required to not assign any personnel previously removed from any other nuclear power plant without the knowledge and consent of the licensee.

Section 26.24 Chemical testing

This section requires that chemical testing be conducted to deter and detect drug abuse. Tests would be required:

- Before the initial granting of unescorted access to protected areas or assignment to activities within the scope of this part;
- On a random basis;
- For-cause; and
- Follow-up to verify abstention

The testing is required because the Commission is concerned with the possible impact on public health and safety if individuals, whose reliability is questionable because of impairment due to the use of alcohol or other drugs, are permitted to perform important tasks, such as manipulating control mechanisms or conducting maintenance on facility equipment or systems.

For-cause testing is required after accidents involving actual or potential substantial degradation of the level of safety of the plant. This is the level of event characterized by the development of an "alert" emergency class.

This section adopts the "Scientific and Technical Guidelines for Federal Drug Testing Programs" issued by the Department of Health and Human Services for procedures for collecting and testing of specimens and for ensuring the integrity of the testing program. The Commission proposes to adopt a cutoff level of 20 ng/ml for an initial screening test of marijuana (believing that

concern for passive inhalation should not result in establishing an unreasonably high cutoff level), and a cutoff level of 75 ng/ml for an initial screening test of phencyclidine (PCP) which would permit onsite testing.

This section permits licensees to conduct initial screening tests onsite and requires, through the HHS guidelines, that a medical review officer review and interpret positive, confirmatory test results.

Section 26.25 Employee Assistance Programs (EAP)

This section requires licensees to maintain an EAP designed to achieve early intervention and to encourage self-referral. This section stipulates that confidentiality shall be extended, except where safety considerations must prevail.

Section 26.27 Management actions and sanctions to be imposed

This section requires that management:

- Complete a suitable inquiry to determine if any person was ever removed from activities within the scope of the proposed rule or denied unescorted access due to not being fit for duty.
- Determine whether persons should be suspended from unescorted access to protected areas and from activities within the scope of the proposed rule following a presumptive positive result of any initial screening test.
- Remove from activities within the scope of the proposed rule for a minimum of three years, those persons having a second confirmed positive,
- Not assign to activities within the scope of the proposed rule, those persons determined to have been involved in sale, use, or possession of illegal drugs within a protected area.

Section 26.28 Appeals

This section requires that there be an appeal process in accordance with due process and fundamental fairness considerations so that adverse findings as a result of the required testing program may be subject to further review at the

instigation of the person found to test positive for proscribed substances. Rather than dictate what that appeal procedure should be, the Commission has limited itself to proposing that there be an appeal procedure and that the collective bargaining agreement grievance procedures may be a suitable means of providing for appeal.

Section 26.29 Protection of information

This section requires the licensee to insure that personal privacy is protected to the extent possible, consistent with the need to carry out the fitness for duty program. Accordingly, specific exceptions to the information disclosure prohibition are provide for. This list of exceptions is considered to be inclusive and no other disclosures should be made. If disclosure of the information is necessary for emergency medical purposes, it is assumed that the individual, or his/her representative, can provide the basis for such release. Regardless, it is not the intent of this provision to in any way create potential harm to anyone through nondisclosure during a medical emergency.

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Regulatory Analysis

The Commission has prepared a regulatory analysis for this rule. The analysis examines the costs and benefits of the rule as considered by the Commission. A copy of the regulatory analysis is available for inspection and copying for a fee at the NRC Public Document Room, 1717 H Street, NW, Washington, DC 20555.

Paperwork Reduction Act Statement

This proposed rule amends information collection requirements that are subject to the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). This rule has been submitted to the Office of Management and Budget for review and approval of the paperwork requirements.

Environmental Assessment and Finding of No Significant Environmental Impact

Identification of Proposed Action: The proposed rule would require licensees authorized to operate nuclear power reactors to implement a fitness for duty program whose general objective is to provide reasonable assurance that activities associated with nuclear power plant operations are carried out in an environment which is free of the effects of alcohol and drug abuse. Under the proposed rule, testing for impermissible drug use would be conducted prior to authorizing unescorted access to protected areas or assignment to other activities within the scope of the proposed rule, randomly for such licensee and contractor personnel, after certain operational events, based on reasonable cause, and to verify continued abstention. In addition, the proposed rule provides for other basic fitness for duty program elements such as the development of written policy and procedures, provisions for the training of supervisors and employees, standards for drug testing, management actions, and requirements for employee assistance programs and appeal procedures.

The Need for the Proposed Action: The Nuclear Regulatory Commission recognizes drug and alcohol abuse problems to be a social, medical, and safety problem affecting every segment of our society. Given the pervasiveness of the problem, prudence indicates that the Commission consider measures that would continue to reasonably assure that the effects of alcohol and drugs do not adversely affect the public health and safety.

The Commission recognizes and appreciates the significant efforts already undertaken by the Nuclear Utility Management and Resources Council (NUMARC), the Institute of Nuclear Power Operations (INPO), and the Edison Electric

Institute (EEI), and each nuclear power reactor licensee in developing and implementing fitness for duty programs for nuclear power plant personnel. Nevertheless, the Commission's evaluation of experience gained since its policy statement was published in the Federal Register on August 4, 1986, indicates that rulemaking is now appropriate to achieve further improvements.

Environmental Impacts of the Proposed Action: The proposed rule would require certain management actions and procedures intended to minimize the probability of human error that could endanger the public health and safety. Although these activities would have a social and economic impact, the impact on the environment would be positive in that there would be some reduction in the probability of a radioactive release due to human error by a person impaired from the effects of alcohol or drugs.

Alternatives to the Proposed Action: The principle alternative would be to take no action and continue to use the Commission's policy statement of August 4, 1986 (51 FR 27921). Since the Commission has concluded that no adverse environmental effects are associated with this proposed action, any alternatives with equal or greater environmental impact need not be evaluated.

Alternative Use of Resources: This action involves the use of health care professionals and facilities not previously considered in connection with the Final Environmental Statements related to any licensed facilities.

Agencies and Persons Consulted: The NRC staff considered numerous documents which are listed in the above bibliography, met with representatives from NUMARC and four unions (The International Brotherhood of Electrical Workers, The International Union of Operational Engineers, the Oil, Chemical and Atomic Workers Union, and the Building and Construction Trades Department of the AFL-CIO), the Federal Aviation Administration, the National Institute on Drug Abuse, and Battelle Human Affairs Research Center.

Findings of No Significant Impact: The Commission has determined under the National Environmental Policy Act of 1969, as amended, and the Commission's regulations in Subpart A of 10 CFR Part 51, that this rule, if adopted, would

not be a major Federal action significantly affecting the quality of the human environment and therefore an environmental impact statement is not required.

Regulatory Flexibility Act Certification

In accordance with the Regulatory Flexibility Act of 1980, 5 U.S.C. 605(b), the Commission hereby certifies that this rule will not have a significant economic impact on a substantial number of small entities. The proposed new 10 CFR Part 26 applies to certain owners and operators of civilian nuclear power reactors and their contractors. The companies that own these facilities do not fall within the scope of "small entities" set forth in the Regulatory Flexibility Act or the small business size standards set out in regulations issued by the Small Business Administration in 13 CFR Part 121. Any costs to the minor number of small entities affected, i.e., contractors, will apply only to those contractor employees working at the nuclear power reactors, and would probably be reimbursed through the contract.

List of Subjects in 10 CFR Part 26

Fitness for duty, Chemical testing, Drug testing, Employee Assistance Programs, Management actions, Sanctions, Appeals, Protection of information, Recordkeeping requirements, Reporting requirements.

For the reasons set out on the preamble and under the authority of to the Atomic Energy Act of 1954, as amended, the Energy Reorganization Act of 1974, as amended, and 5 U.S.C 553. The NRC is proposing to adopt new 10 CFR Part 26.

Part 26 -- Fitness for Duty Programs

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Authority: Secs. 53, 81, 103, 104, 107, 161, 68 Stat. 930, 935, 936, 937, 939, 948, as amended (42 U.S.C. 2073, 2111, 2112, 2133, 2134, 2137, 2201); secs. 201, 202, 206, 88 Stat. 1242, 1244, 1246, as amended (42 U.S.C. 5841, 5842, 5846).

For the purposes of sec. 223, 68 Stat. 958, as amended (42 U.S.C. 2273) §§ 26.21, 26.23, 26.25, and 26.27, are issued under secs. 161b and i, 68 Stat. 948, and 949 as amended (42 U.S.C. 2201(b) and (i)); 26.73 is issued under sec. 161o, 68 Stat. 950, as amended (42 U.S.C. 2201(o)).

General Provisions

§ 26.1 Purpose.

This part prescribes requirements and standards for the establishment and maintenance of fitness for duty programs and procedures by the licensed nuclear industry.

§ 26.2 Scope.

The regulations in this part apply to licensees authorized to operate a nuclear power reactor. Each licensee shall implement a fitness for duty program which complies with all sections of this part. The provisions of the fitness for duty program must apply to all persons granted unescorted access to protected areas, and to licensee or contractor personnel required to respond to a licensee's Technical Support Center (TSC) or Emergency Operations Facility (EOP) in accordance with licensee emergency plans and procedures. The regulations in this part do not apply to NRC representatives, law enforcement personnel, and offsite emergency fire and medical response personnel while on official duty.

The requirements in this part must be implemented by each licensee authorized to operate a nuclear power reactor no later than (insert date 90 days after publication of final rule), except for the requirements to implement random drug testing contained in § 26.24, which must be implemented no later than (insert date 180 days after publication of final rule).

§ 26.3 Definitions.

"Commission" means the Nuclear Regulatory Commission or its duty authorized representatives.

"Confirmatory test" means a second test following the "initial screening test" that is very specific, very reliable, and at least as sensitive as the initial screening test.

"Cutoff level" means the value set for designating a test result as positive.

"Drug abuse" means any wrong or improper use of drugs in the absence of medical supervision.

"Follow-up testing" means chemical testing at unannounced intervals, during or as follow-up to treatment, to ensure that an employee is maintaining abstinence from the previously identified abuse of alcohol or drugs.

"For-cause testing" means chemical testing at the request of a supervisor, or other responsible management official, based upon reasonable suspicion that a person is impaired or may have used alcohol or drugs.

"Impairment" means deficient or diminishing on-the-job performance resulting from physical or psychological stressors, that may include abuse of alcohol or drugs. For the purposes of this rule, impairment is implied whenever a test result exceeds any established cutoff level.

"Initial screening test" means a series of initial tests designed to separate specimens with concentrations of drugs or metabolites above the cutoff level (presumptive positive test result) from those below the cutoff level (negative test result).

"Positive test result" means an assay result indicating that alcohol, drug, or drug metabolite were found in a specimen at or above cutoff levels.

"Presumptive positive" means an unconfirmed positive test result based only on an initial screening test.

"Random test" means a system of unannounced drug testing imposed in a statistically random manner to a group so that all persons within that group have an equal probability of selection.

"Unannounced testing" means unannounced random tests.

§ 26.4 Interpretations.

Except as specifically authorized by the Commission in writing, no interpretation of the meaning of the regulations in this part by any officer or employee of the Commission other than a written interpretation by the General Counsel will be recognized to be binding upon the Commission.

§ 26.6 Exemptions.

The Commission may, upon application of any interested person or upon its own initiative, grant such exemptions from the requirements of the regulations in this part as it determines are authorized by law and will not endanger life or property or the common defense and security and are otherwise in the public interest.

§ 26.7 Information collection requirements: OMB approval.

(a) The Nuclear Regulatory Commission has submitted the information collection requirements contained in this part to the Office of Management and Budget (OMB) for approval as required by the Paperwork Reduction Act of 1980 (44 U.S.C. 3501 et seq.). OMB has approved the information collection requirements contained in this part under control number_____.

(b) The approved information collection requirements contained in this part appear in §§ 26.29, 26.71 and 26.73.

General Performance Objectives

§ 26.10 General performance objectives.

Fitness for duty programs shall:

(a) Have a goal of achieving a drug- and alcohol-free workplace and a workplace free of the effects of these substances;

(b) Provide reasonable assurance that nuclear power plant personnel are not under the influence of any substance, legal or illegal, which in any way affects their ability to safely and competently perform their duties; and

(c) Provide reasonable measures for the early detection of persons who are not fit to perform activities within the scope of this part and for the prevention of conditions adverse to safety that could result from the use of alcohol or drugs.

Program Elements and Procedures

§ 26.20 Written policy and procedures.

Each licensee subject to this part shall establish and implement written policies and procedures designed to meet the general performance objectives and

specific requirements of this part. As a minimum, written policies and procedures shall include the following:

(a) An overall description of licensee policy on fitness for duty, including policy on alcohol and drug abuse. Written policy documents shall be in sufficient detail to provide affected individuals with information on licensee rules, what is expected of them, and what consequences may result from lack of adherence to the policy.

(b) A description of programs which are available to personnel desiring assistance in dealing with drug, alcohol, and other health problems that could adversely affect the performance of activities within the scope of this part.

(c) Procedures to be utilized in testing for alcohol and drugs, including procedures for employee protections and sample quality controls.

(d) A description of immediate and follow-on actions which will be taken, and the procedures to be utilized, in those cases where employees or contractors assigned to duties within the scope of this part are determined to have been involved in the abuse of alcohol; the use, sale, or possession of illegal drugs; or are otherwise considered to be unfit for duty.

§ 26.21 Policy communications and awareness training.

(a) Persons assigned to activities within the scope of this part shall be provided with appropriate training to ensure they understand --

(1) Licensee policy and procedures, including the methods that will be used to implement the policy;

(2) The personal and public health and safety hazards associated with abuse of alcohol and drugs;

(3) The effect of prescription and over-the-counter drugs and dietary conditions on drug test results, and the role of the Medical Review Officer;

(4) Employee assistance programs provided by the licensee; and

(5) What is expected of them and what consequences may result from lack of adherence to the policy,

(b) Initial training must be completed prior to assignment to activities within the scope of this part. Refresher training must be completed on an annual basis, or more frequently where the need is indicated.

§ 26.22 Training of supervisors and escorts.

(a) Managers and supervisors of activities within the scope of this part shall be provided appropriate training to ensure they understand --

(1) Their role and responsibilities in implementing the program;

(2) The roles and responsibilities of others, such as the personnel, medical, and EAP staffs;

(3) Techniques for recognizing drugs, indications of the use, sale, or possession of drugs, and indications of the abuse of alcohol;

(4) Behavioral observation techniques for detecting degradation in performance, impairment, or changes in employee behavior (in the case of escorts, this shall cover detection of impairment); and

(5) Procedures for initiating appropriate corrective action, to include referral of employees for counseling or treatment (in the case of escorts, this shall cover reporting to appropriate management).

(b) Initial training must be completed within 3 months of initial supervisory assignment. Refresher training shall must be completed on an annual basis, or more frequently where the need is indicated.

§ 26.23 Contractors.

All contractor personnel performing activities within the scope of this part for a licensee must be subject to either the licensee's fitness for duty program, or to a program, formally reviewed and approved by the licensee, which meets the standards of this regulation. Written agreements between licensees and contractors for activities within the scope of this part will clearly show that --

(a) The contractor is responsible to the licensee for adhering to the fitness for duty policy; and

(b) Personnel having been denied access or removed from nuclear safety activities at any nuclear power plant for violations of a fitness for duty policy will not be assigned to contracted work without the knowledge and consent of the licensee.

§ 26.24 Chemical testing.

(a) To provide a means to deter and detect drug abuse, the licensee shall implement the following chemical testing programs for persons subject to this part:

(1) Testing before the initial granting of unescorted access to protected areas or assignment to activities within the scope of this part.

(2) Unannounced tests imposed in a random manner. The tests must be administered so that a person completing a test is immediately eligible for another unannounced test. The tests must be conducted at a rate equal to 125 percent of the workforce subject to random testing in any 12 month period.

(3) Testing for-cause, i.e., immediately following any observed behavior indicating alcohol or drug abuse; after accidents involving a failure in individual performance resulting in personal injury, in a radiation exposure or release of radioactivity in excess of regulatory limits, or actual or potential substantial degradations of the level of safety of the plant; or after receiving credible information that an individual is abusing drugs or alcohol. In addition to tests for drugs, tests for alcohol shall be included in all for-cause tests.

(4) Follow-up testing on a random basis to verify continued abstention from the use of alcohol and/or drugs, as applicable.

(b) The primary body fluid to be tested for drugs shall be urine. The primary method of testing for the presence of alcohol shall be a breath measurement device.

(c) Testing programs must meet the "Scientific and Technical Guidelines for Federal Drug Testing Programs" issued by the Alcohol, Drug Abuse, and Mental Health Administration of the Department of Health and Human Services (Proposed at 52 FR 30638), hereinafter referred to as the HHS Guidelines, except as follows:

(1) Specimen Collection Procedures:

To provide for appeals, specimens must be split immediately after collection. A portion of the specimen sufficient for later testing must be retained and protected for the employee's and employer's benefit, to the standards for forensic evidence. The retained specimen may be disposed of following a negative test result. If the test result is positive, the retained specimen must be retained until used for retesting, or all matters and any appeals have been completed, as applicable.

(2) Laboratory Analysis Procedures:

(i) Cutoff levels for initial screening tests must be --

Marijuana metabolites	20 ng/ml
Phencyclidine (PCP)	75 ng/ml

Cutoff levels set by HHS for other drugs shall be utilized.

(ii) Cutoff levels for confirmatory tests must be --

Marijuana metabolites	15 ng/ml

Cutoff levels set by HHS for other drugs must be utilized.

(iii) Cutoff levels for alcohol shall be 0.05 percent by weight alcohol in the blood.

(iv) In addition to testing for the five drugs or classes of drugs specified in the HHS Guidelines, licensees shall consult with local law enforcement authorities and drug counseling services to determine whether any other drugs are being used in the geographical locale of the facility and workforce communities. Where appropriate, other drugs so identified must be added to the list of drugs being tested. Conservative cutoff limits must be established by the licensee for these drugs.

(v) All testing need not be conducted in a single laboratory. The conduct of initial screening tests by licensees is acceptable, provided the licensee staff possesses the necessary training and skills for the tasks assigned, their qualifications are documented, and adequate quality controls are implemented. To limit the probability of false negative tests, quality control procedures must include the submission of a sampling of specimens initially tested as negative to a laboratory meeting the requirements contained in § 26.24(d) for confirmation testing.

(vi) Testing facilities used for initial screening tests by licensees need not have a Scientific Director, Certifying Scientist, or a Supervisor possessing skills comparable to a Medical Technologist as described in the HHS Guidelines. However, licensees shall designate a Medical Review Officer meeting the criteria described in the HHS Guidelines, who shall be responsible for the review and interpretation of positive confirmatory test results, including those due to dietary consumption or prescribed use of drugs.

(d) Laboratories, except facilities used for initial screening tests by licensees, shall meet the standards described in the HHS, "Standards for

Certification of Laboratories Engaged in Urine Drug Testing for Federal Agencies." (Proposed at 52 FR 30638, 30643 - 30652).

§ 26.25 Employee Assistance Programs (EAP).

Each licensee subject to this part shall maintain an Employee Assistance Program to strengthen fitness for duty programs by offering assessment, short-term counseling, referral services, and treatment monitoring to employees for drug, alcohol, and other health problems that could adversely affect the performance of activities within the scope of this part. EAPs should be designed to achieve early intervention and provide for confidential assistance (except where safety considerations must prevail). EAP staff shall inform licensee management when a determination has been made that a self-referring employee's condition constitutes a hazard to himself or herself or others.

§ 26.27 Management actions and sanctions to be imposed.

(a) Prior to the initial granting of unescorted access to a protected area or the assignment to activities within the scope of this part to any person, the licensee shall obtain a written statement from the individual as to whether activities within the scope of this part were ever denied the individual and shall complete a suitable inquiry to determine if that person was, in the past, removed from such activities or denied unescorted access at any other nuclear power plant in accordance with a fitness for duty policy. If such a record is established, the new assignment to activities within the scope of this part or granting of unescorted access must be based upon a management and medical determination of fitness for duty and the establishment of an appropriate follow-up testing program, provided the restrictions of paragraphs (c) and (d) of this section are observed.

(b) A presumptive positive result of any initial screening test (whether for-cause, for initial assignment, or as a result of random testing) must result in immediate notification of licensee management for a determination on suspension of unescorted access to protected areas, and from activities within the scope of this part, pending results of the confirmation test and medical review. A confirmatory test shall be completed and results provided licensee management within 48 hours of the presumptive positive determination.

(c) A confirmed positive test result, lacking any other evidence to the contrary, shall be presumed to be an indication of offsite drug use. The first

confirmed positive test result shall result in immediate removal from activities within the scope of this part and referral to the EAP for counseling and rehabilitation, if appropriate. Satisfactory management and medical assurance of the individual's fitness to adequately perform activities within the scope of this part shall be obtained before permitting the individual to be returned to these activities. Any subsequent confirmed positive test result, based upon routine or follow-up random testing or for-cause testing, shall, as a minimum, result in removal from activities within the scope of this part for a minimum of three years from the date of removal.

(d) Any individual determined to have been involved in the sale, use, or possession of illegal drugs while within a protected area of any nuclear power plant shall be removed from activities within the scope of this part. The individual may not be assigned to activities within the scope of this part for a minumum of five years from the date of removal.

(e) If a licensee has reasonable belief that an NRC employee may be under the influence of any substance, or otherwise unfit for duty, the licensee may not deny access but may escort the individual. In any instance of this occurrence, the appropriate Regional Administrator shall be notified immediately by telephone. During other than normal working hours, the NRC Operations Center shall be notified.

§ 26.28 Appeals.

Each licensee subject to this part shall establish a procedure for employees and contractor/vendor employees to appeal fitness for duty determinations that could have an adverse effect on the individual's employment. The procedure must provide notice and an opportunity to respond and be consonant with fundamental principles of due process. Where applicable, grievance review procedures contained in collective bargaining agreements covering the bargaining unit of which the employee is a member will normally meet this requirement, and they may be used for this purpose whether or not the administrative action taken is a grievable action under the contract.

§ 26.29 Protection of information.

(a) Each licensee subject to this part, who collects personal information on an employee for the purpose of complying with this part, shall establish and

maintain a system of files and procedures for the protection of the personal information.

(b) The licensee shall not disclose the personal information collected and maintained to persons other than assigned medical review officials, other licensees legitimately seeking the information as required by this part for employment decisions and who have obtained a release from current or prospective employees or contractor personnel, NRC representatives, appropriate law enforcement officials, the subject individual or his or her representative, or to those licensee personnel who have a need to have access to the information in performing assigned duties.

Inspections, Records, and Reports

§ 26.70 Inspections.

(a) Each licensee subject to this part shall permit duly authorized representatives of the Commission to inspect its records, premises, activities, and personnel as may be necessary to accomplish the purposes of this part.

(b) Written agreements between licensees and their contractors will clearly show that the --

1. Licensee is responsible to the Commission for maintaining an effective fitness for duty program in accordance with this part; and

2. NRC may inspect, copy, or take away copies of any licensee or contractor documents, records, and reports related to implementation of the licensee's or contractor's fitness for duty program under the scope of the contracted activities.

§ 26.71 Recordkeeping requirements.

Each licensee subject to this part shall --

(a) Retain records of confirmed positive test results which are concurred in by the Medical Review Officer, and the subsequent personnel actions for a period of at least three years; and

(b) Retain records of persons made ineligible for assignment to activities within the scope of this part under the provisions of 10 CFR 26.27(d), for a period of at least five years.

§ 26.73 Reporting requirements.

Each licensee subject to this part shall inform the Commission of fitness for duty events and conditions in accordance with the provisions of § 73.71.

Enforcement

§ 26.90 Violations.

(a) An injunction or other court order may be obtained to prohibit a violation of any provision of --

(1) The Atomic Energy Act of 1954, as amended;

(2) Title II of the Energy Reorganization Act of 1974; or

(3) Any regulation or order issued under these Acts.

(b) A court order may be obtained for the payment of a civil penalty imposed under section 234 of the Atomic Energy Act of 1954, for violations of--

(1) Section 53, 57, 62, 63, 81, 82, 101, 103, 104, 107, or 109 of the Act;

(2) Section 206 of the Energy Reorganization Act of 1974;

(3) Any rule, regulation, or order issued under these Acts;

(4) Any term, condition, or limitation of any license issued under these Acts; or

(5) Any provisions for which a license may be revoked under section 186 of the Atomic Energy Act of 1954.

(c) Any person who willfully violates any provision of the Atomic Energy Act of 1954, as amended, or any regulation or order issued under the requirements of the Act, include regulations under this part, may be guilty of a crime and, upon conviction, may be punished by fine or imprisonment or both, as provided by law.

Date at _____

this _____ day of _____, 1988.

FOR THE NUCLEAR REGULATORY COMMISSION

Samuel J. Chilk, Secretary of
the Commission

Appendix

Fitness for Duty Program Elements Not Included in the Proposed Rule

The Commission has decided not to include several matters in the proposed fitness for duty rule, but seeks comments as to whether these matters should be added to the rule or included as recommendations in implementing guidance.

1. Expand the scope of the rule to include other activities directly related to nuclear safety by licensee and contractor personnel. This could include engineering and quality assurance activities performed outside a protected area and activities performed by escorted licensee or contractor personnel within a protected area which, if not properly performed, could contribute to facility conditions adverse to public or worker safety.

2. Require that licensees take specific measures to deter onsite sale, possession, or use of alcohol and drugs and to achieve early detection should these problems exist. These measures could include:

   (a) searches of the workplace, which would be unannounced and random,

   (b) investigations designed to determine whether there is an existing or potential problem,

   (c) a mechanism for discreet expressions of concern, which can facilitate unrestricted flow of information, and

   (d) information collection from law enforcement authorities and drug counseling services concerning drug activity in the local community.

3. Require licensees to audit their fitness for duty program on an annual basis. These audits would include those portions of fitness for duty programs implemented by contractors. Licensees could accept audits of contractors conducted by other licensees and need not re-audit the same contractor for the same period of time. A copy of the audit report, to include findings, recommendations, and corrective action would be provided to each sharing utility and made available onsite for NRC inspection. Licensees would retain responsibility for the effectiveness of contractor programs and the implementation of appropriate corrective action.

4. Require licensees to collect and compile fitness for duty program performance data, to analyze the data, take corrective actions where warranted, and to submit that data to the Commission once each 6 months. The collection and analysis of data can make a significant contribution to proper program management and development of effective programs. The Commission seeks comment as to whether the rule should establish uniform requirements for the collection of data for proper evaluation and necessary corrective action. The collection and analysis of data is believed important for the following reasons:

° Although the proposed rule would require elements that constitute an effective program based on current information, fitness for duty programs are part of an evolving discipline and lessons learned and advances in technology may warrant future revisions to the programs. The collection and analysis of data would support any future considerations in that regard, e.g., to either add, relax, or strengthen a specific requirement. The program performance data would allow for empirical evaluation of alternative strategies.

° It is expected that some utilities will have elements of their overall fitness for duty program that differ from and/or exceed the minimum requirements of the rule. If performance data are available, the NRC could evaluate whether these other program characteristics are contributing to or detracting from the program goals.

° Trend analysis of the data would facilitate appropriate inquiry should there be indications of any problems, such as a possible failure in program design or implementation.

° The various performance profiles developed from analysis of the data can be compared with the findings from inspections. The relationship between different performance profiles and the information generated through the more labor-intensive inspections can be established. This information could be used to identify certain licensees for more indepth inspection or for relaxing the inspection burden on licensees that are performing well.

The NRC developed a list of data that appear to be appropriate based upon informed reviews by appropriate professionals in other organizations. To ensure consistency of data and to facilitate analysis, the draft form below could be utilized.

FITNESS FOR DUTY PROGRAM PERFORMANCE DATA

Site: _____ Period: Jan-Jun 19__
Jul-Dec 19__

Contact Name: _____ Docket #'s _____

Telephone Number: (___) _____

Avg # of Employees: _____

Avg # of "Permanent" Contractor Employees: _____
(Contractor onsite 6 months or longer)

Avg # of Other Contractors: _____

I. TESTING	Employees (# POS)	Contractors (# POS)	Action Taken: Term	Rehab	Pend
A. Preemployment/Prebadging	( )	( )			
B. Unannounced Periodic	( )	( )			
C. Unannounced Random	( )	( )			
D. For Cause (Incl Post Accident)	( )	( )			
E. Followup (Verify Abstention)	( )	( )			
F. Other (Describe: _____)	( )	( )			

G. Drugs Identified(#):

Marijuana _____ Amphetamines _____ Opiates _____ Others _____

Cocaine _____ Phencyclidine _____ Alcohol _____ (Describe) _____

II. PROACTIVE EFFORTS	#	Total Man-Hrs	# Subjects ID'd	Action Taken: Term	Rehab	Pend
A. Searches of Workplace						
B. Searches of Personal Vehicles						
C. Searches Using Dog						
D. Investigations by Licensee/Contractor						
E. Investigations/Arrests by Law Enforcement		XX				
F. # ID'd by Supervisor	XX	XX				
G. # ID'd thru Allegs. to Employer	XX	XX				
H. # ID'd thru Allegs. to others (NRC, Law Enforcement, etc.)	XX	XX				
I. Other (Describe: _____)	XX	XX				

Data should reflect only those persons confirmed to be using, possessing, or selling drugs. "Term" means terminated, "Rehab" means rehabilitated (or counseled) and returned to duty, "Pend" means final disposition is pending.

IV. EAP PROGRAM USE (REFERRAL SOURCE)

				Disposition		
	Employees	Contractors	Rehab	Dropped Program	Term	Pend
A. Self						
B. Family						
C. Friends/Coworkers						
D. Union						
E. Supervisors						
F. Other (Describe: _____)						

V. CAUSE OF BEHAVIORAL PROBLEM (REASON FOR REFERRAL)

	Employees	Contractors
A. Mental/Emotional		
B. Family/Relationship		
C. Job Related		
D. Medical		
E. Legal		
F. Financial		
G. Alcohol		
H. Drugs		
I. Other (Describe: _____)		

VI. SUMMARY DESCRIPTION OF LESSONS LEARNED:

(Briefly describe any program changes since last report; include additional drugs tested per 10 CFR 26.24(c)(2)(iv).)

PREDECISIONAL DOCUMENT

REGULATORY ANALYSIS FOR
PROPOSED RULE
"Fitness for Duty Programs"
10 CFR Part 26

I. BACKGROUND

Regulatory History

On August 5, 1982, the Commission published for comment a proposed rule to require licensees to develop and implement written procedures concerning fitness for duty (47 FR 33980). In recognition of the initiatives and commitments made by the industry to develop and self-manage fitness for duty programs, the Commission decided to defer implementation of the rule, to issue a policy statement to further encourage such self improvement (August 4, 1986, 51 FR 27921), and to reconsider the need for rulemaking after evaluating the experience gained under the industry program. On December 1, 1987, the Commission was briefed by the Nuclear Utility Management and Resources Council (NUMARC) and the NRC staff on the experience gained to date and on the status of implementation of the Commission's fitness for duty policy statement.

In developing this proposed rule, the NRC staff considered the public comments previously received in response to the 1982 proposed rule and the 1986 policy statement. Also considered were industry experience reported to the Commission and the lessons learned by the staff in evaluating the effectiveness of utility fitness for duty programs, from assessing reported drug related incidents, and from similar rules being developed by other Government agencies.

Need for Proposed Action

The Commission recognizes alcohol and drug abuse in the United States to be a social, medical, and safety problem of significant proportions, affecting people in almost every industry and occupational group. For example, the National

PREDECISIONAL DOCUMENT

Institute on Alcohol Abuse and Alcoholism (NIAAA), in its 1981 Report to Congress, reports that 46 percent of all non-fatal and 40 percent of all fatal U.S. industrial accidents involve alcohol, at an annual cost of $12-15 billion. Given the pervasiveness of the problem in our society, it seems reasonable to assume that alcohol and drug abuse, as well as other emotional and psychological factors, are also present in the nuclear industry. Prudence, therefore, requires that appropriate precautionary measures be imposed to reduce the probability of a person under the influence of alcohol, drugs, or otherwise unfit for duty, from either causing an accident or decreasing the effectiveness of the response to an accident.

Alcohol and drug abusers' job performance can be expected to be negatively affected due to the presence of, or withdrawal from, chemicals in their blood stream. For example, four ounces of alcohol in the blood stream of a 165-pound male requires approximately 12 hours to metabolize. This is one reason other regulatory agencies (e.g., U.S Department of Transportation) mandate specific periods of abstinence (e.g., 4 or 8 hours) for interstate truck drivers, commercial airline pilots, etc., prior to coming on duty. Drugs other than alcohol such as cocaine and opiates require as much as 24-72 hours to metabolize.

Since operation of a nuclear facility by persons not fit for duty could degrade a licensee's ability to operate the facility in a safe manner, development of a regulation concerning the determination of fitness for duty is being considered as an additional means to protect the health and safety of the public. Criteria for determining fitness for duty will depend upon such factors as consumption of alcoholic beverages, use of drugs, stress, and any physical or mental impairment which could affect performance in any way contrary to safety.

Voluntary Initiatives

The Commission recognizes and appreciates the significant efforts already taken by the Nuclear Utility Management and Resources Council (NUMARC), the Institute of Nuclear Power Operations (INPO), the Edision Electric Institute (EEI), and each nuclear power reactor licensee in developing and implementing fitness for

duty programs for nuclear power plant personnel. Much progress has been made through the industry efforts in achieving an environment in which nuclear power plant operations are free of the affects of alcohol and drugs.

II. ANALYSIS

Regulatory Analysis for Fitness for Duty Rulemaking

On December 1, 1987, the Commission was briefed by NUMARC and the staff on the experience gained to date and on the status of implementation of the Commission's fitness for duty policy statement. On December 16, 1987, the staff was requested to prepare a proposed fitness for duty rule. The public comments received under the 1982 proposed rulemaking and the 1986 policy statement, as well as the lessons learned from existing programs, drug related events, and similar rules being developed by other government agencies, have been considered by the NRC staff in the development of the proposed rule.

1. STATEMENT OF PROBLEM

Primarily as a response to industry initiatives and NRC's 1986 policy statement, fitness for duty programs are currently in place among all NRC-licensed nuclear power plants. However, these programs do not achieve uniform standards. For example, not all licensees are conducting random tests, testing cutoff levels vary significantly, and management actions taken in response to positive test results vary.

2. ALTERNATIVES

The NRC could continue under its policy statement approach and provide fitness for duty guidance and request voluntary implementation, or the agency could issue a rule that requires implementation and provides penalties for either noncompliance or program failure.

The policy statement alternative is not judged adequately effective because of the lack of uniform standards in certain key areas in the existing fitness for

duty programs, as summarized above. The Commission decided to have the staff prepare a proposed rulemaking which would both take into account the existing programs and rectify the reported shortcomings by requiring the application of uniform standards throughout the industry to promote the public health and safety.

3. OBJECTIVES

The objective of the fitness for duty rule is to provide for the public health and safety by eliminating access to protected areas at nuclear power plants by personnel who are judged to be unfit for duty. Personnel who would be considered unfit for duty would be those who improperly use alcohol, prescription drugs, illegal drugs, or have physical or mental stress or impairments that could lead to an unsafe situation.

4. VALUE IMPACT

4.1 Benefits

Limiting the presence or use of illicit substances and abuse of legal drugs by workers at nuclear power plants will reduce the likelihood of accidents and provide for a generally safer plant environment. This is because drug and alcohol abuse can impair a worker's motor skills and judgement so that accidents attributable to neglect or error are more probable. Thus the proposed improvements in fitness for duty programs are necessary to promote the health and safety of the public. In addition, benefits will accrue to licensees from the potential reduction in absenteeism, lost worker productivity, medical and insurance costs, and plant downtime. Finally, the licensee's employees will likewise benefit from the improved general safety of the work place, and through their utilization of the education and support programs available to deal with drug and alcohol problems.

4.2 Impacts

4.2.1 Background

The proposed rule would require licensees authorized to operate a nuclear power reactor under 10 CFR 50.22 to implement and maintain a fitness for duty program. By extension, a licensee's contractors and vendors would be similarly covered under this proposed rule.

The proposed rule specifies that industry commit to the following requirements:

1. Development of written policy and procedures;

2. Awareness program, transfer of policy and procedures to all employees;

3. Refresher training for all employees (at least once a year);

4. Development of written agreements between licensees and their contractors and vendors;

5. Chemical testing;

6. Employee assistance program (EAP);

7. Appeal procedures;

8. Reporting requirements

If all of these requirements were new to industry, the cost implications of such a program would be significant.[1] In reality however, the NRC and industry have been actively involved in fitness for duty programs for a number of years. In mid-1982, the Commission published a proposed rule to require licensees to develop and implement written procedures concerning fitness for duty, and in 1986 the Commission issued a policy statement on this subject. Since 1982, industry involvement on the part of NUMARC, INPO, EEI, and individual utilities

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1 For example, in 1979 the TVA estimated that the annual cost of just an alcohol abuse program was approximately $18.5M.

has resulted in each of the nuclear power plant licensees having a fitness for duty program currently in place. These programs are in many respects highly comparable with the requirements set forth in the proposed rule. As a result, the incremental burden to industry of this action is significantly reduced.

4.2.2 Impacts on Industry

The following discusses each of the broad requirements specified previously. Cost estimates are presented only for those requirements that are incremental to the existing fitness for duty programs.

4.2.2.1 Written Policy and Procedures

Each licensee is required to draft policies and procedures for a fitness for duty program. These documents shall set forth all standards of conduct expected of employees and all requirements for management action.

Since all impacted licensees currently have fitness for duty policies and procedures in place, it is envisioned that the proposed rule will necessitate only a fine tuning of these documents in order to conform to the requirements of the new rule. This task is viewed as a one-time implementation cost. In order for industry to accomplish this, the staff assumes an 8 person-week technical staff and management effort per licensee. Utility technical staff is costed at $50 per hour in 1987 dollars which reflects a 1984 base wage rate adjusted by a factor of 1.8 for fringe benefits and plant management, and then escalated to 1987 dollars based on the GNP implicit price deflator.[2]

Cost Per Licensee (320hr x $50) $16,000.00
Industry-Wide Cost ($16,000 x 55 licensees) $880,000.00

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2 NRC's analysis of Industry Labor Rates is available in NUREG/CR-4627, Generic Cost Estimates; Abstract 6.3, Industry Labor Rates, June 1986.

4.2.2.2 Awareness Program

All licensee personnel (workers and supervisors) involved in the nuclear portion of the utility's business will be subject to an awareness training program that explains the new policies and procedures underlying the fitness for duty program. Although awareness training is already an integral part of fitness for duty programs, it is assumed that the formulation of new policies and procedures will require all existing workers to undergo an additional reorientation program. This would be a one-time implementation cost. Staff estimates that 500 employees at each reactor will be subject to the orientation program. It is assumed that the program will be one hour in duration and will be in a classroom setting. Based on generic cost estimates for training which appear in NUREG/CR-4627, the estimated cost per student hour is $15.00 exclusive of the student's time away from work.[3] The $15.00 estimate includes the instructor's time for development, preparation, delivery, evaluation and revisions to the course, and allowances for instructional materials and handouts. The student's time is valued at $38.00 per hour. This is the average hourly salary for various utility labor categories adjusted for fringe benefits and plant management and escalated to 1987 dollars.[4] Thus, the total cost per hour of training per employee is $53.00 [i.e. $15 + 38].

It is recognized that as the labor force turns over, new workers will also be subject to an orientation program. However, staff views these activities as non-incremental since new workers would have been subject to a fitness for duty orientation under the existing licensee programs as well.

Cost Per Nuclear Reactor (500 employees x $53)...$26,500

Industry-Wide Cost ($26,500 x 124 reactors)...$3,286,000

4.2.2.3 Refresher Training

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3 NUREG/CR-4627, Abstract 2.2.3, "Industry Cost for Training or Retraining Staff and Writing or Rewriting Training Manuals," June 1986.

4 Ibid.

All employees (workers and supervisors) subject to the provisions of the fitness for duty program will be required to complete refresher training at least once every year. This training essentially covers all aspects of the program and contains discussions on the health and safety hazards associated with abuse of alcohol and other drugs.

The staff is aware that licensees currently offer such annual training as part of their existing General Employee Training (GET) programs, although some may need to provide more on this subject. Therefore, the proposed requirement will impose no or minimal incremental burden on industry.

Industry-wide Cost = $0

4.2.2.4 Written Agreements with Contractors/Vendors

All contractor and vendor personnel performing safety related duties for a licensee shall be subject to the licensee's fitness for duty program. Written agreements between licensees and contractors/vendors will be required to ensure this compatibility.

The staff believes that agreements between the licensees and their contractors/vendors are currently in place for nearly all licensees and contractors. Although minor revisions to these agreements are possible as a result of changes to the licensee's policies and procedures, the impact here is expected to be restricted to those few instances where formal agreements with contractors in this regard do not exist. The licensee's effort, expended in modifying its own policies and procedures, should provide a quick and easy basis for any needed changes to these agreements.

Industry-wide Cost = $0

4.2.2.5 Chemical Testing

The fitness for duty rule includes the following types of chemical testing: pre-badging, unannounced (random or periodic), for-cause, and follow-up. The

major cost impacts under this portion of the rule relate to the random testing and, to a lesser degree, the follow-up testing. Nearly all utilities already make use of the pre-employment and for-cause tests. Therefore, there are no incremental costs to be incurred for their use under this rule.

The proposed rule requires licensees to perform random unannounced tests at a rate equal to 125 percent of the workforce subject to such tests in any 12-month period. The staff is aware that about two-thirds of the plants do not presently have random testing. The remaining third of the plants have random testing, but not at the specified level. From available data, it appears that the current rates are in the 5 percent to 25 percent range. For this analysis, NRC assumes the rate for those plants is 15 percent.

Other assumptions important to this analysis include the following:

- there are 500 employees and contractors per plant to be tested randomly;
- existing plants have an average remaining life expectancy of 25 years;
- initial screening of random tests cost $20.00 each;
- confirmatory tests are $75.00 each;
- 5 percent of those sampled randomly require confirmatory testing for whatever reason;
- collection of a sample for any test will take an average of 30 minutes of an employee's productive time; and
- based upon data relating to industry labor rates and time-related cost adjustments contained in NUREG/CR-4627, we estimate the average nuclear utility employee's hourly salary and benefits to be $38 in 1987.

a. The estimated annual cost per employee is first based on the sum of: the cost of the random test; plus the cost of the confirmatory test, when necessary; plus the cost of the employee's time away from his/her normal duties.

b. The sum is then multiplied by the factors representative of the industry experience in testing rates: 67 percent of the plants will need a 125 percent annual testing rate and 33 percent of the plants will need a 110 percent (125 precent - 15 precent = 110 precent) annual testing rate.

Substituting the assumed values in equation a gives:

$20/random test + .05(confirmatory/random test) x $75/confirmatory test + .5 hours x $38/hour = $42.75/random test

Substituting in b gives:

(1.25 x .67 + 1.10 x .33) x $42.75/random test = $51.32 per employee per year

This figure is multiplied by the estimated 500 employees per plant and 124 plants to obtain an estimated industry cost of $3,182,000 per year. Assuming an average plant life expectancy of 25 years and a 10 percent discount rate, the industry's lifetime cost becomes $28.9M. If a 5 percent discount rate is assumed, the lifetime cost is about $44.9M.

Industry-wide cost = $28.9M to $44.9M.

4.2.2.6 Employee Assistance Programs

Licensees are required to provide Employee Assistance Programs (EAP) as part of their fitness for duty activities. The EAPs offer short-term counseling, assessments, referral services, and the monitoring of treatment. All licensees currently have such EAP's in place and therefore this proposed requirement will impose no incremental burden on industry.

Industry-wide Cost = $0

4.2.2.7 Appeal Procedures

Each licensee is required to establish a procedure for its employees and contractor/vendor employees to appeal fitness for duty determinations that could have an adverse effect on the individual's employment.

Procedures of this nature are either already a part of the utilities' personnel practices, or will be under the industry standard for access authorization programs. Therefore, this requirement will impose no incremental burden on industry.

Industry-Wide Cost = $0

4.2.2.8 Reporting Requirements

There are a number of administrative requirements associated with the implementation and operation of fitness for duty programs. These include a system of files and procedures for the protection of personal information, recordkeeping requirements, and reporting requirements.

The staff's assessment of the utilities' fitness for duty programs suggests that approximately 50 percent of the existing programs fully meet these requirements, and that for the remaining 50 percent, only some modest increased effort could be required. Recognizing that these latter utilities already have staff personnel on board to manage and administer these programs, and that these requirements constitute only a small increment to their current level of effort, the staff concludes that these requirements could be accommodated with no or minimal incremental cost impact to industry.

Industry-Wide Cost = $0

4.2.3 Impact on Individuals and Society

There will be enhanced awareness of the adverse affects of abuse of alcohol and other drugs by individual workers, their families, and their communities as a result of the required awareness training. This enhanced awareness should result in improvements in general health and productivity.

Although it is recognized that a worker could wrongly lose his or her job as a result of a false positive test, the Commission believes that appropriate measures have been provided to assure that it is highly unlikely to happen. Some of these measures include: quality control standards associated with the collection, handling, and testing of specimens; the setting of appropriate cutoff levels; standards for testing laboratories and laboratory personnel; medical review of test results, appeal procedures, and employee awareness training of the above. The Commission concludes that adverse impacts on an individual resulting from a false positive test are highly unlikely.

Some impacts to individuals may be realized as a result of presumptive positive screening tests. The proposed rule would require that licensee management, based upon a presumptive positive result of any initial screening test (pending results of the confirmation test which is to be provided within 48 hours), determine whether the person should be suspended from unescorted access to protected areas and activities within the scope of the proposed regulation. It is assumed that where the presumptive positive results are readily explainable, e.g., cold medication which was reported prior to the test, the employee would not be suspended. Embarrassment for suspension should be significantly reduced through employee awareness training. Adverse effects on an individual that result from termination actions by the licensee are within the intent of the rule and are an expected and not unwarranted impact in the circumstances. The Commission concludes that unwarranted impacts from management actions in response to presumptive positives would be negligible.

4.2.4 Impact on NRC

In addition to the general oversight of licensees' fitness for duty programs, NRC staff will need to address the matter of periodic inspections, prepare event reports, initiate reactive inspection programs, and review reports and other written submissions. To a limited degree, these activities are currently being conducted with present staff.

The staff estimates that one full-time position at headquarters plus two to five staff positions in the Regional Offices will be required for program

management, inspections, and general oversight of the utilities' fitness for duty programs. An estimated range is provided because of the uncertainties of the extent of the reactive inspection effort. For, example, one Region expended over one FTE on fitness for duty allegations.

Estimates of NRC labor rates available in NUREG/CR-4627 suggest using a value of $72,000 per NRC professional staff-year. This would cover salary and fringe benefits for a mid-level position plus secretarial and management support to that individual. The annual NRC cost for this action at the upper bounds is, therefore, 6 staff x $72,000/staff-year = $432,000/yr.

The 1987 present worth value of the estimated annual cost over a 25 year period is about $3.9 million using a 10 percent discount rate. A 5 percent discount rate gives a lifetime cost of approximately $6.1 million.

NRC Cost = $3.9M to $6.1M

4.2.5 Summary of Impacts

In summary, the staff estimates that the incremental cost to industry of the proposed rule is on the order of $33.0M to $49.0M. Based on a reactor population of 124, the per reactor cost ranges from about $266,000 to $395,000. The dominant cost to industry, representing about 90 percent of industry's total estimated cost, is from chemical testing.

The cost estimates presented here include both incremental implementation and operating costs. The operating costs capture cost impacts over the remaining life of the reactor population.

NRC costs to review and oversee implementation and operation of these programs is estimated at between $3.9M and $6.1M on a 1987 present worth basis.

5. DECISION RATIONALE

The staff believes that certain basic fitness for duty program requirements should be applied uniformly throughout the nuclear power industry, and are needed to ensure public health and safety. These requirements are proposed in this rulemaking.

6. IMPLEMENTATION

The proposed rule will be published for comment and the comment period will be 120 days. After all comments have been taken into consideration, the final rule will be written and published. The provisions in the final rulemaking will become effective upon publication.