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Best Practices for Behavioral Observation Programs at Operating Power Reactors and Power Reactor Construction Sites

Office of Nuclear Security and Incident Response

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ABSTRACT

This NUREG report discusses a research and comparative study sponsored by the U.S. Nuclear Regulatory Commission (NRC) and conducted by Oak Ridge National Laboratory. The report identifies best practices associated with behavioral observation programs (BOPs) used by a cross section of Federal agencies and private entities, discusses the need for effective BOPs at power reactors, and power reactor construction sites, and presents insights and recommendations to improve BOP performance.

The observations and recommendations identified in this report will inform the NRC's regulatory inspection, licensing, and oversight of activities at NRC-licensed facilities during the application, construction, and operational phases. The results will also help inform applicants and licensees of best practices for BOPs. As a result, applicants and licensees have an opportunity to implement enhanced policies, procedures, and training to improve their identification of personnel unfit for duty or behaving in a manner that warrants additional attention and to efficiently and effectively conduct behavioral observations without undue burden. The outcome of this report contributes to reasonable assurance that NRC licensee facility operation and construction activities will not be inimical to public health and safety or the common defense and security.

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EXECUTIVE SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) considers the behavioral observation program (BOP) to be one of the cornerstones of the Fitness-For-Duty (FFD) Program, the physical protection program, as well as the Insider Mitigation Program (IMP). A robust BOP is an important element of FFD and site security. The NRC Office of Nuclear Security and Incident Response (NSIR) is responsible for the development of regulations and guidance associated with FFD and BOP requirements, and the NRC's regulatory oversight of these programs.

This report explores BOPs across multiple industries and reviews ongoing research in behavioral observation, in part, because new plant construction presents several unique challenges associated with BOP implementation when compared to BOP at an operating power reactor facility. This is primarily due to different safety, security, and workforce considerations between an operating nuclear facility and one being constructed. An effective BOP helps improve the defense-in-depth provided by the insider mitigation, physical security, and the FFD programs. The best practices recommended in this report often go beyond regulatory requirements; they are suggestions that, if implemented, would be expected to improve current BOPs.

This report discusses a research and comparative study conducted by Oak Ridge National Laboratory (ORNL), and includes research of various BOPs used in Federal agencies, industry, and academia. These programs, their application, and the resulting lessons learned are compared and contrasted to formulate recommendations and to develop elements of best practice for a robust BOP within the overall framework of FFD programs at operating nuclear power reactors and power reactor construction sites.

ORNL identified 18 best practices, that are listed below in summary form and that are discussed in more detail in section 4 of this report.

(1) The BOP should have a clearly stated purpose.

(2) The scope, performance objectives, methods, and application for a robust BOP within the FFD program should be identified.

(3) The characteristics or observable traits and behaviors related to the identified threat or threats should be defined.

(4) The BOP is just one layer of defense within comprehensive FFD, physical protection, and IMP programs.

(5) The BOP for construction should be scalable.

(6) The BOP should identify areas where safety and security are of elevated concern, and should increase behavioral observation activities in those areas.

(7) The BOP should have a clearly stated operational process.

(8) Each BOP should have a strong procedural basis for implementation.

(9) The BOP should have adequate assurances for objectivity and fidelity.

(10) There should be appropriate stewardship of the personal information in the BOP.

(11) Complete and accurate documentation is an important attribute of a BOP.

(12) A BOP should reflect a clear understanding of roles and responsibilities. Personnel need to understand they are responsible for reporting unusual behavior and that reporting unusual activities or behavior is everyone's responsibility.

(13) A BOP should be subject to ongoing independent program assessments.

(14) The BOP should be layered with multiple observations across time. For example, observations of an individual only at the morning safety briefing or plan of the day meeting should not be the sole basis for making a determination that the individual is or is not fit for duty.

(15) Employees should be protected from repercussions when reporting unusual or suspect behavior concerning personnel at the job site.

(16) Initial and refresher training should be part of a BOP.

(17) The BOP's effectiveness should be continually verified.

(18) Performance metrics should be used to determine the BOP's effectiveness.

The best practices described above collectively represent the results of the program comparisons and literature review. Implementing some or all of these best practices would serve to strengthen any BOP and create a safe and secure environment.

FOREWORD

This NUREG report discusses a research and comparative study sponsored by the U.S. Nuclear Regulatory Commission (NRC) that was conducted by Oak Ridge National Laboratory to compare and contrast behavioral observation programs (BOP) and methods to enhance the BOP implemented at operating and construction sites of commercial nuclear power facilities. The research was undertaken because few reports aggregate BOP implementation information that could be used to enhance the BOP at operating power reactor or power reactor construction sites. Furthermore, marked differences exist between a BOP implemented at an operating facility and one at a construction site, such as differences in the size and transient nature of the workforces, which prevent the direct application at a power reactor construction site of a BOP designed for implementation at an operating power reactor site.

In its review, the staff found that the lessons learned and insights gained in this research could also enhance the BOP if implemented at other commercial nuclear facilities, such as Category II and III fuel cycle facilities or other materials licensees. Therefore the scope of this report, while initially targeting reactor construction sites, was broadened to include the transition from a facility under construction to a site in full operation. Regardless of the site, a BOP should effectively assess personnel behavior during the conduct of regulated activities and not be limited to activities associated with a particular mode of operation. These activities would include those activities necessary for safe and secure construction, operating, maintenance, testing, and security of a facility and its individual safety- and security-related structures, systems, and components. Additionally, a BOP would be applicable to the assessment of persons who are afforded certain types of access to licensees SSCs, information, or radioactive materials and to those persons who perform certain emergency response activities. In summary, a BOP should be written and implemented based on personnel, activities, and facility access. To help ensure the continuing effectiveness of a BOP, it should be revised as considerations change, to maintain assurance that persons are trustworthy, reliable, fit for duty, and will not contribute to conditions adverse to safety or security.

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ACRONYMS

AA	access authorization
BDO	behavior detection officer
BOP	behavioral observation program
BPR	behavior pattern recognition
CATSA	Canadian Air Transport Security Authority
CFR	*Code of Federal Regulations*
C/V	contractors and vendor
COL	combined license
CP	construction permit
DARPA	Defense Advanced Research Projects Agency
DEC	Drug Evaluation and Classification Program
DHS	U.S. Department of Homeland Security
DOD	U.S. Department of Defense
DOE	U.S. Department of Energy
DOS	U.S. Department of State
DRE	Drug Recognition Expert
DS	diplomatic security
DSS	Diplomatic Security Service
DUI	driving under the influence
EAP	employee assistance program
EOF	Emergency Operations Facility
FAA	Federal Aviation Administration
FAM	Foreign Affairs Manual
FFD	fitness for duty
GAO	Government Accountability Office
HRP	human reliability program
IACP	International Association of Chiefs of Police
IMP	insider mitigation program
KAs	knowledge and abilities
KDHE	Kansas Department of Health and Environment
LAPD	Los Angeles Police Department
LWA	limited work authority
MRO	Medical Review Officer
NEI	Nuclear Energy Institute
NHTSA	National Highway Traffic Safety Administration
NRC	U.S. Nuclear Regulatory Commission
NDSU	North Dakota State University
NSIR	Nuclear Security and Incident Response
ORNL	Oak Ridge National Laboratory
PNNL	Pacific Northwest National Laboratory
PRP	personnel reliability program
QA	quality assurance
QNSP	questionnaire for national security positions
SAE	substance abuse expert
SLAC	Stanford Linear Accelerator Center

SOMD	site occupational medical director
SPOT	screening passengers by observation techniques
SSC	structures, systems, and components
TSA	Transportation Security Administration
TSC	Technical Support Center
UA	unescorted access
UAA	unescorted access authorization
WAJ	West Ambler Johnson (residence hall)

1. INTRODUCTION

Background

The NRC's fitness-for-duty (FFD) requirements are in Part 26, "Fitness for Duty Programs," of Title 10 of the *Code of Federal Regulations* (10 CFR). The regulations at 10 CFR 26.3(c) state the following:

> Before the receipt of special nuclear material in the form of fuel assemblies, the following licensees and other entities shall comply with the requirements of this part, except for subpart I; and, no later than the receipt of special nuclear material in the form of fuel assemblies, the following licensees and other entities shall comply with the requirements of this part: (1) Combined license applicants (under 10 CFR Part 52) who have been issued a limited work authorization under § 50.10(e), if the limited work authorization authorizes the applicant to install the foundations, including the placement of concrete, for safety- and security-related structures, systems, and components (SSCs) under the limited work authorization; (2) Combined license holders (under 10 CFR Part 52) before the Commission has made the finding under § 52.103(g); (3) Construction permit applicants (under 10 CFR Part 50) who have been issued a limited work authorization under § 50.10(e), if the limited work authorization authorizes the applicant to install the foundations, including the placement of concrete, for safety- and security-related SSCs under the limited work authorization; (4) Construction permit holders (under 10 CFR Part 50); and (5) Early site permit holders who have been issued a limited work authorization under § 50.10(e), if the limited work authorization authorizes the early site permit holder to install the foundations, including the placement of concrete, for safety- and security-related structures, systems, and components (SSCs) under the limited work authorization.

Section 26.3(d) provides the following:

> Contractors/vendor (C/V) who implement FFD programs or program elements, to the extent that the licensees and other entities specified in paragraphs (a) through (c) of this section rely on those C/V FFD programs or program elements to meet the requirements of this part, shall comply with the requirements of this part.

Behavioral Observation Program (BOP) requirements are stated in 10 CFR 26.33, 26.407, and 73.56(f). The 10 CFR 73.56(f)(1) provision states as follows:

> Licensee and applicant access authorization programs must include a behavioral observation program that is designed to detect behaviors or activities that may constitute an unreasonable risk to the health and safety of the public and common defense and security, including a potential threat to commit radiological sabotage. Licensees, applicants and contractors or vendors must ensure that the

> individuals specified in paragraph (b)(1) and, if applicable, (b)(2) of this section are subject to behavioral observation.

The regulation at 10 CFR 26.33 identifies behavioral observation as a program element of an FFD program, as follows:

> Licensees and other entities shall ensure that the individuals who are subject to this subpart are subject to behavioral observation. Behavioral observation must be performed by individuals who are trained under § 26.29 to detect behaviors that may indicate possible use, sale, or possession of illegal drugs; use or possession of alcohol on site or while on duty; or impairment from fatigue or any cause that, if left unattended, may constitute a risk to public health and safety or the common defense and security. Individuals who are subject to this subpart shall report any FFD concerns about other individuals to the personnel designated in the FFD policy.

Additionally, the BOP element of an FFD program is applicable to those licensees and other entities under 10 CFR Part 26, Subpart K, "FFD Programs for Construction" as stated in 10 CFR 26.407, "Behavioral Observation":

> While the individuals specified in § 26.4(f) are constructing or directing the construction of safety- or security-related SSCs, licensees and other entities shall ensure that these individuals are subject to behavioral observation, except if the licensee or other entity has implemented a fitness monitoring program under § 26.406.

The NRC considers the BOP as one of the cornerstones of the FFD Program, the access authorization (AA) program, and the insider mitigation program (IMP). The BOP focuses on personnel who have been authorized unescorted access to operating power reactor sites, and power reactor construction sites, and the activities they perform. An acceptable BOP provides reasonable assurance that individuals subject to the program are appropriately trained to watch for and react to behavioral factors in individuals that may result in a risk to public health and safety or the common defense and security. Behavioral observation objectives associated with Part 26 have traditionally been focused on drug and alcohol use, mental health issues, and fatigue issues. Behavior observation objectives associated with 10 CFR 73.56 are focused on risks to the common defense and security, whereas the focus under Part 26 is on risk to public health and safety. Following the terrorist attacks of September 11, 2001, the NRC increased its focus on the threat of terrorism. Alcohol, drug abuse, mental health, fatigue, and, to some extent, even criminal behavior have frequently recognizable behavioral indicators. However, behavior associated with terrorism may be less recognizable. Since the research on terrorism and terrorist behavior continues, the BOP should be flexible in order to look at fundamental behavioral factors that indicate a possible risk and, based on the results of new research, have the capability to adapt to new factors or methodologies that might improve detection, assessment, and determination processes.

The construction environment at nuclear plants provides unique and substantial challenges for FFD programs and, in particular, for the BOPs implemented at these sites. Such challenges include the transient workforce, and the fact that construction consists of several phases that require workers of different skill sets at different construction phases. . These phases typically

occur at different times and particular locations throughout the construction site. Lastly, according to the U.S. Department of Labor, Bureau of Labor Statistics, the construction workforce has a turnover rate of almost twice the average rate[1] of an operating nuclear plant. This construction workforce instability is generally predictable based on the scheduling of site activities; however, such instability can adversely affect several elements of the FFD program and the BOP. To counter this workforce instability, licensees need to review the scope, efficiency, and effectiveness of these programs.

FFD program elements affected by a high turnover rate include the drug and alcohol testing program. Although the chances for a single individual to be selected randomly are the same for everyone at any affected NRC facility subject to 10 CFR Part 26, the chance for selection in a given year is dependent on a number of considerations, for example: how long an employee is employed, the total number of chances that he or she has to be randomly selected, and the percentage of time the employee is onsite compared to time spent offsite. Specifically, a construction worker who works at a site for 10 weeks will have 10 chances to be selected if the site does weekly random tests, whereas a permanent employee is subject to being selected 52 times in a year. A construction site entity, as described in NEI 06-06, "Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites," may increase the percentage of personnel tested above the 50 per cent random testing rate, thus increasing the likelihood for selection in random testing. Alternatively, to enhance the detection of adverse performance without increasing drug and alcohol testing, the BOP oversight of the construction site workforce may be increased.

A high turnover rate also affects a supervisor's time to assess an employee's behavior, thus increasing the difficulty in determining a baseline behavior for an individual. A change in personality may be more difficult to detect because of the short duration of contact a supervisor and co-workers may have with a given employee.

The construction of nuclear plants also poses unique challenges to physically protecting safety- and security-related SSCs. During construction, integral parts of a nuclear plant may be easier to access without detection, and the number of construction workers who have or can have proximity access to a particular SSC on a construction site can significantly exceed that of an operational unit. For example, fluid systems, pumps, and valves are exposed during construction; electrical panels, switchgear, and controls are de-energized and fully accessible; and protection and alarm systems that have control and monitoring circuitry during operation do not have tamper indication features while the SSCs are under construction. The IMP and the BOP and are important tools during construction needed to prevent potential industrial sabotage and to reduce the possibility of an adversary inserting latent conditions that could result in future vulnerabilities.

A comprehensive BOP, working in conjunction with a robust quality assurance (QA) program, can help lessen the possibility of sabotage of safety- and security-related SSCs. The QA program at nuclear plants under construction provides a systematic process of checking to see whether an installation, product, or service under development is meeting specified requirements. QA personnel have duties related to the oversight of installation and construction of different aspects of a nuclear plant. Part of these duties may include the observation of equipment installation or fabrication. As part of these observation duties, the QA personnel provide reasonable assurance that installation and fabrication of SSCs is done properly and

within required standards. QA personnel are responsible for identifying improperly installed items and equipment whether through intentional action or because of poor performance or craftsmanship. Notably, the BOP is also applied to these same personnel, who are responsible for installing SSCs on site. In other words, the BOP concerns itself with the behavior of the personnel doing the installation, whereas the QA program is concerned with the proper fabrication and installation of the equipment or item under construction. One of the goals of the BOP is to ensure that the personnel installing the equipment or item do not pose an unreasonable risk to the public health and safety and common defense and security; one of the goals of the QA program is to ensure that SSCs do not fail because of a poor installation. The two programs are similar in that they each provide for oversight of licensee activities that are designed to protect the public health and safety.

In a letter dated December 2, 2009 (Agency-wide Documents Access and Management System (ADAMS) Accession No. ML092880812), to the Nuclear Energy Institute (NEI), the NRC staff stated that it found NEI 06-06, Revision 5, sufficient to pursue formal NRC endorsement via the Regulatory Guide process. The staff also provided information to NEI for current and prospective applicants of a combined license under 10 CFR Part 52, "Licenses, Certifications, and Approvals for Nuclear Power Plants," or a construction permit or limited work authorization under 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities,"[2] that may be of assistance to licensees and applicants in the development of an FFD program during construction. The letter and its enclosure provide a suitable reference for use in the development of site-specific applications of the FFD program.[3] In addition, by letter to NEI dated June 4, 2013, the NRC staff deemed NEI 06-06, Revision 6 acceptable, with one exception, for the NRC staff to begin the process of formally endorsing it via a Regulatory Guide (ADAMS Accession No. ML13084A172). Future revisions of this document may occur and be endorsed by the NRC in a Regulatory Guide.

Objective

Having a robust BOP implementation is important at a construction site as well as operating sites because the program contributes directly to public health and safety and common defense and security. The Office of Nuclear Security and Incident Response has responsibility for ensuring that guidance for implementing comprehensive BOPs provide industry with optimum performance opportunities. New plant construction presents several unique challenges to the safety and security of any nuclear facility. This report explores BOPs across industries and reviews research in the behavioral observation field. The best practices recommended in this report often go beyond regulatory requirements, and suggest ways to improve current BOPs. A comprehensive BOP may help mitigate the risk factors mentioned in this report and may thus reduce the overall risk level at a given facility.

Risk Factors

Discussion of the following risk factors can also be found in Section V "Summary of Public Comments Submitted on Proposed Rule" and in Section VI "Section-by-Section Analysis of Substantive Changes " of the Final Rule published in the **Federal Register** on March 31, 2008 (73 FR 16966).

Drug or Alcohol Use

Drug or alcohol use or the adverse physiological or psychological impact of prescription drug abuse at a reactor construction or operating site is a safety and security concern. Use of drugs or alcohol often results in impaired judgment, impaired motor skills, and diminished mental capacity during safety- or security-significant work activities. In addition, even the proper use of prescription drugs may result in diminished mental and emotional abilities, whereas the failure to use prescription medication properly (including the lack of use) could result in unstable mental processes or erratic emotional behavior. As a result, impairment caused by legal or illegal substances may result in either immediate or delayed effects on safety- or security-significant work activities.

Psychological Conditions

Psychological conditions, such as emotional, mental, and personality disorders, can cause significant deficiency in a person's psychological, occupational, and social functioning. These disorders are of concern because they may predispose an individual to a defect in judgment, reliability, or stability. Such defects may result in poor work performance, accidents and injuries, increased worker conflict, or other negative consequences. In addition, psychological conditions that affect work performance may reasonably affect the safety and security of a nuclear plant construction or operating site.

Fatigue

Fatigue can have a significant adverse effect on workers' abilities to safely and competently perform their assigned duties at nuclear facilities. Fatigue can impair problem-solving, decision-making, and communications skills of persons who are required to remain alert and to be cognizant of the tasks that they are performing, monitoring, or directing. For example, acute or cumulative fatigue can result in the occurrence of micro-sleeps that can have significant harmful consequences.

Criminal Activities

Individual involvement in criminal activities can pose a threat to the construction of nuclear facilities, or threaten facility operation. The theft of materials and tools can cause construction delays and can have a significant impact on schedules and project costs. Even the minor theft of personal property on a construction or operating site can affect the morale and productivity of the workforce. More dangerous criminal activities such as workplace violence can devastate the safety and security afforded to the workforce. Workplace harassment, intimidation, and bullying can erode individual performance to a point where the person affected takes adverse actions against the employer, the facility, or the perpetrator.

An individual's criminal history is used as a means to assess the likelihood that an individual's future behavior(s) may threaten the safe and secure operation or construction of nuclear facilities. An effective AA program, when applied at a construction site, would assist with the mitigation of potential threats. Reliance on other programs (such as those described within the IMP and industrial physical security practices) provides an additional level of assurance that criminal activities can be prevented at a site.

Terrorism

Terrorism is a worldwide threat to the safe and secure construction and operation of a nuclear facility. A credible threat of action against a nuclear facility would be enough to challenge public confidence in the protection of these facilities, and a resulting attack, even if successfully mitigated, would lead to questions regarding the continued operational viability of such a high-value target. During construction of commercial nuclear facilities, a terrorist posing as a legitimate site worker could conduct activities (e.g., intelligence collection activities, the sabotage of equipment, and the staging of items for possible use in an attack) that threaten future operations.

A committed terrorist would be hard to detect without a robust IMP that includes the structure and content of a BOP and an AA program, because the terrorist will make a concerted effort to comply with onsite requirements, fit into cultural norms, and not engage in risky behavior that would draw attention. This type of individual also would typically not be exposed in pre-employment or random programs designed to detect drug and/or alcohol use.

Scope

The ORNL study discussed in this report provides research of various BOPs used in Federal agencies, industry, and academia. These programs, their application, and the resulting lessons learned are compared and contrasted to formulate recommendations and to develop elements of best practice for a robust BOP within the overall framework of FFD and security programs at operating nuclear reactors and power reactor construction sites.

Organization of Report

The following sections summarize the programmatic elements of a BOP and its application at commercial nuclear power reactors, and power reactor construction sites. Related literature is presented and discussed along with relevant additional federal, state, and related entities' BOPs and their legal bases. In addition, studies are compared and contrasted and lessons learned from these programs are provided. Finally, this report presents conclusions and recommendations with a list of best practices.

2. LITERATURE REVIEW

A literature review of behavioral observation-related studies was conducted to support an analysis for the comparative programs. Note that some of the studies had overlapping relevance among the different categories listed below. The review provided a foundation for delineating the best practices discussed later in this report. The literature review fell into the following five basic categories:

(1) Behavioral Observation Studies and Articles. These studies and articles focused on specific behavioral characteristics, especially terrorist characteristics, although they also explored drug, alcohol, mental health, and criminal activities.

(2) Behavior Collection Techniques and Data. These studies reviewed research and analysis methods.

(3) Other BOPs. This category specifically looked at programs other than those included in the comparative analysis below and focused largely on programs using behavior pattern recognition (BPR).

(4) Governmental Reports Related to the BOP. These articles focused on Government Accountability Office (GAO) reports related to the Transportation Security Administration (TSA) BOP.

(5) Other Related Literature. This category assessed case studies (the most notable is the 2007 Virginia Polytechnic Institute and State University (Virginia Tech) shooting and other academic literature.

Below is a synopsis of the most relevant literature. Although all literature reviewed provided a solid background for an assessment of BOPs, some articles are not directly relevant to the BOPs in place at commercial entities subject to 10 CFR Part 26. However, they do provide insight for best practices and lessons learned.

2.1 Behavioral Observation Studies and Articles

This portion of the assessment looked specifically at what behavioral characteristics could indicate actions or behaviors that could constitute an unreasonable risk to public health and safety and the common defense and security. The literature review indicated that all programs listed below had good behavioral indicators for drugs, alcohol, and mental health issues but that they all seemed to lack behavioral indicators for terrorist activities. This section discusses some of the relevant research on psychological traits and behavioral indicators of terrorist and terrorist activities.

The Center for International Research on Terrorism separates related research into the following four main groups:

(1) The first attempts to explain common psychological traits of terrorists. The aim was to distinguish the terrorists' shared psychological characteristics and to draw a certain terrorist profile in general. However,

research showed that no accurate terrorist personality or common psychic attributes that can be referred to as terrorist manners exist (Borum 2004,[4] Hudson 1999,[5] McCormick 2003[6]). Moreover, according to this research, terrorists are not psychotic; rather, they are disturbingly normal (Borum 2004,[4] Hudson 1999,[5] McCormick 2003[6]).

(2) The second group of research posited that terrorism derives from frustration and aggression. According to the frustration and aggression hypothesis, aggression is always a consequence of frustration (Dollard et al. 1939[7], as cited in Berkowitz 1989[8]).

(3) Other researchers attempted to explain the psychological sources of terrorism using a narcissism-aggression model (McCormick 2000).[9] Narcissistic injury of individuals, such as lack of self-esteem and self-respect, can motivate people to join terrorist organizations that they believe can help meet their psychological needs (Borum 2004[4], Hudson 1999[5], McCormick 2003[6]).

(4) The fourth group of research suggested a developmental model. The results of this research can be briefly summarized as "terrorists do not become terrorists overnight." Becoming a terrorist and then committing a violent act is a gradual process. "The manner of terrorist behavior is learned over time" (Wasmund 1983[10]). In this respect, organizations and environment play roles in shaping the psychological behavior of individuals (Alkan 2002[11], Borum 2004[4], Hudson 1999[5], and McCormick 2003[6]). The developmental model justifies that individuals refrain from self-condemnation and makes killing and being killed a plausible cause of action. In this way, immoral behaviors such as killing innocent people are easily transformed into moral attitudes.[12]

In the Anthony Stahelski article, "Terrorists Are Made, Not Born: Creating Terrorists Using Social Psychological Conditioning", Stahelski suggested that terrorist groups use cult-like conditioning techniques to convert normal individuals into terrorists. He further suggested there are three necessary elements to such conversions: (1) a charismatic leader; (2) isolation during the conditioning process; and (3) in the case of an Islamic terrorist, having first been educated in fundamentalist religious schools with other Islamic youth.[13]

In the article entitled, "Unmasking Terrorists—Two Critical Characteristics," Joseph Navarro noted two critical characteristics of terrorists: 1) subscribing to an uncompromising ideology, which is a set of conscious and unconscious ideas that constitute one's goals, expectations, and actions and which seeks to use violence to achieve its goals and 2) isolation, where the proto-terrorist senses that he is different and that society is not indulgent of his thoughts and ideas, and thus begins the isolation and withdrawal process. Mental isolation transforms into spatial and social isolation. Navarro applied these characteristics to domestic terrorists Timothy McVeigh and Theodore Kaczyniski and to foreign-born terrorists.[14]

Both the Stahelski and Navarro articles indicated that being isolated and holding a strong uncompromising ideology, are indicators of possible terrorist leaning. Although these indicators

help paint a picture of terrorists, they do not easily translate into BOPs. A discussion of these indicators should be included in the training curriculum of comprehensive BOPs.

A Library of Congress report entitled, "The Sociology and Psychology of Terrorism: Who Becomes a Terrorist and Why?" stated:

> In profiling the terrorist, some generalizations can be made on the basis of this examination of the literature on the psychology and sociology of terrorism published over the past three decades. One finding is that, unfortunately for profiling purposes, there does not appear to be a single terrorist personality. This seems to be the consensus among terrorism psychologists, as well as political scientists and sociologists. The personalities of terrorists may be as diverse as the personalities of people in any lawful profession. There do not appear to be any visibly detectable personality traits that would allow authorities to identify a terrorist.

Another finding in the Library of Congress report was that the terrorist is not necessarily diagnosable as psychopathic or mentally sick. Contrary to the stereotype that the terrorist may be a psychopath or otherwise mentally disturbed, the terrorist is actually quite sane, although deluded by an ideological or religious way of viewing the world.

The Library of Congress report further stated in this regard:

> Certain psychological types of people may be attracted to terrorism. In his examination of autobiographies, court records, and rare interviews, Jerrold M. Post (1990:27) found that "people with particular personality traits and tendencies are drawn disproportionately to terrorist careers." Authors such as Walter Laqueur and Post have characterized terrorists as "action-oriented, aggressive people who are stimulus-hungry and seek excitement." Even if Post and some other psychologists are correct that individuals with narcissistic personalities and low self-esteem are attracted to terrorism, the early psychological development of individuals in their pre-terrorist lives does not necessarily mean that terrorists are mentally disturbed and that they can be identified by any particular traits associated with their early psychological backgrounds.[5] [15] [16]

A review of other relevant literature revealed that there are similarities in criminal and terrorist activities. The Los Angeles Police Department (LAPD) and the American Public Transit Association have both identified activities that can be related to terrorism. However, basic observation of activities can help identify possible terrorist and criminal threats, as was evidenced by the behavior of the Tsarnaev brothers in the several minutes before the Boston Marathon bombing on April 15, 2013.

Each of the following activities and/or behaviors on their own may be innocent ones, but consider this list compiled by the LAPD which were observed during terrorism surveillance:

- Multiple sightings of the same suspicious person, vehicle, or activity, separated by time, distance, or direction.

- Individuals who stay at bus or train stops for extended periods while buses and trains come and go.

- Individuals who carry on long conversations on pay or cellular telephones.
- Individuals who order food at a restaurant and leave before the food arrives or who order without eating.
- Joggers who stand and stretch for an inordinate amount of time.
- Individuals sitting in a parked car for an extended period of time.
- Individuals who do not fit into the surrounding environment because they are wearing improper attire for the location or season.
- Individuals drawing pictures or taking notes in an area that is not normally of interest to a tourist; or showing an unusual interest in, or photographing, security cameras or guard locations; or watching security reaction drills and procedures.
- Individuals who exhibit suspicious behavior, such as staring or quickly looking away from individuals or vehicles as they enter or leave facilities or parking areas.[17]

Similarly, the perpetrators of the Boston Marathon bombing displayed behaviors inconsistent with the surrounding environment. Specifically, the Tsarnaev brothers were not interested in the activities associated with the marathon race, but were more interested in people watching the race. The types of activities summarized above should be viewed and analyzed in a holistic context to assess their usefulness as potential predictors of terrorist activities.

Other organizations, such as the National Terrorist Alert Response Center, the Oklahoma Information Fusion Center, and the Kentucky Office of Homeland Security, provide similar checklists and behaviors for suspicious activity, including terrorist and criminal activities. A checklist of activities and behaviors could be developed from a literature review. However, a structured checklist is not functionally suitable for use in a comprehensive BOP at an operating power reactor or power reactor construction site. Unlike classroom checklists used for the assessment of task completion and determination of behavior in children, adults in a dynamic and physically diverse or widespread workplace cannot be similarly observed. Adults in these types of environments are mobile and must be observed while performing a wide range of tasks, in wide-ranging locations, while they are involved with and integrate with broadly diverse populations. Therefore, the training provided for observing behavior must be sufficient in scope to provide observers with the recognition skills necessary to effectively implement the BOP. Checklists are a useful tool in training and post assessment activities.

Although checklists are useful in developing training attributes, they do not offer insight into the personality makeup of a terrorist. The checklists may provide an activity-based indication of potential terrorist characteristics. These activities or characteristics may include personnel showing undue interest in the security features of the site or unusual interest in operational activities beyond their assignment area or an indication of surveillance activities before an actual terrorist event. In some Federal agencies, this type of observation is supported by an operational security program, which is designed to deny adversaries access to information about sensitive activities by examining day-to-day activities from an adversary's point of view.

The key behaviors of alcohol, drug abuse, and mental health issues have been well studied and are easier to identify than potential terrorist activities. Often these issues result in overt behavior that is readily identifiable. Terrorist behaviors are often more subtle and more closely related to criminal and espionage activities.

2.2 Behavioral Collection Techniques and Data

This review examined a variety of behavioral collection techniques and research and analysis techniques. The review also included an evaluation of emerging technology, such as behavioral identification using cameras and artificial intelligence.

The book entitled, "Protecting Individual Privacy in the Struggle against Terrorists: A Framework for Program Assessment,"[18] makes several recommendations for a robust data collection program. Although many of these recommendations are designed around protecting privacy, they provide insight for any BOP.

The study identified the following criteria for effective programs:

- The program should have a clearly stated purpose.
- The program and each of its components should have a sound rational basis.
- The program and each of its components should have a *sound experimental basis*.
- The program should be *scalable.*
- The program should have a clearly stated set of *operational or business processes.*
- The program should be capable of being *integrated* in practice with relevant systems and tools inside and outside the organization.
- The programs should be *robust*.
- The program should adequately guarantee that the data on which it depends are *appropriate and reliable.*
- The program should provide appropriate *data stewardship*—a term that refers to accountability for the program resources being used and protected appropriately according to the defined and authorized purpose.
- The program should provide adequate guarantees of *objectivity* in the testing and assessment of the program.
- The program should be subject to ongoing assessments. No system, no matter how well designed or tested, will be perfect.
- The effectiveness of the program and its compliance should be *documented*.

Most of these criteria listed are sound practices that can be transferred to any BOP to enhance its capabilities.

The book entitled, "Protecting Airline Passengers in the Age of Terrorism," discussed the use of behavior pattern recognition (BPR). The Israelis use BPR to identify the possible terrorist by studying the demeanor of passengers and asking simple questions concerning travel details. This assessment allows security officers to determine whether passengers are potential security risks. BPR uses cognitive and emotional clues to identify suspicious behavior. The cognitive clues center on the thought process and language of deception, whereas the emotional clues center on facial expressions, body language, and voice patterns. The authors point out that "formally investigating and training personnel in behavioral recognition with an eye to the science is a new approach to security." The authors also state, "To date there is no better tool to detect suspicious human behavior than another human being."[19]

Airports around the world are using BPR. The Israelis have been using BPR for 4 decades with zero hijackings or airport-based attacks. This success indicates that the use of BPR might be effective at an operating nuclear power plant or a power reactor construction site.

There are several research projects involving technology and behavioral observation. One example is a project called the "Mind's Eye," under development at the Defense Advanced Research Projects Agency (DARPA); this project is aimed at developing a visual intelligence capability for unmanned systems. DARPA hopes to use artificial intelligence to assess human visual tasks to indicate areas of concern.[20]

In addition to ongoing research, tools and products are being developed for testing and application. S.S.B.I. Exports, Pvt. Ltd., sells a product called the Automated Behavior Pattern Recognition System, a crime-prevention system that uses a combination of psycho-physiological indications and cross-referencing of these indications with additional objective information.[21] The product appears to provide a quick and seemingly accurate screen to identify potential suspicious behavior. Although the product looks promising, no objective studies were found to verify the effectiveness of the technology. In addition, an examination of the technology would be necessary to ensure its effectiveness and to determine any legal ramifications involving its use.

A Pacific Northwest National Laboratory (PNNL) study and subsequent publication entitled, "Predictive Modeling for Insider Threat Mitigation," may have applications for a BOP, even though it is focused on the cyber-security threat. The PNNL study discusses a modeling system to help minimize the insider threat. The predictive modeling approach incorporates both cyber and psychosocial data. Evaluations of the predictive model used case studies and additional data sets (some fabricated to test specific aspects of the model and some generated by simulation software). The model automates the detection of high-risk activities on which to focus.[22] The model certainly has cyber-security-related applications and, if proven effective, could be useful in other aspects of the BOP.

2.3 Other Behavioral Observation Programs

Further review considered programs that were not included in comparative analysis because of insufficient program information or because the data were part of the TSA comparison

discussed below in Section 3.1.4. The review looked at the use of behavior pattern recognition (BPR) in the airport setting.

El Al Airlines uses BPR, as does Miami International Airport[23] and Logan International Airport.[24] As discussed earlier, BPR is a process that assesses certain behavior as suspicious. This behavior could be an indication of criminal or terrorist activity. BPR should not be confused with racial profiling. The 1972 terrorist act carried out by Japanese nationals is a good example of the limitations of racial profiling. This was the worst attack to date on the Ben Gurion Airport.[25]

Security at the Ben Gurion Airport now has a multi-level defensive strategy, starting at the perimeter of the airport and working inward to the boarding process. Security personnel, highly trained in the BPR technique, have several opportunities to observe a passenger during the lengthy boarding process. Any passenger can be denied access to a flight for suspicious behavior.

Miami International Airport is currently utilizing BPR to screen passengers. Although Miami does not employ behavioral detection to the extent that the Israelis do, plans exist to train other airport personnel and create a more multi-layered assessment process to observe individuals.

Boston Logan International Airport utilizes Massachusetts State Police to help with airport security. These troopers are trained in BPR to help determine suspicious behavior.

The key elements in these programs are personnel dedicated to behavioral observation, in depth focused training, layered defense, and the use of BPR. Such personnel are dedicated to observe behavior, are well trained to recognize suspect behavior, and are trained to handle those who exhibit such behaviors. Multiple layers of security working in concert toward the same goal ensure the existence of multiple opportunities to stop any terrorist or criminal activity before or after it occurs. The integration of programs and personnel in these layers enhances the opportunities to thwart potential adversaries.

2.4 Governmental Reports Related to Behavioral Observation Programs

In May 2010, the GAO released a report entitled, “Efforts to Validate TSA’s Passenger Screening Behavior Detection Program Underway, but Opportunities Exist to Strengthen Validation and Address Operational Challenges.”[26] The GAO commissioned this report to review the program called Screening Passengers by Observation Technique (SPOT). GAO analyzed (1) the extent to which TSA validated the SPOT program before deployment, (2) implementation challenges, and (3) the extent to which TSA measures SPOT’s effect on aviation security. GAO analyzed TSA documents such as strategic plans and operating procedures, interviewed agency personnel and subject matter experts, and visited 15 airports which have implemented the SPOT program.

The GAO report stated:

> Although the [U.S.] Department of Homeland Security (DHS) is in the process of validating some aspects of the SPOT program, TSA deployed SPOT nationwide without first validating the scientific basis for identifying suspicious passengers in an airport environment. A scientific consensus does not exist on whether behavior detection principles can be reliably used for counterterrorism purposes, according to the National

> Research Council of the National Academy of Sciences. According to TSA, "no other large-scale security screening program based on behavioral indicators has ever been rigorously scientifically validated."

The GAO report further stated:

> TSA is experiencing implementation challenges, including not fully utilizing the resources it has available to systematically collect and analyze the information obtained by BDOs [Behavior Detection Officer] on passengers who may pose a threat to the aviation system. TSA's Transportation System Operations Center has the resources to investigate aviation threats but generally does not check all law enforcement and intelligence databases available to it to identify persons referred by BDOs. Utilizing existing resources would enhance TSA's ability to quickly verify passenger identity and could help TSA to more reliably "connect the dots." Further, most BDOs lack a mechanism to input data on suspicious passengers into a database used by TSA analysts and also lack a means to obtain information from the Transportation System Operations Center on a timely basis. Providing BDOs or other TSA personnel with these capabilities could help TSA "connect the dots" to identify potential threats.

The GAO report also stated that "although TSA has some performance measures related to SPOT, it lacks outcome-oriented measures to evaluate the program's progress toward reaching its goals. Establishing a plan to develop these measures could better position TSA to determine if SPOT is contributing to TSA's strategic goals for aviation security. TSA is planning to enhance its evaluation capabilities to more readily assess the program's effectiveness by conducting statistical analysis of data related to SPOT referrals to law enforcement and associated arrests."

The GAO provided the following 11 specific recommendations for the SPOT program:

- The U.S. Secretary of Homeland Security should convene an independent panel of experts to review the methodology of the DHS Science and Technology Directorate study on the SPOT program to determine whether the study's methodology is sufficiently comprehensive to validate the SPOT program.

- Conduct a comprehensive risk assessment to determine the effective deployment of SPOT.

- Perform a cost-benefit analysis of SPOT.

- Revise and implement the SPOT strategic plan using risk assessment information.

- Study the feasibility of using airport checkpoint-surveillance video recordings to enhance its understanding of terrorist behaviors.

- Provide guidance in the SPOT standard operating procedures or other directives to BDOs or other TSA personnel on how to input data into the Transportation Information Sharing System database.

- Develop a standardized process to allow BDOs or other designated airport officials to send information to TSA's Transportation Security Operations Center about passengers whose behavior indicates that they may pose a threat to security and to provide guidance on how designated TSA officials are to receive information back from the center.

- The Transportation Security Operations Center utilizes all the databases available to it when conducting checks on passengers who rise to the level of an LEO [law enforcement organization] referral against intelligence and criminal databases.

- Establish a plan with objectives, milestones, and timeframes to develop outcome-oriented performance measures for BDOs.

- Establish controls for SPOT data.

- Establish time frames and milestones to systematically evaluate the SPOT training program on a periodic basis.[28]

In response to the May 2010 GAO report to develop a plan for outcome –based performance measures, TSA completed a performance metric plan in November of 2012 and took action on all of GAO's 11 recommendations. GAO, in their November 2013 report, acknowledged that the SPOT validation study was a useful initial step and had addressed issues raised in GAO's May 2010 report, but that methodological weakness still limited its usefulness. TSA has efforts underway to better define the behavioral indicators currently used by BDOs, and to complete an inter-rater reliability study. The inter-rater reliability study could help TSA determine whether BDOs can consistently and reliably interpret the behavioral indicators, which is a critical component of validating the SPOT program's results and ensuring that the program is implemented consistently. The November 2013 GAO report also concluded that providing scientifically validated evidence that demonstrates that behavioral indicators can be used to identify passengers who may pose a threat to aviation security is critical to the implementation of TSA's behavior detection activities.

Although not all the information that appears in the GAO reports is directly applicable to BOPs at operating nuclear plants or power reactor construction sites, the reports do provide some recommendations that, if implemented, would enhance BOPs. The following are some significant points that may be applied to BOPs at operating nuclear power plants and power reactor construction sites:

- Conduct a risk assessment to determine the best way to deploy a BOP. The risk assessment should identify SSCs that might require enhanced security during construction. The risk assessment should identify what security features can be enhanced (including, but not limited to, the BOP) to better protect these SSCs.

- Provide a means to share and document behavioral observations.

- Establish controls for BOP data. In this case, controls refer to the consistency of how the data are collected and analyzed.

- Periodically and systematically evaluate training to ensure that it is effective and is easily understood.

The TSA program is primarily used as a deterrent. The GAO report states in this regard:

> TSA notes that one purpose of the SPOT program is to deter terrorists, but that proving that it has succeeded at deterring terrorists is difficult because the lack of data has presented challenges for the SPOT program office when developing performance measures. We agree that developing performance measures, especially outcome measures, for programs with a deterrent focus [is] difficult. [28]

Appendix II, "Contractor-Reported Challenges to Completing State Construction Projects," to GAO Report No. 09-48, "Embassy Construction: Additional Actions Are Needed to Address Contractor Participation," indicated that finding qualified workers who are cleared is a major challenge. The report notes some of the same turnover issues prevalent in the U.S. construction labor market, such as employees leaving for more money and for a more favorable location.[27]

The Congressional Research Service report to Congress entitled, "Securing General Aviation," describes the Airport Watch Program. This program relies on the cooperation and participation of pilots, airport tenants, and airport workers to observe and report suspicious behavior. The report pointed out that training material is made available to the participants in the program but that they are relatively untrained in detecting suspicious behavior. This was cited as a limitation in the program. The report stated that the implementation of BPR techniques was one possible solution to this limitation. The report noted that line and maintenance personnel could be trained in BPR to become an integral part of security instead of relying on a few security personnel.[28]

2.5 Related Literature

A review was performed of other literature related to BOPs, including case studies and other academic literature. Synopses of the most relevant documents are provided below.

On April 16, 2007, Seung Hui Cho murdered 32 and injured 17 students and faculty in two related incidents on the campus of Virginia Tech. Cho was a student of Virginia Tech majoring in English. The governor empowered an independent panel to investigate the shooting in August 2007; the panel produced the report entitled, "The Virginia Tech Review Panel Report." This report contained several key findings related to the shooting incident, some of which are listed below:

1. Cho exhibited signs of mental health problems during his childhood. His middle and high schools responded well to these signs and, with his parents' involvement, provided services to address his issues. He also received private psychiatric treatment and counseling for selective mutism

and depression. In 1999, after the Columbine shootings, Cho's middle school teachers observed suicidal and homicidal ideations in his writings and recommended psychiatric counseling, which he received. During this counseling he received medication for a short time. Although Cho's parents were aware that he was troubled at this time, they state they did not specifically know that he thought about homicide shortly after the 1999 Columbine school shootings.

2. During Cho's junior year at Virginia Tech, numerous incidents occurred that were clear warnings of mental instability. Although various individuals and departments within the university knew about each of these incidents, the university did not intervene effectively. No one knew all the information and no one connected all of the dots.

3. University officials in the Office of Judicial Affairs, Cook Counseling Center, campus police, the Dean of Students, and others explained their failures to communicate with one another or with Cho's parents by noting their belief that such communications are prohibited by the federal laws governing the privacy of health and education records. In reality, federal laws and their state counterparts afford ample leeway to share information in potentially dangerous situations.

4. The Cook Counseling Center and the university's Care Team failed to provide needed support and services to Cho during a period in late 2005 and early 2006. The system failed for lack of resources, incorrect interpretation of privacy laws, and passivity. Records of Cho's minimal treatment at Virginia Tech's Cook Counseling Center are missing.

5. There was widespread confusion about what federal and state privacy laws allow. Also, the federal laws governing records of health care provided in educational settings are not entirely compatible with those governing other health records.

6. Cho purchased two guns in violation of federal law. The fact that in 2005 Cho had been judged to be a danger to himself and ordered to outpatient treatment made him ineligible to purchase a gun under federal law.

7. Virginia at this time was one of only 22 states that report any information about mental health to a federal database used to conduct background checks on would-be gun purchasers. But Virginia law did not clearly require that persons such as Cho—who had been ordered into out-patient treatment but not committed to an institution—be reported to the database.

8. Some Virginia colleges and universities are uncertain about what they are permitted to do regarding the possession of firearms on campus.

9. The Virginia Tech police may have erred in prematurely concluding that their initial lead in the double homicide was a good one, or at least in

conveying that impression to university officials while continuing their investigation. They did not take sufficient action to deal with what might happen if the initial lead proved erroneous. The police reported to the university emergency Policy Group that the "person of interest" probably was no longer on campus.

10. The Virginia Tech Police Department erred in not requesting that the university's Policy Group issue a campus-wide notification that two persons had been killed and that all students and staff should be cautious and alert.

11. Senior university administrators, acting as the Emergency Policy Group, failed to issue an all-campus notification about the West Ambler Johnson (WAJ) killings until almost 2 hours had elapsed. University practice may have conflicted with written policies.

12. Cho's motives for the WAJ or Norris Hall shootings are unknown to the police or the panel. Cho's writings and videotaped pronouncements do not explain why he struck when and where he did.[29]

The review of the Virginia Tech shootings offers the following important lessons for any BOP:

- A comprehensive BOP should be able to identify behaviors related to all threats, including mental instability.

- Personnel need to be properly trained to identify these behaviors and must be willing to take appropriate action. The training should include a discussion of federal and state laws pertaining to privacy act information and health records.

- A clear set of procedures on how to handle BOP reporting is critical to the success of the BOP. No doubt should exist on how to handle behavioral observation information.

- All data from all sources need to be reviewed. The reviewing official of a BOP should have all information available in order to make an informed decision.

- Documentation is a key element of a program. Without proper documentation, detecting behavioral patterns of concern may be impossible.

- A comprehensive BOP needs to be an integrated site activity. All of these elements need to have clear lines of communication.

Scott D. Sagan's article entitled, "The Problem of Redundancy Problem: Why More Nuclear Security Forces May Produce Less Nuclear Security," discusses redundancy in nuclear security. Sagan's article stated that "redundancy can backfire when diffusion of responsibility leads to 'social shirking.'" He discusses the case study of the 1964 murder of Kitty Genovese in Queens Borough, New York City, where 38 witnesses to the murder failed to report or intervene in the act.[30]

Sagan's observations about "social shirking" have been validated by other researchers and these observations may have direct implications for the fundamental concepts of behavioral observation. Although the "social shirking" phenomenon can adversely impact a BOP, some of the following actions can serve as mitigation:

- Develop comprehensive and consistent training that emphasizes the responsibility to report behavior. This training should include periodic refresher classes and continual security education through, for example, electronic or other visual media, morning briefings, and handouts.

- Produce a clear and concise policy statement that is communicated frequently to all employees. This policy statement should be communicated to the employees during employee orientation to the site and periodically (at least annually) to help ensure the policy is understood by employees.

- Establish clear and concise procedures for the BOP.

- Institute oversight of the program to examine lessons learned from the internal BOP and other BOP programs.

The article entitled, "The Behavior Observation Instrument: A Method of Direct Observation for Program Evaluation," discussed limiting factors of BOPs in clinical settings. The most notable elements impacting behavior observation are cost, manpower, and training.[31] Each of these factors influences a BOP, but it will typically be the cost of the program that determines the extent to which manpower and training are applied. Any adopted changes should have proven benefit to the BOP to decrease the risk to public health and safety or the common defense and security.

3. COMPARATIVE PROGRAMS

3.1 DESCRIPTIONS

Sections 3.1.1 and 3.1.2 below discuss, respectively, the NRC regulatory requirements for establishing a BOP as an element of the FFD and AA programs, and relevant NEI guidance. Subsequent sections compare the NRC requirements and NEI guidance on BOPs to other federal, state and international programs.

The requirements in 10 CFR Part 26, "Fitness for Duty Programs," as well as NEI guidance documents NEI 03-01, "Nuclear Power Plant Access Authorization Program," and NEI 06-06, "Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites" (both of which are discussed below in Section 3.1.2), provide a framework that can be utilized to develop a BOP. Note, however, that this existing NEI guidance for Part 26 does not fully address all of the regulatory requirements, because there are provisions in 10 CFR Part 73 ("Physical Protection of Plants and Materials") that also need to be considered in developing a BOP. The relevant 10 CFR Part 26 and Part 73 provisions are discussed below in section 3.1.1. The NRC's goal in this NUREG report is to provide recommendations that will help the regulated community address both sets of NRC requirements in their BOPs. In this regard, it is important to be familiar with the relevant Part 26 and Part 73 BOP requirements.

A best practice discussed in other programs is additional training for reviewing officials, supervisors, and managers. These personnel should be able to review documentation and make key decisions based on described behavior, personal observations during face-to-face interviews and other associated documentation or information. Although it is easy to make a determination on a positive drug test, combining several small incidents and painting a mosaic about an individual and his or her behavior can be much more difficult. Clear policy, procedures, training and experience can make this process more uniform and can eliminate false positive reports and, perhaps more importantly, false negative reports. As such, having properly trained supervisors and managers, as well as reviewing officials if applicable, at operating reactors and reactors under construction is a key component of a successful BOP.

Of the BOPs reviewed, performance indicators were not well defined in regulations or guidance. As discussed in Section 2 of this report, defining performance for a deterrent program is difficult. Although a trend, such as an increase in the number of positive drug tests, is an empirical measure and can be useful as a performance measure, the cause of the increase is also important. In this case, an increase in positive results could indicate an increase in drug use or it could be attributed to a larger panel of drugs being tested or simply a higher percentage of the population being tested. Performance indicators for any program, whether a BOP or a safety program, help determine how a program is functioning.

3.1.1 U.S. Nuclear Regulatory Commission

The BOP is a vital and supporting element of the FFD, IMP, and AA programs. For example, 10 CFR 73.56 contains the AA requirements applicable to personnel at nuclear power plants, and includes BOP provisions. In this regard, 10 CFR 73.56(f)(1) states that a BOP must be

"designed to detect behaviors or activities that may constitute an unreasonable risk to the health and safety of the public and common defense and security, including a potential threat to commit radiological sabotage." Additionally, 10 CFR 73.56(f)(3) states that personnel who are subject to an AA program must report any concerns arising from behavioral observation, including, but not limited to, concerns related to any questionable behavior patterns or activities of others to the reviewing official, his or her supervisor, or other management personnel designated in their site procedures. This provision further requires that, upon receipt of any such reports, the reviewing official must reassess the reported individual's unescorted access or unescorted access authorization status; if the individual's trustworthiness or reliability is thereby called into question, the reviewing official is required to terminate the individual's access authorization.

With respect to maintaining FFD authorization, 10 CFR 26.71(a)(3) requires that individuals remain "subject to a behavioral observation program that meets the requirements of § 26.33."

In turn, 10 CFR 26.33 states in relevant part as follows:

> Behavioral observation must be performed by individuals who are trained under § 26.29 to detect behaviors that may indicate possible use, sale, or possession of illegal drugs; use or possession of alcohol on site or while on duty; or impairment from fatigue or any cause that, if left unattended, may constitute a risk to public health and safety or the common defense and security.

In accordance with the 10 CFR 26.29(a) training requirements, licensees and other entities must ensure that individuals who are subject to subpart B of Part 26 have the following knowledge and abilities (KAs):

> (1) Knowledge of the policy and procedures that apply to the individual, the methods that will be used to implement them, and the consequences of violating the policy and procedures;
>
> (2) Knowledge of the individual's role and responsibilities under the FFD program;
>
> (3) Knowledge of the roles and responsibilities of others, such as the Medical Review Officer (MRO) and the human resources FFD and Employee Assistance Program (EAP) staffs;
>
> (4) Knowledge of the EAP services available to the individual;
>
> (5) Knowledge of the personal and public health and safety hazards associated with abuse of illegal and legal drugs and alcohol;
>
> (6) Knowledge of the potential adverse effects on job performance of prescription and over-the-counter drugs, alcohol, dietary factors, illness, mental stress, and fatigue;
>
> (7) Knowledge of the prescription and over-the-counter drugs and dietary factors that have the potential to affect drug and alcohol test results;

(8) Ability to recognize illegal drugs and indications of the illegal use, sale, or possession of drugs;

(9) Ability to observe and detect performance degradation, indications of impairment, or behavioral changes; and,

(10) Knowledge of the individual's responsibility to report an FFD concern and the ability to initiate appropriate actions, including referrals to the EAP and person(s) designated by the licensee or other entity to receive FFD concerns.

However, these KAs do not address potential criminal or terrorist behaviors – which are covered by the 10 CFR 73.56 provisions discussed above. Similarly, the focus of 10 CFR 26.189, "Determination of Fitness," is on mental health, drug, and alcohol issues; criminal and terrorist activities can and do fall outside these areas. Consequently, 10 CFR Part 26 does not require or address the qualifications of personnel who are required to make determinations concerning criminal and terrorist activities. However, 10 CFR Part 26 can be used to evaluate the fitness of licensee personnel (e.g., that an individual is mentally stressed, or is exhibiting behavioral changes calling into question the individual's fitness to safely and competently perform assigned duties).

As indicated above, behavioral observation can be utilized to determine whether a person is fit for duty. In this regard, 10 CFR 26.189(c) states:

> A determination of fitness that is conducted for cause (i.e., because of observed behavior or a physical condition) must be conducted through face-to-face interaction between the subject individual and the professional making the determination. Electronic means of communication may not be used.

Also relevant in this regard are the 10 CFR 26.406(c) fitness monitoring provisions, stating that licensees and other entities must "establish procedures that monitors shall follow in response to the indications and actions specified in paragraph (b) of this section and train the monitors to implement the program."[1] Similar training issues are discussed below in Section 3.1.2.

NUREGs and other guidance documents (discussed below in Section 3.1.2) may also be used in developing and implementing more comprehensive and universally consistent BOPs among those licensees and other entities that are required to have BOPs. Note, however, that while guidance documents can help determine acceptable means of complying with NRC regulatory requirements for a BOP, they cannot be used to impose substantive new requirements.

3.1.2 Nuclear Energy Institute

Nuclear Energy Institute (NEI) guidance document NEI 06-06, Rev. 6 "Fitness for Duty Program Guidance for New Nuclear Power Plant Construction Sites," April 2013, describes a process for construction site entities "to authorize and maintain a worker's status in the construction site entity's FFD Program in order to allow an individual to work on a construction site." Licensees or applicants may choose alternative means of complying with applicable requirements. Entities implementing NEI 06-06 guidance may include NRC licensees; contractor/vendors (C/V); applicants for, or holders of, a Combined License (COL), Construction Permit (CP), or Limited Work Authorization (LWA); or other entities authorized by the NRC. The defined process "applies only to construction activities on safety- and security-related SSCs that are performed

on the site where the new power reactor will be installed and operated."[32] Furthermore, licensees or applicants need not follow NEI 06-06 if they have alternative means of complying with applicable requirements.

NEI 06-06 further states:

> The construction site entity's Behavioral Observation Program is the primary means to detect behavior that may indicate possible use, sale, or possession of illegal drugs; use or possession of alcohol on site or while on duty; or any physical impairment or any cause that, if left unattended, may constitute a risk to public health and safety or the common defense and security. Management and oversight personnel that are responsible for observing individuals subject to a Behavioral Observation Program shall report any FFD concerns about individuals to the personnel designated in the construction site entity's policy.
>
> Management and oversight personnel who are responsible for observing individuals subject to the Behavioral Observation Programs must be trained to have sufficient awareness and sensitivity to detect degradation in performance which may be the result of being under the influence of any substance, legal or illegal, physical or mental impairment which in any way may adversely affect their ability to safely and competently perform their duties.

While these statements are broad enough to cover criminal and terrorist activities, they do not require that these topics be covered. Language that includes the impact on site security and critical infrastructure and systems is necessary to address these activities and focus BOP observations.

Further discussion of training in NEI 06-06 includes a general statement of reporting responsibilities with specific training roles, knowledge, and skills remaining undefined. "Training shall communicate the expectation of promptly reporting noticeable changes in behavior or FFD concerns about other individuals to the construction site entity designated personnel for appropriate evaluation and action in accordance with the FFD policy."

NEI 06-06 recommends that management and oversight personnel be notified if any "for cause" behavior is observed. "For cause" behavior, as used in NEI 06-06 and defined in 10 CFR 26.405(c)(2), is any observed behavior or physical condition creating a reasonable suspicion of possible illegal activity or physical or mental impairment.

Construction site entity procedures should provide reasonable assurance that personnel are fit to safely and competently perform their duties. NEI 06-06, Section 7, Behavioral Observation Program, states the process to be followed if an individual's behavior or condition raises a concern while performing, constructing, or directing the construction of safety- or security-related systems. Observations should detect impairments from any cause "which could adversely affect the individual's ability to safely and competently perform his or her duties."

NEI 03-01, "Nuclear Power Plant Access Authorization Program," Revision 3, May 2009, endorsed by NRC staff (ADAMS) Accession No. ML13177A260 and Regulatory Guide 5.66, (ADAMS) Accession No. ML112060028 describes the BOP as the primary means of

determining continued trustworthiness and reliability of covered individuals. NEI 03-01describes the objectives of a BOP as follows:

(a.) To detect and report behaviors that may indicate possible use, sale or possession of illegal drugs, use or possession of alcohol on site or possession of illegal drugs, use or possession of alcohol on site or while on duty; or impairment from fatigue or any cause that, if left unattended constitute a risk to public health and safety or the common defense and security.

(b.) To report and evaluate legal actions taken by a law enforcement authority or court of law which the individual has been subject that could result in incarceration or court order that requires a court appearance, including but not limited to an arrest, an indictment, the filing of charges, or a conviction, but excluding minor traffic violation such as parking or speeding tickets; and,

(c.) To detect and report other behavior that may constitute an unreasonable risk to health and safety of the public, including a potential threat to radiological sabotage. This includes behavior instances addressed in the licensee or C/V disciplinary process leading to unfavorable termination or resignation in lieu of termination.

NEI 03-01 defines which employees are subject to a BOP, as follows:

1. Any individual to whom a licensee intends to grant unescorted access (UA) to nuclear power plant protected vital areas or any individual for whom a licensee authorizes unescorted access authorization (UAA);

2. Any individual who is required by a licensee to physically report to the licensee's Technical Support Center (TSC) or Emergency Operations Facility (EOF) as specified within the licensee emergency plans and procedures;

3. Any individual whose duties and responsibilities permit the individual to take action by electronic means, either on site or remotely, that could adversely impact the licensee's operational safety, security, or emergency response capabilities;

4. Any individual who has a responsibilities for implementing a licensee's protective strategy, including, but not limit to, armed security force officers, alarm station operators and tactical response team leaders:

5. The licensee access authorization program reviewing official or contractor or vender access authorization program reviewers; and

6. Other individuals, at the licensee's discretion, including employees of the contractor or a vender who are designated in access authorization program procedures.

NEI 03-01 also provides training recommendations for personnel subject to the BOP. Individuals covered by BOP should be instructed to comply with the policy and procedures of the licensee's FFD program. The training recommendations are as follows:

a. The licensee and if appropriate C/V must develop a training plan that results in reasonable assurance that licensee and C/V personnel have sufficient awareness and sensitivity to detect degradation in performance which may be the result of being under the influence of any substance, legal or illegal, physical or mental impairment which in any way may adversely affect their ability to safely and competently perform their duties. All C/V training plans must be licensee approved.

b. The training program shall address the knowledge and abilities necessary to detect behavior or activities that have the potential to constitute an unreasonable risk to the public health and safety and the common defense, including the potential to commit radiological sabotage and communicate the requirement of promptly reporting noticeable changes in behaviors, activities or FFD concerns about other individuals to the licensee or C/V's management-designated personnel for appropriate evaluation and action in accordance with regulatory requirements and the licensee approved FFD policy.

c. The training program must also provide for instruction in techniques related to recognition of behaviors adverse to the safe operation and security of the facility, (e.g., unusual interest in or predisposition towards security or operations activities outside the scope of one's normal work assignments, or frequent unexplained absence from work assignments.)

d. Behavioral observations must be performed by individuals who are trained to detect behaviors that may indicate possible use, sale, or possession of illegal drugs; use or possession of alcohol on site or while on duty; or impairment from fatigue or any cause that, if left unattended, may constitute a risk to public health and safety.

e. All individuals will be trained to the same level on their behavioral observation responsibilities.

f. All individuals identified in Section10.b [NEI 03-01] shall undergo initial BOP training. The initial training shall include a comprehensive examination addressing the requirements of Section 10.a.1 (a)-(c) [NEI 03-01]. BOP refresher training shall be completed on a nominal annual basis and shall be documented as required by licensee or C/V procedures. In lieu of refresher training, a comprehensive examination may be administered.

g. Remedial training and re-testing are required for individuals who fail to satisfactorily complete the comprehensive examination.

h. Initial and refresher training may be delivered using a variety of media (including, but not limited to, classroom lectures, required reading, video, or computer-based training systems). The licensee or C/V shall monitor the completion of training.

NEI 03-01 describes the specific responsibilities of personnel subject to the BOP as follows:

1. Observing personnel for behavior traits and patterns that may reflect adversely on their trustworthiness or reliability;

2. Awareness of behavior that might be adverse to safe operations;

3. Reporting observed behaviors of individuals that may adversely affect the safety or security of a licensee's facility, or that may constitute an unreasonable risk to the public health and safety or the common defense and security including a potential threat to commit radiological sabotage; and

4. Reporting those observations to the appropriate licensee or C/V management in accordance with the licensee's or C/V's procedures.

3.1.3 U.S. Department of Energy

The U.S. Department of Energy (DOE) Human Reliability Program (HRP) is designed to provide an additional level of oversight and assurance of responsible action of personnel in designated positions at DOE sites. In this regard, the DOE's 10 CFR Part 712, "Human Reliability Program," states:

> The HRP is a security and safety reliability program designed to ensure that individuals who occupy positions affording access to certain materials, nuclear explosive devices, facilities, and programs meet the highest standards of reliability and physical and mental suitability. This objective is accomplished under this part through a system of continuous evaluation that identifies individuals whose judgment and reliability may be impaired by physical or mental/personality disorders, alcohol abuse, use of illegal drugs or the abuse of legal drugs or other substances, or any other condition or circumstance that may be of a security or safety concern."[33]

As reflected in DOE policy, DOE line management is responsible for safeguards and security of DOE assets. The DOE policy also requires that there be clear and unambiguous lines of authority and responsibilities for ensuring safeguards and security at all DOE and contractor organizational levels. Each individual is required to have the knowledge, skills, abilities, and experience to fulfill his or her responsibilities.[34]

Initial requirements of the HRP are as follows:

- DOE Q Security Clearance (access authorization)

  A DOE Q clearance is a type of security clearance granted by DOE that indicates that the recipient is approved for access to the following levels of classified matter on a need-to-know basis: Top Secret, Secret, Confidential Restricted Data, National Security Information, and Formerly Restricted Data.

- Questionnaire for National Security Positions (QNSP), Part 2

  The annual submission of the QNSP enables DOE to update the personnel security file for the individual, which is reviewed annually.

- Signed Releases, Acknowledgments, and Waivers

  Personnel must review and sign documents to facilitate the collection and dissemination of information, performance of medical assessments, and drug and alcohol testing.

- Completion of HRP Instruction

  Individuals must complete HRP instruction for initial certification and annual recertification. The instruction includes the following elements:

  – HRP objectives;

  – roles and responsibilities of each HRP-certified individual, including recognizing and responding to behavioral change and aberrant or unusual behavior that may result in a risk to national security or nuclear explosive safety, recognizing and reporting security concerns, and reporting prescription drug use;

  – requirements for returning to work after sick leave;

  – the HRP continuous evaluation process; and,

  – a detailed explanation of duties and safety requirements for those who have nuclear explosive responsibilities.

- Counterintelligence Evaluation

  Individuals who occupy certain HRP positions may be required to successfully complete a counterintelligence evaluation; however, it is no longer a general requirement because of revisions to 10 CFR Part 709, “Counterintelligence Evaluation Program.” Under the revised regulation, each site will designate positions in accordance with the regulation’s criteria.

- Completion of Reviews, Evaluations, and Assessments

The following reviews, evaluation, and assessments must be completed:

– Supervisory Review. Each supervisor of an HRP candidate or HRP-certified individual must conduct an initial and annual review to evaluate information (including security concerns) relevant to that individual's suitability to perform HRP tasks in a reliable and safe manner.

– Medical Assessment. The medical assessment is performed for initial certification and then annually for recertification. A medical assessment may be performed more often if required by the site occupational medical director (SOMD). The designated physician, under the supervision of the SOMD, is responsible for the medical assessment of HRP candidates and HRP-certified individuals. In performing this responsibility, the designated physician or the SOMD must integrate the medical evaluation, the available test results, the psychological evaluation, a review of current legal drug use, and any other relevant information. This information is used to determine if a safety or security reliability concern exists and if the individual is medically qualified for HRP duties.

– Psychological Evaluation. As part of the medical assessment, a psychological evaluation must be conducted for initial HRP certification. This evaluation consists of a psychological assessment (test) and an interview. For recertification, the evaluation consists of an interview, but a psychological test may also be conducted, if warranted. Every third year, the psychological evaluation includes a psychological test.

– Management Evaluation. The HRP management official considers the results of the supervisory review, medical assessment, drug and alcohol test results, and any other information relating to an individual's reliability and trustworthiness and makes a recommendation regarding certification.

– Personnel Security Review. A DOE personnel security specialist will perform a personnel security file review upon receipt of the individual's supervisory review, medical assessment, and management evaluation and recommendation. Security concerns identified at any stage of the certification process will be evaluated and resolved in accordance with DOE regulations for access to classified matter or special nuclear materials in 10 CFR Part 710, "Criteria and Procedures for Determining Eligibility for Access to Classified Matter or Special Nuclear Material."

- Drug and Alcohol Testing

The following drug and alcohol testing must be conducted:

– Initial. All HRP candidates will be tested for the use of alcohol and illegal drugs before HRP certification is granted.

– Random Drug Test. HRP-certified individuals are selected randomly, at least once in every 12-month period as required by the DOE HRP Handbook, for unscheduled and unannounced testing for the presence of illegal drugs. A confirmed positive drug test

is considered a security concern that will result in the individual's immediate removal from HRP duties and adjudication under the criteria and guidelines in 10 CFR 710.7, "Application of the Criteria," and 10 CFR 710.8, "Criteria."

– Random Alcohol Test. HRP-certified individuals are selected randomly, at least once in every 12-month period, for unscheduled and unannounced testing for the presence of alcohol. A positive test is an alcohol concentration of 0.02 or greater on a confirmatory test. A person who tests positive will be sent home and will not be allowed to perform HRP duties for 24 hours. The management official will be notified.

- Other Requirements

  Other requirements include the following:

  – The individual shall not have used a hallucinogen (lysergic acid diethylamide (LSD)) in the preceding 5 years and shall not have experienced a flashback resulting from the use of LSD more than 5 years before applying for certification or recertification.

  – Individuals performing nuclear explosive duties, and others in designated positions, are prohibited from consuming alcohol within an 8-hour period preceding scheduled work.[35]

Initial screening is reinforced with behavioral observation of at-risk behavior. Personnel are trained to recognize and respond to behavioral changes and aberrant or unusual behavior that may result in a risk to national security. Individuals assigned to HRP duties must report any observed or reported behavior or condition of another HRP-certified individual that could indicate a "reliability concern." Concerns include, but are not limited to, the following conditions:

- psychological or physical disorders that impair the performance of assigned duties;
- conduct that warrants referral for a criminal investigation or results in an arrest or conviction;
- indications of deceitful or delinquent behavior;
- attempted or threatened destruction of property or life;
- suicidal tendencies or attempted suicide;
- use of illegal drugs or abuse of legal drugs or other substances;
- alcohol use disorders;
- recurring financial irresponsibility;
- irresponsibility in performing assigned duties;

- inability to deal with stress or the appearance of being under unusual stress;

- failure to comply with work directives, hostility or aggression toward fellow workers or authority, uncontrolled anger, violation of safety or security procedures, or repeated absenteeism; and,

- significant behavior changes, moodiness, depression, or other evidence of loss of emotional control.

An individual may be tested for alcohol or drugs if he or she is involved in an incident, unsafe practice or occurrence, or if reasonable suspicion exists that he or she may be impaired. Reasonable suspicion must be based on an articulable belief drawn from facts and reasonable inferences that the person is under the influence or in possession of an illegal drug or alcohol. This suspicion may be based on observations of use or possession of illegal substances or physical symptoms of being under the influence of illegal substances. Abnormal conduct or erratic behavior can also provide a basis for reasonable suspicion.

Supervisors are required to submit for assessment those employees who exhibit unusual conduct. Unusual conduct may include behavior that raises doubts about the person's allegiance to national security or interests.

DOE facilities and sites develop programs to meet the requirements in 10 CFR Part 712, "Human Reliability Program," and supplemental DOE guidance. Under DOE, the Oak Ridge National Laboratory (ORNL) HRP program is designed to reduce "insider" risks to national security through the close and continuous evaluation, selection, and monitoring of individuals in HRP-designated positions. Observations provide a determination on possible impairment by physical disorders, emotional disorders, use of controlled substances, or use of alcohol to excess. All ORNL supervisors receive training entitled, "Free from the Influence for Supervisors." This training includes recognition of employee behavior, physical appearance, and job performance. Specific behaviors and performance indicators are listed with observations to note for action, reporting, and documentation.

The Stanford Linear Accelerator Center (SLAC) is a DOE facility that implements the above HRP policies. The FFD program at SLAC includes training supervisors and managers to observe worker behavior commonly associated with alcohol or substance abuse. The program describes supervisor roles and responsibilities to observe and monitor employee attendance, performance, and behavior. Specific actions are identified as trigger points to evaluate the employee for FFD. These actions include dexterity, coordination, concentration, memory, alertness, vision, and speech. Other behaviors include improper interactions with coworkers or an inappropriate reaction to criticism.

Procedures and training outline a sequence of actions when behavior indicates that the employee may not be fit for duty. The first action is to remove the employee from his or her duties. Subsequent actions include notifying employee relations or security, asking the employee to meet in a private area, informing the employee of concerns, informing the employee that he or she will be referred for a medical assessment, and documenting the observation and following actions.

U.S. Department of Defense (DOD) requirements are similar to those of DOE in support of national security while protecting public health and safety and the environment. The Personnel Reliability Program (PRP) is outlined in DOD Instruction 5210.42, which states that "only those personnel who have demonstrated the highest degree of individual reliability for allegiance, trustworthiness, conduct, behavior, and responsibility shall be allowed to perform duties associated with nuclear weapons, and they shall be continuously evaluated for adherence to PRP standards."[36]

Discussion of U.S. Department of Energy Behavioral Observation

DOE addresses behavioral controls in a graded approach. It requires security awareness training for all employees and subcontractors and includes the responsibility to report specific behavior or actions outside of authorized activity. Site access is strictly controlled by the various area requirements. Areas include property protection areas, controlled construction areas, limited security areas, protected areas, and material access areas. Personnel are escorted in areas in which security controls exceed their specific clearance. Escorts are trained to monitor the movement and behavior of the escorted personnel.

Some of the strengths of the HRP program are as follows:

- The HRP program stresses drug and alcohol testing to ensure that each employee is randomly tested at least once a year.

- In addition to the management review, DOE Personnel Security reviews all HRP personnel annually. These reviews include the annual submission of the QNSP (Part 2) by HRP personnel.

- The HRP program conducts annual psychological and medical reviews.

The increase of drug and alcohol testing gives a greater assurance of a drug- and alcohol-free workplace. The security review by DOE security personnel provides added assurance that relevant security information receives an additional review. Annual medical and psychological reviews help ensure that any potential mental or physical factors that may constitute an unreasonable risk to public health and safety and the common defense and security are discovered before an incident occurs.

The HRP includes employees assigned to sensitive positions, who are subject to additional levels of training and observation requirements. The HRP requires training and clearly defines the roles and responsibilities of the HRP official, medical authority, managers, supervisors, and participating employees.

3.1.4 U.S. Department of State, Bureau of Overseas Building Operation

Volume 3 of the Foreign Affairs Manual (FAM) "Fitness For Duty Requirements For Law Enforcement/Security Personnel in the Bureau of Diplomatic Security (DS)," dated December 16, 2009, describes U.S. Department of State (DOS) FFD requirements for law enforcement and security personnel in the Bureau of Diplomatic Security. The policy "is intended to provide a mechanism for the assessment of an employee's mental, emotional, and neuro-cognitive ability to perform…and to indicate to a reasonable person that continued service

by the employee may (1) pose a threat to public safety, (2) jeopardize the safety of other employees, (3) jeopardize the safety of the particular employee, or (4) interfere with the Department's ability to fulfill its mission."

Volume 3 of FAM 4912 describes the process to determine continuing fitness. DOS requires all supervisory employees to remain alert to any indication of an employee's mental, emotional, physical, or neuro-cognitive impairment and provides specific indicators as potential factors in determining FFD. The policy clearly describes the responsibility of any DOS employee to notify the observing employee's supervisor. Volume 3 of FAM 4913, 4914, and 4915 describe actions following the observation of circumstances that indicate employee impairment.[37]

In monthly project performance reviews, senior managers discuss the security management of ongoing projects and HR as a part of project planning and execution. Civil unrest and the hiring of persons representative of the local population are contributing factors with a potential impact on projects. The Bureau of Overseas Building Operation provides additional training for its headquarters and field staff to better manage the embassy construction program. Construction contractors report that finding and keeping qualified workers (both cleared and uncleared) is a challenge to completing DOS projects.

Discussion of DOS Bureau of Overseas Building Operation Behavioral Observation

DOS provides guidance in the rule to address behavioral observations; however, a primary focus is largely on the security of the job site. Of note is that attention to access control and security is not directly tied to FFD and behavioral observations. Furthermore, observations are defined to note the physical and mental state of the employee. The monthly reviews focus on resource availability rather than on a potential security threat by existing personnel. Training is similar to the NRC's FFD-related training.

3.1.5 Federal Aviation Administration, Transportation Security Administration

TSA claims that the screening passengers by observation techniques (SPOT) program has been so successful that it now has more than 2,000 behavioral detection officers patrolling concourses and departure lounges for unusual, anxious, or otherwise "suspicious" passenger behavior. This program is a derivative of other successful behavioral observation and analysis programs developed and used domestically and internationally.

Behavior detection officers (BDOs) are trained to detect involuntary physical and physiological reactions that may indicate stress, fear, or deception and "discount nervousness, irritation, and confusion that many travelers experience. SPOT provides TSA a nonintrusive, behavior-based method to identify potentially high risk individuals through identification of individual's actions, patterns, or trends of behavior." TSA insists that the officers do not use racial, ethnic, or religious profiling.[38]

BDOs collect two categories of information in the SPOT program. Information is collected through firsthand observation or from other's witnessing at-risk behavior. Other sources of information may include that provided by law enforcement officers, airport personnel, and members of the general public.

The first category of SPOT information includes first hand observations; these observations are recorded without any personally identifiable information and are entered into a database. Individuals whose behavior exceeds an identified threshold make up the second category of information. These identified individuals may be referred for additional screening.[39]

The SPOT program and trained BDOs are recognized as leaders in the behavioral observation arena. For example, BDOs were teamed with local police to provide additional security screening at the 2009 Super Bowl held in Tampa, FL. In addition to supplying officers for the event, TSA provided a 4-hour training overview to Tampa-area law enforcement officers.[40]

The SPOT program was assessed by GAO in May 2010. GAO identified a finding that TSA had not adequately evaluated the program before its implementation. The TSA response was that no other large-scale, behavior-based screening program has been rigorously scientifically validated.

Another TSA behavior awareness program is in development through the TSA Science and Technology Directorate. This project will "provide to bus operators a behavioral observation and security awareness training package that could potentially significantly mitigate the risk of terrorist attacks against public bus transportation in the United States."[41]

Discussion of the SPOT Program

Unlike many other BOPs, the SPOT focus specifically targets behavior related to criminal and terrorist activities. According to GAO Report No. 10-763, from May 29, 2004, through August 31, 2008, the SPOT program led to 1,100 arrests. The majority of these arrests were reported as illegal aliens, outstanding warrants, possession of fraudulent documents, and possession of a suspected illegal drug. GAO examined the travel of key individuals allegedly involved in six terrorist plots. It determined that at least 16 of the individuals allegedly involved in these plots moved through eight different airports in which the SPOT program had been implemented on at least 23 different occasions. These statistics tend to suggest mixed results for the SPOT program.

In a subsequent GAO report No.14-158T released in November 2013, GAO found that "there is a statistically significant relationship between the length of time an individual has been a BDO and the number of SPOT referrals the individual makes. This suggests that different levels of experience may be one reason why BDOs apply the behavioral indicators differently." TSA has efforts underway to better define the behavioral indicators currently used by BDOs, and to complete an inter-rater reliability study. The inter-rater reliability study could help TSA determine whether BDOs can consistently and reliably interpret the behavioral indicators, which is a critical component of validating the SPOT program's results and ensuring that the program is implemented consistently. According to TSA, the current contract to study the indicators and the inter-rater reliability study is to be completed in 2014. (Reference #42)

The SPOT program is just one piece of the overall security program, and it works in conjunction with other screening techniques, such as baggage and passenger searches. The SPOT program is also dependent on information provided by a variety of sources concerning criminal and terrorist activities, such as watch lists and law enforcement alerts. This supplemental information is key to the success of the SPOT program and air transportation security. Finally,

the SPOT program is under constant review, has evolved since its inception, and continues to improve SPOT techniques and application.

3.1.6 North Dakota State University

The North Dakota State University (NDSU) policy for FFD provides a mechanism to identify and intervene when individuals pose a threat to others or to property. Behavioral observation is defined as "reliable report: self-disclosure or third-party opinion about an employee's possible lack of fitness for duty which is assessed as reasonable by the manager/supervisor considering such factors as the relationship of the reporter to the employee, the seriousness of the employee's condition, the possible motivation of the reporter, and how the reporter learned the information." The manager's or supervisor's responsibility is to observe the attendance, performance, and behavior of employees. Observed behavior that warrants action requires the supervisor to interview the employee and refer him or her for medical evaluation as appropriate.

At the NDSU, procedures describe the process to address a triggering event. Specific behaviors are identified as potential triggering events and include, but are not limited to, manual dexterity, coordination, alertness, speech, concentration, and interactions or responses to others.[42]

Discussion of the NDSU FFD Program

The NDSU implements a risk scale to help inform the risk evaluation performed by the manager or supervisor. This is a four-tiered scale and ranges from no risk to severe risk. Manager or supervisor protocol defines measures in the event of actionable behavior. This program also defines a triggering event and includes such elements as alertness, speech, response to criticism, threats of suicide, odor of alcohol or marijuana, and interactions with coworkers and supervisors. Employees who voluntarily seek assistance (for physical, mental, or emotional problems) before their work or attendance is adversely affected will not have their employment status jeopardized for seeking assistance. The triggering event elements did not appear to be adequately tied to the risk category.

3.1.7 Kansas Department of Health and Environment

The Kansas Department of Health and Environment (KDHE) is the primary State health care agency for the State of Kansas and is the provider for the State employee health program. The KDHE HealthQuest FFD program addresses changes in the behavior of State employees who may pose a potential threat to themselves or others in the workplace; it does not address chronic disciplinary or performance problems. This program includes circumstances when an employee's emotional stability or ability to perform work safely might be in question. The program describes factors or indicators for at-risk behavior and appropriate notifications and action if negative behavioral signs are observed.

Discussion of the KDHE FFD Program

The KDHE FFD program establishes that identified risk potential is related to the number of recognized warning signs. The warning signs include, but are not limited to, suicidal behavior, personal expressions of mental instability, and statements or behaviors that would indicate

potential violence. The KDHE FFD program also establishes a single point of contact is provided for FFD decisions.

An evaluation under this program is comprised of a detailed medical and psychosocial history, a current mental status, and substance abuse evaluation. The evaluation also includes psychological testing, and in most instances, a psychiatric consultation and/or a visit to the employee's primary care physician. The Psychological testing component of the evaluation process usually includes a combination of the following instruments (test descriptions below:

a) Minnesota Multiphasic Personality Inventory-2 (MMPI-2)
b) Hilson Career Satisfaction Index (HCSI)
c) Global Assessment of Functioning Scale (GAF)
d) Structured Interview of Reported Symptoms (SIRS)
e) SSASI (Substance Abuse)
f) MAST (Substance Abuse)

3.1.8 Canadian Air Transport Security Authority

The Canadian Air Transport Security Authority (CATSA) is responsible for pre-board passenger and random non-passenger screening, whereas third-party "service providers" train, manage, and employ the screening officers. CATSA uses x-ray machines to verify the contents of all carry-ons, as well as metal detectors, explosive trace detection equipment, and random physical searches of passengers at the pre-board screening points. To determine whether passengers could be criminals or terrorists, security personnel at Canadian airports now study air travelers' facial expressions and body movements using BPR. Beginning in 2010, some air travelers were, and continue to be, "scrutinized by airport 'behavior detection officers' for physiological signs of hostile intent—in other words, screening for dangerous people rather than just for dangerous objects."[40]

Discussion of the CATSA Passenger Screening Program

CATSA is moving toward a program similar to the FAA/TSA SPOT program. It has conducted training and is implementing the program with plans to expand the application. The cost for additional screening (called an air traffic security charge) is being passed on to the customers in fares.

3.1.9 International Drug Evaluation and Classification Program

The Los Angeles Police Department (LAPD) originated the Drug Evaluation and Classification (DEC) Program in the early 1970's. During the 70's, LAPD officers noticed that many of the individuals arrested for driving under the influence (DUI) had very low or zero alcohol concentrations. The officers reasonably suspected that the arrestees were under the influence of drugs, but lacked the knowledge and skills to support their suspicions. In response, two LAPD sergeants collaborated with various medical doctors, research psychologists and other medical professionals to develop a simple, standardized procedure for recognizing drug influence and impairment. Their efforts culminated in the development of a multi-step protocol and the first Drug Recognition Expert (DRE) program.[43]

Discussion of the DEC Program

The LAPD program attracted the attention of the National Highway Traffic Safety Administration (NHTSA's) in the early 1980's. The two agencies collaborated to develop a standardized DRE protocol, which led to the development of the DEC program. During the ensuing years, NHTSA, and various other agencies and research groups examined the DEC program. These various studies demonstrated that a properly trained DRE can successfully identify drug impairment and accurately determine the category of drugs causing such impairment. In 1987, NHTSA initiated DEC pilot programs in Arizona, Colorado, New York and Virginia. The states of Utah, California, and Indiana were added in 1988. In 1989, the International Association of Chiefs of Police (IACP) and NHTSA began to expand the DEC program across the country. Currently 44 states, the District of Columbia, and Canada participate in the DEC program.

Borrowing extensively from medicine, psychiatry, physiology, toxicology, and associated fields, a drug categorization system has been developed that places the primary drugs of abuse into seven categories. These categories are not based on shared chemical structures, nor on their legality, or on the user's subjective experience. Rather, this categorization system is based on the premise that each drug within a category produces a pattern of effects, known as signs and symptoms. A "sign" is detectable by an observer. Signs include bloodshot eyes, horizontal gaze nystagmus (involuntary eye movement), pulse rate, impaired coordination, etc. A "symptom," on the other hand, is by nature subjective. It is experienced by the individual, and may be conveyed to an observer. For example, a feeling of nausea is a symptom. Hallucinations are symptoms, although they may elicit behavioral signs. It is the pattern of effects, rather than a specific effect, that is unique to the category.[44] Attachment A, Drug Influence Evaluation and Symptomology Matrix, provides a useful tool that summarizes use and abuse characteristics that can be used by personnel as a resource for reasonably concluding that further evaluation may be necessary.

DEC Program applicability in regulated BOP programs

Options exist in BOPs for the implementation of a wide variety of measures that go above minimum requirements and therefore not required, yet provide for significant and comprehensive programmatic BOP development and implementation opportunities. Of significant importance among these options is the implementation of BOP training that includes many, if not all, of the individual evaluation symptomology found in Appendix A. While random testing achieves a level of deterrence, the functional importance of the BOP is that the behavioral characteristics of those under the influence of illegal substances are recognizable, and are reported to proper licensee personnel when recognized. At a minimum, BOP training programs should include from Attachment A, a focus on training taken from the general indicators and duration of effects sections, to ensure that the BOP training curriculum provides the greatest opportunity for program success.

Synthetic Cathinones (Bath Salts), Synthetic Marijuana and Ecstasy (MDMA)

There is a growing concern in the industry for drugs being abused that are outside the required panel of substances tested [Section 26.31(d)]. In particular, Bath Salts, Synthetic Marijuana and MDMA are growing in popularity as an alternative to the five panel drugs currently being tested for. Further, alternative drug users knowingly use these drugs to subvert the licensee's drug testing program. Although these drugs are not currently being tested, the resulting effects

could pose a safety concern to the individual and site personnel. It is for this reason that an awareness of them and their resulting effects are worth discussion.

The energizing and often agitating effects reported in people who have taken bath salts are consistent with other drugs like amphetamines and cocaine that raise the level of the neurotransmitter dopamine in brain circuits regulating reward and movement. A surge in dopamine in these circuits causes feelings of euphoria and increased activity. A similar surge of the transmitter norepinephrine can raise heart rate and blood pressure. Bath salts have been marketed as cheap and until recently, legal substitutes for those stimulants. A recent study found that MDPV—the most common synthetic cathinone found in the blood and urine of patients admitted to emergency departments after bath salts ingestion—raises brain dopamine in the same manner as cocaine but is at least 10 times more potent.[45]

Synthetic marijuana, also known as K2 or Spice, comes in a wide variety of herbal mixtures that produce experiences similar to marijuana (cannabis). Spice users report experiences similar to those produced by marijuana—elevated mood, relaxation, and altered perception—and in most cases the effects are even stronger than those of marijuana. Some users report psychotic effects like extreme anxiety, paranoia, and hallucinations. So far, there have been no scientific studies of the effects on the human brain, while there is evidence that the cannabinoid compounds found in these products act on the same cell receptors as THC, the primary psychoactive component of marijuana. Some of the compounds found in synthetic marijuana however, bind more strongly to those receptors, which could lead to a much more powerful and unpredictable effect. Because the chemical composition of many products sold as synthetic marijuana is unknown, it is likely that some varieties also contain substances that could cause dramatically different effects than the user might expect.[46]

MDMA, popularly known as Ecstasy, is a synthetic, psychoactive drug that has similarities to both the stimulant amphetamine and the hallucinogen mescaline. It produces feelings of increased energy, euphoria, emotional warmth and empathy toward others, and distortions in sensory and time perception. The hallucinatory effects often reported in users of bath salts are consistent with other drugs such as MDMA or LSD that raise levels of another neurotransmitter, serotonin. A recent analysis of the effects in rats of mephedrone and methylone showed that these drugs raised levels of serotonin in a manner similar to MDMA.[47]

3.2 PROGRAM COMPARISON

The programs described herein apply to specific and somewhat different needs for behavioral observations. The concerns and focus vary from protecting special nuclear materials and screening passengers at airports, to monitoring personnel on campus and providing an avenue for industry to identify employees who pose a risk to themselves or others. Programs included in this comparison range from general observation plans to formal HRPs.

Table 1 shows the general comparison of programs and behavioral observation attributes. Attributes are compared and contrasted in the following Table 1.

Table 1- Comparison of Programs and Behavioral Observation Attributes

PROGRAM ATTRIBUTES	NRC	NEI	DOE	DOS	FAA/TSA	NDSU	KDHE	CATSA	ORNL and SLAC	DEC
Regulations	●	●	●	●	●			●	●	
Procedures/Methods	●	●	●	●	●	●	●	●	●	●
Roles	●	●	●	●	●	●	●	●	●	●
Training	●	●	●	●	●	●	●	●	●	●

Overall programs reviewed provide some procedural basis and some degree of training for personnel implementing the BOPs. NDSU and KDHE programs reflect the organizational policy and comply with Federal and State statutes, which implement various elements of a BOP. Not all programs, however, define the observational elements of BOP as an independent program element, or provide detailed criteria for behavioral observation. This comparison analyzed the various programs based on the information that was made available for review, and that was available through public sources.

3.3 REGULATION OR REQUIREMENT BASIS

The NRC Behavior Observation and DOE Human Reliability programs have similar requirements as described in 10 CFR Parts 26 and 73, and in the DOE's 10 CFR Part 712. These requirements define personnel positions, roles, and responsibilities and implementation requirements at facilities regulated by the NRC and DOE, respectively. The goal of the requirements is to ensure that adequate safety and security is maintained at these facilities. These NRC and DOE programs also define elements of personnel activity and behavior that require management attention or intervention. For example, 10 CFR 73.56.(f)(1) states: "Licensee and applicant access authorization programs must include a behavioral observation program that is designed to detect behaviors or activities that may constitute an unreasonable risk to the health and safety of the public and common defense and security, including a potential threat to commit radiological sabotage."[48]

The 10 CFR 26.407 regulation specifically addresses behavior observation at a power reactor construction site: "While the individuals specified in § 26.4(f) are constructing safety- or

security-related SSCs, licensees and other entities shall ensure that these individuals are subject to behavioral observation, except if the licensee or other entity has implemented a fitness monitoring program under § 26.406."

Programs described by SLAC and ORNL both follow DOE guidance and regulations outlined in 10 CFR Part 712 and DOE orders and manuals. Implementation guides for use with DOE orders describe the requirement for a continuing evaluation of each employee's judgment and reliability (10 CFR 710.7) to determine his or her eligibility for access to classified matter or special nuclear materials. Furthermore, similar to the NRC regulations, a security concern that involves a person in the human reliability program must be immediately reported.

NEI presents FFD guidance for new nuclear power plant construction sites in accordance with the requirements in 10 CFR Part 26. Furthermore, NEI 06-06 provides a standard approach in creating and applying an FFD program for new reactor construction personnel.

DOS addresses FFD requirements by providing "a mechanism for the assessment of an employee's mental, emotional, and neuro-cognitive ability to perform…."[49] The regulations in Volume 12 FAM 040 DS Fitness Programs, are governed by other Federal laws and acts, including the Foreign Service Act, Public Law 84-885, and Volume 16 FAM 110. Observations are made by supervisors and other employees, but the final decision to order an FFD evaluation is the responsibility of the Director of Diplomatic Security Service (DS/DSS).

NRC Management Directive 12.1, "NRC Facility Security Program," dated September 14, 2011, states, "Protective measures must be taken to prevent loss, damage, or destruction that might result from theft, vandalism, arson, sabotage, or other unlawful acts at unclassified NRC facilities. The measures taken must be adequate to provide reasonable assurance of protection."[50]

DOD Directive 5210.42(3) states that "only those personnel who have demonstrated the highest degree of individual reliability for allegiance, trustworthiness, conduct, behavior, and responsibility shall be allowed to perform duties associated with nuclear weapons, and they shall be continuously evaluated for adherence to PRP standards."

TSA SPOT requirements evolved quickly after the 2001 terrorist attacks, and are based on U.S. Code, Title 14, "Aeronautics and Space," and the Aviation and Transportation Security Act. This law requires the screening of all individuals before entry into a secured area of an airport in the United States, to ensure the safety and integrity of persons and facilities.

3.4 PROCEDURES AND METHODS

As discussed above, NRC regulations in 10 CFR Parts 26 and 73 are implemented at each site through site-level procedures. These procedures outline who is included in the FFD program, and by extension the BOP program, and include: (a) the objectives of the program, (b) responsibilities of the employees and supervisors, (c) training, (d) indicators or observed conditions that could affect safety and security at the site, and (e) actions for negative indicators, testing, assessment, consequences, rights, documentation, and approving authorities.

The FFD program outlined in NEI 06-06 provides guidance for FFD programs and behavioral observation site procedures at commercial power reactors under construction. Licensees at sites regulated by the NRC apply the requirements in 10 CFR Part 26, and may use the implementing guidance in NEI 06-06, in developing their FFD programs and behavioral observation procedures. These site procedures describe the program, responsibilities, training requirements, specific relative policies, and the steps and techniques necessary to implement the policy as it applies to activities related to safety- and security-related construction.

DOE regulations and guidance include a description of the process used to establish and implement an HRP. Procedures are specific to each site and follow DOE orders and guidance. Site procedures describe requirements, roles and responsibilities, program administration, reviews, and training.

Site procedures at DOE facilities provide a step-by-step process for implementing an HRP. The process includes behavioral observation. Trained managers, supervisors, and personnel must observe and report "unusual conduct" for further evaluation. Inappropriate conduct is described and includes a pattern of abnormal conduct, erratic behavior, indications of illegal use of drugs, habitual use of alcohol, or association or sympathy with individuals or groups that advocate unlawful acts or with individuals or groups that have as their goal to alter or overthrow the U.S. Government.

The DOE supervisor is responsible for observing and monitoring employee performance and behavior. When knowledge or circumstances reveal that an employee may be unfit for duty, the supervisor must implement the policy and procedures in a fair manner. Observation of unfit behavior is cause for immediate reporting of the behavior with the potential for subsequent medical or security evaluations. Reported individuals are immediately removed from duties and access until an investigation is completed and final resolution is determined. Observations, actions, and reasons for action are documented.

DOS procedures describe conditions, factors, and appropriate responses and actions to address observed behavioral concerns. A DOS behavior observation evaluation must also be objective and reasonable. Supervisors are trained and responsible for observing employees to monitor their ability to perform. Changes or specific indicators in observed employee behavior can cause concern. Indicators are listed but are not inclusive of all possible observations. Supervisors must promptly address indications of possible physical, mental, or emotional impairment.

The Aviation and Transportation Security Act requires screening procedures and states, in part, that airports ‘‘shall establish procedures to ensure the safety and integrity of… (i) all persons providing services with respect to aircraft providing passenger air transportation or intrastate air transportation and facilities of such persons at an airport in the United States described in section 44903(c)."[51]

KDHE uses HealthQuest protocol for behavior observation referrals to address behavioral changes in employees that may pose a potential threat to themselves or others in the workplace. The HealthQuest vendor service is a managed network of diagnosticians and caregivers who see employees quickly, analyze their situations, and develop treatment plans.

KDHE provides behavior observation criteria to be used in its fitness determinations. If an individual's behavior meets one or more of the criteria, the supervisor prepares a description of his or her actions to remove the employee from the work situation and to investigate further. The employee can be referred to the EAP if he or she is not eligible for family medical leave. The HR department maintains documentation of behavior observation and FFD cases.

NDSU procedures provide guidance for identifying and addressing FFD issues discovered by behavioral observation. The manager assesses the potential risk and is encouraged to contact HR for assistance as needed. University police are contacted if there is an indication of significant risk. Methods of behavioral observation for NDSU rely on a reliable report or direct observation of an employee. Observations that indicating potential issues are listed and include, but are not limited to, coordination, alertness, and interactions with others. Issues can also be self-reported.

CATSA procedures and methods for behavioral observation (screening) are similar to procedures used by TSA. Selected Canadian airport security personnel are trained in BPR. BDOs study travelers' facial expressions and body movements for signs of hostile intent. The airport deploys BDOs throughout the airport to look for unusual, anxious, or suspicious behavior. Training includes awareness of typical nervousness, anger, or confusion that travelers often experience. Internal procedures are in place to ensure the further investigation of people exhibiting unusual behavior.

3.5 ROLES AND RESPONSIBILITIES

The NRC requires licensees to implement a FFD program that utilizes a BOP or a fitness monitoring program while constructing safety- or security-related SSCs. However, as of the publication of this report, all affected entities have implemented a BOP in lieu of a fitness monitoring program. Specific roles and responsibilities of C/Vs are described in site procedures.

Consistent with 10 CFR 26.821(b), NEI 06-06 states, "Each construction site entity is responsible to the NRC for ensuring that the applicable FFD program/program elements of 10 CFR Part 26 are implemented and effective at their construction sites, including those implemented by a C/V."[32] Similarly, NEI 03-01 provides an acceptable method for meeting the BOP requirements at operating commercial power reactors.

The Tennessee Valley Authority (TVA) describes responsibilities related to FFD and behavioral observations in TVA procedure, FFD010/000, "Fitness for Duty,"[52] This document describes policy and program elements in detail, outlining the responsibilities of employees. All trained employees must report any observed behavioral or physical conditions indicating possible substance abuse. The document defines the roles for the medical review officer and HR staff. This procedure also addresses supervisory responsibilities.

At DOE facilities, contractors implement DOE orders and policies at the site level. Site-specific FFD-related procedures discuss roles and responsibilities that include behavioral observation. Employees are trained and empowered to act and report on FFD and behavior observation related concerns. The supervisor is responsible for observing and monitoring attendance, performance, and behavior; following FFD policies and procedures; and, implementing the policies and procedures in a fair and consistent manner. The medical department is responsible

for assessing all employees referred for cause or possible impairment. HR is responsible for maintaining case files and for advising supervisors and employees as needed. The supervisor, the medical department, and HR must provide case documentation.

12 FAM 040, Diplomatic Security Fitness Programs, describes the responsibilities related to DOS FFD and behavioral observation. The position responsibilities described in this document include the roles of the DSS Director, the DOS employee's supervisor, medical service, and the employee.

The FAA administrator's authority, with respect to programs related to the testing of airport security screening personnel, is transferred to the Under Secretary of Transportation for Security. The procedures and training materials describe the duties and responsibilities of employees who have security-sensitive functions.

The KDHE protocol for the FFD and behavior observation referrals program defines the roles and responsibilities of the HR Director, the care manager, and the EAP counselor.

NDSU defines the responsibilities of employees and managers or supervisors in the policy manual.

3.6 TRAINING AND REQUALIFICATION

Selection of personnel for training differs according to the program and agency. Some programs require training of all personnel; other programs introduce behavioral observation awareness with FFD training for which supervisors and management receive more extensive training. The § 26.33 "Behavioral Observation" requirements is an element of the NRC's 10 CFR Part 26 FFD Program. 10 CFR 26.33 states that behavioral observation must be performed by personnel who are trained under § 26.29 "to detect behaviors that may indicate possible use, sale, or possession of illegal drugs; use or possession of alcohol on site or while on duty; or impairment from fatigue or any cause that, if left unattended, may constitute a risk to public health and safety or the common defense and security." Similarly, all DOE personnel in the HRP are trained on program requirements and responsibilities for both self-reporting and reporting of at-risk behavior in others. Periodic retraining is standard for both FFD and behavior observation programs.

Knowledge and abilities (KA) are listed in 10 CFR 26.29(a), and include the knowledge of policies, procedures, roles, responsibilities, and potential adverse effects, and the ability to observe and detect performance degradation. An 80-percent score on a comprehensive examination is required by 10 CFR 26.29(b) for both initial and refresher training and must be completed annually.

The TSA program for hiring and training security screening personnel was established under direction of the Under Secretary of Transportation for Security. The training program standards include meeting qualifications, obtaining satisfactory scores on examinations, and demonstrating FFD on a daily basis. The program requires annual proficiency reviews and documents the training and reviews. TSA requires extensive training for the SPOT program that includes techniques to detect behaviors exhibited in response to a fear of discovery.

Miami International Airport changed its training procedures in 2006 when Ron Stover's company, New Age Security Solutions, trained 150 airport police to identify potential threats through BPR. At Mr. Stover's urging, Miami International Airport later committed to training all airport workers in the method. "Employees such as parking lot attendants, ramp workers, gate agents and food service employees are extremely good at detecting suspicious behavior," Stover explains. "It's all about noticing irregularities, and you have to know what's regular to be able to spot what's irregular."[53]

Based on the scope of this review, industry and private organizations with more basic programs often rely on required reading or acceptance of procedures with limited formal training, or on the retraining of managers or supervisors. Furthermore, some FFD programs are outsourced to service providers and the training of supervisors, managers, and HR personnel was often handled as a part of the contracted service.

4. RECOMMENDED BEST PRACTICES

The following are recommended best practices for a BOP:

- The BOP should have a clearly stated purpose. The purpose should explain why the program is necessary and should include the program objectives. The policy and program objectives should be clearly communicated to all employees and reviewed and updated periodically. Reinforce the purpose to all employees periodically through training and security education programs. As an example, DOE's operational security program contains posters that encourage positive security activities, including reporting suspicious activities.

- Define the scope, performance objectives, methods, and application of the BOP. For nuclear power plant construction, this program applies to all facets of the construction of safety- and security-related SSCs and the integration of these SCCs into the nuclear power plant. A BOP at an operating power reactor or power reactor construction site should clearly describe its scope and applicability, including clearly identifying performance objectives. These performance measures should be measurable, quantifiable, realistic, and achievable. All covered employees should fully understand the need for such a program (i.e., to establish a drug-free workplace, to prevent criminal activity or terrorist acts, or to prevent fatigue-related accidents). An effective program will also ensure that procedures and policies detail the methods used to achieve established performance objectives.

- Define the characteristics or observable traits and behaviors related to the risk or risks to guard against. Clearly communicate to employees that these characteristics or observable traits and behaviors may correspond to specific threats to safe and secure plant operations or to personal safety. The comparative study and literature review showed that BOPs are typically focused on five aspects of behavior: (1) drug and alcohol use, (2) fatigue, (3) mental and emotional conditions, (4) criminal activities, and (5) terrorist activities. Once the threats are defined, educate the workforce on the threat and the behavioral indications of these signs. However, while a checklist of behaviors is helpful, a BOP should not assign a quantitative analysis to behavior indicators ("x" number of behavior indicators triggers an action by the BOP). A single behavior indicator may be enough to cause concern. Note that workers are the frontline of defense against the insider threat.

- BOPs are just one layer of a comprehensive security program. BOPs should be an integral part of all activities at an operating power reactor or power reactor construction site and interwoven with effective physical security practices. In addition, behavioral observation and QA have overlapping goals (leveraging each other's efforts) to ensure that construction is completed correctly and safely. The BOP should pay close attention to behavioral characteristics that may affect quality issues during construction, as well as during normal operations, and determine the cause for those issues. When protecting safety- and security-related SSCs, a comprehensive security program should use a graded approach to assess the construction and operational activities that may cause the greatest risk to public health and safety or the common defense and security, and

should adjust security, behavioral observation, and supervision based on the particular activities being conducted.

- The BOP for construction should be scalable. Guidance for scaling an FFD and behavior observation program during construction was provided in the enclosure to the NRC's letter to NEI dated December 2, 2009.[3] As the number (or types) of activities increases during site construction, the BOP should expand accordingly. A site may have areas in which the risk or the sensitivity of construction requires greater attention. Plan and implement the program to be flexible enough to provide an adequate BOP both during peak construction, and when construction activities subside.

- The BOP should identify areas during operation and construction for which health, safety, and security are of elevated concern. For instance, a BOP could provide for an increased number of behavioral observations in such areas when safety- or security-related SSCs are being constructed. During construction in these areas, such a BOP would likely increase awareness of behavioral observation among employees. Also, SSCs requiring inspections, tests, analyses, and acceptance criteria may need special attention. During construction, these SSCs do not have the level of security and protection that they will have after construction is completed, and these SSCs will be more accessible to the general plant population than during operation of the plant. As with most programs, BOPs are limited by time and resources. A BOP should focus on, and consciously allocate its resources to, those areas that are of most concern during construction.

- A BOP should have a clearly stated operational process. This process should identify how and to whom behavioral observation reports are made. Clearly define the procedures for coordination and compilation of reports. Establish a clear and concise process to evaluate reports, and clearly define that process. In some of the most recent incidents involving violent behavior described earlier, the existence of behavioral keys could have alerted the public to potential violence. In the case of Virginia Tech shooter Seung Hui Cho, several incidences of his aberrant behavior could have led to an intervention that may have prevented the April 2007 shootings. The university had no clear-cut guidelines for intervention. Although professors had recommended that Cho voluntarily receive counseling, he never attended counseling sessions. There were several warning signs of a potential mental breakdown, but the university took no definitive action.

- Each BOP should have a strong procedural basis for implementation. The following outline provides a method of approach to procedure development:

  – Begin with a clear statement explaining the need for the BOP. [1]

  – Include a detailed statement of purpose. Examples of the purpose for having a BOP are provided in 10 CFR 26.33, such as the need to detect behaviors that may indicate the use of illegal drugs that would constitute a risk to public health and safety or the common defense and security.

- Identify all personnel and personnel categories included in the BOP's scope, and any exclusions or exceptions.

- Provide behavioral observation guidelines that include specific indicators in observed employee behavior that may cause concern. The observation and the basis for referral for assessment or evaluation should be objective and reasonable.

- Identify all procedures related to post-observation actions. The following circumstances and site-specific procedures will dictate the actions and the order of the actions:

    - If there is no immediate threat to personnel, or SSCs at the work site, further action can be delayed to await additional guidance. In this event, notify management or other appropriate personnel as described in procedures of the possible need for an FFD assessment by the substance abuse expert (SAE) or Medical Review Officer (MRO) that could potentially lead to the employee's removal from duty and revocation of unescorted access. The following steps should be taken if the employee is removed from duty:

        1. Notify the employee that he or she is being removed from duty.

        2. Discuss details in a private setting.

        3. Provide the employee a written statement providing the basis for the removal from duty.

        4. Notify management or other appropriate personnel as described in procedures of the circumstances.

        5. Inform the employee that an FFD assessment may be required by the SAE.

        6. If the circumstance involves a bargaining unit employee, inform the bargaining unit representatives.

        7. Document observations and reasons for the FFD assessment.

        8. Provide details to the appropriate personnel as described in procedures for the FFD assessment.

- The BOP site procedures should include the process for returning to duty if the FFD assessment results identify an FFD issue, or if follow up actions (such as suspension, referral for treatment, or dismissal), are determined to be appropriate. Document all actions taken, and consider adopting the following related practices:

    - A comprehensive BOP should have adequate checks and balances to promote objectivity (i.e., that behavioral observations are free of bias). As with any program, dealing with subjective factors should be minimized. Examine and

evaluate all reports of suspicious or inappropriate behavior. The policy and procedures of a comprehensive program should define who reviews reports and what actions should be taken. When practical, the BOP program should consider a second reviewer of any suspicious or inappropriate behavior. This would help ensure that the program's objectivity is maintained.

  - There should be appropriate stewardship of the personal information in the BOP. Handle behavioral observation reports and actions with the privacy of individuals as a priority. Because behavioral observation can be subjective, the probabilities of false positive results are of higher probability than the probabilities in more objective programs, such as drug testing. What happens with records of the resolved observation? Are they maintained in the personnel file? The BOP should have a defined process and policy to protect the individual's privacy.

- Complete and accurate documentation is an important attribute of a BOP. Document and record observations and, more importantly in the case of criminal and possible terrorist activities, analyze observations. One isolated action may be insignificant. For instance, a worker is noted to be in an area in which they have no assigned work or reason to be present. This circumstance may be innocent, in that he or she reported to the wrong place. However, coupled with previous reports that the same individual had been in other unauthorized places, any new report has added significance, and may be a pattern that indicates intelligence collecting or possible future criminal or terrorist actions. Documentation is often an important element in periodic personnel reviews and in the reconstruction of the event. As such, consider the following practices:

  - A BOP should reflect a clear understanding of roles and responsibilities. Personnel should understand they are responsible for reporting unusual behavior and that reporting unusual activities or behavior is everyone's responsibility. The supervisor or trained individual who observes, or receives reliable information, that an employee may be unfit for duty should be prepared to take immediate action to remove the employee from his or her duties, and notify appropriate personnel of such action. Further, the supervisor should document the action and the reasons for conducting an evaluation. The tendency is to assume that someone else will report that a coworker has been acting strangely.

- Reporting unusual activities or behavior is everyone's responsibility. A key to a good program is having every worker commit to the program. Workers should understand that the security and safety of their coworkers, the community, and themselves are at stake. The consequences of a deliberate act, or an accident caused by fatigue, drugs, or alcohol could result in an accident that injures or kills an employee. A terrorist or sabotage event has the potential not only to injure or kill employees but also to affect the community at large. In his article, Sagan points out the problem of social shirking when observing behavior. He uses the well documented case of the 1964 murder of Kitty Genovese in Queens Borough, New York City, in which multiple eyewitnesses failed to report her murder.[30] Everyone should understand the importance of reporting anomalies in behavior, and such reporting duties should be emphasized in training. As such, consider the following practices:

– A BOP should be subject to ongoing independent program assessments. The indications of alcohol use, drug abuse, criminal activities, mental health, and fatigue are easier to identify than are insider activities, and have been researched extensively. Indications that sabotage and terrorist activities are being planned are harder to identify. Research into behaviors that might indicate an individual is planning such acts is ongoing. One criticism of the SPOT program utilized by TSA is its lack of empirical data. The BPR program utilized by Miami International Airport, El Al Airlines, and other entities has shown promising results, but empirical data about this program are limited. Anecdotal evidence, such as the success shown by El Al Airlines and Israeli security personnel, indicates that BPR may be a viable option in the operating nuclear power plant or power reactor construction setting. Once the technology for BPR for cameras and infrared cameras has been proven, it could provide another tool for a BOP. Consider applying such technology in a comprehensive BOP once it has been proven effective.

– BOPs should be layered with multiple observations made by multiple personnel. For example, a single observation of an individual made at the morning safety briefing or plan of the day meeting should not be the sole basis for making a determination that the individual is or is not fit for duty. Personnel who are involved in implementing the BOP should make multiple observations in the actual working environment every day. One of the successes attributed to the El Al Airlines BOP is that multiple personnel are involved in screening personnel and that these personnel range from security personnel to ticket-counter personnel. This multiple-layered approach provides several opportunities for behavioral observation. A BOP should consider having personnel observers and activity observers, and, in certain instances, this could be done in conjunction with the QA program.

– An employee should not have any fear of reporting unusual or suspect behavior concerning any personnel at the job site. It should be clear from the licensee's policy statement and training that management will not tolerate repercussions, reprisals, or bullying for reporting unusual or suspect behavior concerning anyone at the job site. Management should be sensitive to the reluctance of new employees and junior personnel (such as union apprentices, trainees, and interns) to report unusual or suspect behavior. Emphasis should be placed on ensuring these employees that repercussion, reprisals, or bullying for reporting activities will not be tolerated. Personnel should feel it is their responsibility to report any activity that poses a threat to the safety or security of the plant. A comprehensive program will ensure that the reporting of behavior will not resort in retaliation, even if it involves anomalous or suspicious behavior in supervisors and security personnel.

– Initial and refresher training should be part of a BOP. Personnel making behavioral observations should be trained in a consistent manner. Training should be ongoing and should be updated to keep up with the changes and innovations in behavioral observation. As noted above, the use of behavioral observation to discover potential terrorist activities is a fairly new area of research, especially in the United States. It is important that organizations and

trainers stay abreast of changes and update training accordingly. A BOP should consider levels of training: (1) training for management, (2) training for supervisors and observers, and (3) training for personnel. A comprehensive BOP training program should include a training checklist similar in content to the checklist provided in Appendix A.

– Continually verify the effectiveness of the program. When a drug or alcohol test is positive, especially if in a post-accident situation, examine why the BOP did not identify the behavioral problem before the accident. Were there multiple opportunities for observation? Why did coworkers not report a problem? In addition, capture lessons learned and learn from them. If the BOP discovered an individual under the influence, what led to the discovery? Is there something learned in the incident that could be added to training?

– Develop performance metrics to indicate how well a program is operating. Based on the literature review, measuring the success of a deterrent program is difficult; however, meaningful performance indicators are helpful in determining program performance and improvement. Consider these performance indicators carefully and develop them to ensure appropriate metrics with suitable parameters. As an example, the mere increase or decrease of positive drug tests may be influenced by other factors, such as the number of tests performed. A good performance indicator will be significant and measurable. However, GAO Report No. 10-763 noted the difficulty in developing performance measures, especially outcome measures, for programs with a deterrent focus. [26] Still, performance indicators can measure certain aspects of the BOP.

5. CONCLUSIONS

All BOPs at NRC-licensed facilities subject to Part 26 and Part 73 have common elements that are part of an organization's FFD program that is used to screen, monitor/observe, and test workers at operating nuclear power reactors or power reactor construction sites. Personnel subject to subpart B of Part 26 are required to monitor the behavior of others to detect at-risk conduct or factors. The programs reviewed vary in specific application, training, and methods.

NRC regulations do not include specific requirements on how to implement a BOP. The content of BOP implementation procedures is thus at the discretion of the licensee or other entity. Attention to alcohol and drug abuse, even fatigue management, addresses safety concerns and cross cuts to security when combined with a BOP and IMP. Effective behavioral observation practices have been found to include the training of management, supervisors, employees, and contract construction personnel, and involve full implementation of detailed screening and observation procedures.

Adequately protecting against threats to a site's structural integrity, or its protective systems, includes consideration of an adversary who is dedicated to his or her cause, will not abuse drugs or alcohol, and who will appear average or above average. A standard drug and alcohol program will not detect this threat and therefore, an effective BOP and IMP should be implemented. Furthermore, the average turnover rate for construction workers is 20 percent and highly transient which challenges effective program implementation and increases hiring opportunities for the potential adversary.

An HRP designed and implemented as described in 10 CFR part 712, better addresses this potential threat but at a greater cost. Psychological evaluation, polygraph tests, random testing, and a well-defined training program for management, supervisors, and workers increase costs and reporting requirements. Although the 10 CFR part 712 HRP provides improved identification of at-risk personnel, it does not guarantee human reliability.

Training employees, supervisors, and managers in human behavior patterns with clear guidance on expectations yields a more robust program with higher probability of success in the identification of impaired behavior, and in the observation of potential threats by individuals who exhibit at-risk actions.

The best practices described above collectively represent the program comparisons and literature review. Implementation of some or all of these best practices would serve to strengthen any BOP.

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APPENDIX A

Drug Influence Evaluation – Symptomology Matrix

Major Indicators	CNS Depressants	CNS Stimulants	Hallucinogens	Dissociative Anesthetic	Narcotic Analgesic	Inhalants	Cannabis
HGN	Present	None	None	Present	None	Present	None
Vertical Gaze Nystagmus	Present (High Dose)	None	None	Present	None	Present (High Dose)	None
Lack of Convergence	Present	None	None	Present	None	Present	Present
Pupil Size	Normal (1)	Dilated	Dilated	Normal	Constricted	Normal (4)	Dilated (6)
Reaction to Light	Slow	Slow	Normal (3)	Normal	Little or None Visible	Slow	Normal
Pulse Rate	Down (2)	Up	Up	Up	Down	Up	Up
Blood Pressure	Down	Up	Up	Up	Down	Up or Down (5)	Up
Body Temperature	Normal	Up	Up	Up	Down	Up, Down or Normal	Normal
Muscle Tone	Flaccid	Normal/Rigid	Normal/Rigid	Rigid	Normal/Flaccid	Flaccid/Normal	Normal
General Indicators	Uncoordinated Disoriented Sluggish Thick, Slurred Speech Drunk-like Behavior Gait Ataxia Drowsiness Droopy Eyes Fumbling *NOTE With Methaqualone: Pulse will be elevated and body tremors will be evident. Alcohol, Quaaludes elevate pulse. SOMA and Quaaludes dilate pupils	Restlessness Body Tremors Excited Euphoric Talkative Exaggerated Reflexes Anxiety Grinding Teeth (Bruxism) Redness to Nasal Area Runny Nose Loss of Appetite Insomnia Increased Alertness Dry Mouth Irritability	Dazed Appearance Body Tremors Synesthesia Hallucinations Paranoia Uncoordinated Nausea Disoriented Difficulty in Speech Perspiring Poor Perception of Time and Distance Memory Loss Disorientation Flashbacks *NOTE: With LSD horripilation (Goose Bumps; hair standing on end)	Perspiring Warm to the Touch Blank Stare Very Early Angle of HGN Onset Difficulty in Speech Incomplete Verbal Responses Repetitive Speech Increased pain Threshold Cyclic Behavior Confused Agitated Hallucinations Possibly Violent and/or Combative Chemical Oder “Moon Walking”	Droopy Eyelids (PTOSIS) “On the Nod” Drowsiness Depressed Reflexes Low, Raspy, Shallow Speech Dry Mouth Facial Itching Euphoria Fresh Puncture Marks Nausea *NOTE: Tolerant users exhibit relatively little psychomotor impairment.	Residue of Substance Around Mouth Odor of Substance Possible Nausea Slurred Speech Disorientation Confusion Bloodshot, Watery Eyes Lack of Muscle Control Flushed Face Non-Communicative Intense Headaches *NOTE: Anesthetic gases cause below normal blood pressure; volatile solvents and aerosols cause above normal blood pressure.	Marked Reddening of the Conjunctiva Odor of Marijuana Marijuana debris in Mouth Body Tremors Eyelid tremors Relaxed Inhibitions Increased Appetite Impaired Perception of Time and Distance Disorientation Possible Paranoia

Duration of Effects	Barbiturates: 1-16 hours Tranquilizers: 4-8 hours Methaqualone: 4-8 hours	Cocaine: 5-90 minutes Amphetamines: 4-12 hours Ecstasy 3-6 hours	Duration varies widely from one Hallucinogen to another.	Onset: 1-5 minutes Peak Effects: 15-30 minutes Exhibits Effects: Up to 4-6 Hours	Heroin: 4-6 Hours Methadone: 24 Hours Others vary	Most Volatile Solvents: 6-8 Hours Anesthetic Gases and Aerosols: very short duration	Exhibit Effects: 2-3 Hours Impairment may last up to 24 hours without awareness of effects.
Usual Methods of Administration	Oral Injected (occasionally)	Insufflation (snorting) Smoked Injected Oral	Oral Insufflation Smoked Injected Transdermal	Smoked Oral Insufflation Injected Eye drops	Injected Oral Smoked Insufflation	Insufflation Historically Taken Orally.	Smoked Oral
Overdose Signs	Shallow breathing Cold Clammy Skin Pupils Dilated Rapid Weak Pulse Coma	Agitation Increased Body Temperature Hallucinations Convulsions	Long Intense Trip	Long Intense Trip	Slow, Shallow Breathing Clammy Skin Coma Convulsions	Coma	Fatigue Paranoia
FOOTNOTES: These indicators are the most consistent with the category. Keep in mind that there may be variations due to individual reaction, dose taken and drug interactions. 1) Soma or Quaaludes usually dilate pupils; 2) Quaaludes and ETCH may elevate; 3) Certain psychedelic amphetamines cause slowing; 4) Normal but may be diluted; 5) Down with anesthetic gasses but up with volatile solvents and aerosols; 6) Pupil size possibly normal.							

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11. ABSTRACT (200 words or less)

This NUREG report discusses a research and comparative study sponsored by the U.S. Nuclear Regulatory Commission (NRC) and conducted by Oak Ridge National Laboratory. The report identifies best practices associated with behavioral observation programs (BOPs) used by a cross section of Federal agencies and private entities, discusses the need for effective BOPs at power reactors, and power reactor construction sites, and presents insights and recommendations to improve BOP performance.

The observations and recommendations identified in this report will inform the NRC's regulatory inspection, licensing, and oversight of activities at NRC-licensed facilities during the application, construction, and operational phases. The results will also help inform applicants and licensees of best practices for BOPs. As a result, applicants and licensees have an opportunity to implement enhanced policies, procedures, and training to improve their identification of personnel unfit for duty or behaving in a manner that warrants additional attention and to efficiently and effectively conduct behavioral observations without undue burden. The outcome of this report contributes to reasonable assurance that NRC licensee facility operation and construction activities will not be inimical to public health and safety or the common defense and security

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