Report on Review of Payroll at the Vermont Department of Public Safety

Respectfully Submitted by

StoneTurn Group LLP

Office of the Vermont State Auditor

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Executive Summary

In July 2012, Vermont Governor Peter Shumlin announced an investigation into allegations that a Vermont State Trooper, referred hereafter as "Trooper A", had fraudulently claimed large amounts of overtime pay for hours not actually worked. Governor Shumlin requested the State Auditor's Office conduct a review of payroll transactions, processes and procedures relating to the reporting of overtime at the Department of Public Safety ("DPS"). The Vermont State Auditor's Office ("SAO") engaged StoneTurn Group LLP ("StoneTurn"), an independent forensic accounting firm, to assist to (1) develop a work plan; (2) team with SAO staff to assess existing processes and controls intended to mitigate fraud, abuse and waste relating to DPS overtime pay; and (3) design and execute forensic data analytics covering the period January 1, 2010 through September 30, 2012 to identify indicators of possible fraudulent, abusive or wasteful activities. These factual analyses do not constitute opinions or judgments regarding whether fraud or other misconduct by any group or individual occurred, nor are they an audit conducted in accordance with generally accepted auditing standards. Additionally, StoneTurn has not been engaged to investigate potential civil or criminal violations and we offer no opinion on such matters.

This report describes the work performed and the corresponding results. The report begins with a summary of significant findings and recommendations relating to the controls review and forensic data analytics. It follows with a more detailed discussion of the background, scope of services, procedures, results and recommendations.

Department of Public Safety Overtime Processes and Controls

The review of processes and controls at DPS revealed vulnerabilities to fraud, abuse and waste across the process of approving, reporting, processing and monitoring overtime. The State is planning in the near future to implement a new payroll reporting system. The new system is likely to address certain vulnerabilities identified by this review. We recommend that SAO and/or DPS conduct a review of the new system after it has been fully implemented to ensure that it is designed and operating effectively to mitigate fraud, abuse and waste vulnerabilities. Following are our observations and recommendations regarding processes likely to remain intact after the new systems are implemented.

Table 1 – Summary of Observations and Recommendations for DPS Payroll Processing

Overtime Process	Observations	Recommendations
Supervisor approval of expected and unexpected overtime.	• DPS policy of permitting troopers to "self-activate" to on-duty status without prior approval is inherently vulnerable to abuse. • Third party contracts, e.g. local town patrols, Federal grants and	• Implement recurring, standard and detailed reports / analyses as a monitoring control of overtime. • Implement threshold criteria to limit overtime amounts for individual projects and require rotation of individuals charging projects.

Table 1 – Summary of Observations and Recommendations for DPS Payroll Processing		
Overtime Process	**Observations**	**Recommendations**
	utility company homeland security services are inherently vulnerable to abuse. • Vulnerabilities in the advanced approval process could subject DPS to overtime amounts that are excessive or unnecessary. • Expected overtime for specific projects is not managed for optimal efficiency.	• Consider periodic independent party review to validate that overtime is or was required.
DPS employee completion of time reports.	• Manual nature of time reports and complexity in time coding leaves opportunity for errors or intentional misreporting.	• Formalize and circulate time keeping instructions to DPS employees. • Implement formal time keeping training. • Embed automated controls into new time reporting system.
Supervisor approval of time reports.	• Anecdotal evidence indicates that supervisors provide "rubber stamp" approval of time reports and perform inadequate review.	• Prohibit template electronic signatures. • Require supervisors to conduct periodic detailed overviews of overtime incurred by direct reports. • Periodically audit individual payroll reports, including of overtime activity, on both a random and judgmental basis. • Hold supervisors accountable for errors in time reports.
Supervisor submission of time sheets to DPS Payroll at DPS Headquarters.	• There is risk that an employee or another individual modifies time reports between supervisor approval and submission to DPS Payroll. • Absence of formal chain of custody process and documents heightens risk and hinders detection of errors.	• Implement a structured and documented chain of custody for submission of time reports. • Include in new time reporting system historical logs of time stamped approvals for time keeping entries.
DPS review and processing of payroll.	• The payroll process is subject to human error or manipulation because payroll review and processing are largely manual and heavily reliant upon a small number of key individuals. • DPS current payroll system data validation checks are largely undocumented.	• Embed controls into new reporting system to prevent and detect entry of ineligible overtime. • Include authorization levels in new time reporting system for payroll adjustments and related atypical payroll entries. • Enhance documentation of payroll system rules, controls and processes.
DPS Headquarters monitoring and oversight of employee overtime.	• DPS Commanding Officers and payroll personnel perform high-level review of overtime with a focus on budget, rather than detecting fraud, abuse and waste. • DPS employees not aware or concerned that they are being monitored or that overtime abuse will be detected.	• Specifically include fraud, abuse and waste as an objective of DPS Commanding Officers and payroll personnel periodic overviews. • Schedule review of overtime and finance activity at regular and surprise intervals and incorporate forensic data analytics to identify potential anomalies. • Share results and obtain sign off from supervisors of reviewed employees.

Forensic Data Analytics

Forensic data analytics involves the design and execution of custom queries, algorithms and analyses of data to identify possible indicators of fraud, abuse or waste. The fact that an individual is flagged in a particular data test does not, in and of itself, prove any impropriety. Rather, test results might indicate the need for investigation by law enforcement personnel.[1] Our factual analyses do not constitute opinions or judgments regarding fraud or other misconduct by any group or individual.

We developed and executed forensic analytics that collected and assimilated data from disparate sources of Vermont government data, including payroll data from the Human Capital Management system and DPS / Vermont State Police "Spillman System", the primary communications and database tool used by State law enforcement and emergency response personnel. The table below summarizes test objectives and select results.

Table 2 – Summary of Forensic Data Analytic Tests, Objectives and Select Results

Test	Objective	Result
Benchmarking by Title and Department[2]	Obtain baseline by earnings code, department, title and individual to determine average levels of overtime by department and title for comparison to each individual.	167 individuals at DPS flagged in one or more benchmarking tests for having above average overtime compared to peer groups.
Trending Analysis by Pay Period	Consider whether decrease of overtime after investigation became public indicates change in overtime patterns.	172 individuals flagged in overtime trending analysis.
Consecutive Periods with Overtime	Consider consecutive number of periods with overtime in a row by individual.	37 flagged in consecutive overtime analysis.
Overtime Activity by Project Code	Consider whether project codes indicate unusual activity, e.g., disproportionate trends of law enforcement services under contract with towns lacking a stand-alone police force.	15 individuals flagged in project code analysis.
Recurring Overtime Amounts	Consider whether data indicates certain troopers routinely charged the same amount of overtime.	82 individuals flagged in recurring overtime analysis.

[1] StoneTurn will provide DPS with all forensic analyses described herein simultaneous to the issuance of this report for DPS to perform additional procedures, if any, it deems appropriate.

[2] For purposes of our report and accompanying analyses, the term "department" corresponds with the field in the payroll data provided by the State "HR_DEPTID_VT". This field typically identifies the DPS division, subdivision and location for each individual.

Table 2 – Summary of Forensic Data Analytic Tests, Objectives and Select Results		
Test	**Objective**	**Result**
Miscellaneous Payroll Activity	Consider standard fraud, waste and abuse anomaly tests, e.g., address matches, round dollar transactions.	No significant findings.
Risk Scoring	Aggregate results of each data test to derive a total risk score for each DPS individual.	Risk scores across DPS personnel ranged from 0 to a high of 10. One individual (Trooper A) scored 10, followed by one with a score of 8, one with a score of 7, eight with a score of 6, ten with a score of 5, and the remaining with scores of 4 or less. The vast majority of DPS employees (85%) had risk scores of 1 or 0.
Compare Payroll Data to Spillman Data	Use law enforcement radio log data to test the validity of the time reported in the payroll system for certain individuals.	Comparison of Spillman data to payroll data of 16 upper-tier risk-score individuals confirmed information reported in time records with one exception. Results for one individual (Trooper A) indicated hours reported were not fully supported by Spillman data. We recommend that the DPS and other state agencies consider implementing similar forensic data analytics as a preventive and detective tool.

Virtually all of our testing procedures flagged Trooper A for anomalous activity and resulted in Trooper A having, by a notable margin, the highest risk score of all DPS employees. We designed our forensic analytics neither to support the criminal investigation nor identify specific instances of misconduct by Trooper A. Nonetheless, Trooper A topped the list of employees flagged with data anomalies. These results validate the procedures performed and, more importantly, demonstrate the importance and usefulness of data analytics to detect overtime and, potentially, other government fraud, waste and abuse. We recommend that the DPS and other state agencies consider implementing similar forensic data analytics as a preventive and detective tool.

Discussion

1.0 Introduction

In early July 2012, Vermont Governor Peter Shumlin disclosed an investigation into a Vermont State Trooper, who was alleged to have claimed excess and fraudulent overtime. The investigation began as a result of another trooper reporting suspicious billing to superiors after he noticed that a fellow trooper had billed for hours not worked.[3]

In response to these allegations, Governor Shumlin requested the Vermont SAO perform a review of payroll transactions, processes and procedures for DPS, with a particular focus on reporting of overtime. SAO engaged StoneTurn to assist the review.

StoneTurn is an independent consulting firm that provides specialized financial, economic, and accounting analyses to various clients in forensic accounting, complex litigation, data analytics, forensic technology and intellectual property matters. The firm consists of practitioners with a wide range of experience in forensic accounting investigations, evaluation of internal controls, regulatory matters and complex business disputes.

2.0 Background on the Department of Public Safety

The DPS website describes the purpose of DPS as "to promote the detection and prevention of crime, to participate in searches for lost and missing persons, and to assist in cases of state wide or local disasters or emergencies." DPS is organized into four primary divisions, the Vermont State Police ("VSP"), Vermont Emergency Management ("VEM"), Criminal Justice Services ("CJS"), and Fire Safety.[4]

The VSP is the primary law enforcement agency serving approximately 200 towns, 90% of the land mass and 50% of the population of the State of Vermont, in addition to supporting local, county and federal partners. The Vermont State Police consists of 327 sworn members, approximately 90 emergency communication dispatchers and civilian support staff, whose mission is to serve and protect by providing the highest quality law enforcement services.[5]

[3] http://vtdigger.org/2012/07/10/vermont-state-police-sergeant-committed-time-sheet-fraud-shumlin-says/
[4] http://www.dps.vermont.gov/aboutus
[5] http://vsp.vermont.gov/about_us

3.0 Scope of Services

The SAO engaged StoneTurn to develop a work plan and, in conjunction with SAO staff, conduct a forensic review of overtime pay practices of DPS.[6] The State requested that these procedures include:

- Review of internal controls intended to prevent fraud, abuse and waste relative to how DPS overtime is processed, approved, managed and controlled, and;

- Analytic and transaction testing of the available data and records to search for indicators of possible fraud, abuse, or waste, including anomalous overtime activity and other unusual activity. The payroll transaction testing covered the period from January 1, 2010 through September 30, 2012.

StoneTurn performed its work in accordance with the terms of the agreement with the State and with the Standards for Consulting Services of the American Institute of Certified Public Accountants. These procedures do not constitute an audit of the DPS or State financial statements or any other attestation service, including an attestation on the operating effectiveness of internal controls.

StoneTurn's findings are strictly limited to the procedures performed, documents analyzed and discussions held in the capacity of consultant to the State. StoneTurn reserves the right to modify this report should additional relevant facts or information become available to us.

The procedures performed as part of the forensic accounting review were executed by a combination of StoneTurn and/or SAO personnel and were based on data, documents and other information provided by the State. The procedures performed consisted of factual analyses of the information provided related to DPS payroll and the results described herein are observations or findings related to the underlying data and/or documentation considered. These factual analyses do not constitute opinions or judgments regarding, for example, whether fraud or other misconduct by any group or individual has, or might have, occurred.

We understand that additional follow-up procedures may be performed by the State at its discretion, including by law enforcement personnel. The State did not engage StoneTurn to assist with any subsequent evaluation of employee misconduct or investigation of potential civil or criminal violations and we offer no such opinion. StoneTurn will provide DPS with all forensic analyses simultaneous to the issuance of this report.

[6] Our engagement scope encompassed DPS as a whole; however, certain procedures were focused on VSP due to the nature of the data available.

4.0 Summary of Procedures Performed

StoneTurn, in conjunction with the SAO, performed various procedures, including, but not limited to: (1) periodic meetings and discussions with StoneTurn and SAO representatives; (2) interviews with DPS personnel; (3) interviews with Department of Human Resources ("DHR") personnel; (4) interviews with Department of Information & Innovation ("DII") personnel; (4) review of available documentation regarding payroll processing, data and internal controls; (5) observing certain information systems; (6) performing data analytics on payroll-related data sources; and (7) performing independent research.

5.0 Review of Existing Policies, Procedures and Internal Controls of Overtime at DPS

StoneTurn and the SAO began the review of DPS overtime policies, procedures and internal controls by gaining an understanding of the existing policies, procedures and internal controls through review of documentation and discussions with relevant personnel. We then conducted a risk assessment to identify inherent[7] fraud, abuse and waste risks related to overtime pay. The team then assessed the design of existing processes and controls to determine residual risk[8] and considered these risks against existing processes and controls.

We are aware that DPS has taken certain steps to bolster control and oversight of overtime since learning of the alleged misreporting of overtime by Trooper A. In addition, the State is implementing a new payroll reporting system in the near future which may address certain issues. Our evaluation focused on those policies, procedures and internal controls that are likely to remain in place after the new system is implemented.

5.1 Supervisor Approval of Expected and Unexpected Overtime

Existing Processes / Controls:

DPS employees must receive approval to work overtime, except for instances where no advance approval is obtained by a trooper due to the nature of a law enforcement incident. The specific

[7] Inherent risk refers to vulnerabilities without regard to existing controls. The assessment considers both likelihood and significance of identified risk. Our focus was on risks that had reasonably possible likelihood and a more than inconsequential impact if they occurred.

[8] Residual risk refers to vulnerability after the design and operating effectiveness of controls are taken into account. Our scope was limited to design effectiveness; that is, whether the controls, if operating effectively would mitigate the risk. The State did not request that we evaluate whether processes and controls were, in fact, operating as designed.

advance approval process for overtime may vary slightly for each department, but the underlying tenets are the same.

DPS differentiates between "expected" and "unexpected" overtime. Expected overtime includes time spent working on such tasks as public event security, training and construction details. Supervisors approve expected overtime during scheduling and departmental planning meetings.

In some instances, overtime hours are awarded on a first-come/first-served basis. For these tasks, supervisors post schedules for expected overtime at various DPS locations / barracks and overtime hours are signed-up for by individuals.

In other instances, expected overtime occurs as part of a third party contract whereby DPS receives reimbursement for overtime cost. These include contracts for such things as local town patrols, grant programs (e.g. Federal Click-It-Or-Ticket program) and utility company homeland security services. The DPS finance team tracks amounts charged to these contracts using project codes and bills for the services rendered. In addition, finance reconciles the total amounts charged to such projects to the contract amount in order to track billing against contracts. The DPS finance team also then provides project-level reports to the Station Commanders tasked with overseeing individual projects for their review.

Unexpected overtime typically requires the approval of a supervisor with rank above the individual requesting to work overtime. Approval can occur by phone, in person, or through dispatch in connection with emergency calls. For troopers, there may be instances where no advance approval is obtained due to the nature of a law enforcement incident. In these circumstances, VSP policy states that officers may "self-activate to an on-duty status when immediate law enforcement action is justified and appropriate under the presented circumstances."[9]

As a practical matter, the reactive nature of law enforcement makes it difficult for shift supervisors to ensure on a real-time basis the valid need for unexpected overtime. Given this inherent vulnerability, DPS should conduct after-the-fact reviews of communication logs and incident records to ensure that the overtime was warranted and performed. After-the-fact reviews also provide a convenient way to remind troopers that DPS is monitoring overtime usage.

Expected overtime is easier to monitor and control. We learned anecdotally that DPS finance and Station Commanders provide some level of oversight; however, there is no clear method of accountability for the financial impact of each individual project. We further understand that project codes used to track expected overtime events may not be subject to disaggregated analyses on a recurring basis. Notwithstanding advance supervisor approval, there does not

[9] Vermont State Police Rules and Regulations - Section V, Chapter 3, Article XI,3.1

appear to be a practice of ensuring projects overall are being managed efficiently in terms of the appropriate number of overtime hours or with who is incurring those overtime hours.

For example, the forensic data analysis revealed that experienced troopers, such as sergeants, accounted for a large percentage of overtime cost related to local town patrol contracts. There does not appear to be any analysis into whether these contracts can be serviced with more junior (and presumably less expensive) DPS personnel. We also note that local town patrol and other contracts are inherently vulnerable to abuse as there is a natural tendency to pay less attention to cost when a service is being paid by a third party.

Recommendations:

- As a detective monitoring control, DPS should implement detailed and recurring reports for reviewing payroll-related transactional data, including overtime and project codes by individual. This analysis would provide DPS personnel with operational and financial insight that would prove useful in managing overall overtime costs and identifying unusual trends.

- For recurring projects with foreseeable overtime amounts, we recommend that DPS implement overtime criteria designed to prevent dominance of select projects by one or few individuals. These controls might include monthly employee limits for overtime amounts on individual projects and mandatory rotations of those individuals that work on project-based overtime.

5.2 Time Reporting Process

Existing Processes / Controls:

Vermont government employees manually complete a time report on a bi-weekly basis. Certain employees, such as salaried administrative employees, report only on an exception basis. They provide details of the hours worked each day only if there is a payroll event outside of their normal work schedule, e.g., a sick day. A large proportion of DPS staff report on an affirmative basis; that is, the employee completes an itemized breakdown of hours for each day worked. Most State Troopers, for example, itemize their work days on time reports and code their time spent for regular hours, overtime and personal time, among others.

This coding of time in time sheets is accomplished through the use of earnings codes. Earnings codes are a combination of numerical digits and/or letters input onto a time sheet by an employee in order to identify hours by category. For example, earnings code “16” indicates “call-in hours cash”, meaning hours worked by a trooper that has been called in to work unexpectedly and wishes to be compensated in cash for those hours. The earnings codes drive how hours are

translated into pay dollars and dictate such things as whether time should be paid at straight time or time-and-a-half and whether hours should be deducted from accrued paid time off.

Employees that work overtime hours, including State Troopers, are required to complete an overtime recap form that provides detail regarding the overtime work, such as detail on projects or grants worked on, case or incident numbers, dates of overtime, earnings code charged and free-form notes regarding the work performed. These overtime recaps may vary by DPS group and can be completed in excel template or hard copy, but generally include similar information.

DPS employees manually complete their own time sheets. Given the various options for earnings codes and project codes, the opportunity for intentional or unintentional errors exists for every time report.

DPS developed a "Reporting Time Instructions" guide for DPS employees regarding employee codes, earnings codes and union requirements that should be taken into consideration when filling out (and approving) timesheets. We learned anecdotally that DPS payroll does not formally or systematically circulate the manual to all DPS personnel, but rather distributes on an ad hoc basis.

Recommendations:

- DPS should formalize and circulate written time reporting instructions. The instructions should, at a minimum, include a guide that references the most common coding by level, manner in which the reports should be completed and contact information for payroll related questions.

- DPS should implement and provide formal training, including comprehensive training for new employees and an annual refresher course for current employees regarding (1) the various codes that are used for time entries; (2) applicable regulations that should be followed when filling out time sheets (e.g. union agreements); and (3) updates that may be implemented to the payroll system and payroll process.

- We understand that the State is in the process of implementing a new payroll module of its ERP system, including an electronic time reporting mechanism. An electronic timesheet system should help reduce/prevent errors associated with the current manual process. In addition, an electronic time reporting system should reduce, if not prevent, eligibility errors.

- The new time reporting system should include automated controls, such as real time systematic verification of payroll reporting codes, prompts requiring employees to complete certain required fields based on data entered, and a comprehensive set of time reporting "rules" embedded into the system to ensure accuracy in reporting for employees depending on department, level, employment contract, etc. For example, an electronic time sheet could

have embedded controls which prevent individuals from using certain codes for pay they are not eligible for or from charging paid personal time they have not accrued.

- We also suggest that the electronic time reporting system allow for free-form comments and descriptions of hours entered to provide for a formal record of what the hours related to, particularly for overtime and call-in pay. These comments can then be used in verification and subsequent auditing of hours reported.

5.3 Supervisor Approval of Time Reports and Overtime "Recaps"

Existing Processes / Controls:

After overtime has been incurred, employees separately identify the overtime and call-in hours on the bi-weekly time sheet through specific earnings and project codes. The employee then signs each time sheet under penalties of perjury. The DPS employee's direct supervisor then reviews time sheets prior to submission to DPS payroll. Supervisors evidence their review via signature of employee time sheets. DPS policy provides for hand written approval signatures; however, we learned that, on some occasions an "electronic" (historically a jpeg image of signature included on a spreadsheet template) signature has been used.

With regards to overtime, DPS policy requires the employee's direct supervisor to review overtime recap forms to verify that the description/reason for the overtime hours provided reasonably supports the hours recorded on the front page of each employee's time report. DPS policy also expects direct supervisors to review leave slips, radio logs and other documentation to verify time actually worked.

DPS modified the process in August 2012, presumably as a result of the Trooper A investigation. DPS policy now demands advance approval whenever possible and mandates that all DPS divisions use overtime/leave slips to document overtime and leave.

The use of an electronic signature template (i.e. jpeg) for supervisor approval creates risk in the review process as it provides an opportunity for the employee to alter or circumvent the supervisor approval process altogether if time sheets are not custody controlled. When an electronic signature image is saved on a template, employees can circumvent altogether the review process by completing a "pre-approved" time sheet. They can even submit the timesheet to DPS payroll without review by their supervisor.

The current review process, moreover, depends highly on the supervisors to conduct an adequate review of time sheets. We received anecdotal evidence that some supervisors performed little or no detailed review, resulting in a "rubber stamp" approval. We also noted that scanning the descriptions provided by the employee on overtime recaps attached to time sheets may not, in

and of itself, validate the legitimacy of the recorded hours. Employees can falsify explanations and/or reference task or job codes that were not actually worked.

Rubber stamping of time sheets contributes to a lax organizational culture and creates substantial risk that intentional or unintentional errors in employee time sheets go undetected. It also tempts DPS employees, who might not otherwise engage in time abuse, to do so because they perceive that their misconduct will go undetected.

Recommendations:

- DPS should prohibit the use of the electronic signature images in template form by supervisors. We understand that DPS recently notified supervisors that electronic signatures will no longer be accepted.

- Employee time sheets currently include a section for employees to attest that their time sheet is true and accurate as evidenced by their signature. Supervisor signatures lines are adjacent to the employee's signature under the same language. We recommend these time sheets have distinct attestation statements for employees and supervisors, with the former focusing on the accuracy of the hours reported and latter indicating that the supervisor specifically reviewed and approved the hours reported by each employee. In addition, reference to available whistleblower and fraud hotline numbers could also be incorporated in order to set an appropriate tone that time keeping fraud is taken seriously.

- DPS should require all supervisors to submit periodic (i.e. monthly or bi-weekly) overtime reports that include the detail on overtime, call-in and special compensation time recorded for the period for their direct reports. These reports should include a signed certification that the supervisor verifies that the information contained on the report is truthful and accurate to the best of their knowledge.

- DPS should implement a process for periodic random and judgmental sample auditing of payroll records with a focus on overtime and call-in hours. These sample audits should include review of timesheets and supporting documentation regarding reported overtime in order to assess the validity. Supporting documentation could include, but is not limited to, records from the Spillman system tracking law enforcement activity, data regarding citations issued during the applicable time periods, and proof of call-ins.

- DPS should publicize these audits to prevent abuse by personnel who believe that DPS will not detect their misconduct. These audits would also allow for assessment of effectiveness of supervisor review and would provide additional assurance that reported overtime is valid.

5.4 Supervisor Submission of Time Reports to DPS Headquarters

Existing Processes / Controls:

DPS requires approved time sheets to be delivered directly from the supervisor to DPS Payroll via email, fax or paper form for manual entry into the Paradox payroll system. Employees may not take back possession of a time sheet after receiving supervisor approval.

Paper time report submission requires the supervisor to have time reports delivered to DPS Headquarters Room 108 (DPS Payroll Coordinator's office) and placed in a designated time report basket within the office. Some supervisors electronically deliver time sheets via fax or email. If a correction is required, the supervisor communicates and documents approval by email.

Our understanding of current practices indicates that physical submission or fax of timesheets to DPS payroll does not provide a sufficient audit trail for the chain of custody of timesheets. For example, current procedures do not require DPS payroll to track or maintain a record of individuals who deliver timesheets. Therefore, DPS remains vulnerable to an individual other than the supervisor physically accessing and altering the time sheet prior to submission to payroll.

Recommendations:

- DPS should implement a formal chain of custody form that requires a signature from the individual(s) that collect timesheets from supervisor and deliver to DPS payroll. The hard copy timesheets delivered to DPS payroll should be delivered in sealed envelopes and contain a signed chain of custody form. Alternatively, time sheets sent electronically should be emailed directly from the supervisors and emails should be retained in a segregated payroll email account to provide an adequate audit trail. Delivery of timesheets via fax should be permitted only if accompanied by a signed chain of custody form.

- DPS should require DPS payroll administrators to confirm with supervisors via email or phone before processing edits/corrections to ensure that they are legitimate and authorized appropriately. Such edits should be logged accordingly.

- We understand the State is in the process of implementing an electronic time keeping system which will render delivery of timesheets from each DPS location obsolete. The implementation should ensure that unique logins for each individual time keeper and supervisor and should maintain a historical, time stamped log of electronic approvals by the employee and approving supervisor for payroll activity in order to provide an adequate audit trail for time keeping entries and approval.

5.5 DPS Payroll Processing of Time Sheets

Existing Processes / Controls:

As discussed, DPS employees populate payroll earnings codes when filling out their time reports. These codes identify overtime paid to employees. A DPS payroll administrator collects all the timesheets provided by the supervisors and compares the names of the employees on the timesheets to a certification report to confirm that all timesheets have been collected. Additionally, the DPS payroll administrator confirms that the timesheets are completed fully and do not contain missing or incorrect information, including missing fields or employee and supervisor signatures, among other things. After the DPS payroll administrator finishes the review, he or she manually keys time sheet information by earnings code and date into Paradox, DPS's current payroll entry system.

After entry into the Paradox system, the DPS payroll administrator runs two system reports to assist in identifying any manual entry errors. The first report identifies any missing timesheets. The second report captures any instances in which an activity code has been entered for an employee who is ineligible for that particular activity code.

Additionally, the DPS payroll administrator uses the information contained on the certification report to prepare a list of individuals qualified for special compensation items. The DPS payroll administrator reviews the list and confirms that those eligible for the additional compensation benefits receive them. These additional compensation benefits include such things as clothing allowances, a contractually guaranteed forty-hour annual payment, special teams pay and canine feeding pay.

Within Paradox, each employee has an overtime code designation that is specific to their job type. DPS developed this designation to prevent employees from being paid for tasks that do not conform with the rules for their designated overtime type. We further understand that Paradox contains additional systematic edit checks and data rules to convert DPS payroll data in hours into their data equivalents in the primary ERP system at DHR (PeopleSoft) in both hours and dollars. This conversion is what ultimately calculates each employee's paycheck based on the hours entered into their time report.

Based on our discussions with payroll personnel at DPS and at DHR in Montpelier, we understand that the systematic edit checks currently in existence in the Paradox system perform limited verifications. We also understand that many of the verifications of payroll accuracy performed at DPS are done on a manual basis by the payroll personnel who, through experience, are knowledgeable of the types of issues and inaccuracies to look for in individual time sheets. DPS payroll personnel appear very knowledgeable of the many rules and nuances associated with the various DPS employment contracts and pay structures. In addition, DPS payroll personnel have developed written instructions and guidelines for processing payroll each bi-

weekly period. However, the primarily manual review that is required each payroll period is subject to human error and relies heavily on the personal knowledge of a select group of professionals.

While DPS and DHR personnel manually verify payroll amounts to ensure payments to employees correspond to time reporting, lack of documentation as to the exact manner in which the existing payroll system is applying rules and running systematic verification procedures makes auditing, confirming and updating the payroll system extremely difficult, if not impossible. Specifically, we learned through discussions with DPS, DHR and DII personnel that the time entry data verification rules, or edits, exist in Paradox are embedded in the decades-old software code and that an itemized list of those rules did not exist in written form.

Recommendations:

- The new time reporting system should significantly strengthen controls and reduce the potential for human error with regards to manual entry of time sheet entries and subsequent verification. All Vermont government agencies, including DPS, should be consulted and work closely with the implementation team in order to ensure seamless transition and accurate payroll processing.

- The State should develop system controls to prevent and/or timely detect ineligible overtime from being entered by an employee when completing his or her time sheet. These system controls should allow only eligible overtime reporting based on each employee's pre-defined earnings codes, pay grade, union status, and whether or not the individual is eligible for special benefits compensation.

- The system should include electronic checks using authorization thresholds/limitations for certain payroll adjustments, merit bonuses and other atypical payroll entries.

- Currently, formal documentation regarding the antiquated payroll system serving the 9,000+ State employees is limited or non-existent. Under the new time keeping system, we recommend that the time reporting system rules, controls and processes be well documented in order to provide adequate auditing, maintenance, adaptation, modification and control over payroll activities.

5.6 DPS Headquarters Monitoring and Oversight of Trooper Overtime

Existing Processes / Controls:

DPS payroll personnel perform a secondary review after payroll has been entered into Paradox and sent by DPS payroll to DHR for processing. Written procedures indicate that the review should be completed while processing the payroll; however, if time is of the essence, DPS payroll may perform the review after payroll has been processed. The review includes checking, among other things, adjustment codes for prior pay periods, regular hours for employees required to affirmative report hours, call-in codes and holiday codes.

In addition to DPS payroll review of bi-weekly payroll, DPS finance and DPS Commanding Officers (including the VSP Colonel, DPS Commissioner and Majors) monitor payroll, including overtime and call-in pay, through budget analyses and financial reporting at periodic departmental meetings. These reviews are intended to provide general oversight of overtime and identify unusual trends or spending variances by individual, Troop or other divisions within DPS.

Recommendations:

- Implementing detailed and formal periodic overtime reports will allow supervisors to review overtime-related hours and compensation for direct reports on a periodic basis. Such a review allows supervisors to monitor overtime at each DPS location and potentially identify outliers or amounts that appear to be inconsistent with other personnel within their department and/or with the supervisor's understanding of work activity of subordinates.

- DPS should ensure the review of overtime budget and actual performance be continued and occurs at regular intervals. These reviews should include follow-up with supervisors or individuals on an as needed basis in order to better understand potential anomalies. Analyses used for such monitoring reviews should include overtime reports on a disaggregated basis, including by project code, department, level and individual, as well as reports on aggregated activity levels.

6.0 Forensic Data Analytic Procedures

At the request of the State, our procedures also included performing analytic and transaction testing of DPS payroll-related data in order to identify possible indicators of fraudulent, abusive or wasteful activities at DPS, including anomalous overtime activity and other unusual activity.[10]

Our team of data analysts and forensic accountants, working with the SAO, designed and executed custom queries, algorithms, and analyses of payroll-related data in order to profile the activity contained in individual data sets and across multiple discrete data sets. We designed data tests to identify red flags, trends, anomalies or other indicators of fraud, abuse, or waste with respect to overtime at DPS. We will provide DPS with all forensic analyses simultaneous to the issuance of this report for whatever additional investigation or other action the agency deems appropriate.

We tracked the number of unique tests flagged for every DPS employee. We then created a risk score by totaling the number of tests that flagged an individual employee, e.g., an employee receiving a risk score of 5 means that data analytics flagged the employee on five tests. Trooper A, incidentally, received the highest risk score of any DPS employee which, as we discuss below, demonstrates the importance and usefulness of forensic analytics as a tool to curb government fraud, abuse and waste.

Note: The fact that an individual is flagged in a particular data test *does not*, in and of itself, prove any impropriety. Our tests, rather, identify *possible indicators* of fraud, abuse or waste. Our observations and findings derive from data provided by the State. Our procedures present factual analyses and *do not* constitute opinions or judgments regarding, for example, whether fraud or other misconduct by any group or individual has occurred. Neither StoneTurn nor the SAO has participated in, or has direct knowledge of, investigative or other procedures that the State has performed or plans to perform.

Our procedures, as defined by the State, covered the period from January 1, 2010 through September 30, 2012. The State Human Capital Management system ("HCM") served as a primary data source. This data included detailed records of DPS employee timekeeping entries, with fields identifying such information as date, earnings code, position, department, hours and payroll dollar amount. We used various tests to understand trends by pay groups, department, positions and individuals.

We also used non-payroll data, for example, data from the VSP Spillman System ("Spillman"), the primary communications and database tool used by law enforcement and emergency

[10] Our review did not consider manipulation of overtime to increase pension benefits. We excluded procedures aimed at identifying this practice, known as "spiking", from our analysis as it has recently been addressed in a separate review by SAO and action by the Vermont State Legislature.

response personnel. Spillman includes, among other things, data regarding communication between sworn officers and dispatchers, i.e. radio logs, and other data regarding incidents responded to by sworn officers. We used Spillman data as a tool to compare payroll data with radio logs for 16 employees receiving high risk scores. This analysis validated the hours recorded on employees' time sheets with the exception of Trooper A.

6.1 Summary of Earnings Codes at DPS

We categorized the dozens of earnings codes used by DPS employees into groups to understand and summarize DPS earnings code activity. These groups included: (1) regular pay; (2) benefits; (3) overtime; (4) other pay; (5) expense reimbursement; and (6) compensatory time ("comp time") payoff. Regular pay and benefits comprise approximately 90% of the total compensation cost, with overtime pay being the next highest amount at 7.7%, or $11.5 million during the two year and nine month study period.

Table 3 – Summary of DPS Payroll for the Period 2010 – 2012 by Earnings Code

Category	2010	2011	2012*	Total	%
Regular Pay	$ 31,987,816.46	$ 34,305,812.31	$ 25,900,739.82	$ 92,194,368.59	61.5%
State Share Benefits	$ 14,547,586.45	$ 15,788,456.59	$ 12,238,025.90	$ 42,574,068.94	28.4%
Total Overtime	$ 3,838,718.87	$ 4,367,739.33	$ 3,275,254.77	$ 11,481,712.97	7.7%
Other Pay	$ 1,029,362.60	$ 1,076,245.84	$ 780,332.16	$ 2,885,940.60	1.9%
Expenses	$ 150,559.46	$ 192,731.41	$ 142,587.34	$ 485,878.21	0.3%
Comp Time Payoff	$ 136,088.07	$ 116,633.51	$ 156,055.84	$ 408,777.42	0.3%
Total Pay	**$ 51,690,131.91**	**$ 55,847,618.99**	**$ 42,492,995.83**	**$ 150,030,746.73**	**100.0%**

*Through September 30, 2012

We further grouped overtime by the primary earnings code categories and call-in pay. Of the $11.5 million in total overtime, $9.7 million (84%) was regular overtime taken in cash, followed by call-in pay of $0.9 million (8%).

Table 4 – Summary of DPS Overtime for the Period 2010 – 2012 by Earnings Code

OT Category	Earnings Code	2010	2011	2012*	Total	%
Overtime Cash	2P	$ 2,938,086.12	$ 2,938,497.68	$ 2,124,481.85	$ 8,001,065.65	69.7%
Overtime Cash	12	$ 254,931.70	$ 753,247.46	$ 673,090.55	$ 1,681,269.71	14.6%
Call In Pay	Various	$ 314,079.34	$ 357,930.89	$ 247,552.70	$ 919,562.93	8.0%
Overtime Holiday Cash	2A	$ 208,343.63	$ 146,451.65	$ 141,604.82	$ 496,400.10	4.3%
Overtime Holiday Cash	2H	$ 98,675.80	$ 142,536.06	$ 65,859.62	$ 307,071.48	2.7%
Guarantee Overtime	G1	$ 19,243.68	$ 20,455.20	$ 15,459.84	$ 55,158.72	0.5%
WKND DIFF 2ND+SHF DIFF OT	Q8	$ 3,913.98	$ 6,664.15	$ 5,485.40	$ 16,063.53	0.1%
WKND DIFF 1ST SHIFT OT	Q7	$ 1,444.62	$ 1,956.24	$ 1,719.99	$ 5,120.85	0.0%
Total Overtime		**$ 3,838,718.87**	**$ 4,367,739.33**	**$ 3,275,254.77**	**$ 11,481,712.97**	**100.0%**

*Through September 30, 2012

Additional discussion of earnings code categories can be found in subsequent sections of this report.

6.2 Benchmarking Analysis by Title and Department

Our analytics performed on the underlying DPS payroll data began by calculating overtime and total pay statistics in a variety of manners for use in benchmarking analyses. For these analyses, we summarized data by earnings code, department, and pay period, as well as by earnings code, title and pay period in order to determine average levels of overtime by department and title for use in comparing individuals to their peer groups. These analyses were done in terms of overtime dollars, hours and days, in increments that included pay periods, calendar years and across all periods combined. This was also done for overtime as a whole and call-in pay (a subset of overtime) broken out separately.

Benchmarking is a useful method for identifying outliers, which in this case would be those DPS employees whose overtime activity exceeded averages. In the benchmarking analyses performed, we divided total overtime and call-in time for each individual by that individual's total pay over the entire study period in order to arrive at overtime and call-in pay as a percentage of the individual's pay. The individual's overtime and call-in percentages were then compared, or benchmarked, to the averages for their department and for their title. We expressed this comparison in terms of a percentage, e.g. individual's overtime percentage ÷ department overtime percentage.

Based on discussions with DPS personnel, we understand that overtime is often voluntary and allocated on a first-come/first-serve basis. The analysis reveals that some employees actively seek out overtime shifts while others choose not to seek out overtime at all, and varying degrees in between the two extremes. This provides one explanation for the differences in overtime amounts between individuals.

We also understand that overtime variability results from title, department, job and rank. Variability in overtime amounts can occur because duties differ, e.g., a sergeant subject to unexpected overtime spent investigating crime scenes vs. a sergeant in an administrative role.

In order to take such job-specific variability into account, we structured our analysis to identify individuals whose transactional data demonstrated outlier traits for *both* their title and department. We flagged those individuals who exceeded the average overtime for their title by 50% *and* exceeded the average overtime for their department by 50%. We performed the same analyses for (1) total overtime dollars, (2) call-in dollars on a stand-alone basis, (3) total

overtime hours, (4) call-in hours, (5) total overtime days and (6) call-in days. These analyses yielded the following results in terms of individuals flagged:[11]

- **Overtime as % of Pay in Dollars -** There are 95 individuals that exceeded the average overtime % of total pay for their respective title and department by more than 50%. The 95 individuals represent $1.5 million or 13% of the total $11.5 million of overtime recorded by DPS for the period January 1, 2010 through September 30, 2012. These results by title and department are summarized in the charts below:

Table 5 - Summary of Individuals that Exceeded Average Overtime % of Total Pay in $ (by Title)

Title	No. of Employees	Total OT	Total Pay	Average Overtime % of Total Pay for Flagged Individuals
Sergeant	13	$ 447,483.86	$ 2,229,377.19	20.1%
Senior Trooper - Station	7	$ 157,506.16	$ 877,122.03	18.0%
Senior Auxiliary Trooper	6	$ 12,871.90	$ 74,473.33	17.3%
Fire Prevention Officer	6	$ 41,157.87	$ 923,026.47	4.5%
PSAP Emrgcy Comm Dispatcher II	6	$ 342,423.25	$ 1,412,824.92	24.2%
Trooper Recruit	6	$ 5,049.00	$ 79,173.31	6.4%
All Other Titles	51	$ 498,413.08	$ 3,764,807.46	13.2%
Grand Total	**95**	**$ 1,504,905.12**	**$ 9,360,804.71**	**16.1%**

Table 6 - Summary of Individuals that Exceeded Average Overtime % of Total Pay in $ (by Department)

Department	No. of Employees	Total OT	Total Pay	Average Overtime % of Total Pay for Flagged Individuals
DPS-FST-Training	11	$ 20,122.39	$ 105,696.00	19.0%
DPS-SP-LE-Recreation Safety Pr	9	$ 15,245.40	$ 88,475.08	17.2%
DPS-SP-SS-OPD-Recruits	7	$ 6,059.53	$ 107,685.21	5.6%
DPS-SP-LE-Dispatching-Willisto	4	$ 259,381.20	$ 1,098,823.31	23.6%
DPS-SP-LE-Williston	4	$ 170,216.04	$ 751,577.29	22.6%
All Other Departments	60	$ 1,033,880.56	$ 7,208,547.82	14.3%
Grand Total	**95**	**$ 1,504,905.12**	**$ 9,360,804.71**	**16.1%**

- **Call-In as % of Pay in Dollars -** There are 73 individuals that exceeded the average call-in % of total pay for their respective title and department by more than 50%. The 73 individuals represent $325K or 35% of the total call-in recorded by DPS for the period January 1, 2010 through September 30, 2012.

[11] For purposes of each unique test, individuals are defined as each employee-title-department combination. Therefore, certain employees may be flagged in a particular test more than once to the extent they have worked in multiple departments or had various titles over time. Employees that are flagged multiple times for an individual test due to more than one employee-title-department combination would only be counted once toward the final risk score for that test.

Table 7 – Summary of Individuals that Exceeded Average Call In % of Total Pay in $ (by Title)				
Title	**No. of Employees**	**Total Call In**	**Total Pay**	**Average Call In % of Total Pay for Flagged Individuals**
Senior Trooper - Station	25	$ 149,289.46	$ 4,727,085.98	3.2%
Sergeant	23	$ 121,749.70	$ 3,891,947.47	3.1%
Trooper 1/c - Station	7	$ 22,084.52	$ 694,244.91	3.2%
All Other Titles	18	$ 31,425.97	$ 2,656,571.86	1.2%
Grand Total	**73**	**$ 324,549.65**	**$11,969,850.22**	**2.7%**

Table 8 – Summary of Individuals that Exceeded Average Call In % of Total Pay in $ (by Department)				
Department	**No. of Employees**	**Total Call In**	**Total Pay**	**Average Call In % of Total Pay for Flagged Individuals**
DPS-SP-LE-St Albans	7	$ 51,045.20	$ 1,306,862.25	3.9%
DPS-SP-LE-Williston	6	$ 61,135.73	$ 1,418,106.80	4.3%
DPS-SP-BCI-Administration	6	$ 23,914.82	$ 680,118.07	3.5%
DPS-SP-LE-Brattleboro	6	$ 31,169.40	$ 1,073,384.29	2.9%
DPS-SP-LE-Middlesex	5	$ 21,133.19	$ 752,113.86	2.8%
All Other Departments	43	$ 136,151.31	$ 6,739,264.95	2.0%
Grand Total	**73**	**$ 324,549.65**	**$11,969,850.22**	**2.7%**

- **Individual Overtime Hours as % of Average Overtime Hours** – There are 35 individuals that exceeded the average overtime hours for their related title and department by more than 50%. The 35 individuals had 38,000 overtime hours or approximately 10% of the 400,000 overtime hours recorded by DPS for the period January 1, 2010 through September 30, 2012.

Table 9 – Summary of Individuals that Exceeded Average Overtime Hours % (by Title)			
Title	**No. of Employees**	**Average Overtime Hours for Flagged Individuals**	**Average Title Overtime Hours**
Sergeant	9	1,100	543
PSAP Emrgcy Comm Dispatcher II	7	1,937	1,122
Trooper 1/c - Station	3	1,034	597
Senior Trooper - Station	3	1,217	660
All Other Titles	13	524	274
Grand Total	**35**		

Table 10 – Summary of Individuals that Exceeded Average Overtime Hours % (by Department)			
Department	**No. of Employees**	**Average Overtime Hours for Flagged Individuals**	**Average Department Overtime Hours**
DPS-SP-LE-Dispatching-Williston	5	2,115	1,247
DPS-SP-LE-Traffic Safety Progr	3	1,029	527
DPS-SP-BCI-Administration	3	58	34
DPS-SP-LE-Dispatching-Rockingham	3	2,331	1,190
All Other Titles	21	825	466
Grand Total	**35**		

- **Individual Call-In Hours as % of Average Call-In Hours** – There are 65 individuals that exceeded the average call-in hours for their related title and department by more than 50%. The 65 individuals had 9,300 call-in hours or approximately 30% of the 31,000 call-in hours recorded by DPS for the period January 1, 2010 through September 30, 2012.

Table 11 – Summary of Individuals that Exceeded Average Call In Hours % (by Title)			
Title	**No. of Employees**	**Average Call In Hours for Flagged Individuals**	**Average Title Call In Hours**
Senior Trooper - Station	24	189	89
Sergeant	21	141	51
Trooper 1/C	5	149	76
Trooper 1/c - Station	4	158	77
PSAP Emrgcy Comm Dispatcher II	3	5	0
All Other Titles	8	51	19
Grand Total	**65**		

Table 12 – Summary of Individuals that Exceeded Average Call In Hours % (by Department)			
Department	**No. of Employees**	**Average Call In Hours for Flagged Individuals**	**Average Department Call In Hours**
DPS-SP-LE-Williston	8	197	84
DPS-SP-BCI-Administration	6	90	30
DPS-SP-LE-Middlesex	5	268	163
DPS-SP-LE-St Albans	5	255	137
DPS-SP-LE-Brattleboro	5	198	120
All Other Departments	36	86	43
Grand Total	**65**		

- **Overtime Days as % of Average Overtime Days –** There are 28 individuals that exceeded the average overtime days for their related title and department by more than 50%.

Table 13 – Summary of Individuals that Exceeded Average Overtime Days (by Title)			
Title	**No. of Employees**	**Average Overtime Days for Flagged Individuals**	**Average Title Overtime Days**
Sergeant	9	289	141
PSAP Emrgcy Comm Dispatcher II	5	383	224
Lieutenant	3	251	153
Trooper 1/c - Station	3	269	155
Senior Trooper - Station	3	203	126
PSAP Emrgcy Com Dsp Spvsrs	2	417	253
All Other Titles	3	78	40
Grand Total	**28**		

Table 14 – Summary of Individuals that Exceeded Average Overtime Days (by Department)			
Department	**No. of Employees**	**Average Overtime Days for Flagged Individuals**	**Average Department Overtime Days**
DPS-SP-LE-Dispatching-Rockingh	3	435	248
DPS-SP-LE-Traffic Safety Progr	3	251	142
DPS-SP-LE-Dispatching-Willisto	3	453	260
DPS-SP-LE-Rutland	2	233	151
DPS-SP-LE-Shaftsbury	2	286	151
DPS-SP-LE-Williston	2	360	178
All Other Departments	13	198	114
Grand Total	**28**		

- **Call-In Days as % of Average Call-In Days –** There are 66 individuals that exceeded the average call-in days for their related title and department by more than 50%.

Table 15 – Summary of Individuals that Exceeded Average Call In Days (by Title)			
Title	**No. of Employees**	**Average Call In Days for Flagged Individuals**	**Average Title Call In Days**
Senior Trooper - Station	24	43	21
Sergeant	21	30	10
Trooper 1/C	5	34	17
PSAP Emrgcy Comm Dispatcher II	4	2	0
Trooper 1/c - Station	3	28	15
All Other Titles	9	10	4
Grand Total	**66**		

Table 16 – Summary of Individuals that Exceeded Average Call In Days (by Department)			
Department	**No. of Employees**	**Average Call In Days for Flagged Individuals**	**Average Department Call In Days**
DPS-SP-LE-Williston	8	46	19
DPS-SP-BCI-Administration	6	17	6
DPS-SP-LE-Middlesex	5	57	36
DPS-SP-LE-Brattleboro	5	46	27
DPS-SP-LE-St Albans	4	62	33
All Other Departments	38	17	9
Grand Total	**66**		

6.3 Trending Analysis of Overtime by Pay Period

Overtime irregularities at DPS became public during the second week of July 2012. Simultaneously, Governor Shumlin announced a criminal investigation of Trooper A and a DPS-wide payroll review. We theorized that individuals who had systematically inflated reported overtime, if any, might cease their misconduct after the Governor's announcement. We thus compared average overtime levels before the Governor's announcement to overtime levels subsequent to his announcement.[12] We flagged individuals whose average overtime as a percentage of total pay decreased by a set threshold of at least 20%. This resulted in 88 individuals being flagged.[13] A summary of the number of individuals having at least a 20% decline in average overtime as a percentage of total pay after the Governor's announcement and the average change by title is reflected in the following table:

[12]Note, however, that overtime activity available to study subsequent to the Governor's announcement was limited to the period July 2012 through September 2012 which is much shorter than the period analyzed prior to the announcement and which included Hurricane Irene and other events that likely required substantial overtime.
[13] Individuals that had 100% decrease in overtime were not considered for this analysis as these individuals appear to be no longer working for Vermont DPS or appear to be still working for Vermont DPS but received a small amount of overtime prior to the announcement and none subsequently.

Table 17 – Summary of Individuals with Overtime as % of Pay that Decreased by more than 20% after Disclosure of Fraud (by Title)		
Title	**No. of Employees**	**Average % Decrease in Overtime**
Sergeant	11	-47.3%
Senior Trooper - Station	7	-37.6%
Senior Auxiliary Trooper	5	-51.5%
PSAP Emrgcy Comm Dispatcher I	5	-48.3%
PSAP Emrgcy Comm Dispatcher II	4	-49.8%
Hazmat Response Team Member	4	-33.1%
All Other	52	-47.3%
Total	**88**	**-47.1%**

In addition to looking at the results by title, we have also presented the number of individuals by department that have at least a 20% decline in average overtime as a percentage of total pay after the Governor's announcement in the following table:

Table 18 – Summary of Individuals with Overtime as % Pay that Decreased by more than 20% after Disclosure of Fraud (by Department)		
Department	**No. of Employees**	**Average % Decrease in Overtime**
DPS-FST-Training	11	-54.9%
DPS-SP-LE-Recreation Safety Pr	7	-59.5%
DPS-SP-LE-Williston	6	-48.0%
DPS-FS-Haz Mat Response Prog	5	-41.1%
DPS-EM-Emerg Mgmt Prog Grant	5	-36.6%
DPS-SP-LE-Dispatching-Rockingh	4	-46.6%
All Other Departments	50	-43.7%
Total	**88**	**-47.2%**

We performed the same trending analyses on call-in pay, which flagged 54 individuals. Of these individuals, the average percentage drop ranged between 23% and 78%. A summary of these results by title is reflected in the following table:

Table 19 – Summary of Individuals with Call In as % Pay that Decreased by more than 20% after Disclosure of Fraud (by Title)		
Title	**No. of Employees**	**Average % Decrease in Call In**
Senior Trooper - Station	31	-44.2%
Sergeant	13	-48.4%
Trooper 1/c - Station	6	-43.4%
Senior Trooper - Outpost	2	-70.0%
Trooper 1/C	2	-65.1%
Total	**54**	**-46.8%**

A review of the results by department indicates that the 54 individuals with a call-in percentage drop greater than 20% originated from 16 different departments at DPS. A summary of the number of individuals having at least a 20% decline in average call-in pay and the average change by department is reflected in the following table:

Table 20 – Summary of Individuals with Call In as % Pay that Decreased by more than 20% after Disclosure of Fraud (by Department)		
Department	**No. of Employees**	**Average % Decrease in Call In**
DPS-SP-LE-Royalton	8	-42.3%
DPS-SP-LE-St Albans	6	-45.6%
DPS-SP-LE-Rockingham	6	-45.1%
DPS-SP-LE-St Johnsbury	5	-53.8%
DPS-SP-LE-Rutland	5	-46.1%
DPS-SP-LE-Williston	5	-36.1%
All Other Departments	19	-50.7%
Total	**54**	**-46.8%**

6.4 Analysis of Consecutive Overtime by Pay Periods

We theorized that a large number of consecutive overtime pay periods might be indicia of misconduct. We therefore quantified the total number of consecutive bi-weekly periods that each individual recorded overtime. We flagged those individuals with greater than 50 bi-weekly periods in a row (out of 73 in our study period). This resulted in 39 individuals totaling $1.7 million, or approximately 15%, of the total $11.5 million of overtime recorded at DPS for the period from January 1, 2010 through September 30, 2012. The number of consecutive pay periods with overtime pay ranged between 50 and 73 for the flagged individuals. A summary of these results by title is reflected in the following table:

Table 21 – Summary of Individuals with Overtime Pay Exceeding 50 Consecutive Pay Periods (by Title)			
Title	**No. of Individuals**	**Average Consecutive Pay Periods with Overtime Pay**	**Total Overtime ($)**
Sergeant	11	61	$ 614,876.16
Senior Trooper - Station	8	61	$ 261,731.59
PSAP Emrgcy Comm Dispatcher II	7	68	$ 360,554.94
Lieutenant	3	62	$ 149,938.41
PSAP Emrgcy Com Dsp Spvsrs	2	73	$ 139,109.93
Captain	2	62	$ 70,571.42
VSP Fire Investigator	1	53	$ 64,027.35
Instructor & Prog Trng Coord	1	72	$ 24,203.04
Identification Specialist	1	56	$ 14,123.31
Fire Academy Instructor & Prog	1	72	$ 30,955.68
Grand Total	**37**		**$ 1,730,091.83**

In addition to presenting the results by title, we have also summarized the consecutive pay periods with overtime analysis by department in the following table:

Table 22 – Summary of Individuals with Overtime Pay Exceeding 50 Consecutive Pay Periods (by Department)			
Department	**No. of Individuals**	**Average Consecutive Pay Periods with Overtime Pay**	**Total Overtime ($)**
DPS-SP-LE-Rutland	5	60	$ 148,163.79
DPS-SP-LE-Dispatching-Willisto	5	69	$ 273,916.30
DPS-SP-BCI-Drug Enfrc Prog-NIU	4	61	$ 172,098.53
DPS-SP-LE-Traffic Safety Progr	3	64	$ 172,063.86
DPS-FST-Administration	2	72	$ 55,158.72
DPS-SP-LE-Williston	2	69	$ 174,561.53
DPS-SP-LE-St Johnsbury	2	57	$ 80,034.94
DPS-SP-LE-Dispatching-Rutland	2	73	$ 102,280.91
DPS-SP-LE-Royalton	2	58	$ 96,711.35
DPS-SP-LE-Rockingham	2	53	$ 103,565.41
DPS-SP-LE-Dispatching-Rockingh	2	65	$ 123,467.66
DPS-CJS-VT Crime Info Center	1	56	$ 14,123.31
DPS-SP-BCI-Administration	1	73	$ 34,628.70
DPS-SP-BCI-Arson	1	53	$ 64,027.35
DPS-SP-BCI-Rutland	1	73	$ 51,001.23
DPS-SP-BCI-ICAC	1	55	$ 27,301.56
DPS-SP-LE-Derby	1	62	$ 36,986.68
Total	**37**		**$ 1,730,091.83**

6.5 Analysis of Overtime Activity by Project Code

The payroll data provided by the State includes information related to specific project codes that can be used by DPS employees to identify payroll hours spent on certain projects, grants or task types. These include tasks such as criminal investigations, responding to house alarms, assisting with motor vehicle crashes, covering shifts for employees out on leave, construction details and patrolling certain geographic regions. Not all time keeping entries require a project code, but many DPS employees use such codes to explain time recorded on their time sheets, including time spent working overtime. We extracted those overtime pay records which included project coding and analyzed by project, department, title and individual. For informational purposes, a summary of the top ten project codes for overtime is included below.

Table 23 – Summary of Overtime by Project Codes

Project Code	2010	2011	2012	Total	%
Criminal Investigation	$ 482,913.74	$ 352,951.94	$ 239,269.86	$ 1,075,135.54	13.0%
Dispatchers-Shift Coverage	$ 342,576.90	$ 335,192.52	$ 347,035.37	$ 1,024,804.79	12.4%
USF_Positions	$ 284,976.23	$ 269,903.62	$ 101,024.38	$ 655,904.23	7.9%
Crash Investigation	$ 93,991.36	$ 92,459.10	$ 63,891.73	$ 250,342.19	3.0%
Training	$ 21,541.49	$ 92,733.46	$ 102,614.28	$ 216,889.23	2.6%
Holiday	$ 16,254.69	$ 69,687.09	$ 111,341.53	$ 197,283.31	2.4%
Administration	$ 59.90	$ 50,794.12	$ 81,058.90	$ 131,912.92	1.6%
Domestic/Family Disturbances	$ 26,970.97	$ 57,195.33	$ 46,500.65	$ 130,666.95	1.6%
NULL	$ 577.15	$ 2,819.89	$ 126,683.27	$ 130,080.31	1.6%
LTC_Jericho	$ 49,743.43	$ 47,928.84	$ 20,273.73	$ 117,946.00	1.4%
Remaining Project Codes Combined	$ 1,473,540.63	$ 1,607,806.33	$ 1,268,174.19	$ 4,349,521.15	52.5%
Total Project Code Overtime	**$ 2,793,146.49**	**$ 2,979,472.24**	**$ 2,507,867.89**	**$ 8,280,486.62**	**100.0%**

Based on discussions with DPS personnel, we understand that some of the overtime irregularities allegedly perpetrated by Trooper A involved coding false overtime hours to project codes related to certain contracts between the VSP and local towns. Under these local town contracts ("LTC"), the VSP would agree to provide law enforcement services to towns that did not have stand-alone police forces in exchange for payment. A summary of the top ten LTC project codes for overtime is included below.

Table 24 – Summary of Overtime by LTC Project Codes					
LTC Project Description	**2010**	**2011**	**2012**	**Total**	**%**
LTC_Jericho	$ 49,743.43	$ 47,928.84	$ 20,273.73	$ 117,946.00	14.9%
LTC_Dorset	$ 38,046.82	$ 40,212.96	$ 28,534.07	$ 106,793.85	13.5%
LTC_Poultney	$ 36,617.32	$ 36,321.17	$ 22,926.08	$ 95,864.57	12.1%
LTC_Hartland	$ 34,172.34	$ 34,262.28	$ 25,964.73	$ 94,399.35	11.9%
LTC_East Montpelier Town	$ 15,717.47	$ 17,716.06	$ 12,486.42	$ 45,919.95	5.8%
LTC_Cambridge Town	$ 21,709.40	$ 9,182.05	$ 10,374.12	$ 41,265.57	5.2%
LTC_Burke	$ 8,846.66	$ 10,486.98	$ 7,435.37	$ 26,769.01	3.4%
LTC_Franklin_Cty_Caring_Comm	$ 11,301.09	$ 13,705.11		$ 25,006.20	3.2%
LTC_Huntington	$ 10,189.56	$ 6,273.57	$ 7,716.07	$ 24,179.20	3.1%
Remaining LTC Projects Combined	$ 92,060.96	$ 65,818.42	$ 55,534.75	$ 213,414.13	27.0%
LTC Project Total Overtime	**$ 318,405.05**	**$ 281,907.44**	**$ 191,245.34**	**$ 791,557.83**	**100.0%**

We separately analyzed the LTC projects in order to identify any trends in the data by individual. From this analysis, it was apparent that in many of the larger LTC project codes, one individual, often at the sergeant or senior trooper level, comprised a significant portion of the overtime cost. For example, with the highest dollar value LTC project code related to the town of Jericho, Trooper A comprised approximately 31% of the total cost for that contract even though 33 other troopers had recorded time on patrol for Jericho. In some instances, an individual trooper was the top overtime earner for multiple LTC project codes.

We noted that those troopers comprising a high percentage of a given LTC project code typically had a large disparity between the next closest trooper charging overtime for that project code; therefore we developed a threshold for identifying those top overtime earners. For purposes of this analysis, we flagged those individuals with at least $10,000 in total overtime to a project code who comprised at least 20% of that given project code over the study period. This resulted in 7 individuals being identified.

In addition, when analyzing project codes used by Trooper A, we noted that he frequently used certain codes in his time records. These included "LTC_Jericho" (discussed previously), as well as "Crash Investigation" and "Alarm Response" project codes. When the latter two project codes were considered separately, we observed that Trooper A comprised an inordinately high percentage of the overtime charged to these particular project codes. Trooper A represented approximately 8% of the Alarm Response overtime project code (out of 276 troopers charging the project code) and 7% of the Crash Investigation overtime project code (out of 212 troopers charging the project code). Trooper A was again flagged in relation to these project codes.

Of the total overtime coded to projects during the study period, over 65% of the total amount was attributed to 3 employment titles out of 111 different titles using project codes. Sergeants were the highest at 27%, followed by Senior Trooper – Station at 25% and PSAP Emergency Communications Dispatcher II at 13%. When we considered the top 10 individuals for project code overtime, we noted that Dispatchers, particularly at Williston and Rockingham locations, make up 5 of the top 10 spots (approximately $351,000 in total overtime cost). It is our understanding that Dispatchers have been required to code overtime using project codes to

identify shift coverage and overtime to be paid for out of certain allocated funds. In addition, 4 of the top 10 are Sergeants (approximately $292,000), including Trooper A who had the highest project coded overtime pay of any DPS employee. The top 10 project code overtime earners were flagged as part of the project code analysis.

In total, the project code analyses flagged 15 individuals based on the criteria of: (1) the top 10 project code overtime earners; (2) specific analysis of the LTC; and (3) Crash Investigation and Alarm Response project codes. Trooper A was the only individual flagged in all three analyses.

6.6 Analysis of Recurring Overtime Amounts

Each record in the payroll data provided by the State included detailed information on the pay amount. Generally, one record corresponds to one payroll item on a particular day from an individual's time sheet, e.g. two hours of overtime on 1/1/20XX. Using the transactional data we were able to ascertain the number of times a particular time sheet entry was repeated over time by analyzing the pay amounts and hours for each record in the data. A general premise of anomaly detection is that amounts that recur with high frequency in a data set can sometimes be indicative of unusual activity. For example, suppose hypothetically that a DPS employee reported two hours of overtime on multiple work days each pay period. A recurring overtime activity analysis would identify those amounts that repeat over time and the individual whose payroll data demonstrated that pattern.

Our analysis identified those overtime dollar amounts that repeated multiple times in the transaction data and calculated the number of instances those amounts occurred for each respective DPS employee. We then aggregated the total number of recurring overtime instances by employee in order to evaluate an individual's overtime billing pattern for duplicate amounts against that of their peers. While there are some reasons that recurring amounts would naturally occur in the data, the magnitude by which one DPS employee's recurring overtime entries compares to another offers a useful evaluation metric.[14]

After aggregating each employee's total number of recurring overtime instances, we calculated both a department and title average in order to perform peer-to-peer comparisons. We flagged any DPS employees whose aggregate recurring overtime instances exceeded the average for their department *and* title by 50% over the study period. This resulted in 82 flagged individuals. The 82 flagged individuals have 30 different titles and represent 30 different departments. As

[14] It should be noted that certain DPS personnel are contractually eligible to receive a minimum of four hours of overtime pay for each "call-in" instance served even if the call-in lasts under four hours. Therefore, it is reasonable to expect the presence of recurring overtime amounts within the payroll data for call-in.

reflected in the table below, approximately half of the total number of flagged individuals are represented by four titles.

Table 25 – Summary of Individuals with Recurring Overtime Amounts (by Title)		
Title	**No. of Employees**	**% of Total**
Senior Trooper - Station	15	18.3%
Sergeant	13	15.9%
PSAP Emrgcy Comm Dispatcher II	7	8.5%
Trooper 1/C	5	6.1%
All Other Titles	42	51.2%
Grand Total	**82**	**100.0%**

A review of the recurring overtime payments by department indicates dispersion among various departments. The following table summarizes the flagged individuals for recurring overtime payments by department.

Table 26 – Summary of Individuals with Recurring Overtime Amounts (by Department)		
Department	**No. of Employees**	**% of Total**
DPS-FST-Training	8	9.8%
DPS-SP-LE-Rutland	6	7.3%
DPS-SP-LE-Dispatching-Willisto	6	7.3%
DPS-SP-LE-Recreation Safety Pr	4	4.9%
DPS-SP-LE-St Albans	4	4.9%
DPS-SP-LE-Dispatching-Rockingh	4	4.9%
DPS-SP-LE-St Johnsbury	4	4.9%
All Other Departments	46	56.1%
Grand Total	**82**	**100.0%**

6.7 Other Miscellaneous Payroll Activity Analyses

In addition to the procedures focused specifically on overtime, we conducted several standard forensic data analytic procedures. These procedures included: (1) searching for round dollar payroll entries; (2) searching for employees with multiple payroll identification numbers; (3) searching for multiple employees in the payroll data with common addresses; and (4) searching for employees with P.O. box addresses. These general tests did not identify any significant unexplained anomalies and did not impact the summary risk scoring.

6.8 Risk Scoring

After completing the analyses using payroll data, we analyzed the number of times that each specific DPS employee was flagged in our data tests. We assigned a risk score to reflect the number of times a test flagged each individual DPS employee. A risk score of six, for example, means that the employee was flagged on six separate analytics. The following table summarizes the risk scoring across all DPS employees from the analyses performed after the completion of the aforementioned procedures:

Table 27 - Summary of Risk Scoring for All DPS		
Risk Score	**No. of Individuals**	**% of Total**
10	1	0.1%
8	1	0.1%
7	1	0.1%
6	8	0.9%
5	10	1.1%
4	23	2.5%
3	32	3.5%
2	61	6.6%
1	171	18.5%
0	615	66.6%
Grand Total	**923**	**100.0%**

Trooper A is the individual with the Risk Score of 10.

6.9 Comparison of Payroll Data to Spillman Data

After conducting the aforementioned risk scoring analyses using payroll system data, we performed an additional procedure on certain individuals with higher risk scores to cross-reference their hours reported in the payroll system with radio activity logs from the Spillman data. For this procedure, we selected troopers having a risk score of 5 or greater (i.e. employees flagged in 5 or more tests).[15]

As noted, Spillman is the primary communications and database tool used by law enforcement and emergency response personnel at DPS, primarily the VSP. Spillman includes historical

[15] There were 21 individuals from DPS with risk scores of 5 or more (16 troopers and 5 dispatchers). However, for purposes of this analysis, Spillman data could be used to validate only trooper hours as dispatchers often spend portions of shifts manning radios and other portions taking calls from E-911. While Spillman radio log data does contain some information on the dispatcher activity interfacing with troopers when the dispatcher was on radio, it does not include records of hours spent by dispatchers on other activities, such as E-911, training, supervisory or administrative tasks. As a result, Spillman data did not represent a complete record of a dispatcher's work day.

database tables that track, among other things, records of communication between sworn officers and dispatchers, i.e. radio logs, and other data regarding incidents responded to by sworn officers.

The radio log tables in the Spillman system house records on each radio transmission between a trooper and dispatcher, as well as for each entry made by a trooper into the laptop computer system present in the trooper's automobile. Each radio log record is date and time-stamped and includes, among other things, codes regarding the activity associated with each transmission, the unit number associated with the transmission, and in some instances free form notes.

For our detailed analysis on the selected individuals, we first identified the particular unit number associated with each respective individual in order to extract that individual's radio log records.[16] From the extracted radio log records, we identified those records associated with the trooper signing on-duty and off-duty throughout a shift. We then calculated the total number of hours on-duty in a given shift day using the radio log date and time-stamping field.[17] We then compared the total number of hours in each shift day from the Spillman radio log data to the reported hours in the respective individual's time keeping records to determine if radio activity corroborated the hours reported by trooper.

From this analysis, we were able to independently corroborate the hours reported in the payroll system with those hours in Spillman radio log data for all troopers tested except for Trooper A. When comparing the shift hours calculated from Spillman to reported payroll hours for each day, we found that Trooper A's radio log activity validated on average for a given day only 84% of his hours reported, whereas all other troopers subject to this additional procedure yielded validation of at least 99% of the hours reported on average.

Due to the time intensive and complex nature of this analysis to compare Spillman data to the HCM payroll system data for each individual, we focused our analysis on those individuals with higher risk scores. Nonetheless, the results demonstrate the usefulness of Spillman data in assessing and validating reported hours. DPS could use Spillman as an effective monitoring tool on a go-forward basis if it makes modest modifications to the structure of Spillman data tables.

[16] Radio log data is catalogued by unit number and does not keep historical record of the individual trooper name assigned to that unit number at the time of the transmission. However, we were able to independently corroborate what unit number in the radio log data was associated with a particular individual trooper by comparing the radio log records to a separate table of law incidents which lists the responding unit *and* name of the responding officer by incident and day.

[17] Certain shifts cross calendar days, such as a shift from 4:30PM to 1:30AM. For purposes of this analysis, shifts that start and end on different calendar days are factored into our data query logic and considered to be one shift day.

6.10 Summary of Data Analytics

As noted, Trooper A is the individual with the Risk Score of 10. The team, however, did not design the forensic analytics to support the criminal investigation or identify specific instances of potential misconduct of Trooper A. Nonetheless, Trooper A topped the list of data anomalies.

These results validate the design of the procedures performed. Most importantly, they demonstrate the importance and usefulness of data analytics to detect overtime and, potentially, other government fraud, waste and abuse. We recommend that the DPS and other state agencies consider implementing similar forensic data analytics as a preventive and detective tool.