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Released By – James A. Riedel

BACKGROUND

The present research is the second in a series of studies to develop and test a Department of Defense (DoD) Adjudication Decision Support (ADS) system. The long-term goal is to develop an ADS system that will automatically evaluate completed personnel security investigations in accordance with the Adjudicative Guidelines for Determining Eligibility for Access to Classified Information (December 29, 2005) and by using decision logic comparable to expert adjudicators. Cases that contain appropriately little adverse information will qualify for automatic clearance approval. The purpose of the present study was to estimate automated approval rates for NACLC investigations based on preliminary decision rules.

HIGHLIGHTS

The results indicated that approximately 40% of NACLC investigations in the study sample would have been appropriate for automated approval under the reported decision rules because these cases contained little or no adverse information of security concern. As part of the Defense Information Systems for Security (DISS), an ADS system could provide significant cost savings, improve adjudication timeliness, and allow the central adjudication facilities to focus human resources on complex cases and those with serious adverse information. Machine-readable data from investigation providers will be required to deploy the system.

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PREFACE

Automated review of security clearance Reports for Adjudication (RFA) is one way the Department of Defense (DoD) can improve the efficiency of the personnel security program. The present study continues the development of decision rules to identify National Agency Check with Local Agency Checks and Credit Checks (NACLC) investigations with adverse information that does not pose an undue security concern. Decision rules were tested against a random sample of DoD RFAs. The results of this study advance our understanding of the relationships between investigative information and clearance eligibility determinations, and serve as the foundation for developing an automated Adjudication Decision Support (ADS) system.

James A. Riedel
Director

EXECUTIVE SUMMARY

The present research is the second in a series of studies to evaluate preliminary decision rules and provide automated approval estimates for a Department of Defense (DoD) Adjudication Decision Support (ADS) system. The long-term goal of the ADS program is to develop a system that will automatically evaluate completed personnel security investigations in accordance with the Adjudicative Guidelines for Determining Eligibility for Access to Classified Information (December 29, 2005) and using decision logic comparable to the logic of expert adjudicators. The ADS system will process closed personnel security investigations in accordance with national guidelines before distribution to the DoD central adjudication facilities (CAFs). The system will identify information that is relevant to clearance eligibility determinations based on decision rules established by policy, senior adjudicators, other personnel security experts, and empirical research on past determinations. Cases that contain appropriately little adverse information will qualify for automatic approval. This should greatly shorten case processing times for the cleanest cases, facilitate the initial review of complex cases by adjudicators, reduce the overall workload at the CAFs, increase adjudication consistency, and facilitate case assignment.

The ADS system will have two major components: (1) an automated approval process and (2) an automated case summary reporting function. The automated approval process will be based on decision rules for checking the content of lead results in investigative reports. Ultimately, this system will require machine-readable investigative reports as input. The purpose of the automated approval component is to identify adverse information of security concern in order to distinguish cases that may be granted clearance eligibility by the system from those that must be reviewed by an adjudicator. Automated case summary reporting will summarize relevant information about each case and present it to authorized users with a recommendation for further action. The objective of the present study was to provide automated approval estimates based on a preliminary set of decision rules for screening National Agency Check with Local Agency Checks and Credit Checks (NACLC) investigations.

APPROACH

A previous study developed and tested a large number of conservative decision rules for screening NACLC investigations, which resulted in an unnecessarily cautious approval rate of 6%. In contrast, the present approach to automatic approval employed fewer, more targeted rules. The analysis began by categorizing as ineligible for immediate approval cases in which the scope of the investigation was expanded to include additional leads and/or adverse information was identified by the investigation provider. Expanded investigations are likely to contain information that should be reviewed by an adjudicator (e.g., potentially disqualifying conditions). Therefore, expanded investigations generally should be

ineligible for automated approval. In an operational ADS system, investigations with identified issues of security concern and/or added coverage at this stage would be referred to an adjudicator, while the remainder still would be eligible for automatic approval.

A set of additional "critical checks" then was applied to the remaining investigations to ensure that only the cleanest cases would be considered eligible for automated approval. As a safeguard, the decision rules for this study screened certain database fields that could contain serious adverse information of security concern. Critical checks included information from the personnel security questionnaire, national agency checks, local agency checks, and credit reports. Significant adverse information in any of these fields most likely would have resulted in expansion, but the decision rules for the ADS system should provide safeguards comparable to human adjudication. So, these additional checks were applied to ensure adequate security.

In order to generate automated approval estimates, two random samples were drawn from NACLC investigations, for Secret and Confidential clearance, closed by the Defense Security Service (DSS) in CY03. Investigation data were drawn from a research copy of the DSS Case Control Management System (CCMS) and merged with data from the Joint Personnel Adjudication System (JPAS), which contained information about clearance eligibility and documented issues. Cases with incomplete data for the variables of interest after merging CCMS and JPAS tables were omitted from the analysis. Since the results for the two samples were nearly identical, only results for the second sample are provided in this report.

RESULTS AND DISCUSSION

The present study evaluated preliminary decision rules for automated screening of NACLC investigations and found that approximately 40% of applicants were eligible for automatic approval under the reported rules because these cases contained little or no adverse information of security concern. Previous research found that only a small percentage of cases were entirely devoid of adverse information. When considered together, these studies provide a rationale and foundation for a DoD ADS system. The DoD CAFs process thousands of security clearance eligibility determinations every year. The vast majority of applicants are granted access eligibility, and only a small percentage of these cases contain significant adverse information of security concern. The use of automated clean-case screening could provide significant cost savings, improve adjudication timeliness, and allow the CAFs to focus human resources on complex cases and those with serious issues.

DUSD (CI&S), DSS, PERSEREC and other DoD components endorse a vision for a more integrated, efficient and effective personnel security system as part of the Defense Information Systems for Security (DISS) being developed by DSS. The future system will use automation to, among other things, improve adverse information detection and resolution, accelerate investigation and adjudication,

more fully utilize risk management principles, promote reciprocity across the government, facilitate accurate requirements forecasting, and accommodate surge demands for clearances. Notable changes will include utilizing the Automated Continuing Evaluation System (ACES) to perform an approved variation of the current NACLC investigation, making use of automation for determining when to request Special Interviews (SPIN) from the Office of Personnel Management (OPM), and for evaluating investigative results. ADS will be an important component of this system.

The ADS program may be implemented more quickly by leveraging and repurposing ACES research completed at this time. Both research programs seek to identify cases of security concern, but ACES draws prompt attention to those that pose the greatest risk, while ADS focuses on those posing the least concern. Given the similarities between the two programs, many of the rules and criteria developed for ACES should transfer in principle, if not in the specifics, to ADS.

Whether developed independently or in association with ACES, the ADS system will require machine-readable data from investigation providers. Ideally, all elements of the investigative report would be transmitted electronically from the provider in a delimited format that can be read by a computer system. Also, summary codes should detail the adjudicative relevance of identified issues, and provide information on previously adjudicated matters (Kramer, Crawford, & Richmond, 2004; Richmond & Timm, 2004; Leggitt & Lang, in press). The minimum requirement for an ADS system is that report information be amenable to electronic parsing, search, and extraction. This requirement is likely to be achievable given that most standard NACLC leads are automated and personnel security questionnaire information is stored as delimited data in e-QIP. At some point, the DISS may provide all NACLC data, except for field lead information, via e-QIP and ACES record checks.

The methods and findings reported here are intended to provide a point of departure for additional research to validate and optimize decision rules and approval estimates for different types of investigations. The present research also provides a foundation upon which to build an ADS model for SSBIs. The leads conducted in NACLC investigations also are present in SSBIs, but SSBIs contain additional leads that must be evaluated by the system. The foremost challenge is to further develop methods for evaluating unstructured text from field leads. The present study used a keyword search to examine general remarks from the personnel security questionnaire. This served the purpose of the present study, but SSBIs contain much more unstructured text from subject and reference interviews than do NACLC investigations. Procedures for evaluating this information must be further developed and tested.

RECOMMENDATIONS

- Convene a working group of all stakeholders (senior central adjudication facilities, counterintelligence, and security managers) to review the preliminary decision rules and automated approval estimates from this study.
- Work with investigation providers to obtain delimited, machine-readable input for the ADS system.
- Extend and test ADS decision rules to accommodate Single Scope Background Investigations and periodic reinvestigations.
- Specify the data sources and processing sequence of ADS as a component of the DISS.

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BACKGROUND

Management Initiative Decision 908 directed the Deputy Under Secretary of Defense for Counterintelligence and Security (DUSD/CI&S) to oversee Joint Personnel Adjudication System (JPAS) improvements and e-clearance integration efforts. Part of this tasking included using automated procedures to accelerate the processing of security clearance eligibility determinations. DUSD (CI&S) tasked the Defense Personnel Security Research Center (PERSEREC) to contribute to this effort. One of PERSEREC's contributions was to initiate a research program to develop an Adjudication Decision Support (ADS) system that will use automation to improve adjudication efficiency and effectiveness. The present research is the second in a series of studies to develop preliminary decision rules and provide automated approval estimates for National Agency Check with Local Agency Checks and Credit Checks (NACLC) investigations.

Individual eligibility for access to classified information is determined in accordance with Executive Order 12968, Access to Classified Information, August 4, 1995. The security clearance process consists of two major functions: investigation and adjudication. First, personnel security investigators collect information about an individual's personal history as it relates to loyalty, trustworthiness, and reliability. This background information serves as the basis for determining clearance eligibility. The process of determining eligibility for access to classified information is referred to as adjudication. In the course of adjudication, information collected during the investigation is evaluated against national guidelines (Adjudicative Guidelines for Determining Eligibility for Access to Classified Information, December 29, 2005) to determine if an individual is an acceptable security risk, and whether or not to grant eligibility for access.

The adjudicative guidelines describe the adjudication process and indicators of potentially adverse information (i.e., disqualifying conditions). In this context, adverse information is information that is contrary to granting eligibility for access to classified information. Personnel security investigations contain varying degrees of adverse information. Some investigations do not contain adverse information; some contain relatively insignificant adverse information and/or mitigating conditions; others include information that may result in denial or revocation of access eligibility. It will be important for an ADS system to reliably detect adverse information of security concern based on the guidelines, and to determine whether cases should be automatically approved or sent to an adjudicator. The key is to determine appropriate criteria for automating the initial review process so cases containing little or no adverse information can be automatically approved for access without increasing risks to national security.

A prior study by PERSEREC (Crawford & Riedel, 1996) examined the costs and benefits of clean-case screening by the Defense Investigative Service (DIS). The

Defense Security Service (DSS; formerly DIS) conducted personnel security investigations for the Department of Defense (DoD) prior to transferring this function to the Office of Personnel Management (OPM) in February 2005. The authors compared DIS case analyst and adjudicator ratings of the level of derogatory information (clean, minor derogatory information, major derogatory information) in several different types of investigations coded over a one-month period. They also examined cost data from the adjudication facilities to project potential cost avoidance with different screening scenarios. It was concluded that DoD could save millions of dollars by screening clean cases and cases with minor derogatory information through a computer system, and automation would pose very little increase in risk. Furthermore, automation should reduce clearance processing time, permit the electronic storage of derogatory information, and allow collaboration between DIS and the adjudication facilities to establish screening criteria.

The present research builds on the risk management perspective of Crawford and Riedel (1996). Risk management is the process of applying security countermeasures to attain an acceptable level of risk at a reasonable cost (Roper, 1999). The primary goal of the ADS program is to develop a system that will automatically evaluate completed personnel security investigations in accordance with the Adjudicative Guidelines for Determining Eligibility for Access to Classified Information (December 29, 2005), and by using decision logic comparable to the logic of expert adjudicators (Youpa, Marshall-Mies, Lang & Carney, 2004).

DOD AUTOMATED PERSONNEL SECURITY SYSTEM

DUSD (CI&S), DSS, PERSEREC and other DoD components endorse a vision for a more integrated, efficient and effective personnel security system as part of the Defense Information Systems for Security (DISS) being developed by DSS.[1] The future system will use automation to, among other things, improve adverse information detection and resolution, accelerate investigation and adjudication, more fully utilize risk management principles, promote reciprocity across the government, facilitate accurate requirements forecasting, and accommodate surge demands for clearances. Notable changes will include utilizing the Automated Continuing Evaluation System (ACES) to perform an approved variation of the current NACLC investigation, making use of automation for determining when to request Special Interviews (SPIN) from OPM, and for evaluating investigative results. ADS will be a component of this system.

The process envisioned for initial NACLC investigations includes the following steps. First, clearance requests will be submitted electronically by security managers through an existing function in the Joint Personnel Adjudication System (JPAS).

[1] The DISS is an enterprise architecture system to facilitate a more holistic environment within DSS. The system will provide a secure software solution for all aspects of the industrial security, personnel security, counterintelligence and security education training and awareness programs by integrating several existing systems.

JPAS will electronically validate requests at the appropriate level and authorize the OPM Electronic Questionnaires for Investigations Processing (e-QIP) system to allow applicant access. Applicants will complete the personnel security questionnaire using e-QIP, and submit fingerprints via live scan. If applicants respond affirmatively to certain questions on the e-QIP questionnaire, the system will ask relevant follow-up questions. Digital signatures will be obtained and used, eliminating the need for paper record submission and retention.

Next, ACES will acquire applicant data from e-QIP and fingerprint checks, and then conduct additional record checks deemed to meet or exceed NACLC standards. Additional checks will include all centrally stored, electronically available, waiver and prescreening information. In addition to acquiring this information, ACES also will perform preliminary processing to ensure that data are stored in a format that facilitates subsequent analysis. Data acquired by ACES and other sources will be evaluated using ADS business rules to determine which applicants qualify for Secret and Confidential level access eligibility (it is planned that eventually Single Scope Background Investigations for Top Secret access will be screened by the ADS system). The ADS component of this system will process electronic reports for adjudication (e-RFA) in accordance with national guidelines. The system will identify information that is relevant to clearance eligibility determinations based on decision rules established by policy, senior adjudicators, other personnel security experts, and empirical research on past determinations.

Cases that contain adverse information assessed to pose minimal risk will qualify for automatic approval. If no potentially disqualifying conditions are detected by the system, the requested access eligibility will be electronically approved and posted in JPAS. Cases with adverse information of security concern will be evaluated electronically to assess whether an OPM SPIN or other review is necessary. In the event neither a SPIN nor buffer cell review is deemed necessary, cases will be adjudicated by the appropriate adjudication facility. This process should greatly shorten case processing times for the cleanest cases, facilitate the initial review of complex cases by adjudicators, reduce the overall workload at the CAFs, increase adjudication consistency, and facilitate case assignment.

The ADS component of the automated system will include a variety of controls to safeguard and maintain adjudication integrity. Initial evaluation of decision rules for research and development will be conducted virtually, in parallel to determinations by adjudicators; that is, all ADS system eligibility recommendations will be reviewed by adjudicators to ensure that the system is working properly. The results of virtual and manual adjudication will be compared and used to modify decision rules, as necessary. Prior to final deployment, adjudicators will continue to periodically audit random samples of automatically approved cases. This procedure will assess the ongoing efficacy of ADS decision rules and improve security by eliminating a priori certainty over which cases will be reviewed by adjudicators.

ADS RESEARCH PROGRAM

Current ADS research is developing decision rules, meant for stakeholder feedback and trial implementation, for automated approval of clearance eligibility for applicants with little or no adverse information of security concern in their backgrounds. The immediate objective is to estimate the percentage of cases that would be automatically approved for access under different rule models. The research program is also developing automated case summaries, which are improved summary formats of the information contained in electronic reports for adjudication. These summaries will document the automated processing performed, and facilitate the manual adjudication process when automated approval is not appropriate. The ADS research program is divided into three stages, with each stage corresponding to security clearance products across DoD military, civilian, and industrial applicants:

1. National Agency Check with Local Agency Checks and Credit Checks (NACLC) as well as Access National Agency Check and Inquiries (ANACI) initial and periodic reinvestigations for Confidential and Secret clearances
2. Single Scope Background Investigation Periodic Reinvestigations (SSBI-PR) for Top Secret (TS) and Sensitive Compartmented Information (SCI) periodic reviews
3. Single Scope Background Investigations (SSBI) for initial TS and SCI access determinations.

The present study is part of Stage 1, which focuses on automated approval estimates for NACLC and ANACI investigations. These types of investigations contain relatively small amounts of unstructured textual information. The standards for NACLC and ANACI investigations require a completed personnel security questionnaire, which contains unstructured text, as well as national and local records checks. These investigations do not require subject and reference interviews unless adverse information is developed as part of the standard inquiry. Stage 2 will extend the research to SSBI-PRs, which include additional investigative leads. Stage 3 will incorporate the results of earlier stages to test and evaluate decision rules for initial SSBIs.

ADS SYSTEM COMPONENTS AND RESEARCH OBJECTIVES

The ADS system is designed to have two major components: (1) automated approval processing logic and (2) an automated case summary reporting function. The automated approval process will consist of decision rules for checking the presence of potentially derogatory content in the lead results of investigative reports. Ultimately, this system will require machine-readable investigative reports as input. Automated Case Summary (ACS) reports will be the human-readable output of the system. These reports will summarize relevant information about each case and present it to authorized users with a recommendation for further action made by

the processing logic. The objective of the present study was to further develop and test the automated approval component of the system.

The automated approval component of the ADS system seeks to identify adverse information of security concern in investigative reports to distinguish between cases that may be granted clearance eligibility by the system and those that must be reviewed by an adjudicator. Youpa, Marshall-Mies, Lang, and Carney (2004) developed and evaluated an initial set of decision rules for automated approval of security clearances based on NACLC investigations. The initial set of rules was applied to a random sample of FY02 NACLC investigations conducted by the Defense Security Service (DSS) to estimate the percentage of cases that would qualify for automated approval. Given the intentionally cautious rules that were applied, the researchers found that only 6.4% of the cases in the sample were eligible for automatic approval.

The present study was an extension of the Youpa et al. (2004) project, and was based on risk management principles. The primary aim was to estimate the percentage of cases that would be eligible for automated approval given a less conservative yet reasonable set of decision rules. The research team evaluated a select set of rules for screening NACLC investigations in order to increase automated approval estimates, while maintaining an acceptable level of effectiveness. This study was, in part, conducted on the premise that a small and focused set of rules may be more easily explained, implemented, and optimized than a large set of complex rules.

METHODOLOGY

APPROACH

The present approach to automated approval involved the following three basic steps.

1. Identify investigations with added coverage
2. Check for adverse information in critically important sources
3. Determine eligibility for automated approval

Cases with added coverage, where the scope of the investigation was expanded to include additional leads and/or adverse information identified by the investigation provider (i.e., DSS), were considered ineligible for automated approval. Although most expanded investigations do not result in an adverse action (denial or revocation), they are more likely to contain derogatory or suspicious information that should be reviewed by an adjudicator (e.g., potentially disqualifying conditions). Based on data from the recently retired DSS Case Control Management System (CCMS), it was predicted that approximately 40 percent of the sampled investigations would include additional coverage, and that the remainder would be free of significant adverse information. Thus, although all cases would be evaluated by the ADS system and result in an automated summary, only unexpanded cases would be considered eligible for automatic approval.

To safeguard against oversights in case expansion, the decision rules for this study also screened certain database fields that might contain particularly serious adverse information of security concern. This set of additional "critical checks" was applied to the unexpanded investigations to ensure that only appropriate cases would remain eligible for automated approval. Significant adverse information in any of these fields most likely would have resulted in expansion, but an ADS system should strive to be accurate and comparable to human adjudication.

The critical checks were selected by the researchers, and included information from the personnel security questionnaire, national agency checks, local agency checks, and credit reports. A total of 32 elements from the personnel security questionnaire were chosen, including a keyword search of the general remarks. A CCMS result code was used to screen national agency and credit bureau checks. These codes were based on DSS criteria for evaluating national agency and credit leads. While the database contained a similar result code for field leads, including local agency checks, an abundance of missing values precluded its use in this study. Thus, a computer program developed by PERSEREC was used to extract relevant information from field lead data in CCMS. Among other things, the program identified the presence of sworn statements, attachments, and/or additional leads (i.e., added coverage). For this study, if any of these items were present, the case was considered ineligible for automated approval.

PROCEDURE

In order to assemble cases for this study, data were extracted from research copies of the DSS CCMS and the JPAS. CCMS was used to assemble closed NACLC investigations, and JPAS was employed to obtain case dispositions following adjudication. SPSS Clementine® was the primary software used to compile the study database. In addition, a software program called ALICE, developed by PERSEREC, extracted field lead data. The data extracted with ALICE were analyzed separately and merged with the other data from CCMS.

Two random samples were drawn from NACLC investigations, for Secret and Confidential clearance, closed by DSS in CY03. Since the results for the two samples were nearly identical, only results for the second sample are provided in this report. SPSS Clementine® was used to merge CCMS tables containing leads for the sampled cases. These data then were merged with tables from JPAS that contained information about case dispositions. This procedure provided the data table necessary for analysis. The disposition data included information about clearance eligibility and adjudication profile (i.e., identified issues of security concern, if any), which were used as outcomes in the analysis. Cases with incomplete data for the variables of interest after merging CCMS and JPAS tables were omitted from the analysis.

Much of the data for this study were recoded, aggregated, and analyzed using SPSS® for Windows 14.0. For each investigative element used in the analysis, information regarded as acceptable according to the decision rules was assigned a value of 0, and information that could be potentially disqualifying and thus would necessitate review by an adjudicator was assigned a value of 1. Only cases in which all investigative elements were coded 0, or acceptable, were considered eligible for automated approval of clearance eligibility. Cases in which any element was coded 1 were not considered eligible for automated approval and would be referred to an adjudicator for further review.

First Set of Decision Rules: Case Category Codes

Two sets of decision rules were used to screen investigations for automated approval. The first set applied existing CCMS case category codes to determine whether or not investigations contained documented issues or were expanded. Case category codes in CCMS indicate, among other things, the level of clearance application, applicant community, the presence of adverse information, and whether or not there was added coverage (i.e., the investigation was expanded). The codes in Table 1 represented clean NACLC investigations that did not receive additional coverage. Investigations with these codes remained eligible for automated approval pending critical checks. The remaining cases were considered ineligible at this stage, and would be referred to an adjudicator.

Table 1
CCMS Case Category Codes Used for Initial Screen

Code[a]	Description
1D1	SECRET PR MIL NON-ISSUE - SECURITY PROGRAM
1E1	SECRET PR CIV NON-ISSUE - SECURITY PROGRAM
1F1	SECRET PR IND NON-ISSUE - SECURITY PROGRAM
2D1	SECRET PR MIL - NACLC NON-ISSUE, SECURITY PROGRAM
2E1	SECRET PR CIV - NACLC NON-ISSUE, SECURITY PROGRAM
2F1	SECRET PR INC - NACLC NON-ISSUE, SECURITY PROGRAM
2K2	SECRET NACLC - MIL NON-ISSUE, SECURITY PROGRAM
2L2	SECRET NACLC - CIV NON-ISSUE, SECURITY PROGRAM
2M2	SECRET NACLC - IND NON-ISSUE, SECURITY PROGRAM
3D1	CONFIDENTIAL PR MIL - NACLC NON-ISSUE, SECURITY PROGRAM
3E1	CONFIDENTIAL PR CIV - NACLC NON-ISSUE, SECURITY PROGRAM
3F1	CONFIDENTIAL PR INC - NACLC NON-ISSUE, SECURITY PROGRAM
3K2	CONFIDENTIAL NACLC - MIL NON-ISSUE, SECURITY PROGRAM
3L2	CONFIDENTIAL NACLC - CIV NON-ISSUE, SECURITY PROGRAM
3M2	CONFIDENTIAL NACLC - IND NON-ISSUE, SECURITY PROGRAM

[a] Cases with these codes were considered eligible for automated approval at this stage of the analysis.

Second Set of Decision Rules: Critical Checks

The second set of decision rules involved checking "critical" fields. Table 2 presents the critical checks chosen for analysis. Critical checks were employed as a safeguard against approving investigations with potentially disqualifying conditions that were not identified by the first set of decision rules using case category codes. These were applied to Electronic Personnel Security Questionnaire (EPSQ), National Agency Check (NAC), Field Lead/Local Agency Check (LAC), and Credit Bureau Check (CBC) data.

Table 2
CCMS Fields Used for Critical Checks

CCMS Field	Source Label	Approval Eligibility Rule
EPSQ		
DUAL_CIT_CD	3. Dual Citizenship	No
CTZNSHP_TYPE_CD	3. Citizenship	US
CTZNSHP_CY_CD	8. Your Spouse	US
CTZNSHP_CY_CD	9. Your Relatives and Associates	US
FRGN_BSNS_INTRT_CD	12. Your Foreign Activities: Property	No
FRGN_EMPL_JST_CD	13. Your Foreign Activities: Employment	No
FRGN_GVMT_ACT_CD	14. Your Foreign Activities: Foreign Government	No
FRGN_PSPRT_DATA_CD	15. Your Foreign Activities: Passport	No
DISCHRG_DATA_CD	17. Your Military Record	No
MNTL_HLTH_REF	19. Your Medical Record	No
JOB_TRMNTN_IND_CD	20. Your Employment Record	No
FLNY_ARST_OFNS_CD	21. Your Police Record: Felony Offenses	No
FRM_EXPL_OFNS_CD	22. Your Police Record: Firearms/Explosives Offenses	No
PNDG_CHRG_OFNS_CD	23. Your Police Record: Pending Charges	No
ALC_DRG_OFNS_CD	24. Your Police Record: Alcohol/Drug Offenses	No
MIL_POL_OFNS_CD	25. Your Police Record: Military Court	No
MSCLNS_OFNS_CD	26. Your Police Record: Other Offenses	No
DRG_ILGL_USE_CD	27. Your Use of Illegal Drugs: Illegal Use of Drugs	No
DRG_SNSTV_PSTN_CD	28. Your Use of Illegal Drugs: Sensitive Positions	No
DRG_ACTVTY_ILGL_CD	29. Your Use of Illegal Drugs: Drug Activity	No
ALCH_CNSL_CD	30. Your Use of Alcohol	No
SEC_DEN_DATA_CD	32. Your Investigation Record: Clearance Actions	No
BANKRUPTCY_DATA_CD	33. Your Financial Record: Bankruptcy	No
WAGE_GAR_DATA_CD	34. Your Financial Record: Wage Garnishments	No
REPOS_DATA_CD	35. Your Financial Record: Repossessions	No
TAX_LIEN_DATA_CD	36. Your Financial Record: Tax Lien	No
UNPAID_JUD_DATA_CD	37. Your Financial Record: Unpaid Judgments	No
DLDBT180_DATA_CD	38. Your Financial Delinquencies: 180 Days	No
PUB_REC_DATA_CD	40. Public Record Civil Court Actions	No
ORG_AFF_M_DATA_CD	41. Your Association Record: Membership	No
ORG_AFF_A_DATA_CD	42. Your Association Record: Activities	No
PRMKS	43. General Remarks	No keyword hits
NAC		
NAC_LEAD_RSLT_CD	NAC Lead Result Code	Favorable
LAC (ALICE Fields)		
ATTACHMENTS	Presence of Attachment(s)	Not present
SWORN STATEMENTS	Presence of Sworn Statement(s)	Not present
NON-LAC LEADS	Presence of Non-LAC Lead(s)	Not present
CBC		
NAC_LEAD_RSLT_CD	NAC Lead Result Code	Favorable

Investigations in the study sample were based on the DoD Electronic Personnel Security Questionnaire (EPSQ). The EPSQ is an electronic version of Standard Form 86 Questionnaire for National Security Positions (SF-86), and consists of 43 item blocks. Security clearance applicants complete SF-86 to initiate the investigation process. The personnel security questionnaire requests information such as citizenship, residence, education, employment, criminal history, etc., and applicants' responses help determine the scope of the background investigation. Their questionnaire responses also are considered, along with interviews and records checks, to reach an appropriate clearance eligibility determination.

It should be noted that with OPM now conducting investigations, a new electronic version of the SF-86 is being used by DoD clearance applicants. The OPM e-QIP enables security clearance applicants to complete a personnel security questionnaire over a secure Internet connection. However, since the EPSQ was used by DoD when these data were collected, EPSQ data were analyzed (see Table 2).

National Agency Checks (NAC) were screened by using a result code entered in CCMS. The results of Credit Bureau Checks also were contained in the NAC lead result field in CCMS. According to the decision rules employed in this study, only NACs and CBCs with result code "A" (Favorable) were considered eligible for automated approval. Any other result code would necessitate that the case be referred to an adjudicator for further review. NAC and CBC data were considered separately in this study.

Since result codes were generally unavailable for CY03 field leads in CCMS, the ALICE program compiled a list of cases with clean LACs and no additional field leads or attachments. These cases were considered eligible for automatic approval. The remaining cases were coded as referrals. In a previous study, the researchers checked a 5% random sample of cases to estimate the reliability of this procedure and found no discrepancies (Youpa et al., 2004). Thus, ALICE appears to provide a reliable and accurate assessment of LACs for purposes of this evaluation.

The final safeguard was a keyword search of unstructured text in the EPSQ General Remarks field. This was done to identify potential issues that were not indicated elsewhere on the security questionnaire. As detailed in Appendix A, the unstructured text was examined in a series of steps. In brief, the contents of sample General Remarks fields were studied to generate a keyword list, which was then condensed and refined to increase its precision. When evaluating the final sample, the presence of any word on the list resulted in exclusion from automated approval. While a deployed ADS system would utilize more elaborate text analytics, this procedure provided an initial estimate of the impact of unstructured text on overall automated approval rates.

RESULTS

The investigations sampled for this study included about 5% (n = 10,526) of the roughly 230,000 NACLC investigations closed by DSS in CY03. With a sample of this size, there is a 99% confidence level that the reported values are within ±1.23 of the population values. The sample consisted of 8,621 (81.9%) males and 1,905 (18.1%) females. Applicants were 61.8% (n = 6,505) military, 38.0% (n = 4,000) industrial, and 0.2% (n = 21) civilian government employees.[2] The sample contained 7,054 (67.0%) NACLC-Secret, 178 (1.7%) NACLC-Confidential, 3,270 (31.1%) Secret-PR, and 24 (0.2%) Confidential-PR investigations.

CASE CATEGORY CODES

DSS case category codes were used to initially eliminate from automated approval those investigations with known issues of security concern and/or added coverage (i.e., expanded investigations). This sample contained 2,355 (22.4%) investigations with case category codes that represented identified issues and/or added coverage. A total of 8,171 (77.6%) investigations were coded as nonissue. These nonissue investigations remained eligible for automated approval, pending the additional checks. Table 3 shows the distribution of CCMS case category codes for these investigations.

[2] Investigations for civilian government employees were being conducted by OPM during this period. So, these types of cases were underrepresented in CCMS, which is a DoD database.

Table 3
Distribution of CCMS Case Category Codes

Code	Label	Frequency	Percent
1D3	PR MIL (NON-ISSUE - SECURITY PROGRAM)	1	0.0
1F3	PR IND (NON-ISSUE - SECURITY PROGRAM)	1	0.0
1S3	SECRET PR MIL (ISSUE CASE - SUITABILITY)	2	0.0
2D1	SECRET PR MIL - NACLC (NON-ISSUE, SECURITY PROGRAM)	1,584	15.0
2DA	SECRET PR MIL - NACLC (NON-ISSUE - ADDED COVERAGE)	1	0.0
2E1	SECRET PR CIV - NACLC (NON-ISSUE, SECURITY PROGRAM)	4	0.0
2F1	SECRET PR INC - NACLC (NON-ISSUE, SECURITY PROGRAM)	948	9.0
2FA	SECRET PR IND - NACLC (NON-ISSUE - ADDED COVERAGE)	17	0.2
2K2	SECRET NACLC - MIL (NON-ISSUE, SECURITY PROGRAM)	3,625	34.4
2KB	SECRET NACLC - MIL (NON-ISSUE, ADDED COVERAGE)	5	0.0
2L2	SECRET NACLC - CIV (NON-ISSUE, SECURITY PROGRAM)	14	0.1
2M2	SECRET NACLC - IND (NON-ISSUE, SECURITY PROGRAM)	1,883	17.9
2MB	SECRET NACLC - IND (NON-ISSUE, ADDED COVERAGE)	37	0.4
2S1	SECRET PR MIL - NACLC (ISSUE CASE - SECURITY)	67	0.6
2S3	SECRET PR MIL - NACLC (ISSUE CASE - SUITABILITY)	273	2.6
2S6	SECRET PR CIV - NACLC (ISSUE CASE - SUITABILITY)	1	0.0
2S7	SECRET PR IND - NACLC (ISSUE CASE - SECURITY)	71	0.7
2S9	SECRET PR INC - NACLC (ISSUE CASE - SUITABILITY)	208	2.0
2SA	SECRET PR MIL - NACLC (ADDED COVERAGE FOR ISSUE - SECURITY)	1	0.0
2SC	SECRET PR MIL - NACLC (ADDED COVERAGE FOR ISSUE - SUITABILITY)	4	0.0
2SG	SECRET PR IND - NACLC (ADDED COVERAGE FOR ISSUE - SECURITY)	16	0.2
2SI	SECRET PR IND - NACLC (ADDED COVERAGE FOR ISSUE - SUITABILITY)	7	0.1
2V1	SECRET NACLC - MIL (ISSUE CASE - SECURITY)	97	0.9
2V3	SECRET NACLC - MIL (ISSUE CASE - SUITABILITY)	774	7.4
2V6	SECRET NACLC - CIV (ISSUE CASE - SUITABILITY)	2	0.0
2V7	SECRET NACLC - IND (ISSUE CASE - SECURITY)	167	1.6
2V9	SECRET NACLC - INC (ISSUE CASE - SUITABILITY)	487	4.6
2VA	SECRET NACLC - MIL (ADDED COVERAGE FOR ISSUE - SECURITY)	9	0.1
2VC	SECRET NACLC - MIL (ADDED COVERAGE FOR ISSUE - SUITABILITY)	15	0.1
2VG	SECRET NACLC - IND (ADDED COVERAGE FOR ISSUE - SECURITY)	18	0.2
2VI	SECRET NACLC - INC (ADDED COVERAGE FOR ISSUE - SUITABILITY)	27	0.3
3D1	CONFIDENTIAL PR MIL - NACLC (NON-ISSUE, SECURITY PROGRAM)	1	0.0
3F1	CONFIDENTIAL PR INC - NACLC (NON-ISSUE, SECURITY PROGRAM)	7	0.1
3FA	CONFIDENTIAL PR IND - NACLC (NON-ISSUE - ADDED COVERAGE)	4	0.0
3K2	CONFIDENTIAL NACLC - MIL (NON-ISSUE, SECURITY PROGRAM)	36	0.3
3M2	CONFIDENTIAL NACLC - IND (NON-ISSUE, SECURITY PROGRAM)	69	0.7
3MB	CONFIDENTIAL NACLC - IND (NON-ISSUE, ADDED COVERAGE)	1	0.0
3S1	CONFIDENTIAL PR MIL - NACLC (ISSUE CASE - SECURITY)	1	0.0

Code	Label	Frequency	Percent
3S3	CONFIDENTIAL PR MIL - NACLC (ISSUE CASE - SUITABILITY)	1	0.0
3SG	CONFIDENTIAL PR IND - NACLC (ADDED COVERAGE FOR ISSUE - SECURITY)	1	0.0
3S9	CONFIDENTIAL PR INC - NACLC (ISSUE CASE - SUITABILITY)	2	0.0
3SA	CONFIDENTIAL PR MIL - NACLC (ADDED COVERAGE FOR ISSUE - SECURITY)	1	0.0
3SI	CONFIDENTIAL PR IND - NACLC (ADDED COVERAGE FOR ISSUE - SUITABILITY)	1	0.0
3V1	CONFIDENTIAL NACLC - MIL (ISSUE CASE - SECURITY)	1	0.0
3V3	CONFIDENTIAL NACLC - MIL (ISSUE CASE - SUITABILITY)	6	0.0
3V7	CONFIDENTIAL NACLC - IND (ISSUE CASE - SECURITY)	7	0.1
3V9	CONFIDENTIAL NACLC - INC (ISSUE CASE - SUITABILITY)	21	0.2
Total		10,526	100.0

CRITICAL CHECKS

Critical checks were performed on EPSQ, NAC, LAC, and CBC fields in CCMS. Table 4 shows the frequency and percentage of nonissue investigations categorized as eligible and ineligible according to the decision rules for ADS critical checks. As shown in the table, 50.7% (n = 4,140) of the 8,171 nonissue investigations in the sample were eligible for automated approval after conducting critical checks. These cases represent 39.3% of the 10,526 investigations in the original sample. Considered separately, investigations were determined to be ineligible for automated approval due to adverse information in EPSQ (26.9%), CBC (21.5%), NAC (15.3%), and LAC (5.3%) fields.

Table 4
CCMS Nonissue Investigation Eligibility for Automated Approval Based on Critical Checks (n = 8,171)

Field	Eligible		Ineligible	
	Frequency	Percent	Frequency	Percent
EPSQ	5,971	73.1	2,200	26.9
3. Dual Citizenship	8,158	99.8	13	0.2
3. Citizenship	8,145	99.7	26	0.3
8. Spouse Citizenship	8,113	99.3	58	0.7
9. Relatives Citizenship	7,853	96.1	318	3.9
12. Foreign Property	8,130	99.5	41	0.5
13. Foreign Employment	8,123	99.4	48	0.6
14. Foreign Contact	8,086	99.0	85	1.0
15. Foreign Passport	8,149	99.7	22	0.3
17. Military Discharge	8,139	99.6	32	0.4
19. Medical Record	8,154	99.8	17	0.2
20. Employment Record	7,920	96.9	251	3.1
21. Felony Offenses	8,107	99.2	64	0.8
22. Firearms Offenses	8,156	99.8	15	0.2
23. Pending Charges	8,162	99.9	9	0.1
24. Alcohol/Drug Offenses	7,780	95.2	391	4.8
25. Military Court	8,125	99.4	46	0.6
26. Other Offenses	7,801	95.5	370	4.5
27. Illegal Use of Drugs	7,963	97.5	208	2.5
28. Use Sensitive Position	8,153	99.8	18	0.2
29. Drug Activity	8,170	100.0	1	0.0
30. Use of Alcohol	8,162	99.9	9	0.1
32. Clearance Actions	8,149	99.7	22	0.3
33. Bankruptcy	8,107	99.2	64	0.8
34. Wage Garnishments	8,094	99.1	77	0.9
35. Repossessions	8,155	99.8	16	0.2
36. Tax Lien	8,151	99.8	20	0.2
37. Unpaid Judgments	8,163	99.9	8	0.1
38. Delinquencies 180 Days	8,036	98.3	135	1.7
40. Public Records	8,019	98.1	152	1.9
41. Membership	8,171	100.0	0	0.0
42. Activities	8,171	100.0	0	0.0
43. General Remarks	7,756	94.9	415	5.1
NAC (NAC Result Code)	6,922	84.7	1,249	15.3
LAC	7,735	94.7	436	5.3
CBC (NAC Result Code)	6,412	78.5	1,759	21.5
Recommendation[a]	4,140	50.7	4,031	49.3

[a] The percentage of cases eligible for automated approval from the original sample of 10,526 investigations is 39.3%.

JPAS DISPOSITIONS OF CCMS NONISSUE INVESTIGATIONS

JPAS dispositions of CCMS nonissue investigations were checked to assess the validity of the decision rules used in this study. The analysis included examination of JPAS issue distribution and documented clearance eligibility. The distribution of issues recorded in JPAS for CCMS nonissue investigations is presented in Table 5. As can be seen in the table, 79.6% (n = 6,501) of CCMS nonissue investigations in this sample had no issues documented in JPAS at the time of the study. The

remaining 20.4% (n = 1,670) of the cases had from one to five issue categories documented by adjudicators. A total of 891 (10.9%) of the investigations with documented issues had only one identified security concern (i.e., adjudicative guideline).

Table 5
JPAS Issue Distribution for CCMS Nonissue Investigations

JPAS Issue Categories	Frequency	Percent	Cumulative Percent
0	6,501	79.6	79.6
1	891	10.9	90.5
2	461	5.6	96.1
3	220	2.7	98.8
4	81	1.0	99.8
5	17	0.2	100.0
Total	8,171	100.0	

Clearance eligibility for CCMS nonissue cases was retrieved from a research copy of JPAS. The overwhelming majority of cases in the study sample contained positive adjudication actions. A very small percentage had what would be considered unfavorable determinations. Table 6 shows the distribution of outcomes for CCMS nonissue investigations. As can be seen in the table, 97.5% (n = 7,967) of the cases were eligible for Secret clearance after adjudication. A total of 99.2% (n = 8,103) of the sampled cases received favorable eligibility determinations.

Table 6
Clearance Eligibility for CCMS Nonissue Investigations

Code	Eligibility	Frequency	Percent
3	Pending Reply to Statement of Reasons	5	0.1
C	Confidential	58	0.7
D	Denied	4	0.0
J	No Determination Made	11	0.1
P	Interim Top Secret	49	0.6
Q	Favorable	5	0.1
R	Revoked	3	0.0
S	Secret	7,967	97.5
U	Interim SCI	23	0.3
V	SCI - DCID 6/4	1	0.0
Z	Loss of Jurisdiction	45	0.6
	Total	8,171	100.0

Table 7 provides a cross-tabulation between ADS eligibility for automated approval and JPAS issues for CCMS nonissue investigations. A total of 3,780 (91.3%) investigations considered eligible for automated approval based on preliminary ADS decision rules had no documented issues in JPAS. In contrast, 360 (8.7%) investigations that were deemed eligible for automated approval had documented issues, and were considered possible misses in the sense that some relevant

adverse information may not have been detected, given the decision rules used in this study. Of investigations considered ineligible for automated approval, 2,669 (66.2%) were clean, and 1,362 (33.8%) had documented issues. Cases deemed ineligible for automated approval by ADS decision rules, but that had no documented issues in JPAS, were considered possible false alarms. In an operational system, misses are more problematic than false alarms because misses represent cases with potential security concerns that could be approved automatically. Since the primary purpose of this study was to obtain automated approval rate estimates, the presence of possible misses is inconsequential. As part of future research and development, decision rules can be adjusted to reduce the miss rate (i.e., detect additional adverse information), if previously undetected adverse content is deemed to require attention. Examples of possible undetected adverse information from this study are presented in Appendix B.

Table 7
Eligibility for Automated Approval by JPAS Issues Cross Tabulation

	ADS Eligible		ADS Ineligible		Row Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
JPAS Clean	3,780	91.3	2,669	66.2	6,449	78.9
JPAS Issues	360	8.7	1,362	33.8	1,722	21.1
Column Total	4,140	100.0	4,031	100.0	8,171	100.0

JPAS DISPOSITIONS OF ADS ELIGIBLE WITH ISSUES CASES

The cross-tabulation between ADS eligibility for automated approval and the presence of documented issues in JPAS (see Table 7) showed that 360 cases were ADS-eligible, but had issues recorded by adjudicators. Table 8 shows the distribution of issue categories for these cases. As can be seen in the table, the majority (72.8%) had one documented issue category, while the remaining cases (27.2%) contained multiple issues.

Table 8
Issue Distribution for ADS Eligible with JPAS Issues Cases

JPAS Issue Categories	Frequency	Percent	Cumulative Percent
1	262	72.8	72.8
2	72	20.0	92.8
3	18	5.0	97.8
4	7	1.9	99.7
5	1	0.3	100.0
Total	360	100.0	

The 360 potentially “missed” cases were explored further by examining the content of each investigation in CCMS. Most of these cases contained only minor adverse information, such as isolated, small dollar collections, single 30 to 90 days past due accounts, and petty traffic violations. A minority of cases contained more serious information about misdemeanor arrests, extensive foreign travel, and bad debt in

excess of $2,000. Two personnel security experts[3] independently examined the data and agreed that approximately 20% of the potentially missed cases contained adverse information of security concern. The experts disagreed with each other about the status of 18% of the cases. The remaining cases (62%) were determined to not contain significant adverse information.

Table 9 shows the clearance eligibility documented in JPAS for cases that were ADS-eligible with issues. None of these cases received unfavorable eligibility determinations (e.g., denial or revocation). Of the 360 cases with issues noted in JPAS, 99.4% (n = 358) received favorable eligibility determinations. The remaining 0.6% (n = 2) were "Loss of Jurisdiction" for which the applicants no longer required access eligibility or had transferred from the component sponsoring the clearance request.

Table 9
Clearance Eligibility for ADS Eligible with JPAS Issues Cases

Code	Eligibility	Frequency	Percent
S	Secret	358	99.4
Z	Loss of Jurisdiction	2	0.6
	Total	360	100.0

In addition, a subset of ADS eligible, "clean" cases (n = 114) were examined to compare the level of adverse information in the two groups. Despite the presence of many clean investigations, there were cases with comparable levels of unfavorable information in the clean subset. The same two personnel security experts independently coded 17% of the "clean" subset as containing adverse information. They disagreed amongst themselves about 9% of the cases, and the remainder (74%) was considered clean.

These results demonstrate inconsistency in the application of JPAS adjudication profile codes, and cast doubt on the utility of these codes for research. Prior personnel security research (Crawford & Trent, 1987) noted problems with the identification of issue cases. Some coding ambiguities may result from the ability to quickly resolve ambiguous content, adverse information present in the initial investigation that is not considered to require further attention, and possible resistance to the use of the issue case label (for fear of exaggerating the severity of minor derogatory content).

The profile codes indicate the adequacy of the present decision rules for detecting adverse information. A small percentage (38% of 360 cases, or 1.59% of 8,171 nonissue cases) of the evaluated sample would have received favorable determinations with a mild to moderate level of derogatory content, but none of these was actually denied eligibility by adjudicators. (See examples in Appendix B.)

[3] Both expert consultants for this study have worked for many years in counterintelligence and security for DoD and the intelligence community. They currently conduct personnel security investigations.

Personnel security stakeholders must provide feedback about the appropriateness of these standards and criteria, on whether the rules and permitted derogatory content entail acceptable risks. Furthermore, a deployed ADS system will require periodic assessments and optimization of decision rules to adequately detect all necessary adverse information of security concern.

CONCLUSION

The present study evaluated preliminary decision rules for automated screening of NACLC investigations and found that approximately 40% of applicants were eligible for automatic approval under the reported rules because these cases contained little or no adverse information of security concern. Previous research found that only a small percentage of cases were entirely devoid of adverse information (Youpa, Marshall-Mies, Lang, & Carney, 2004). Together, these studies provide a rationale and foundation for a DoD ADS system. The DoD CAFs process thousands of security clearance eligibility determinations every year. The vast majority of applicants are granted access eligibility, and only a small percentage of these cases contain significant adverse information of security concern. The use of automated clean case screening could provide significant cost savings, improve adjudication timeliness, and allow the CAFs to focus human resources on complex cases and those with serious issues (Crawford & Riedel, 1996).

The ADS system may be implemented faster by leveraging and repurposing ACES research completed at this time. Both research programs seek to identify cases of security concern, but ACES draws prompt attention to those that pose the greatest risk (Chandler & Timm, 2002), while ADS focuses on those posing the least concern. Given the similarities between the two programs, many of the rules and criteria developed for ACES (e.g., Chandler & Rome, 2005) should transfer in principle, if not in the specifics, to ADS. The most important difference is that ACES looks at recent and more troubling security-related developments (Chandler & Timm, 2002), while ADS must consider whether single modest concerns should be reviewed, whether patterns of minor concerns should be reviewed, and the enduring relevance of previously adjudicated issues. Furthermore, ACES does not perform as extensive an examination of unstructured text fields for potentially derogatory content as would be necessary for ADS. In sum, ADS will require more restrictive approval criteria than ACES.

In addition to being more conservative than ACES, the ADS program has a different measure of success. The ACES program assesses its success in terms of rules that provide information of immediate use to case handlers or adjudicators (Chandler & Timm, 2002). ACES must provide actionable information for users to find value in reviewing its output. In contrast, the cases automatically approved by ADS would only be reviewed for auditing purposes or when ADS findings are pertinent to a subsequent personnel security assessment. ADS is primarily concerned with reducing the adjudication workload, without substantially increasing security risk. The decision rules for automated clean case screening are different than those appropriate for continuing evaluation. Moreover ADS also must record even minor adverse information for auditing purposes. Therefore, ADS rules will require extensive stakeholder feedback parallel to that provided for ACES decision rules (e.g., Chandler & Rome, 2005).

One limitation of the present study is that it made use of data structures from the discontinued DoD EPSQ and CCMS applications, while current investigations are conducted by OPM with e-QIP and the Personnel Investigations Processing System (PIPS). Leggitt and Lang (in press) examined the structure of OPM electronic case records and found they are not well suited for automation, but when used with other DoD data sources they may contribute to an effective ADS system. Any future ADS system will utilize information from the most current personnel databases. It is expected that input for an ADS system may initially come from OPM, then eventually from the DISS. The impact of other data sources on automated approval estimates is unknown.

A problem of both CCMS and OPM data is that issue coding is too imprecise and inconsistent for use in an ADS system. The present study used CCMS case category codes as an initial screen of adverse content, and documented issue categories in JPAS were utilized as an outcome measure. Inconsistencies in these data may have contributed to possible system misses and false alarms in the evaluation of the decision rules. In concurrence with Crawford and Trent (1987), the present study found that CCMS investigations flagged as containing issues did not necessarily include significant adverse information of security concern. PERSEREC has also examined the case summary codes in use by OPM (Kramer, Crawford, & Richmond, 2004; Richmond & Timm, 2004; Leggitt & Lang, in press), and they present even greater ambiguity. Flawed codes would not block the creation of an effective automated system, but the system could achieve the greatest security and efficiency through reliable codes. If reliable summary codes are unavailable, an ADS system would have to focus on raw data.

The ADS system will require machine-readable data from the investigation provider. Ideally, all elements of the investigative report would be transmitted electronically from the provider in a delimited format that can be read by a computer system. Also, summary codes should detail the adjudicative relevance of identified issues, and provide information on previously adjudicated matters (Kramer, Crawford, & Richmond, 2004; Richmond & Timm, 2004; Leggitt & Lang, in press). The minimum requirement for an ADS system is that report information be amenable to electronic parsing, search, and extraction. This requirement is likely to be achievable given that most standard NACLC leads are automated and personnel security questionnaire information is stored as delimited data in e-QIP. At some point, the DISS may provide all NACLC data, except for field lead information, via e-QIP and ACES record checks.

The methods and findings reported here are intended to provide a point of departure for additional research to validate and optimize decision rules and approval estimates for different types of investigations. Another step in ADS research will be to evaluate decision rules for SSBIs. The present research provides a foundation upon which to build an ADS model for SSBIs. The leads conducted in NACLC investigations also are present in SSBIs, but SSBIs contain additional leads that must be evaluated by the system. The foremost challenge is to further develop

methods for evaluating unstructured text from field leads. The present study used a keyword search to examine general remarks from the personnel security questionnaire. This served the purpose of the present study, but SSBIs contain much more unstructured text from subject and reference interviews than do NACLC investigations. Procedures for evaluating this information must be further developed and tested. In addition, adjudication experts and other personnel security stakeholders should provide feedback on ADS screening criteria and procedures.

RECOMMENDATIONS

- Convene a working group of all stakeholders (senior central adjudication facilities, counterintelligence, and security managers) to review the preliminary decision rules and automated approval estimates from this study.
- Work with investigation providers to obtain delimited, machine-readable input for the ADS system.
- Extend and test ADS decision rules to accommodate Single Scope Background Investigations and periodic reinvestigations.
- Specify the data sources and processing sequence of ADS as a component of the DISS.

CONCLUSION

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APPENDIX A

PRELIMINARY ANALYSIS OF UNSTRUCTURED TEXT IN EPSQ GENERAL REMARKS

PRELIMINARY ANALYSIS OF UNSTRUCTURED TEXT IN EPSQ GENERAL REMARKS

The purpose of the Adjudication Decision Support (ADS) system is to detect adverse information of security concern in completed personnel security investigations, and to determine which cases are eligible for automated approval of clearance eligibility. The ADS system will be designed to exclude from automatic approval cases that contain significant adverse information, and refer them for adjudication. While NACLC investigations, which were the focus of this study, consist primarily of tightly organized data, they also contain unstructured text from remarks entered on the Electronic Personnel Security Questionnaire (EPSQ).[4] Moreover, adverse information sometimes appears only in EPSQ remarks. So, the ADS system must be able to reliably detect such content.

The EPSQ includes at least 29 remarks fields for applicant explanations. The majority of EPSQ remarks provide an opportunity to explain affirmative responses to issue-relevant, filter items. In keeping with the risk-management approach of this study, most of the EPSQ remarks fields were determined to be relatively inconsequential because they were directly related to filter questions. The General Remarks field is an exception because it is not linked directly to any other item and may include a diverse range of content. As described in the body of this report, result codes for case expansion plus additional critical checks should have detected most relevant derogatory content. The EPSQ General Remarks field was included as a critical check in this research because it could contain unique information.

KEYWORD MATCHING

Unstructured text poses a special challenge to designing an ADS system because natural languages use complex rules that are difficult to address with computers. As an initial step, keyword matching was explored as a way to detect adverse content in unstructured text from EPSQ General Remarks. A keyword list was developed to include those words that primarily indicate the presence of adverse information, and to minimize the selection of innocuous material.

Keyword matching is one of the simplest methods for analyzing unstructured text. Essentially, a list of target words is generated, and then a computer program uses the list to find matching character strings in a body of text. The list of words can be optimized based on observed outcomes with test documents. Furthermore, the method is relatively transparent, so interested parties can easily see what was done. For these reasons, keyword matching was chosen as the initial approach to evaluating unstructured text in the ADS research program.

[4] The EPSQ is an electronic version of Standard Form 86. The EPSQ was being used by DoD security clearance applicants during the period these data were collected. DoD applicants currently are using e-QIP.

METHOD

PERSEREC developed a computer program, Keyword Search (KWS), to facilitate assessment of potential keywords for this study. KWS was used to search a database for specified character strings. The program then presented target detection rates per investigation and as independent character string elements. Initially, KWS was used to evaluate potential keywords against a development sample of CY03 NACLC investigations from the Defense Security Service Case Control Management System. A sample of 4,457 cases with a total of 13,105 remarks was examined. This sample included all EPSQ remarks fields, such as those pertaining to employment, education, and military service.

Potential keywords were found by inspecting remarks that previously were determined by one of the authors to contain issue-relevant content. Relevant terms were extracted from these fields. The criteria for establishing issue-relevance were based on the Adjudicative Guidelines for Determining Eligibility for Access to Classified Information, training in adjudication from the Defense Security Service Academy (DSSA), and prior PERSEREC research (Kramer, Crawford, & Richmond, 2005; Kramer, Crawford, & Bosshardt, 2005, Kramer; Crawford, Heuer, & Hagen, 2001). The keyword list used in this study also incorporated word lists previously generated by PERSEREC subject-matter experts for other related projects.

A final list of keywords resulted from several iterations of analysis using KWS. Keywords were tested to estimate their utility in detecting adverse information of security concern. All remarks in the development sample were read and categorized for issue-relevance according to previously discussed criteria. A preliminary list of keywords was reduced through an iterative process of scrutinizing the list for false alarms, including and excluding individual keywords, and running the analysis again. A false alarm was defined as a keyword found in a remark without issue relevance.

Two test samples of NACLC EPSQ General Remarks (hereafter referred to as Samples 1 and 2) were then used to evaluate the final keyword list. Only EPSQ General Remarks fields were used for this part of the keyword analysis. Sample 1 consisted of 7,954 cases with 995 remarks, and Sample 2 consisted of 8,171 cases with 1,003 remarks. The body of this report contains additional information about the investigations in Sample 2. KWS was utilized to perform this evaluation. The program provided frequencies of hits, misses, false alarms, and correct rejections to assess the utility of keywords for identifying issue-relevant remarks.

RESULTS

Analysis of keywords using the development sample resulted in a final list of 442 words (see Appendix C). This list was further evaluated by searching General Remarks from Samples 1 and 2. Based on analysis by KWS, the issue-relevant hit rate was 35% in both samples, and the correct rejection rate was 56% and 57% for Samples 1 and 2 respectively, resulting in a correct identification rate of 91% for Sample 1, and 92% for Sample 2. False alarms ranged from 5% to 7%, and 2% to 3% of issue-relevant remarks in the two samples were missed. The percentages of incorrectly identified remarks were 9% and 8% in Samples 1 and 2 respectively (see Table A-1).

Table A-1
Results of General Remarks Keyword Analysis

Sample 1 (n=995)			*Sample 2 (n=1003)*		
KWS Analysis	*Frequency*	*Percent*	*KWS Analysis*	*Frequency*	*Percent*
Hits	354	35	Hits	354	35
Correct Rejections	553	56	Correct Rejections	564	57
Total Correctly Identified	**907**	**91**	**Total Correctly Identified**	**918**	**92**
False Alarms	73	07	False Alarms	49	05
Misses	15	02	Misses	36	03
Total Incorrectly Identified	**88**	**09**	**Total Incorrectly Identified**	**85**	**08**

Issue-relevant remarks that were not detected by the keyword search (i.e., misses) were read and categorized by adjudicative guideline. As can be seen in Table A-1, there were 15 (2%) misses in Sample 1 and 36 (3%) misses in Sample 2. Most of the missed content fell within the Foreign Influence guideline. Adverse information pertaining to foreign influence proved difficult to detect in these cases because words such as “family,” “spouse,” and “mother,” which may identify relatives living outside the United States or registered aliens within the United States also tend to inflate the false alarm rate. Nevertheless, cases with missed remarks could have been detected as a result of one or more other critical checks. In Sample 1, 8 (53%) of the cases with missed issue-relevant General Remarks were flagged by other critical checks. Likewise, in Sample 2, 27 (75%) of the keyword misses were caught by other checks.

Keywords with at least 5% hits in each sample are displayed in Table A-2. As can be seen in the table, these words had very similar hit rates in both samples. For example, the word “paid” had a hit rate of 38.69% and 37.04% in Samples 1 and 2, respectively. About half of the keywords in Table A-2 relate to financial issues such as bankruptcy, credit problems, and delinquent accounts. The other half relate to misdemeanor criminal issues such as speeding tickets, payment of fines, and other offenses. Marijuana use, in most cases, was self-reported by subjects as experimental, and did not involve criminal charges or proceedings.

Table A-2
Comparison of Keyword Hits between Test Samples

Sample 1			*Sample 2*		
Keyword	*Issue-Relevant Hits*	*Issue-Relevant Hit Rate (%)*	*Keyword*	*Issue-Relevant Hits*	*Issue-Relevant Hit Rate (%)*
paid	146	39.57	paid	149	38.21
$	136	36.86	$	144	36.92
fine	126	34.15	fine	129	33.08
speed	108	29.27	speed	107	27.44
ticket	67	18.16	ticket	78	20.00
police	60	16.26	court	67	17.18
court	49	13.28	police	57	14.62
pay	40	10.84	pay	44	11.28
credit	40	10.84	speeding ticket	38	9.74
speeding ticket	31	8.40	credit	32	8.21
fail	31	8.40	fail	32	8.21
marijuana	29	7.86	debt	27	6.92
debt	27	7.32	marijuana	22	5.64
offense	22	5.96	dismiss	22	5.64

CONCLUSION

Unstructured text in EPSQ general remarks was examined as a safeguard in the overall risk-management model of this study. Specifically, keyword matching was used as a critical check and to begin to estimate the unique impact of unstructured text on automated approval rates in an ADS system. More sophisticated text analysis would be used to reduce errors in a deployed system, but overall automated approval rates are unlikely to be greatly affected.

The present keyword list was primarily generated through the analysis of actual text in NACLC investigations. It is, therefore, tuned to detect the most frequently occurring adverse information rather than all possible derogatory content in EPSQ remarks. Infrequent topics, by their nature, may have only a negligible impact on error and approval rates, but may be important to include in ADS keyword lists. The criteria for keyword inclusion must be discussed with personnel security stakeholders.

Future ADS research will address Single Scope Background Investigations (SSBI). SSBIs include far more unstructured text than NACLC investigations and call for a more comprehensive approach to text analysis. The ADS program will use the present findings as a foundation for future research. This effort may include established keyword lists and appropriate commercial text analytic software.

REFERENCES

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APPENDIX B

EXAMPLES OF ADVERSE CONTENT IN ADS ELIGIBLE CASES WITH AND WITHOUT ISSUES DOCUMENTED IN JPAS

EXAMPLES OF ADVERSE CONTENT IN ADS ELIGIBLE CASES WITH AND WITHOUT ISSUES DOCUMENTED IN JPAS

The Adjudication Decision Support (ADS) research program is developing rules for automated screening of security clearance applications. Completed personnel security investigations with limited adverse content will be approved by the ADS system, while cases with more substantial concerns will be automatically referred for external adjudication. In the present study, preliminary decision rules were proposed and tested. This appendix illustrates the adverse content of cases that were considered eligible for automated approval based on the proposed rules, but that had documented issues in the Joint Personnel Adjudication System (JPAS). A small sample of cases that were considered eligible and did not have documented issues in JPAS also are provided for comparison.

The adverse information contained in this appendix was abstracted from the Defense Security Service Case Control Management System and reviewed by the researchers. In addition, two personnel security experts were employed to review the abstracted information and to indicate for each case whether or not a potential security concern was present. The examples below represent cases in which the experts agreed about the presence or absence of relevant concerns.

The following examples provide a basis for discussing the acceptability of the decision rules used in this study, as well as the utility of issue categories documented in JPAS for this type of research. Some of the examples are at the boundaries of rule criteria, or may indicate weaknesses that require revision. Conversely, this level of adverse content may be acceptable in a risk-management framework. Comprehensive stakeholder feedback will be required as the ADS research program moves forward.

EXAMPLES OF ADVERSE CONTENT FROM 360 ADS ELIGIBLE CASES WITH ISSUES DOCUMENTED IN JPAS

THE FOLLOWING EXAMPLES CLEARLY CONTAIN ADVERSE INFORMATION OF SECURITY CONCERN ACCORDING TO TWO PERSONNEL SECURITY EXPERTS EMPLOYED FOR THIS STUDY

Case 4

- Previous credit history: three 30 day late, one 60 day late, one 90 day late payments
- Business travel: 20 between 1996 and 2003, including China, United Arab Emirates, etc. (not fully itemized)

Case 18

- Pending court case: Operating vehicle under the influence

Case 22

- Father naturalized citizen (1967)
- Business and pleasure travel: 18 trips, including China, Hong Kong, Japan, and several European countries

Case 24

- Previous credit history: one 60 day past due
- Citation: Speeding ticket (2000)
- Arrest: Disturbing the peace, September 1998, dismissed October 1998

Case 31

- Credit report: Past due balance $77
- Previous credit history: two 30 day, one 90 day, two 120 day, and one bad debt
- One deceased parent born in Germany

Case 32

- Parents born in Jamaica (documentation unclear)
- Delayed entry program – access suspended

Case 49

- Subject, parents, and siblings naturalized citizens from the Philippines (1988-1994). Spouse dual citizen US/Philippines. Subject is divorced from a Philippine citizen, alien registration number provided.
- Previous credit history: one 30 day late payment

Case 78

- Business travel: Hong Kong and Singapore for 1 and 2 months
- Citation: License suspended for failure to appear (1984), license reinstated (1984)
- Citation: License held in abeyance (1985) pending driver improvement plan – plan completed (1985)

Case 80

- Citation: Inattentive driving (2000) - $25 fine
- Citation: Following too closely (2001) - $25 fine
- Citation: Disregarding traffic control device (2002) - $25 fine
- Selective service: Registration number unrecalled

Case 87

- Arrest: Underage drinking (1999), misdemeanor, $67 fine and $67 court costs

Case 96

- Previous credit history: four 30 day late payments
- Arrest: Shoplifting (1998), misdemeanor – dismissed (2000)
- Arrest: Breaking and entering (1999) – dismissed
- Citation: Speeding and reckless driving (2001) – guilty of lesser charge, $10 fine and $90 court costs

Case 97

- Father born in Mexico, no citizenship information, only knows date of birth (Subject born in US)

Case 99

- Citation: Speeding (2001) - $115 fine
- Citation: Fishing without a license, pled guilty, prayer for judgment, paid $86 court costs
- Arrest: Possession of marijuana (2001), misdemeanor – dismissed

Case 109

- Collection/charge off $271
- Previous credit history: two 30 day late payments, one bad debt
- Nonmortgage balance: approximately $54,000

Case 110

- Previous credit history: two 30, one 60, one 90, one 120 day late payment, and one bad debt

- Collection/charge off for $2,012

THE FOLLOWING EXAMPLES DO NOT CLEARLY CONTAIN ADVERSE INFORMATION OF SECURITY CONCERN ACCORDING TO TWO PERSONNEL SECURITY EXPERTS EMPLOYED FOR THIS STUDY

Case 2

- Credit: Consumer counseling
- Credit report: one 30 day past due
- Nonmortgage credit balance approximately $51,000
- Previous credit history: one 30 day past due

Case 3

- Citation: Failure to report an accident in the quickest way possible (Class E misdemeanor) by waiting until the following day – fine $100 (2002). Plead guilty and paid $124 (2002).

Case 5

- Counseling: Marital, family, or grief

Case 6

- Previous credit history: one 60 day past due

Case 8

- Credit report: two 30 day late payments ($40)
- Previous credit history: two 30 day late payments

Case 16

- Infraction: Failure to obey a traffic light (2002) – charge was nolled (2002) and records automatically erased

Case 26

- Citation: Speeding and improper passing (2002) – dismissed
- Credit report: one 30 day past due ($158)
- Previous credit history: one 30 day past due
- Citation: No operator's license, charge pending with upcoming trial

Case 27

- Citizenship status unknown for one parent
- Pleasure travel: 3 day trip to Dominican Republic (2002)

Case 33

- Citation: Lesser charge of speeding (2002) – fine $25, court costs $90

Case 35

- Credit status: Debt consolidation, $231,000 mortgage, 21 open credit accounts
- Previous credit history: one 30 day late payment

Case 92

- Citation: Speeding (2001) – fine $30, court costs $90
- Citation: Speeding and failure to wear seatbelt (2001) – fine $25, court costs $90
- Citation: Failure to stop at stop sign (2000) – prayer for judgment, $90 court costs
- Citation: Expired registration – fine $25, $86 court costs
- Previous credit history: three 30 and 1 60 day late payments

Case 154

- Parent born in the United Kingdom, naturalized (1974), naturalization number provided

Case 230

- Credit report: one 30 day late payment for $29
- Previous credit history: one 30 and two 60 day late payments
- Employment travel: Ongoing travel as a flight attendant (2001-2003), including Europe, Canada, and Bermuda

Case 264

- Previous credit history: one 30 day late payment

Case 276

- Credit report: $47 past due
- Credit status: 22 open accounts
- Previous credit history: eleven 30, three 60, one 90, and one 120 day late payments

EXAMPLES OF ADVERSE CONTENT FROM 114 ADS-ELIGIBLE CASES WITH NO ISSUES DOCUMENTED IN JPAS

THE FOLLOWING EXAMPLES CLEARLY CONTAIN ADVERSE INFORMATION OF SECURITY CONCERN ACCORDING TO TWO PERSONNEL SECURITY EXPERTS EMPLOYED FOR THIS STUDY

Case 398

- Business travel: One week trip to Israel (1998)

Case 405

- Credit report: $668 past due
- Collections/charge offs for $12,007 related to medical care

Case 408

- Business travel: Nonitemized ongoing travel to South Korea – seemingly defense employment
- Previous credit history: one 30 and one 90 day past due payments
- Summary offense: Criminal mischief for lighting pizza box and throwing into dumpster to ignite contents (1995). Offense not listed on security forms (2002), pled guilty – fine $100, court costs $72

Case 414

- Attended school in Israel (1998-2000)
- Parent-in-law born in Germany and has dual citizenship (U.S./Israel)
- Parent-in-law born in Belgium (deceased)
- Previous credit history: four 30 and one 60 day late payments

Case 423

- Parent-in-law born in Italy, said to be U.S. citizen but no documentation provided
- Spouse-like relationship with naturalized U.S. citizen
- Counseling: Marital, family, or grief
- Credit status: Mortgage $220,000, 32 open credit accounts
- Citation: Speeding (2002) – fine $115.25

Case 427

- Relationship Otherwise Known with a Canadian citizen living in Canada
- Foreign travel: Pleasure trip to Canada for one month (Dec. 2002 - Jan. 2003)

Case 429

- Spouse naturalized citizen from the Philippines
- Parents-in-law Philippine citizens (one deceased)

Case 442

- Father and half-brother were born in, are citizens of, and live in Mexico.
- Sibling is dual citizen U.S./UK, lives in UK
- Pleasure trip to Mexico (2001) – 1 week
- Pleasure trip to UK (1998) – 1 week
- Credit status: 24 open accounts

Case 447

- Business travel: Six trips to Germany, France, UK and Canada (2000 – 2002), each less than 1 week
- Credit status: 21 open accounts

Case 459

- Child born abroad of U.S. parents
- Parent-in-law born in Hungary, said to be U.S. citizen but no documentation

THE FOLLOWING EXAMPLES DO NOT CLEARLY CONTAIN ADVERSE INFORMATION OF SECURITY CONCERN ACCORDING TO TWO PERSONNEL SECURITY EXPERTS EMPLOYED FOR THIS STUDY

Case 392

- Previous credit history: one 30 and one 60 day late payment

Case 397

- Employment Travel: Flew as a pilot to the Bahamas and Canada (1999 – 2003)

Case 403

- Both parents and one sibling naturalized citizens (1985), one sibling naturalized (1977)

Case 410

- Born abroad of U.S. parents, no certificate number entered
- Credit report: Past due 30 days - $104
- Credit status: Nonmortgage debt - $80,000
- Credit report: Consumer counseling
- Previous credit history: two 30, two 60, and two 90 day late payments

Case 420

- Born in German of U.S. parents (1984), documented
- Pleasure travel: Trip to Germany (2000) – 10 days

Case 422

- Credit Report: Debt consolidation, consumer counseling
- Previous credit history: five 30 and one 90 day late payments

Case 426

- Business travel: Nonitemized travel to the Bahamas (1995-1999) during military service in Florida
- Credit status: 21 open accounts

Case 435

- Credit status: 21 open accounts
- Citation: Disobeying a traffic signal (1998) – fine, fee unknown
- Citation: Disobeying a traffic signal (2000) – fine, fee unknown
- Citation: No proof of insurance (2002) – fine, fee unknown

Case 463

- Family records: No address for parents or sibling (living)
- Credit report: two accounts 30 days past due for $160
- Previous credit history: four 30, one 60, and one 90 day late payments

Case 472

- Mother (deceased) born in Cuba, said to be U.S. citizen but no documentation provided
- Father naturalized citizen from Cuba, citizenship number provided but no date
- Stepmother naturalized citizen from Costa Rica, citizenship number provided but no date

APPENDIX C

LIST OF 442 KEYWORDS USED IN FINAL ANALYSIS

Table C-1
List of 442 Keywords Used In Final Analysis

Keyword	Usage	Keyword	Usage	Keyword	Usage
$	FAC	aryan	WAC	chapter 13	WAC
absentee	FAC	assailant	WAC	chapter 7	WAC
abus	FAC	assault	WAC	charge	WAC
accident	FAC	asylum	WAC	charges dropped	WAC
accomplice	WAC	attorney	WAC	chat room	FAC
account	FAC	authenticat	FAC	child custody	WAC
accus	FAC	avenge	FAC	child endangerment	WAC
addict	FAC	B&E	WAC	Child enforcement	WAC
adjournment	WAC	bad	WAC	child support	WAC
adjudicat	FAC	bail	WAC	chronic	WAC
advers	FAC	balance	WAC	civil case	WAC
advis	WAC	bankrup	FAC	civil conviction	WAC
affluence	WAC	barbituate	WAC	claim	WAC
aggravat	FAC	battery	WAC	cocaine	WAC
alcohol	FAC	behavior	WAC	collection	WAC
alcohol awareness	WAC	bench	WAC	community service	WAC
alcohol problem	WAC	beyat	WAC	computer download	WAC
alcoholics anonymous	WAC	bigamy	WAC	computer virus	WAC
alien	WAC	bigot	WAC	conceal	FAC
allegation	FAC	bipolar	WAC	condition	FAC
al-q	FAC	blood	WAC	confederate	WAC
altercation	WAC	blow up	WAC	conflict	WAC
amount	WAC	bomb	WAC	confront	FAC
amphetamine	FAC	bouncer	WAC	contempt of court	WAC
anarch	FAC	brag	WAC	convict	FAC
anger	WAC	brainwash	WAC	counseling	WAC
Anger Management Class	WAC	breach	WAC	count	WAC
anxiety	FAC	breath	FAC	county court	WAC
anxiety attack	WAC	brib	FAC	court	WAC
apathy	WAC	bruise	WAC	court date	WAC
apology	WAC	burglary	WAC	court enforcement	WAC
appeal	WAC	burn	WAC	court ordered	WAC
arab	FAC	buttocks	WAC	CPU21	WAC
arbitrat	FAC	cannibis	WAC	credit	FAC
arbitration	WAC	careless	WAC	credit card	WAC
argu	FAC	carnal	WAC	crim	FAC
argument	WAC	case	WAC	cruelty	WAC
armageddon	WAC	caught	WAC	cultural attache	WAC
arraign	FAC	CDS	WAC	curfew	WAC
arrearage	WAC	certificate of disposition	WAC	cyber	WAC
arrest	FAC	certificate of relief	WAC	damage	FAC
arson	WAC	chapter	WAC	date incurred	WAC
Article 15	WAC	chapter 11	WAC	david koresh	WAC

Keyword	Usage	Keyword	Usage	Keyword	Usage
debt	FAC	ethic	FAC	homocide	WAC
debt collection	WAC	expatriat	FAC	hurt	FAC
debt satisfied	WAC	experiment	FAC	illegal	WAC
debtor discharge	WAC	expir	FAC	immigrat	FAC
defense attache's office	WAC	explosive	FAC	Impair	FAC
defense force	WAC	export	FAC	imprison	FAC
defensive driver	FAC	expulsion	WAC	incarcerat	FAC
delinq	FAC	expunge	FAC	incest	WAC
deni	FAC	extort	FAC	incident	WAC
deny	WAC	extramar	FAC	infidel	FAC
depress	FAC	fail	FAC	insomnia	FAC
derelict	FAC	fals	FAC	insubordina	FAC
derog	FAC	fanatic	WAC	internal	WAC
desertion	WAC	fbi	WAC	interven	WAC
diplomat	FAC	fee	FAC	intoxicat	FAC
disagree	FAC	felony	WAC	irate	WAC
disaster management	WAC	final disposition	WAC	irreconcil	FAC
discharge	FAC	financ	FAC	IRS	WAC
dishonor	FAC	fine	FAC	islam	FAC
disloyal	FAC	fire	FAC	jail	FAC
dismiss	FAC	firearm	FAC	jeopardy	WAC
disorder	WAC	FMLN	WAC	jew	FAC
dispos	FAC	fond	FAC	jihad	WAC
distrust	FAC	foolish	FAC	joint custody	WAC
disturb	FAC	foreclos	FAC	judg	FAC
divorce settle	FAC	foreign business	WAC	juvenile	WAC
dmv	WAC	forge	FAC	ketamine	WAC
docket	WAC	FOUO	WAC	kill	WAC
doctor	WAC	fugutive	WAC	KKK	WAC
domestic	WAC	gambl	FAC	knife	WAC
donat	FAC	gang	WAC	LAPD	WAC
drink	FAC	garnish	FAC	larceny	WAC
dropped	WAC	gram	WAC	late	WAC
drug	FAC	guilt	FAC	licens	FAC
drunk	FAC	gun	WAC	lied	WAC
dual	WAC	had it coming	WAC	lien	WAC
dui	WAC	halcion	WAC	liquor	WAC
dwi	WAC	Hamas	WAC	lithium	WAC
ecstacy	WAC	hangover	WAC	loan	FAC
embezzl	FAC	harass	FAC	machette	WAC
emigrat	FAC	health care provider	WAC	madd	WAC
emotion	WAC	heathen	FAC	mafia	WAC
episode	WAC	Hezb	FAC	magistrate	WAC
espionage	WAC	hit	WAC	manifesto	WAC
estate	WAC	hitler	WAC	marijuana	WAC
estimated value	WAC	home country	WAC	martial	WAC

Keyword	Usage	Keyword	Usage	Keyword	Usage
mecca	WAC	pay	FAC	reposses	FAC
mental	WAC	percocet	WAC	reprimand	FAC
mercenar	FAC	personality conflict	WAC	resignation	WAC
meth	FAC	picked-up	WAC	restrict	FAC
methamphetamine	FAC	pilgrim	FAC	retaliat	FAC
militan	FAC	pimp	FAC	revok	FAC
minor	WAC	plaintiff	WAC	revolver	WAC
MIP	WAC	polic	FAC	riot	FAC
misappropriate	FMC	polygamy	WAC	ritalin	WAC
misconduct	WAC	porn	FAC	Rommel	WAC
molest	FAC	porn site	FAC	sabotage	FAC
money	WAC	positive	WAC	satis	FAC
mortgage	FAC	possess	FAC	satop	WAC
mosque	WAC	precinct	FAC	SCIF	WAC
motion	FAC	prescrib	FAC	SDS	WAC
motor	WAC	prescription	WAC	seat belt	WAC
mph	WAC	prison	FAC	seatbelt	FAC
MPS	WAC	probat	FAC	second amendment	WAC
MSA	WAC	promis	FAC	sedition	WAC
MTA	WAC	proof	WAC	segregat	FAC
murder	FAC	property	WAC	semitic	WAC
mushroom	FAC	proprietor	WAC	Serzone	WAC
muslim	WAC	prostitut	FAC	settle	FAC
n.j.s	WAC	protest	FAC	sex	FAC
narcotic	FAC	prozac	WAC	sheriff	FAC
nasdaq	WAC	psych	FAC	shoot	FAC
nazi	FAC	punch	FAC	shoplift	FAC
new world order	WAC	punish	FAC	side effects	WAC
nigger	FAC	purge	FAC	situation	WAC
NLETS	WAC	pursuit	WAC	skinhead	WAC
no contest	WAC	racial	WAC	small claims	WAC
nolo	WAC	rap sheet	WAC	sodomy	WAC
non-us citizen	WAC	rape	FAC	speed	FAC
not a citizen	WAC	real estate	WAC	speeding ticket	WAC
null process	WAC	reckless	WAC	ssn	WAC
nystatin	WAC	recognizance	WAC	stalk	FAC
obscene	WAC	red badge	WAC	steal	FAC
obsess	FAC	red light	WAC	stole	FAC
offens	FAC	reduc	FAC	stress	FAC
ounce	WAC	re-entry	WAC	substance	WAC
oxycodone	WAC	refugee	WAC	subversive	WAC
paid	WAC	regulat	FAC	suit	WAC
palimony	WAC	rehab	FAC	supremacy	WAC
pander	FAC	rehir	FAC	suspect	FAC
parol	FAC	remission	WAC	suspicion	WAC
paxil	WAC	renounc	FAC	swastika	FAC

APPENDIX C

Keyword	Usage	Keyword	Usage	Keyword	Usage
symptom	FAC	turner diaries	WAC	violen	FAC
tax	FAC	u.s.c	WAC	visa	FAC
the n word	WAC	uif	WAC	waiver	WAC
theft	WAC	ultra conservative	WAC	warn	FAC
therap	FAC	undesir	FAC	warrant	FAC
threat	FAC	unfavorable	WAC	wellbutrin	WAC
ticket	FAC	unlisted	WAC	witness	FAC
time share	WAC	urinalysis	WAC	worthless	WAC
treason	WAC	USBC	WAC	worthless check	WAC
treasury	WAC	vagran	FAC	zoloft	WAC
trial	WAC	vehicle	WAC	Zyprexa	WAC
tried mar	FAC	verdict	WAC		
troubl	FAC	violat	FAC		

Note. FAC = Fragment Any Case, WAC = Word Any Case.