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EVALUATION OF 1982 SELECTIVE SPEED
ENFORCEMENT PROJECTS IN VIRGINIA

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ABSTRACT

This report describes and evaluates Virginia's FY 1982 selective speed enforcement projects. The state allocates federal monies among competing state and local police agencies to fund their efforts to reduce identified crash problems. As a condition of the state grant, the federal government requires that the effectiveness of the programs be evaluated.

Virginia devoted \$592,545 of its federal allocation for highway safety activities to selective enforcement in FY 1982. Of this amount, \$266,675 went to the Department of State Police and \$325,870 to 18 city, town, and county police and sheriff's departments. This report describes each of the 19 projects, including the project goals, proposed and conducted enforcement activity, and results achieved. The descriptions are followed by a general statistical analysis that compares selective and nonselective enforcement jurisdictions across the state.

Each project director established activity, citation, and crash goals, and the evaluations of the projects primarily compare the goals with the results. Many localities did not have a sufficient number of crashes for the computation of statistical values from which to make comparisons. Consequently, a more general chi-square analysis was used to compare crash data from all selective enforcement jurisdictions to data from all jurisdictions which had no selective enforcement projects.

The report states whether each project did or did not meet its goals and attempts to explain the results. The statistical analysis revealed that selective speed enforcement did not appear to reduce fatal, injury, or total crashes during 1982.

Following are brief findings, conclusions, and recommendations; however, the reader should consult the text to determine results and conclusions for a given project.

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FINDINGS

For the convenience of the reader, Exhibit I has been prepared to facilitate the comparison of results among the 19 localities that received 1982 selective speed enforcement grants. It focuses on changes in man-hours worked, citations issued, and crashes that occurred in each locality and indicates whether a local project met its immediate, intermediate, and ultimate goals. However, some oversimplification is unavoidable and the reader should consult the description of each project in the text of the report to determine specific results and conclusions.

A summary of findings for 18 local and 1 statewide project is presented in Exhibit I. Because no data were received for 1 local project, that project is not considered in the following general observations.

1. Of the 13 projects for which activity data were supplied, all increased their enforcement efforts using grant funds, but only 8 (62%) met the immediate goals set for man-hours to be worked.
2. The number of citations issued for speeding increased during the grant period in 12 localities, decreased in 4, and remained the same in 2. Just 56% (10 of 18) of the grant recipients met their goals for issuing citations.
3. Only 44% (8 of 18) of the projects met or exceeded their goals for reducing total crashes, though there were significantly fewer total crashes in 56% (10 of 18) of the areas.
4. Fatal crashes were reduced in 3 localities, but most localities had so few fatal crashes that no reliable trend could be determined. Injury crashes declined in 8 localities (44%), increased in 5 (28%), and remained the same in 5 (28%). Damage crashes declined in 9 localities (50%), rose in 5 (28%), and remained the same in 4 (22%).

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Exhibit 1

A Summary of Findings by Projects

COUNTIES

CITIES & TOWNS

PROJECT ADMINISTRATION:	Ashland	Emporia	Luray	Petersburg	Rocky Mount	Vinton	Virginia Beach	Wise	Charles City	Chesterfield	Franklin	Hanover	James City	Mecklenburg	Prince George	Roanoke	Surry	Sussex	State Police
Did the grant recipient submit any data for use in project evaluation?	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	N	N	Y	Y	Y	Y	Y	Y
Did the project follow a predetermined plan?	Y	Y	Y	Y	Y	Y	Y	Ø	Y	Ø	Y	Ø	Ø	Y	Y	Y	Y	Y	Y
Did the project plan use baseline data?	Y	Y	Y	Y	Y	Y	Y	Ø	Y	Ø	Y	Ø	Ø	Y	Y	Y	Y	Y	Y
Did the project identify immediate, intermediate, and ultimate goals?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Number of previous STEP grants.	0	2	4	0	2	1	0	0	1	1	1	3	0	2	2	3	1	0	-
PROJECT RESULTS:																			
Did the project meet or exceed its immediate goals for man-hours worked?	N	Y	N	Y	Y	Y	Y ¹	Ø	Y	Ø	Ø	Ø	Ø	Y	N	Ø	Y	N	N
Man-hours worked increased (+), decreased (-), or remained the same (NC).	+	+	+	+	+	+	+ ¹	Ø	+	Ø	Ø	Ø	Ø	+	NC	Ø	+	+	+
Did the project meet or exceed its intermediate goals for citations issued?	Y	N	N	Y	Y	N	Y	Ø	Y ²	Y ²	Y ²	N ²	Y ²	N ²	N	N ²	Y ²	Y	N ³
Speeding citations issued increased (+), decreased (-), or remained the same (NC).	NC	-	+	+	+	-	+ ¹	Ø	+ ²	+ ²	+ ²	+ ²	+ ²	- ²	NC	- ²	+ ²	+	+ ³
Did the project meet or exceed its ultimate goals for crash reduction?	N	Y	Y	Y	Y	N	N	Ø	N	N	N	N	Y	Y	N	N	Y	N	Y
Total crashes increased (+), decreased (-), or remained the same (NC).	+	-	-	NC ⁴	-	+	NC ⁴	Ø	NC	+ ⁴	- ⁴	- ⁴	- ⁴	- ⁴	NC	- ⁴	-	+ ⁵	-
Fatal crashes increased (+), decreased (-), or remained the same (NC).	S	S	S	S ⁴	S	S	- ⁴	Ø	S	S ⁴	-	S ⁴	S ⁴	S	S	S ⁴	S	S ⁵	-
Injury crashes increased (+), decreased (-), or remained the same (NC).	-	-	-	NC ⁴	+	+	+ ⁴	Ø	NC	+ ⁴	NC ⁴	- ⁴	- ⁴	-	-	-	-	+ ⁵	NC
Damage crashes increased (+), decreased (-), or remained the same (NC).	+	-	-	NC ⁴	-	+	NC ⁴	Ø	NC	NC ⁴	- ⁴	+ ⁴	- ⁴	-	+	- ⁴	-	+ ⁵	-

- Ø - Cannot be determined because insufficient data were provided.
- NC - Signifies a change smaller than plus or minus three percent.
- S - Sample size too small (less than 5 in either year) to indicate a reliable trend.
- Y/N - Where a locality set multiple goals for reducing crashes but met only part of its goals, Y/N signifies whether the goal for total crashes was met.
- 1. Virginia Beach's immediate goal was to purchase 8 radar units.
- 2. Convictions were used as a surrogate measure for citations since citation data were unavailable.
- 3. The State Police's intermediate goal was to reduce the percentage of motorists exceeding 55 mph from the 1979/1980 level of 39.9% to 30.0%. The 1981/1982 percentage was 30.5%, only 0.5% short of the goal. But this represents little progress in light of the low figure of the intervening 1980/1981 period, 23.9%.
- 4. Represents change on targeted roads only.
- 5. Speed-related crashes only (speeding citation issued).

CONCLUSIONS

1. Four of the 18 local projects failed to provide data for evaluation, despite repeated requests for information. Consequently, 29% (\$95,300) of the funds allocated to Virginia localities were distributed to finance projects which produced no data from which the proposed activity could be evaluated or confirmed.
2. Each of the reporting localities ostensibly followed a pre-determined plan based on prior crash or citation data. However, the baseline data provided the evaluation team were of such a general nature that location and time patterns of crashes and citations were inadequate for selecting locations for increased enforcement of speed limits. Thus, localities may have limited the increased enforcement to locations determined largely by intuition rather than science.
3. For those projects whose plan rested on adequate data, it is unclear how closely the officers followed the plan to concentrate enforcement activities, since few projects limited patrol to selected sites. Where baseline data indicated particularly appropriate times for increased enforcement of speed limits, localities seem to have attempted to schedule patrol during those times when possible.
4. Each project identified immediate, intermediate, and ultimate goals. This facilitated both independent and self-evaluation and focused attention on the proper purpose of each grant.
5. The statistical analysis comparing crashes in all current selective enforcement jurisdictions to crashes in nonselective enforcement jurisdictions revealed no selective enforcement impact on fatal crashes and a negative impact on injury crashes and total crashes. Injury crashes increased in localities with selective enforcement grants and decreased in nonselective enforcement localities. Total crashes decreased in both groups, but more in jurisdictions with no selective enforcement. Selective enforcement projects in 1982 apparently did not reduce fatal, injury, or total crashes for that year.

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RECOMMENDATIONS

1. Jurisdictions receiving a selective enforcement grant should be required to record and report accurate activity, citation, and crash data during the project period. This evaluation has established that many localities keep inadequate data or fail to report any data, despite repeated requests that they do so. Failure to report adequate data precludes the required project evaluation.
2. Selective speed enforcement grants should be awarded to localities with a documented crash problem. Some localities receiving 1982 grants could not meet project goals partly because heavy activity under prior grants had significantly reduced speed-related crashes. Grants to jurisdictions without an identifiable crash problem do relatively little to combat speed-related crashes.
3. Documentation of a crash problem should include accident and citation data for prior years. Adequate data from prior years furthers accurate responses to safety problems and should be as specific as possible in order to identify locations, days, and times when unsafe driving behavior occurs.
4. Each project should be planned and implemented according to available crash and citation data, and selective patrol should be limited to sites, days, and times presenting an identifiable problem. Concentrated enforcement should have the greatest impact on speed-related crashes.
5. Each applicant for a project grant should be required to identify immediate, intermediate, and ultimate goals. Current grant recipients established such goals upon request, and this facilitated their enforcement activities and the evaluation of their projects.

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INTRODUCTION

The Highway Safety Act of 1966(1) gives the Secretary of Transportation authority to allocate federal funds to the states for highway safety projects.(2) Among the uses to which these funds can be applied are "traffic control... [and] surveillance of traffic for detection of high or potentially high accident locations...."(3) Federal monies can thus be used for selective enforcement because it involves identifying high accident locations and responding with police patrol focusing on the cause of the accidents. The statute requires that the Secretary of Transportation establish performance criteria for selective traffic enforcement projects (STEP), and these criteria require the states to evaluate the effectiveness of the projects in reducing accidents.(4) This report presents the results of the evaluations of selective speed enforcement projects funded in Virginia during fiscal year 1981-82, the majority of which were conducted in calendar year 1982.

As provided for by the Highway Safety Act and within federal guidelines, each state decides how it will use federal monies to alleviate traffic safety problems occurring within its borders. In Virginia, the Transportation Safety Administration of the Division of Motor Vehicles (TSA/DMV) is the agency empowered to distribute highway safety funds.(5) The statute requires that at least 40% of the state's allocation of federal funds be passed on to local jurisdictions to conduct highway safety projects.(6) In addition, the federal regulations for selective enforcement projects require that the jurisdiction conducting the project identify a particular highway safety problem and take appropriate measures to reduce that problem.(7)

The federal regulations also require that each project be evaluated. They express a preference for evaluating the impact of each project in terms of reduced crashes; however, a state is required to

perform only one in-depth evaluation during each fiscal year.(8) A number of factors are at work to prevent the evaluation of each of Virginia's STEP projects individually. The projects differ as to the specificity of an accident problem they identify, and the quality of data varies dramatically between jurisdictions. As a result, the effects of all of the projects have been summed, and they are evaluated by comparing the summed data to those for the remainder of the Commonwealth. It should also be noted that this report discusses only Virginia's selective speed enforcement projects; the effectiveness of federally funded alcohol countermeasures is described in a separate report.

PURPOSE

Although each local project has its own goals, the projects together have the common goal of reducing identified accident problems. The term "selective enforcement" means that police officers select certain locations and times at which traffic laws will be stringently enforced. Normally this requires an effort complementary to the routine patrol activities conducted throughout the jurisdiction.

Ideally, the officers planning a project review accident data and identify roadways or intersections experiencing an unusually high number of crashes. Often the accident problem will be limited to certain days and times. The officers then determine the behavior of drivers that causes most of the crashes, and determine the appropriate form of police activity that will deter that unsafe behavior. For example, a highway might have a particularly high number of crashes on weekend nights caused by excessive speed; an appropriate response is to concentrate radar patrols along that road on weekend evenings.

It is postulated that selective enforcement patrols will cause the number and severity of crashes to decline. Such reductions would be evidenced first by a smaller total number of crashes and second by relatively fewer severe crashes -- fatal or personal injury -- and relatively more property damage crashes. The enforcement projects can reduce crashes in two ways: first, by identifying and ticketing unsafe drivers, and second, by informing motorists of the selective enforcement through public information campaigns to encourage compliance with the traffic laws.

Although the ideal is to limit the selective enforcement to specific highway safety problems, the projects cannot always be conducted according to the ideal. Often, a jurisdiction's police department is so taxed by other duties that its enforcement of traffic laws is of low priority. When these jurisdictions receive a grant, they cannot

conscientiously limit enforcement of traffic laws to particular locations and leave the rest of their roads unpatrolled. Instead, they use the grant to conduct general traffic patrol. In other jurisdictions, officers may be aware of particular traffic problems which are not identified through accident data. The officers usually will patrol these areas in addition to ones with a disproportionate number of crashes. Finally, some jurisdictions do not have sufficient data from previous years which are detailed enough for the identification of specific crash problems. Again, these jurisdictions perform more general patrol.

PROJECT EVALUATIONS

The remainder of the report is in two major parts. First, the evaluations of the local projects are presented. Each local project is described in terms of the accident problem identified and the patrol activity proposed as a response to the problem. (After identifying a problem, each project director set goals ex ante to increase patrol activity, to increase the number of citations issued, and to decrease accidents.) The descriptions then compare the project results with the ex ante goals to determine the effectiveness of the project. Where a project did not attain its goals, reasons for this are considered.

The second major part presents the results of a statistical analysis conducted to determine the effectiveness of the projects. It would have been preferable to analyze each project individually; however, such an evaluation would not be meaningful, because accidents and citations, which are the only objective means of evaluating a project, are rare events. Each jurisdiction has relatively few accidents; hence, it is quite difficult to establish that a given change is statistically significant. To overcome this problem, the observed data from all selective enforcement jurisdictions were summed for a single statistical analysis. As described in detail later, the analysis compared data for these STEP jurisdictions with data for the remainder of the state, exclusive of locales that had selective enforcement projects before the current grant period, through the use of the chi-square statistical test.

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DESCRIPTIONS OF PROJECTS

Town of Ashland

Ashland is located in east-central Virginia and has a population of approximately 4,700. There are 2,500 registered vehicles in the town. Interstate 95 is adjacent to Ashland, and U.S. 1, which parallels I-95, passes through its town limits.

Problem Statement

In 1979, Ashland had 301 automobile crashes. Although this number had declined to 231 in 1981, the crashes had become relatively more severe. In 1980, 8.7% of all accidents resulted in a fatality or an injury, but this figure rose to 11.3% in 1981. This increase of 2.6% occurred during a period when the severity ratio statewide increased only 0.6%. Ashland authorities estimated that the economic loss from automobile crashes within the town limits during 1981 totalled \$1.5 million.

The accident problem is concentrated in Ashland's business district, an area designated Patrol Area 3. The police department estimated that in 1979 approximately 44% of the town's automobile accidents occurred in the business district. By 1981, this percentage had risen to approximately 46%.

Proposed Activities

Ashland received a grant of \$16,000 and proposed to use the money to hire a traffic safety officer. This officer was to review Ashland's crash problem and devise a patrol schedule. Although he would not be limited to patrolling any particular part of the town, he was expected to concentrate his activity in Patrol Area 3.

Project Goals

- Ultimate : 1. To reduce injury crashes by 15%.
- 2. To reduce all crashes by 15%.
- Intermediate : 1. To issue 20% more traffic citations.
- Immediate : 1. To work 2,000 hours of selective enforcement.

Conducted Activities

Ashland hired a traffic safety officer, and he began work on March 1, 1982. Although he occasionally responded to emergencies, he devoted nearly all of his time to enforcing the traffic laws. He established a patrol schedule with four shifts: (1) a split shift from 6:00 a.m. to 10:00 a.m. and 4:00 p.m. to 8:00 p.m.; (2) 5:00 p.m. to 3:00 a.m., emphasizing the detection of persons driving under the influence (DUI); (3) 9:00 p.m. to 5:00 a.m., emphasizing DUI; and (4) 12:00 noon to 8:00 p.m. The split shift was scheduled primarily for weekdays to respond to morning and afternoon rush-hour traffic, and the other shifts, particularly the two emphasizing DUI, were scheduled for weekends.

The traffic safety officer conducted 758 hours of selective enforcement, and the remainder of the Ashland Police Department devoted only 1,060 man-hours to regular traffic patrol in 1982. The selective enforcement grant allowed the town to increase total traffic patrol man-hours by 71.5%. Table 1 shows the hours of selective enforcement activity carried out under this grant. From the table it can be seen that the bulk of the activity, 456 hours, or 60.2%, was conducted during March, April, and May. The numbers of hours of patrol during the four time schedules were not reported.

Table 1

Monthly Man-hours of Selective Enforcement in Ashland During 1982

<u>Month</u>	<u>Hours</u>
January	*
February	*
March	176
April	140
May	140
June	60
July	70
August	44
September	24
October	36
November	42
December	26

*The grant did not begin until March 1982

Project Results

Ashland's immediate goal was to provide 2,000 hours of selective patrol. As discussed above, the traffic safety officer performed 758 hours. This figure is small because the officer devoted much of his time to being in court, thus reducing the time he could spend in the field. The Ashland Police Department worked only 1,818 man-hours of combined regular traffic patrol and selective enforcement. This indicates that the project planners were unduly optimistic concerning the expected number of STEP man-hours to be worked.

The town's intermediate goal was to increase the number of citations issued by 20%. Table 2 shows the number of citations issued in Ashland from 1979 through 1982. In 1981, the Ashland Police Department issued 796 citations: 373 for speeding, 37 for DUI, and 386 for other violations. In 1982, the police issued 1,095 citations: 369 for speeding, 146 for DUI, and 580 for other violations. While there was a 37.6% increase in the total number of citations issued, there was no change in the number of citations issued for speeding. The table demonstrates that the Police Department issued more citations in each of the last 4 years; there was a 92.5% increase in citations between 1979 and 1980 and a 2.8% increase between 1980 and 1981. Over the 4-year period, citations for speeding increased 92.2%, and citations for all violations rose 172.4%. Thus, Ashland has shown an increasing commitment to highway safety.

Table 2

Citations Issued in Ashland By Violation
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	192	208	373	369
DUI	*	*	37	146
Other	*	*	386	580
Total	402	774	796	1,095

* Data not available

Ashland's ultimate goals were to reduce all crashes by 15% and injury crashes by 15%. Table 3 shows the number of crashes in Ashland

from 1979 through 1982. Personal injury crashes fell from 25 in 1981 to 24 in 1982, a 4% decline, and the number of total crashes increased 5.2%, from 231 in 1981 to 243 in 1982. Thus, Ashland met neither of its ultimate goals. Following the significant drop in crashes between 1979 and 1980, from 301 to 243, the total number of crashes in Ashland remained relatively constant for the 3-year period 1980-1982. As Table 2 shows, 1980 was the year with the greatest increase in citations. Although the total number of accidents did not decline in 1982, the severity of crashes did. In 1981, 11.3% of the accidents involved a fatality or injury and in 1982 this figure was 9.9%. Thus, the total number of accidents reached a plateau in 1980 and was largely unaffected by the town's selective enforcement project, but the project may have had an impact on crash severity.

Table 3

Crashes in Ashland 1979-1982				
<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	0	1	1	0
Injury	39	20	25	24
Property Damage	<u>262</u>	<u>222</u>	<u>205</u>	<u>219</u>
Total	301	243	231	243

Conclusion

Although the selective enforcement grant allowed Ashland to increase its traffic safety patrol activity 71.5% and to issue 37.6% more citations for infractions of traffic laws, the town did not reduce the total number of crashes nor the number of injury crashes. However, crash severity declined marginally in 1982 after increasing from 1980 to 1981. It appears that accidents did not decline during the project period because a plateau had been reached after a dramatic reduction in 1980. This fall accompanied the rapid increase in the number of citations issued that year. Although the number of citations issued in subsequent years continued to rise, accident levels remained relatively constant. Thus, it appears that a greater emphasis on traffic safety by Ashland's police force in 1980 made it difficult for the current selective enforcement grant to have an impact on the locality's highway safety problem.

City of Emporia

The city of Emporia has a population of 4,823 and is located in southeastern Virginia near the North Carolina border. It had received two selective enforcement grants prior to the 1982 grant, one in 1979 and the other in 1981. Under the prior grants, selective enforcement activity was carried out for a 15-month period between 1979 and 1981. There were 2,870 vehicles registered in Emporia in 1979 and 2,948 in 1981. Three major highways -- Interstate 95, U.S. 58, and U.S. 301 -- cross through the city.

Problem Statement

Because Emporia is a relatively small city, its police department does not have a traffic division. The officers enforce the traffic laws as part of their overall duties, and no special attention is given to this aspect of work. Emporia acquired its first two selective enforcement grants for the purpose of increasing traffic law enforcement.

The first project took place from January through May 1980. During this period, the number of total crashes declined 46.2% as compared to the number for the same period in 1979. Following the termination of this project in May, the number of total accidents for the remaining 7 months of 1980 increased by 11% over the 1979 level.

During the second selective enforcement project, which began in March 1981 and terminated in January 1982, the number of crashes did not decline from the 1980 level, but there were significantly fewer crashes than in 1979. This is an indication that the first project reduced the number of accidents to a level where the second project had little chance for achieving any further significant reduction. The current project began immediately following termination of the second one.

Most of Emporia's crashes occur on U.S. 58 and U.S. 301. In 1981, 25.6% of all crashes occurred on Fridays, 16.8% on Thursdays, and 15.2% on Saturdays. The percentages peaked during the morning and evening rush hours; 15.2% of all crashes occurred between 8:00 and 10:00 a.m. and 22.4% from 4:00 to 6:00 p.m. The greatest percentage for any 2-hour period was the 8.0% for the 4:00 to 6:00 p.m. period on Fridays. According to the police department, the most significant cause of the crashes was failure to yield the right-of-way, which accounted for 31.2% of the accidents in 1981. The next two most common causes were following too closely and speeding, which accounted for 12.0% and 8.8%, respectively.

Proposed Activities

Emporia received \$10,000 for the 1982 project, with the funds to be used to pay off-duty officers to conduct selective enforcement patrol activity. This is the same approach the city used during its previous projects. The sole responsibility of these officers was to enforce traffic laws within the city limits.

Neither the days, hours, nor locations of the enforcement activity were fixed. The city police department indicated that the patrol schedules could not be fixed because the use of off-duty officers limited the flexibility of the program, and the locations could not be fixed because Emporia had little regulation of traffic other than through the selective enforcement projects. The project planners did not believe that all of the city's traffic patrol activity should be concentrated in a few locations at the expense of the remainder. Instead, they hoped to schedule most of the selective enforcement on Thursday, Friday, and Saturday during daylight hours. The police department has a map on which all of Emporia's accidents are plotted, and officers were expected to choose the location for their selective enforcement activities according to the accident patterns displayed on the map.

Project Goals

- Ultimate : 1. To reduce injury crashes by 15%.
- 2. To reduce total crashes by 15%.
- Intermediate : 1. To increase the number of speeding citations issued by 10%.
- Immediate : 1. To provide 600 hours of selective enforcement activity.

Conducted Activities

As noted earlier, this is Emporia's third selective enforcement project grant. Table 4 shows the man-hours of selective enforcement activity conducted from 1980 through 1982. Emporia's current grant began in February 1982, immediately after completion of its 1981 grant. From February through December, Emporia conducted 1,048 hours of selective enforcement activity. Although there was some activity each month, 948 hours, 90.4% of the total, took place from February through September. During the current grant period, Emporia police officers issued a total of 362 citations, 343 for speed limit violations.

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Table 4

Monthly Man-hours of Selective Enforcement in Emporia
1980-1982

<u>Month</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
January	49	*	81
February	46	*	123
March	46	23	124
April	89	73	146
May	27	130	125
June	*	127	115
July	*	112	130
August	*	85	93
September	*	113	92
October	*	139	9
November	*	57	37
December	*	80	54
Total	257	939	1,129

* No selective enforcement

The activity was conducted by off-duty officers working overtime, and, except for emergencies, their duties were limited to the enforcement of traffic laws. They conducted their activities throughout the city rather than at specific locations, but adjusted their activities according to the crash patterns disclosed by the map on which accident sites were marked. As a result, much of the enforcement activity was concentrated on U.S. 58 and U.S. 301. Most of the accidents occurred on Thursdays, Fridays, and Saturdays during rush hours, and the selective enforcement was scheduled accordingly. The enforcement was concentrated on Thursdays and Saturdays from 9:00 a.m. to 6:00 p.m., and on Fridays from 9:00 a.m. to 11:00 p.m.

Project Results

Emporia's immediate goal was to conduct 600 hours of selective enforcement activity. As shown above, the police department was actually able to provide 1,048 hours, exceeding its goal by nearly 75%. The primary reason the city could provide so many hours is that it used regular officers working overtime to carry out the project rather than hiring a special officer.

The city's intermediate goal was to increase the number of speeding citations by 10%. The city did not, however, keep citation data during periods when it was not conducting a selective enforcement project. Thus, the citation goal must be measured using data from March through December of each year. Table 5 shows the number of citations issued in 1981 and 1982. From March through December 1981, Emporia's police department issued 382 total citations, 378 of them for speeding. During this same period in 1982, they issued 325 total citations, including 307 for speeding. Thus, total citations fell 14.9%, and speeding citations declined 18.8%. One explanation for the reductions may be that selective enforcement had been conducted under a previous grant throughout the 11 months preceding the current project and Emporia's residents may have driven more cautiously during the current grant period. Unfortunately, the extent to which the increase in citations issued in 1981 under the first grant may have induced greater subsequent voluntary compliance with the traffic laws cannot be determined for lack of data for the period prior to 1981.

Table 5
Citations Issued in Emporia by Month
1981-1982

<u>Months</u>	<u>Speeding</u>		<u>All Citations</u>	
	<u>1981</u>	<u>1982</u>	<u>1981</u>	<u>1982</u>
January	*	21	*	21
February	*	36	*	37
March	21	47	21	49
April	44	45	44	47
May	53	37	54	37
June	56	43	56	45
July	44	47	45	49
August	22	40	22	50
September	45	15	45	15
October	44	5	45	5
November	35	12	35	12
December	<u>14</u>	<u>16</u>	<u>15</u>	<u>16</u>
Total	378	364	382	383

* Not available

1891

Emporia's ultimate goals were to reduce both injury and total crashes by 15%. Table 6 shows the number of accidents in Emporia for the 1979 through 1982 period. Over the 4-year period, the number of personal injury accidents remained relatively constant, ranging from a high of 37 in 1981 to a low of 35 in 1979 and 1982. The number of total accidents was reduced by 29.1%, from 141 in 1979 to 100 in 1982. When only the 11-month project periods are used for comparisons, a decrease in crashes is also shown. Injury accidents declined 20%, from 35 in 1981 to 28 in 1982. Similarly, total crashes declined 25.9%, from 108 to 80. Thus, Emporia met both of its crash reduction goals during the project.

Table 6

Crashes in Emporia
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	1	0	0	1
Injury	35	36	37	35
Property Damage	<u>105</u>	<u>83</u>	<u>81</u>	<u>64</u>
Total	141	119	118	100

Conclusion

As a result of Emporia's previous grants, accident levels have been on the decline for the past 4 years. The use of annual data does not show a drop in injury accidents during this 4-year period, but the use of monthly data to compare the current project period with the same period in 1981 shows that both injury and total accidents declined. It cannot be determined, however, how much of this decline can be attributed to the current project. First, the change in the number of citations issued cannot be measured due to a lack of data for the period prior to 1981. It is postulated that the issuance of citations increased during periods of selective enforcement, and thereby changed driving behavior, but this hypothesis cannot be tested. Second, with so few injury accidents in Emporia, any observed change could be a random fluctuation. While it appears that the current grant did reduce total accidents, the extent of this drop attributable to the project cannot be determined.

-1892

Town of Luray

Luray is a small town located in north-central Virginia. There are caverns and mountains nearby which attract a significant number of tourists to the area, particularly during the summer and fall. It is the only jurisdiction in Page County in which alcohol can be legally purchased by the drink.

Problem Statement

Because of the heavy influx of tourists, traffic congestion develops near the motels, restaurants, and a shopping center at the east end of town. Accidents tend to be concentrated in these congested areas, but they rarely involve serious injury. The town began selective enforcement in 1978, and each year thereafter the numbers of crashes have been reduced dramatically (see Table 7). In 1979, there were 146 accidents, 21 of which involved injuries. In 1980, the number of total crashes was reduced 38.4% to 90 and personal injury crashes 19.0% to 17. The trend continued through 1981, when the number of total crashes was reduced another 7.8% to 83. Thus, Luray's accident problem appears to have been very responsive to selective enforcement.

Table 7

Crashes in Luray
1979 - 1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	0	0	0	0
Injury	21	17	25	17
Property Damage	<u>125</u>	<u>73</u>	<u>58</u>	<u>34</u>
Total	146	90	83	51

Proposed Activities

For 1982, Luray received a grant of \$13,000 to continue selective enforcement of the traffic laws. In its previous projects, Luray had used off-duty officers to conduct the selective enforcement activities, and the current grant was to be conducted in the same way. Although project activity was not limited to particular locations, the officers were expected to devote significant attention to the congested areas on the east end of town. Selective enforcement officers were also expected

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to respond to citizen complaints related to traffic problems. Most of the selective enforcement was to take place on weekends between 2:00 p.m. and 2:00 a.m.; however, special enforcement activity was also scheduled for significant public events.

Project Goals

- | | | | |
|--------------|---|----|---|
| Ultimate | : | 1. | To reduce total crashes by 12%. |
| Intermediate | : | 1. | To increase the number of speeding citations by 15%. |
| | | 2. | To increase the total number of citations by 15%. |
| Immediate | : | 1. | To provide 1,500 hours of selective enforcement activity. |

Conducted Activities

In 1982, the Luray Police Department conducted 1,228 hours of selective enforcement patrol and 10,510 hours of regular traffic patrol. Luray did not rely solely on the federal grant to provide traffic law enforcement; instead, it used the grant to supplement traffic patrol by 11.7%. This demonstrates Luray's continuing dedication to traffic safety.

Table 8 shows the man-hours of selective enforcement in Luray from 1979 through 1982. During the current grant period, 76.1% of the selective enforcement activity took place between June and October. This corresponds to the tourist season, which begins with summer visitors to the mountains and caverns and reaches a peak with the autumn colors in October.

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Table 8

Monthly Man-hours of Selective Enforcement in Luray
1979-1982

<u>Month</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
January	3	57	*	*
February	20	107	*	*
March	*	72	133	78
April	21	115	106	59
May	107	128	53	74
June	218	100	78	104
July	446	113	231	117
August	451	162	265	163
September	14	226	168	237
October	*	*	154	314
November	*	*	*	63
December	*	*	*	19
Total Selective Enforcement	1,280	1,080	1,188	1,228
All Traffic Patrol**	10,314	14,368	11,872	11,738

* No selective enforcement
 ** Includes selective enforcement

The 1982 project was conducted as planned. Although the selective enforcement officers were not limited to particular locations, they spent much of their time patrolling the congested east side of town and locations where citizens had complained of traffic safety problems. Most of the patrol activity was conducted on weekends, in the afternoons and evenings, because most tourists visit Luray on weekends and because many Page County residents go to town on Friday and Saturday evenings for a "night on the town."

Project Results

Luray's immediate goal was to provide 1,500 hours of selective enforcement. By providing only 1,228 hours in 1982, it fell short of

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the goal by 18%. This project was similar to others throughout the state in that it used off-duty officers rather than establish a new position to carry out project activities. Computing the project cost at \$10.57 per man-hour of selective enforcement may have led the planners to be overly optimistic about the amount of patrol that could be performed under this grant. As Table 8 shows, Luray has not conducted more than 1,280 hours of selective enforcement in any of the 4 years for which they have received grant funds.

Luray's intermediate goals were to increase the number of citations issued for speeding and the total number of citations by 15%. Table 9 shows the number of citations issued from 1979 through 1982. Over this 4-year period, there were declines in the numbers of citations issued for each category of data shown. The total number of citations fell from 380 in 1981 to 308 in 1982, while citations for speeding rose from 83 to 86, a 3.6% increase. Thus, Luray did not meet either of its intermediate goals for the 1982 project. It is not clear why the number of citations fell. The three prior selective enforcement grants may have led to greater voluntary compliance with the traffic laws by area residents in 1982. Table 8 shows that except for 1980, the total number of man-hours of traffic safety patrol varied little over the 1979 - 1982 period. Citations declined during the year following the heavy patrol activity in 1980; however, they also declined in 1982. Further, the 38.4% decline in citations from 1980 to 1981 exceeds the 17.4% decline in traffic safety patrol. This enforces the theory that the decline in citations cannot be entirely attributed to less patrol, and it indicates that voluntary compliance with the traffic laws may have increased after 1980.

Table 9

Citations Issued in Luray by Violation
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	153	187	83	86
Reckless Driving	138	123	73	46
DUI	84	78	72	61
Other	<u>173</u>	<u>229</u>	<u>152</u>	<u>115</u>
Total	548	617	380	308

Luray's ultimate goal was to reduce the total number of crashes by 12%. The data previously shown in Table 7 give the number of accidents in Luray from 1979 through 1982. There were 83 accidents in 1981, and

this declined 38.6% to 51 in 1982. Moreover, this is only part of a steady decline in the total number of accidents since a high of 146 in 1979. There was a 65% decline in the number of accidents in Luray from 1979 to 1982. Because Luray's police chief emphasizes the importance of reporting accidents for insurance purposes, this decline is not caused by less stringent reporting policies. During this same 1979-1982 period, the number of accidents occurring statewide declined only 12.6%.

Conclusion

Luray has conducted selective enforcement activity since 1979. During 1981 and 1982, the police department conducted nearly 12,000 total hours of traffic safety patrol, and in 1980 14,368 hours were performed. Selective enforcement activities accounted for approximately 10% of the total hours worked. While selective and total hours of patrol remained relatively constant during these years, the numbers of citations issued for speeding, reckless driving, DUI, and other declined, as did the total number of citations. Moreover, accidents declined significantly in 1980, and they continued to decline in 1981 and 1982, even though fewer citations were issued. This could indicate that the earlier projects had made local residents more aware of unsafe driving behaviors and that they responded with greater voluntary compliance of the traffic laws. Thus, it appears that Luray's past and current grants have reduced accidents in the town.

-1898

City of Petersburg

Petersburg is a city of approximately 41,000 people located in east-central Virginia. In 1982, there were 24,675 registered vehicles in Petersburg. Besides the many major streets in the city, Interstate 95 goes through the eastern city limits.

Problem Statement

Petersburg's highway safety problem is concentrated on four city streets: Washington, Sycamore, Wythe, and Crater. These four streets accounted for over a third of all of Petersburg's crashes during each of the 3 years (1979-1981) prior to this project. The city-wide percentage of crashes involving death or injury remained relatively constant at 19% during this same period, but has steadily increased on these four streets. In 1979, 17.7% of all accidents on the four targeted streets involved a death or injury, and this rose to 25.8% in 1980 and to 27.3% in 1981.

According to data tabulated by the city police department, speed contributed to 25% of the city's injury accidents and 40% of the fatal accidents in 1980. Moreover, the death rate jumped from 6.9 in 1979 to 16.3 in 1980.

Proposed Activities

Petersburg received a grant of \$26,508 in 1982 to hire two full-time traffic safety officers, thus giving the city 80 man-hours of selective enforcement per week. The officers were to focus their enforcement activity on Washington, Wythe, Crater, and Sycamore streets, but they were not limited to particular days or times. The current grant was for the first year of a planned 2-year project.

In addition, Petersburg planned to coordinate the enforcement activities with a public information program to increase awareness of the city's traffic safety problems. This program was to have two components: (1) a public information and education campaign to describe the locations and causes of most of the city's accidents, and (2) the purchase of a radar unit with a large digital display to allow motorists to observe their vehicle speed as they drove through the check sites. By making the public more aware of the accident problem, the city hoped to increase voluntary compliance with the speed limits.

Petersburg also received an alcohol enforcement grant in 1982. Although the alcohol project is evaluated separately, it was conducted

in conjunction with selective speed enforcement as part of an overall traffic safety program.

Project Goals

- Ultimate : 1. To reduce the total number of crashes on the four streets by 10%.
2. To reduce injury accidents on the four streets by 10%.
3. To reduce, over a 2-year period, these four streets' share of Petersburg's accidents from 53% to 22%.
- Intermediate : 1. To increase citations issued for speeding by 10%.
- Immediate : 1. To provide 3,000 hours of selective speed enforcement.

Conducted Activities

In 1982, Petersburg conducted 3,428 man-hours of selective enforcement. As Table 10 shows, these hours were relatively evenly distributed by month throughout the year, although they varied from 320 in April to 248 in July. This even distribution of man-hours worked was possible because the city hired two traffic safety officers whose primary duty was to conduct selective enforcement, rather than using off-duty officers to perform project functions. The numbers of man-hours of selective enforcement worked on each day of the week are shown in Table 11. Although Petersburg conducted selective enforcement on every day of the week, most activity was concentrated on Thursdays, Fridays, and Saturdays. These three weekdays accounted for 54.7% of the project's selective enforcement activity.

Table 10

1982 Monthly Man-hours of Selective Enforcement in Petersburg

<u>Month</u>	<u>Man-hours</u>
January	288
February	264
March	308
April	320
May	272
June	264
July	248
August	288
September	272
October	312
November	296
December	<u>296</u>
Total	3,428

Table 11

1982 Daily Man-hours of Selective Enforcement in Petersburg

<u>Day</u>	<u>Man-hours</u>
Sunday	308
Monday	312
Tuesday	472
Wednesday	464
Thursday	632
Friday	624
Saturday	<u>624</u>
Total	3,436

Table 12 contains figures on total traffic patrol man-hours worked by the entire police department rather than the hours worked by the two selective enforcement officers. These figures show that 39.0% of Petersburg's general traffic patrol was performed between noon and 4:00 p.m. and 24.0% during the 8:00 a.m. to noon and 4:00 p.m. to 8:00 p.m. periods. For the most part, general traffic law enforcement is a daytime activity in Petersburg.

-1902

Table 12

1982 Hourly Man-hours of Traffic Law Enforcement in Petersburg

<u>Time</u>		<u>Man-hours</u>
Midnight	- 4:00 a.m.	0
4:00 a.m.	- 8:00 a.m.	240
8:00 a.m.	- Noon	2,400
Noon	- 4:00 p.m.	3,840
4:00 p.m.	- 8:00 p.m.	2,400
8:00 p.m.	- Midnight	<u>960</u>
Total		9,840

Petersburg's selective enforcement patrol was not limited to particular locations at particular times. Instead, the police department identified high accident times and had a selective enforcement officer on duty at those times. This officer then patrolled different locations throughout the city while giving special attention to the four targeted streets.

The city implemented the public awareness program proposed in the grant application. It purchased a radar set that allowed motorists to observe their speed. In addition, the police department prepared newspaper articles and radio spots publicizing the city's highway safety problems. According to the project director, the public information program was well received.

Project Results

Petersburg's immediate goal was to provide 3,000 hours of selective enforcement. As shown in Table 10 above, Petersburg actually provided 3,428 hours, surpassing its goal by 14.3%. The average cost per man-hour was \$7.73.

Petersburg's intermediate goal was to increase citations for speed limit violations 10%. Table 13 shows the number of citations issued from 1979 through 1982. The police department issued 6,156 citations in 1981 and 5,852 in 1982. While the total number of citations decreased between 1981 and 1982, citations for speeding increased 45.0%, from 1,645 to 2,385. The intermediate goal of this selective enforcement project was substantially exceeded.

-1903

Table 13

Citations Issued in Petersburg By Violation
1979 - 1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	3,536	2,224	1,645	2,385
Reckless Driving	396	314	289	206
DUI	604	359	537	697
Other	<u>3,949</u>	<u>3,849</u>	<u>3,685</u>	<u>2,564</u>
Total	8,485	6,746	6,156	5,852

All three of Petersburg's ultimate goals dealt with crash reduction in four identified areas. Table 14 contains figures on the number of crashes occurring on the four targeted streets as well as city-wide totals. As the table shows, there was no real change in the number of injury and total crashes in the four targeted areas from 1981 to 1982. Injury accidents increased from 165 to 166 and total accidents declined from 620 to 618. Thus, during the first year of this project, the city did not meet its total and injury crash reduction goals. The city considered the current grant as the first year of a 2-year program, and it intended its goals to be measured accordingly. Over the 2-year period 1981 - 1983 injury accidents declined 22.8% and total accidents declined 18.4%. While there was no change during the first year of the project, measuring the number of crashes over 2 years shows that Petersburg met these two ultimate goals.

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Table 14

Crashes on Targeted Streets and City-wide in Petersburg
1979-1983

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>
Targeted Streets					
Fatal	0	1	4	2	1
Injury	131	158	165	166	157
Property Damage	<u>609</u>	<u>457</u>	<u>451</u>	<u>450</u>	<u>348</u>
Total	740	616	620	618	506
City-wide					
Fatal	1	6	7	5	7
Injury	379	355	338	495	492
Property Damage	<u>1,593</u>	<u>1,457</u>	<u>1,459</u>	<u>1,162</u>	<u>895</u>
Total	1,973	1,818	1,804	1,662	1,394
Percentage of Total on Targeted Streets					
	37.5%	33.9%	34.4%	37.2%	36.3%

The third ultimate goal was to reduce the percentage of the city's total accidents occurring on the targeted roads. The police department originally believed that these streets had 53% of the city's accidents; however, an error in the computer program that compiled the crash statistics was discovered. A recompilation of the city-wide statistics determined that these four roads accounted for only 34.4% of the total crashes in 1981. This percentage increased slightly over the 2 years of the program to 36.3% in 1983. Because of the data error, it would not be appropriate to evaluate this goal.

Conclusion

Petersburg's project integrated selective speed enforcement, selective alcohol enforcement, and a public information campaign. The first year of the program allowed the city to nearly double the amount of traffic safety activity it conducted. Although the total number of citations declined during this year, citations for speeding rose 45.0%. The accident statistics for the targeted streets showed virtually no

1905

change during the first year of the program, but injury and total accidents showed a rapid decline during the second year. The proportion of the city's accidents on targeted roads increased slightly during the 2 years, indicating that the number of accidents city-wide declined more than did the number on targeted streets. Thus, the impacts of this project are mixed. To the extent that it may have had spillover effects on the remainder of the city, it appears that there was a beneficial impact. The project did not, however, improve the accident problem on the targeted streets.

1906

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Town of Rocky Mount

The town of Rocky Mount has a population of approximately 4,500 and is located in southwestern Virginia. Two major highways, U.S. 220 and Route 40, pass through the town limits. The town is only 10 miles from Ferrum College, which has 1,300 students, and is the county seat of Franklin County.

Problem Statement

In 1979, Rocky Mount had a total of 207 accidents. The number of crashes declined significantly as a result of patrol activity funded by 1980 and 1981 selective enforcement grants. In 1980, the number of total crashes was reduced 19.3% to 167 and remained near that level in 1981, with 174. Thus, the number of crashes in the 2 years with selective enforcement was significantly lower than in the previous year.

Not only did the number of crashes decline during the 1980-81 grant period, but crash severity declined as well. In 1979, the year without selective enforcement, 20.3% of the crashes involved injury or death. In 1980, this was reduced to 16.8%, and was it further reduced to 15.5% in 1981. Thus, earlier selective enforcement projects appear to have led to a reduction in both the total number and the seriousness of crashes.

Proposed Activities

For 1982, Rocky Mount received a grant of \$9,600. The police department planned to use the grant funds to hire a full-time traffic safety officer. Although he was not expected to limit his activities to specific locations, days, or hours, the traffic safety officer was expected to target his enforcement activities on the town's accident problem. Accordingly, most of the patrol activity was scheduled for the 4:00 p.m. to midnight period. The officer was expected to emphasize patrol on U.S. 220 and Route 40. In addition, Rocky Mount planned to have a public information campaign of "safety talks" to be presented to local groups. These safety talks would emphasize Rocky Mount's highway safety problem and explain the selective enforcement campaign.

Project Goals

- Ultimate : 1. To reduce the total number of accidents by 10%.
- 2. To reduce the number of personal injury accidents by 10%.

- Intermediate : 1. To increase the number of citations for speeding by 20%.
- Immediate : 1. To provide 1,200 hours of selective enforcement of speed limits during the project.
2. To give 40 safety talks.

Conducted Activities

As planned, Rocky Mount used the grant to hire a full-time traffic safety officer. He began his selective enforcement activities in July 1982, and he worked approximately 160 hours a month from July through December. He continued to work in 1983, but data for that year are not available. The selective enforcement activity increased the amount of traffic safety patrol by approximately 15% in 1982.

The selective enforcement officer conducted his activities as he saw necessary. Although his activities were not limited to particular locations, days, or times, he usually patrolled from 4:00 p.m. to midnight. Stationary radar patrol was the primary method used to detect violations of speed limits.

Project Results

Rocky Mount's immediate goal was to conduct 1,200 hours of selective enforcement. Because the data were furnished by calendar year rather than for the project period, it cannot be determined whether Rocky Mount met this goal. The town estimates, however, that the officer conducted 960 hours of selective enforcement in the last 6 months of 1982. Because the officer continued his activities after January 1, 1983, it is likely that he performed the 240 remaining hours necessary to meet the 1,200 man-hour goal.

The town's intermediate goal was to increase the number of citations issued for speeding by 20%. The number of citations issued from 1979 to 1982 is shown in Table 15. The number of citations for speeding rose from 57 in 1981 to 279 in 1982, for nearly a fivefold increase. Thus, Rocky Mount far surpassed its intermediate goal. Of the 279 citations issued in 1982, 97.1% were issued during the 6 months of the grant period. Similarly, 75.9% of all traffic citations in 1982 were issued during the grant period.

1909

Table 15

Citations Issued in Rocky Mount by Violation
1979 - 1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	44	121	57	279
Reckless Driving	27	32	35	26
DUI	42	42	36	42
Other	<u>153</u>	<u>88</u>	<u>132</u>	<u>22</u>
Total	266	283	260	369

Rocky Mount's two ultimate goals were to reduce all crashes and personal injury crashes by 10% each. The numbers of crashes in Rocky Mount from 1979 through 1982 are shown in Table 16. From 1981 to 1982, total accidents were reduced from 174 to 147, a 15.5% decline, and personal injury crashes increased from 26 to 34, a 46% increase. Thus, Rocky Mount met its goal of reducing all crashes but did not reduce personal injury crashes.

Table 16

Crashes in Rocky Mount
1979 - 1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	0	1	1	1
Injury	42	27	26	34
Property Damage	<u>165</u>	<u>139</u>	<u>147</u>	<u>112</u>
Total	207	167	174	147

It is not clear why these two trends would go in opposite directions. The number of personal injury accidents has fluctuated between 42 and 26 over the 4-year period (see Table 16). When a community has so few crashes, any random fluctuation can represent a large percentage change. As a result, with a town the size of Rocky Mount, personal injury crashes are not a particularly good measure of highway safety trends. On the other hand, the total number of crashes

-1910

steadily declined between 1979 and 1982. In 1979, there were 207 accidents, and this fell 29.0% by 1982. Of this decline, nearly half occurred between 1981 and 1982. Thus, the largest decline in the total number of Rocky Mount's crashes took place during the current grant period.

Conclusion

Rocky Mount's selective enforcement program led to a rapid increase in the number of citations issued in 1982. The total number of crashes declined from the 1981 level though personal injury crashes increased; therefore, the results of the project are inconclusive. It is likely, however, that the change in injury crashes is a random fluctuation. Because the town has so few injury crashes, these crashes may be a poor measure of highway safety in Rocky Mount. If injury crashes are excluded from consideration, then Rocky Mount's selective enforcement program met its crash reduction goal.

-1911

Town of Vinton

The town of Vinton has a population of approximately 10,000 people and is located in southwestern Virginia. It borders Roanoke, a city of nearly 100,000 persons. It is also located between I-81 to the north and several recreational areas to the south and serves as a corridor for out-of-town travelers. The current selective enforcement grant is Vinton's second consecutive project.

Problem Statement

For a town of its size, Vinton has an unusually high number of crashes. In 1979, there were 189 reportable accidents, 32 of which involved injuries. In 1980, the number of crashes remained relatively constant at 182, but the number involving injuries rose to 43. The percentage of accidents involving injuries increased from 16.9% of all accidents in 1979 to 23.6% in 1980.

Vinton has identified four streets that have a particularly serious highway safety problem: (1) Route 24, which is the primary east-west route and carries 19,000 vehicles a day, (2) Route 634, which carries traffic to the recreational lakes 20 miles south of Vinton and has an average daily volume of 6,400 vehicles, (3) Gus Nicks Boulevard, between Routes I-581 and U.S. 460 and the town, which carries approximately 14,000 vehicles a day, and (4) Washington Ave., which has a daily volume of 15,000 vehicles. The Department of Highways and Transportation projects that the town's traffic volume will increase significantly, especially during the spring and summer months.

Proposed Activities

Vinton received a grant of \$8,907 and planned to use the funds to pay the salary of a traffic safety officer. Because Vinton had had a previous grant, the officer hired in 1981 was to be retained. In addition, Vinton planned to hire a second traffic safety officer using local funds, thus doubling the selective enforcement coverage.

With the two officers, Vinton expected to provide selective enforcement from 7:00 a.m. to 11:00 p.m. The officers would be encouraged to patrol the four streets mentioned above, but their activities were not to be limited to those streets. The town also expected to conduct general traffic patrol 16 hours a day, 7 days a week.

Project Goals

- Ultimate : 1. To reduce total, property damage, and injury crashes by 10%.
- Intermediate : 1. To increase the number of citations issued by 15%.
- Immediate : 1. To provide 1,000 man-hours of selective enforcement activity with an emphasis on speeding violations.

Conducted Activities

Vinton began its first project in October 1981, when it hired a traffic safety officer. The second grant provided for selective enforcement patrol through the end of 1982. To supplement the activities of the grant officer, the town followed through on its plans and used local funds to hire a second officer. The two officers conducted 4,528 man-hours of selective enforcement in 1982 (see Table 17). Hours of enforcement activity were relatively consistent throughout the year, ranging from a low of 228 hours in January to a high of 448 hours in February. Selective enforcement was conducted from 8:00 a.m. until midnight 7 days a week. The selective enforcement targeted the four identified streets as well as other locations where the officers had reason to believe that a traffic safety problem existed. During peak morning and evening traffic periods, from 6:30 a.m. to 8:30 a.m. and from 4:00 p.m. to 6:30 p.m., the selective enforcement was conducted using stationary radar. During the remainder of the day, radar was only one of the many methods that the officers used to detect traffic law violations.

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Table 17

1982 Monthly Man-hours of Selective Enforcement in Vinton

<u>Month</u>	<u>Man-hours</u>
January	288
February	448
March	408
April	432
May	432
June	400
July	296
August	360
September	328
October	360
November	440
December	<u>336</u>
Total	4,528

Project Results

Vinton's immediate goal was to provide 1,000 hours of selective enforcement activity. Because the city hired two selective enforcement officers, it was able to provide 4,528 hours in 1982. Vinton thus surpassed its goal nearly fivefold.

Vinton's intermediate goal was to increase the number of citations issued by 15% over the 1980 level. Data in Table 18 show the number of citations issued from 1979 through 1982. In 1980, Vinton issued 1,788 citations; this fell 7.7% to 1,650 in 1981 and another 14.7% to 1,408 in 1982. Thus, Vinton did not meet its intermediate goal of increasing citations over the 1980 level.

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Table 18

Citations Issued in Vinton by Violation
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	326	1,238	1,086	820
Reckless Driving	104	176	136	145
DUI	13	29	44	51
Other	<u>234</u>	<u>345</u>	<u>384</u>	<u>392</u>
Total	677	1,788	1,650	1,408

Vinton's ultimate goal was to reduce total, property damage, and injury crashes by 10%. Table 19 presents data on the number of each type of crash reported to the state police. The numbers for all crash types rose from 1981 to 1982. Personal injury crashes rose from 39 to 44, an increase of 12.8%; property damage crashes rose 20.9%, from 105 to 127; and total crashes 19.4%, from 144 to 172. Thus, Vinton did not meet the ultimate goals they set for the project.

Table 19

Crashes in Vinton
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	0	0	0	1
Injury	32	43	39	44
Property Damage	<u>157</u>	<u>139</u>	<u>105</u>	<u>127</u>
Total	189	182	144	172

It is not clear why Vinton did not meet its intermediate and ultimate goals. The total number of crashes has remained relatively constant except for the nearly 21% drop in 1981. Thus, the number of crashes during 1979 and 1980 may be more representative of Vinton's crash experience. Vinton did have a minor drop in total crashes from 1979 and 1980 levels.

1915

Conclusion

The town of Vinton increased the number of hours of selective enforcement activity by 4.5 times the 1,000-hour goal. This large increase in project activity did not yield a comparable increase in the number of citations issued. In fact, both total citations and those issued for speed limit violations decreased in each of the last 3 years. Thus, the town's intermediate goal of increasing the number of citations issued was not reached. In addition, Vinton did not reach the crash reduction goals. The numbers of all crash types rose between 1981 and 1982. If the number of 1982 crashes are compared to those for 1979 and 1980, there was a slight increase in fatal and injury crashes and a small decrease in property damage crashes. Under these conditions, the town still was not able to achieve its crash reduction goals.

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1917

City of Virginia Beach

The city of Virginia Beach has nearly 225,000 people and is located on the coast of Virginia. Because it is a resort community, its population has been increasing dramatically. Local officials estimate that the permanent population increases by 1,000 persons per month, and the beach attracts a large number of individuals who make short visits to the area.

Problem Statement

Virginia Beach has a high number of crashes, and the police department indicates that speeding is the second leading cause of fatal crashes. In 1980, there were 5,764 crashes, 31 of which involved fatalities and 1,978 that produced injuries. Speeding was determined to be a factor in 42.0% of the fatal crashes and 17.5% of the injury crashes. The city's death rate, deaths per 100 million vehicle miles of travel, was 12.9 in 1981, third highest among Virginia cities with populations exceeding 50,000 persons.

The city has identified six highways that have a particularly serious crash problem: General Booth Boulevard, Laskin Road, Military Highway, Sandbridge Road, Northampton Boulevard, and Shore Drive. In 1981, these six highways accounted for 15.9% of Virginia Beach's injury crashes and 15.6% of its total crashes.

Furthermore, the rising population increases the number of vehicles on Virginia Beach roads. The numbers of registered vehicles for the 1978-1981 period are given in Table 20. The annual increase has consistently exceeded 3%, and local officials predict that it will soon exceed 10%. In addition, the number of vehicles in Virginia Beach swells during the summer months as vacationers visit the city. With the number of vehicles increasing at such a rapid rate, the accident problem is likely to worsen.

-1918

Table 20

Vehicle Registrations in Virginia Beach
1978-1981

<u>Year</u>	<u>Passenger</u>	<u>Other</u>	<u>Total</u>	<u>% Increase Over Previous Year</u>
1978	132,574	14,675	147,222	-
1979	138,399	15,330	153,729	4.41
1980	143,268	15,727	158,995	3.42
1981	152,716	16,521	169,237	6.44

Proposed Activities

Virginia Beach received a \$24,000 grant to purchase 8 radar sets. The city planned to use local funds to pay officers to operate the units. Once the radar sets were purchased, a three-part coordinated program to reduce crashes was to be implemented. The city had already used its sophisticated computer equipment to identify the six most dangerous highways and the time of day when most crashes occurred. Local officials planned to use the radar equipment and selectively patrol the six identified problem highways. Second, the city planned to implement a public education program through the schools and the media. Third, Virginia Beach has begun an engineering program to redesign and reconstruct dangerous highways. Thus, Virginia Beach planned to use the grant as only a small part of a multifaceted program to reduce crashes.

Project Goals

- Ultimate : 1. To reduce fatal crashes on the 6 selected highways by 20%.
2. To reduce injury crashes on these roads by 10%.
3. To reduce the total number of crashes on these roads by 5%.
- Intermediate : 1. To increase the number of citations issued for speed limit violations by 20%.
- Immediate : 1. To purchase 8 moving radar sets.

1989

Conducted Activities

Virginia Beach purchased 14 moving radar sets on April 28, 1982. The police department was able to purchase 6 more units than originally anticipated because the manufacturer offered the city a significant discount. With the purchase of these new units, the city now had a total of 28 units and was ready to implement its three-part program to reduce crashes. First, the city project director discussed the crash patterns on each of the six highways with the patrol personnel and established a system of patrol activity. In this way, the radar sets were used in response to specific crash problems. Second, Virginia Beach implemented a public information program using local print and electronic media and the public schools to explain the crash problem in the hope of increasing voluntary compliance with the traffic laws. Third, the city continued its highway improvement program.

Project Results

Virginia Beach received funds only for the purchase of radar equipment; it was not given funds to provide manpower to operate this equipment. As a result, the city's selective enforcement project does not fall within the guidelines that require an impact evaluation. Instead, a grant to purchase equipment must satisfy only an administrative evaluation, which determines simply whether the equipment was properly purchased. Because Virginia Beach has implemented a comprehensive program to reduce accidents, an impact evaluation of the project was carried out at their request. Virginia Beach's immediate goal was to purchase 8 radar sets. It was able to purchase 14 units, 6 more than planned, because the sets were purchased at a discount.

Virginia Beach's intermediate goal was to increase the city-wide number of citations for speed limit violations by 20%. The number of citations issued in Virginia Beach from 1979 through 1982 are given in Table 21. In 1981, there were 16,814 speeding citations, and this increased to 24,442 in 1982. This represents a 45.4% increase, which far surpasses the 20% goal. Moreover, the number of citations for all moving violations has risen over the 4-year period. In 1979, there were 21,600 citations for all moving violations, and in 1982 this number had risen to 38,212, a 76.9% increase. Thus, Virginia Beach has shown a long-term commitment to strict enforcement of the traffic laws. It should be noted that Virginia Beach was able to accomplish this without receiving federal grant funds to pay for manpower.

Table 21

Citations Issued in Virginia Beach By Violation
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	10,165	13,431	16,814	24,442
Reckless Driving	2,716	2,436	2,468	2,134
DUI	775	772	948	1,830
Other Moving Violations	<u>7,944</u>	<u>7,768</u>	<u>10,834</u>	<u>9,806</u>
Total Moving Violations	21,600	24,407	31,064	38,212

The city's ultimate goals were to reduce the number of fatal crashes on the six selected highways by 20%, injury crashes by 10%, and all crashes by 5%. The number of crashes on the six highways during 1981 and 1982 are given in Table 22. The number of fatal crashes on the six targeted highways declined from 8 to 7, a 12.5% reduction. The number of personal injury and total crashes rose over the 2 years. In 1981, there were 318 personal injury crashes and in 1982 there were 335, a 5.3% increase. The total number of crashes was 962 in 1981 and 980 in 1982, a 1.9% increase. Thus, Virginia Beach did not attain any of its ultimate goals.

Table 22

Crashes by Selective Enforcement Location in Virginia Beach
1981-1982

<u>Roadway</u>	<u>1981</u>			<u>1982</u>		
	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>
General Booth	0	23	65	1	14	43
Laskin	1	63	230	0	68	261
Sandbridge	2	28	68	0	32	56
South Military	1	37	127	0	32	105
Shore	4	121	317	5	132	345
North Hampton	0	46	155	1	57	170
All Targeted Rds.	8	318	962	7	335	980
City-wide	32	1,199	6,152	28	2,134	6,179

1921

While the cumulative numbers of total and injury crashes on these six roadways were not lowered, crashes were lowered on three of them. The number of total crashes on General Booth Boulevard declined from 65 to 43, a 33.8% decrease; those on Sandbridge Road fell 17.6%, from 68 to 56; and those on South Military Highway fell 17.3%, from 127 to 105. On two of these three highways, the number of personal injury crashes declined during this period as well. On General Booth Boulevard there was a decline of 39.1% and on South Military Highway there was a decline of 13.5%. Although total crashes declined on these three highways, the increase on the other three was great enough to result in an overall increase of 1.9%. In contrast, the total number of crashes city-wide increased only 0.4%, which is a lower rate of increase than on the selective enforcement highways. While the cause of these results is not readily apparent in light of the increased enforcement activity, one probable explanation is that increased traffic was responsible for the increase in the number of crashes.

Conclusion

Virginia Beach was unable to reduce the number and severity of crashes in the selective enforcement locations, in spite of the fact that the police department issued 45.4% more tickets for speeding in 1982 than in 1981. Thus, the rapid growth in traffic volume may be responsible for the increase in crashes in the selective enforcement locations.

1922

Town of Wise

1983

Wise is a town of approximately 4,100 people and is located in the far western part of the state. It is approximately 3 square miles in size. Clinch Valley College is located immediately outside the town limits, and Mountain Empire Community College is less than 20 miles away. U. S. Route 23 passes through the western edge of Wise, and the business loop of the route goes through the center of town.

Problem Statement

Although the number of crashes in Wise is not large, the trend has shown a dramatic increase. From 1980 to 1981, the number of personal injury crashes more than tripled, from 11 to 34. Further, the total number of crashes increased from 97 to 130, an increase of 34.0%. Thus, the number of crashes in Wise has increased at a rapid rate.

Project Plan

Wise received a grant of \$3,500 and planned to use the funds to pay officers overtime to conduct selective enforcement. Project activity was to supplement Wise's existing commitment to traffic law enforcement; before the grant, 85% of the police department's time was devoted to traffic control.

The police department identified 12 high accident locations, all at intersections. The primary causes of the crashes were also identified. In the planned project activity, 70% of the selective enforcement man-hours were to be allocated to patrolling 5 of the locations. In addition, patrols were to be conducted on Thursdays, Fridays, and Saturdays, from 1:00 p.m. to 8:00 p.m. The 5 special locations were the intersections of Main Street and Norton Road, Norton Road and Spring Street, Main Street and Birchfield, Birchfield and Lake Street, and Main Street and Gibson. The remaining 30% of the selective enforcement time was to be spent at the 7 other high accident locations at other times. At each location, the selective enforcement officers were to be instructed to devote particular attention to controlling the driving actions which caused most of the crashes.

Although Wise set an intermediate goal of increasing citations, its primary interest was to increase public awareness of crash-causing behavior. The police department views officer contact as the primary means for increasing public awareness. Thus, the selective enforcement officers were encouraged to issue a warning rather than a citation in appropriate instances.

1924

Project Goals

- Ultimate : 1. To reduce injury crashes by 10%.
2. To reduce violation-related crashes by 10%.
3. To reduce total crashes by 10%.
- Intermediate : 1. To increase the number of tickets issued by 10%.
- Immediate : 1. To provide 500 hours of selective traffic enforcement during the project period.

Conducted Activities

Wise did not supply the information requested by the evaluation team. As a result, the selective enforcement activities conducted cannot be described.

Conclusion

Wise did not provide the data necessary for an evaluation. Consequently, no conclusions can be drawn with respect to the effectiveness of the project.

Charles City County

1925

Charles City County is located in east-central Virginia. It comprises 204 square miles and has a population of approximately 6,700. There were 5,097 registered vehicles in Charles City County in 1982. Among the highways traversing the county are State Routes 5, 155, and 156, all of which carry significant volumes of traffic.

Problem Statement

The crash trend in Charles City County is one of an increasing number of severe crashes. In 1979, 37.6% of all crashes resulted in death or injury. This rose to 41.2% in 1980 and to 48.2% in 1981. The county's death rate of 6.4 per 100 million vehicle miles makes it 83rd worst of Virginia's 95 counties. The number of total crashes has not followed this same increasing pattern; there were 116 total crashes in 1979, 131 in 1980 (a 12.9% increase), and 110 in 1982 (a 16.0% decrease).

The sheriff's department has identified speeding and failure to yield the right-of-way as the primary causes of the county's crashes. In 1980, speed was a factor in 66% of the fatalities and 25% of the personal injury crashes. Failure to yield the right of way or failure to stop was a factor in 8% of the personal injury crashes and 12% of the property damage crashes.

Proposed Activities

Charles City County received a grant of \$7,000. It proposed to use the funds to pay off-duty officers to conduct selective enforcement activities. Because the county has very few deputy sheriffs, the ability to conduct selective enforcement at particular times is limited by the availability of off-duty manpower. Accordingly, the sheriff's department planned to focus the project on weekend evenings, but activity was not to be limited to those times.

The project was to be directed at reducing both speeding and failure-to-yield violations. Selective speed enforcement was to be conducted on Routes 5 and 155. Enforcement of the right-of-way laws was to be conducted at the intersections of Routes 156 and 6, Routes 5 and 155, and Routes 605 and 607. Each selective enforcement officer was to decide what enforcement activity to conduct during his tour of duty.

Project Goals

- Ultimate : 1. To reduce the number of fatal crashes by 30%.
2. To reduce the number of personal injury crashes by 10%.
3. To reduce the total number of crashes by 5%.
- Intermediate : 1. To increase the number of citations for speeding by 15%.
2. To increase the number of citations for failure to yield by 10%.
- Immediate : 1. To provide 600 hours of selective enforcement activity.

Conducted Activities

Charles City County began its selective enforcement program in March 1982 and continued it through the end of the year. The number of man-hours of activity conducted each month is given in Table 23. The sheriff's department conducted 877.5 man-hours of selective enforcement. While some activity was conducted each month of the project, nearly 76% was conducted during the 6-month period from May through October. Thus, the activity was concentrated during the warmest months of the year. In addition, selective enforcement patrols were concentrated during weekends and evenings; 43.2% on Fridays, Saturdays, or Sundays, and 67.4% between 4:00 p.m. and midnight.

1927

Table 23

1982 Monthly Man-hours of Selective Enforcement in Charles City County

<u>Month</u>	<u>Man-hours</u>
January	*
February	*
March	65.5
April	66.0
May	92.5
June	121.0
July	111.0
August	99.0
September	144.5
October	95.5
November	63.0
December	<u>19.5</u>
Total	877.5

* Did not begin until March 1982

As planned, the officers focused their activity on speeding and failure to stop or yield. They were told the locations experiencing crash problems and conducted their selective enforcement accordingly.

Project Results

Charles City County's immediate goal was to provide 600 hours of selective enforcement activity. The sheriff's department actually conducted 877.5 hours, surpassing its goal by 46.2%. Since the county received a grant of \$7,000, the cost per man-hour of selective enforcement activity was \$7.98.

Charles City County's intermediate goals were to issue 15% more citations for speeding and 10% more for failure-to-yield citations. The county did not keep citation data for the period prior to the selective enforcement project, so there is no way to determine whether the county met its intermediate goals. The number of citations issued during the project period are given in Table 24. Selective enforcement resulted in the issuance of 46 citations for failure-to-yield and 73 for speed limit violations during the 10 months of project activity. While the lack of prior data prevents the making of comparisons, the number of citations per month and citations per hour of activity can be computed. An average of 12 citations per month or 1 citation for each 7.3 hours of activity does not appear to constitute a concentrated enforcement program.

1928

Table 24

Citations Issued in Charles City County
March - December 1982

<u>Violations</u>	<u>Number</u>
Failure to yield	46
Speeding	73

Conviction data from prior years are available because they are reported to the DMV. While convictions can be used as a surrogate of citations, two assumptions must be made: (1) that the conviction rate remained constant, and (2) that the State Police, whose citations are included in the conviction data, did not change their patrol activity in the county. The number of convictions for various offenses are given in Table 25. The total number of convictions rose from 219 to 285, an increase of 30.1%. Convictions for speed limit violations increased from 49 to 117, an increase of 138.8%. If it is assumed that the increase in convictions resulted from an increase in citations and that both increases were the result of selective enforcement activity, then it appears that Charles City County met one of its two intermediate goals.

Charles City County's ultimate goals were to reduce fatal crashes by 30%, personal injury crashes by 10%, and all crashes by 5%. The number of crashes for the 1979 - 1982 period are given in Table 26. The number of fatal crashes declined from 5 in 1981 to 3 in 1982. This represents a 40% reduction, which surpasses the county's 30% goal. The county did not meet its goals for reducing personal injury or total crashes. The number of personal injury crashes rose from 48 to 49 and the total number of crashes remained constant at 110. Thus, Charles City County met only one of its three ultimate goals.

While there was no change in the number of crashes from 1981 to 1982, it does appear that crash severity leveled off. The proportion of crashes involving injury or death had risen from 37.1% of all crashes in 1979 to 48.2% in 1981. In 1982 this proportion was 47.3%, in effect no change over the previous year. Because the selective enforcement project was conducted during 10 months in 1982, the project may be at least partly responsible for slowing the trend of increasingly serious crashes.

-1929

Table 25

Convictions in Charles City County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	31	48	49	117
Reckless Driving	12	12	13	16
DUI	3	2	2	6
Failure to Yield	7	8	8	3
Other	<u>92</u>	<u>104</u>	<u>147</u>	<u>143</u>
Total	145	174	219	285

Table 26

Crashes in Charles City County
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	2	3	5	3
Injury	41	51	48	49
Property Damage	<u>73</u>	<u>77</u>	<u>57</u>	<u>58</u>
Total	116	131	110	110

Conclusion

The Charles City County Sheriff's Department conducted nearly 900 hours of selective enforcement during 1982, and therefore exceeded its immediate goal. This increase in patrol activity resulted in little change in the number of crashes that occurred in the county. The number of fatal crashes declined from 5 to 3, while the number of personal injury and total crashes remained virtually constant. These results indicate that the county's ultimate goals were not achieved for total and injury crashes, but were exceeded for fatal crashes. In determining whether the intermediate goals were achieved, conviction data were used because the county did not keep citation data for the years prior to this project. Project activity was designed to impact both speed limit and failure-to-yield violations. There was a significant increase in the number of convictions for speed limit violations, a significant decrease for failure-to-yield, and an increase in total convictions.

-1930

Some portion of the increase in convictions may be due to State Police activity but there is no way to determine the proportion. Finally, a selective enforcement project that averages only 12 citations per month or one citation for each 7.3 hours of activity is too selective for practical purposes. As a result, it was not felt that the intermediate goal of increased citations was achieved.

Chesterfield County

1931

Chesterfield County is located in east-central Virginia, immediately adjacent to Richmond and Petersburg. Because of Richmond's proximity, much of Chesterfield is suburban. There has been a significant increase in the number of vehicles registered in the county during the past 4 years. There were 85,205 registered vehicles in 1978 and 106,301 in 1981, a 25% increase. In contrast, statewide registrations increased only 18.1% during the same 4-year period. The county contains several major highways connecting the city of Richmond with areas in the county. Interstate 95 and U.S. 1 go through the eastern end of the county, and U. S. 360 and U.S. 60 cross the county from east to west.

Problem Statement

In 1981 there were 2,583 reportable crashes in Chesterfield County, 20 involved a fatality and 947 resulted in a personal injury. The county's death rate from highway accidents rose from 2.4 in 1979 to 2.6 in 1980, an 8% increase. The county keeps data on approximately 60% more crashes than reported to the State Police because some of the crashes investigated by county officers do not result in damage of \$250, the state's minimum for reportable accidents.

Speeding is involved in a significant number of Chesterfield County's crashes. Excessive speed contributed to 35% of the fatal crashes and 30% of all crashes in 1980.

The county has five roads which have particularly serious safety problems. They are U.S. 60 (Midlothian Turnpike), U.S. 360 (Hull Street Road), U.S. 301 (Jefferson Davis Highway), Route 653 (Courthouse Road), and Route 10. Together, these five highways accounted for 30% of all of the county's crashes in 1980.

Proposed Activities

Chesterfield County proposed a series of coordinated programs to reduce crashes. The county received three grants: one to purchase radar units, the second to fund selective speed enforcement, and the third to fund selective alcohol enforcement. In addition, the county recently installed a computer system to record crash and citation data. Using this system, locations with a high incidence of unsafe driving behavior can be identified. This allows traffic enforcement activity to be targeted to the type of behavior in each location.

The county received \$18,000 to purchase radar units and \$35,000 for selective speed enforcement. The selective enforcement was to take

place on the five above cited highways. The days and hours of the activity were to be determined according to the crash peaks identified through the use of the computer. However, based on experience, much of the activity was expected to be done between 3:00 p.m. and 2:00 a.m. In addition, Chesterfield County planned to use locally funded manpower to respond to crash problems identified on other highways.

Project Goals

- Ultimate : 1. To reduce fatal crashes by 12% on the 5 targeted roads.
2. To reduce injury crashes by 20% on these roads.
3. To reduce total crashes by 20% on these roads.
- Intermediate : 1. To increase arrests for speed limit violations by 10%.
2. To increase arrests for traffic signal violations by 10%.
3. To increase arrests for FTC and failure-to-yield violations by 20%.
- Immediate : 1. To provide 2,000 hours of selective speed enforcement activity.
2. To purchase 12 radar units.

Conducted Activities

Chesterfield County's project activities cannot be described because the county has not provided the necessary information to the evaluation team.

Project Results

Only a limited evaluation of Chesterfield County's selective speed enforcement project can be conducted because county police officials did not provide data to the evaluation team. As a result, the evaluation was performed using data provided by the State Police and the DMV. These data often do not closely relate to the goals set by the county.

1933

The county's immediate goals were to purchase 12 radar units and to conduct 2,000 hours of selective enforcement activity. Neither of these goals can be evaluated. The evaluators were not provided the information on whether the units were purchased or whether enforcement activity was performed.

The county set a series of intermediate goals to increase citations for violations of traffic laws. Because the county did not provide arrest data, conviction data provided by the DMV were used as surrogate measures of arrests. Using conviction data required two assumptions: (1) that the conviction rate remained constant; and (2) that the State Police, whose citations are included in the conviction data, did not change their patrol activity in the county. The figures in Table 27 are for the number of convictions during 1981 and 1982. The county set a goal to increase citations for speeding by 10%. The number of speeding convictions rose from 5,245 in 1981 to 6,042 in 1982, a 15.2% increase. The county hoped to increase citations for following-too-closely and failure-to-yield by 20%. The number of convictions for failure-to-yield fell from 256 to 224, a 12.5% decline. Convictions for following-too-closely rose from 126 to 155, an increase of 23.0%. Thus, using conviction data as a measure of citations, it appears that Chesterfield County met two of its intermediate goals.

Table 27

Convictions in Chesterfield County
1981-1982

<u>Violation</u>	<u>1981</u>	<u>1982</u>
Speeding	5,245	6,042
Fail to Yield	256	224
Follow Too Closely	126	155
DUI	127	378
Other	<u>7,821</u>	<u>7,728</u>
Total	13,575	14,527

The county's ultimate goals were to reduce fatal crashes by 12%, injury crashes by 20%, and all crashes by 20% on the roads targeted for selective enforcement activity. Because State Police crash data are not available for U.S. 301, only 4 of the 5 targeted highways can be considered. The number of crashes on these four highways for the 1979 through 1982 period are given in Table 28.

1834

The number of fatal crashes on these highways fell from 4 in 1981 to 3 in 1982, a 25% decline. This exceeds Chesterfield County's goal of a 12% reduction. The number of injury and total crashes on these highways increased, however. In 1981, there were 253 injury crashes and this increased 16.2% to 294 in 1982. Similarly, the total number of crashes increased 3.8%, from 740 to 768. The figures in Table 28 indicate that the number of total crashes in 1981 and 1982 were lower than those in 1979 and 1980. There were 895 total crashes in 1979 and 816 in 1980. These numbers declined to 740 and 768 in 1981 and 1982. While there was nearly a 4% increase during the project period over the previous year, the 2-year average (1981 and 1982) was 11.9% lower than the average of the preceding 2 years (1979 and 1980). These results still were not sufficient to reach the 20% goal set for total crash reduction. In addition, there was no effective change in the 2-year averages of injury crashes; there were 276 in the earlier period and 274 in the latter.

Conclusions

Even though Chesterfield County did not furnish crash, conviction, citation, or activity data, an evaluation was performed using data obtained from other sources. There was no way to determine whether the immediate goals of purchasing 12 radar units and working 2,000 hours of special patrol were reached because of the lack of information. Conviction data were used as a surrogate of citation data to determine whether the intermediate goals were attained. The county appears to have reached two of its three goals for increasing the numbers of citations issued. The goals for speed limit and following-too-close violations appear to have been achieved; that for failure-to-yield was not. An analysis of crash data obtained from the State Police indicated that total and injury crash reduction goals were not reached.

1985

Table 28

Crashes on Selective Enforcement Highways in Chesterfield County
1979-1982

<u>Highway</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
U.S. 60				
Fatal	2	0	0	1
Injury	119	101	84	100
Total	372	312	264	281
U.S. 360				
Fatal	3	1	1	1
Injury	84	51	69	72
Total	235	185	196	183
Route 653				
Fatal	0	1	0	0
Injury	34	21	28	46
Total	75	90	83	109
Route 10				
Fatal	2	2	3	1
Injury	61	81	72	76
Total	213	229	197	195
Combined				
Fatal	7	4	4	3
Injury	298	254	253	294
Total	895	816	740	768

Note: Data for U.S. 301 are unavailable

-1936

Franklin County

1987

Franklin County is located in southwestern Virginia and it has a population of approximately 35,200. In 1981, there were 25,970 registered vehicles in the county. The county contains two large lakes that attract heavy recreational traffic during the summer. In addition, Ferrum College is located in the county. This is Franklin County's second consecutive selective enforcement grant.

Problem Statement

Crashes in Franklin County have been attributed to a combination of recreational traffic and speeding. In 1980, 30% of all crashes in the county and 56% of the fatal crashes involved speed limit violations. Franklin County's death rate was 3.8 per million miles of travel during 1981, thus placing it 54th out of the 95 counties statewide.

The highways which carry recreational traffic to the lakes have a disproportionate share of Franklin County's crashes. State Route 40 and U.S. 220 accounted for 40% of the county's crashes during 1980.

Proposed Activities

Franklin County had originally planned to use its \$26,500 grant to hire two full-time selective enforcement officers. Subsequent to receiving the funds, a decision was made to use present staff on an overtime basis because the county could not attract qualified candidates for 1-year's employment.

Although project patrol activity was not to be limited to particular locations at specified days and hours, the roads around the lakes were to be more heavily patrolled during the months when tourists were present. As a result, the county expected to devote special attention to Routes 122, 116, 616, 670, and 681 around Smith Mountain Lake. Most of the activity was to take place on weekends between the hours of 4:00 p.m. and 4:00 a.m. During the fall and winter months, the County Sheriff's Department expected to devote additional attention to U.S. 220 south of Rocky Mount and Route 40, highways which the state police do not patrol on a regular basis.

Project Goals

- Ultimate : 1. To reduce the number of injury crashes on the targeted roads by 10%.
- : 2. To reduce the total number of crashes on the targeted roads by 10%.
- Intermediate : 1. To increase the number of citations issued by 15%.
- Immediate : 1. To provide 1,500 hours of selective enforcement activity.

Conducted Activities

Franklin County began its first selective enforcement project in May 1981 and continued it through May 1982. During this period, the sheriff's department conducted 2,451 man-hours of selective enforcement activity.

The 1982 grant funds were delayed because the Virginia Department of Transportation Safety had to approve the change from hiring full-time traffic safety officers to using existing staff on an overtime basis. The delay in receiving funds delayed the project starting date.

Project Results

Evaluating Franklin County's project was difficult because not all the necessary data were available to the evaluation team. Although the county set crash and citation goals, it did not have corresponding data for the years prior to project initiation. Thus, data from other sources had to be used. Moreover, the county provided activity data from the first project, but not for the second one.

Franklin County's immediate goal was to provide 1,500 man-hours of selective enforcement activity. Whether or not this goal was reached could not be determined, because the county did not provide activity data. During the previous grant 2,451 man-hours of activity were worked and there is no reason to suspect that the 1982 goal was not reached.

Franklin County's intermediate goal was to increase citations by 15%. Because the county did not keep citation data for the period prior to its first grant, a comparison of the numbers of citations issued cannot be made. Instead, conviction data were used as a surrogate measure of citations. In using conviction data, two assumptions must

1989

were made: (1) that the conviction rate remained constant, and (2) that the State Police, whose citations are included in conviction data, did not change their patrol activity in Franklin County. The number of convictions in Franklin County from 1979 through 1982 are given in Table 29. The total number of convictions rose from 2,504 in 1981 to 2,781 in 1982, an increase of 11.1%. Speeding convictions rose dramatically. In 1981, there were 935 speeding convictions, and this rose 46.1% to 1,366 in 1982. Because the emphasis of this selective enforcement project was on speed limit violations, the increase in speeding convictions more accurately demonstrates the effects of this enforcement activity than do total convictions. Thus, Franklin County can be considered to have met its intermediate goal to increase citations.

Table 29
Convictions in Franklin County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	1,258	1,260	935	1,366
Reckless Driving	134	142	114	99
DUI	59	67	62	116
Other	<u>1,225</u>	<u>1,487</u>	<u>1,393</u>	<u>1,200</u>
Total	2,676	2,956	2,504	2,781

Franklin County's ultimate goals were to reduce injury and total crashes on the 7 targeted highways by 10%. The county, however, does not have crash data for each of the targeted highways for periods prior to the start of the current project. To analyze crash reductions, State Police data were used, and they were for only 4 of the 7 highways. The analysis did not include data from Routes 616, 670, and 681. The evaluation was performed in two parts; first, it considered crashes on the 4 highways, and second, it considered countywide crashes.

1980

The number of crashes on the 4 highways for which State Police data were used are given in Table 30. The number of total crashes on these roads declined from 233 in 1981 to 213 in 1982, a decrease of 8.6%. The number of injury crashes increased slightly, from 94 to 96, a 2.1% change. While progress was made in reducing the total number of crashes, Franklin County did not meet either of its goals to reduce crashes by 10%. One reason that the crash reduction goals were not reached by the 1982 project was the success of the 1981 project, which reduced total crashes from the previous 2-year average by 16.8% and injury crashes by 13.0%.

Table 30.

Crashes on Selective Enforcement Highways in Franklin County
1979-1982

<u>Highway</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
U.S. 220				
Injury	37	31	39	34
Total	104	91	90	82
Route 40				
Injury	53	60	40	47
Total	129	144	107	97
Route 116				
Injury	6	7	5	5
Total	16	21	14	13
Route 122				
Injury	7	15	10	10
Total	23	32	22	21
Combined				
Injury	103	113	94	96
Total	272	288	233	213

NOTE: Data for Routes 616, 670, and 681 not available

County-wide crash patterns corresponded to those on the targeted highways. Injury crashes increased slightly, while the total number of crashes declined (see Table 31). Injury crashes rose from 220 in 1981 to 229 in 1982, a 4.1% increase. Total crashes, however, declined 6.2%, from 561 to 526. It should be noted that the total number of crashes in

1981

1982 was 12.1% below the average for the 2 years prior to selective enforcement activity in the county.

Table 31

Crashes in Franklin County
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	13	9	8	6
Injury	214	238	220	229
Total	595	602	561	526

Conclusion

The results of Franklin County's selective enforcement project are mixed. Although the total number of convictions did not meet the goal set, the number of speeding convictions exceeded the goal more than threefold. Total crashes on the targeted highways did not meet the goal when compared to the 1981 figures, but did exceed the goal when compared to the 2-year average for the period immediately preceding selective enforcement activity. The number of injury crashes actually increased slightly between 1981 and 1982, but did not differ much from the 1979-1980 average number of injury crashes. These results indicate that Franklin County had some success with their enforcement project, but did not reach all of the goals set.

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1983

Hanover County

Hanover County is located in east-central Virginia and adjoins the city of Richmond at the city's northern border. The county has a population of approximately 50,200 people and in 1981 had 43,278 registered vehicles. A number of major highways connect the county and Richmond. These routes are Interstate 95, U.S. 1, U.S. 33, U.S. 301, and U.S. 360.

Problem Statement

Sheriff department personnel in Hanover County have indicated that their crash problem is attributed to speed limit violations. In 1981, there were 897 crashes, 360 of them involving an injury and 11 a fatality. In 1980, there were 857 total crashes, 322 injury crashes, and 14 fatal crashes. The 1981 figures represent an 11.8% increase in injury crashes and a 4.7% increase in total crashes from 1980. During 1981, excessive speed contributed to 21.1% of the personal injury crashes and 27.3% of the fatal crashes. In 1980, these rates were 20.2% for injury crashes and 35.7% for fatal crashes.

Three roads -- U.S. 301, U.S. 33, and State Route 54 -- had a particularly severe accident problem. During 1980 and 1981, these three roads accounted for 35.7% and 18.2% of the fatal, 16.2% and 16.4% of the injury, and 16.0% and 14.8% of all crashes, respectively.

Proposed Activities

Hanover County has instituted a comprehensive hand-tabulation system to record crash data. Complete data for each crash are recorded and compiled with year to date data each morning. This system gives the county a continually updated data base with which to identify high accident locations. The system also identifies the predominant causes of crashes, thus allowing the county to respond to each high accident location with appropriate enforcement activities.

This data system was used to identify the four highways on which Hanover County proposed to focus its selective enforcement activities. The highways were U.S. 33, U.S. 301, Route 54, and Atlee Road. The days and hours of the selective enforcement would vary according to the crash patterns revealed by the data-keeping system.

The county received three grants in FY 1982: (1) \$28,000 for salaries to conduct speed limit selective enforcement activity, (2) \$5,000 to purchase radar equipment, and (3) \$10,000 to conduct alcohol selective enforcement activities. The alcohol grant was not

1944

evaluated for this report. The county had originally planned to use the selective enforcement funds to hire two traffic safety officers; however, the county board refused to authorize new positions because of budget constraints. Consequently, the sheriff's department changed its proposed program to allow existing staff to carry out the project on an overtime basis.

Project Goals

- Ultimate :
 - 1. To reduce the number of fatal crashes on the targeted roads by 10%.
 - 2. To reduce injury crashes on these roads by 10%.
 - 3. To reduce total crashes on these roads by 10%.
- Intermediate :
 - 1. To increase speeding citations threefold.
- Immediate :
 - 1. To provide 2,300 hours of selective enforcement activity.
 - 2. To purchase 2 radar units.

Conducted Activities

Hanover County's selective enforcement program was delayed because of its decision to use existing staff rather than to hire a new officer. During the period in which this report was being prepared, the county did not provide data concerning its revised program of selective enforcement activity.

Project Results

Because the county did not provide all of the data requested by the evaluation staff, it was difficult to determine if the county met its goals. Some of the goals could not be evaluated at all; for others, surrogate measures were used, or data were obtained from other sources. Further, annual data are the only data available and they do not accurately correspond to the project period. Because project initiation was delayed until the summer of 1982, only half of the 1982 data correspond to the project period. As a result, the data tended to understate the project's results.

1945

The county's immediate goals were to conduct 2,300 hours of selective enforcement and to purchase 2 radar units. Neither of these goals could be evaluated due to insufficient data.

Hanover County's intermediate goal was to increase the number of speeding citations threefold. Because of insufficient data, the numbers of citations could not be determined. Instead, conviction data had to be used. Two assumptions were made when using convictions as a measure of the number of citations issued: (1) that the conviction rate remained constant, and (2) because conviction data include citations written by the State Police in Hanover County, that their activity remained constant. While neither of these assumptions could be tested for accuracy, there was no reason to suspect that the previous policies and procedures of the judicial system or that State Police patrol activity has changed.

The number of convictions in Hanover County for the 1979-1982 period are given in Table 32. Convictions for speed limit violations rose from 4,455 in 1981 to 5,236 in 1982, an increase of 17.5%. Because the county's goal was to increase citations for speeding threefold over the number issued the previous year, it fell short of its goal. Even so, the number of convictions has risen dramatically over the past four years. The number of convictions for speeding has risen 86.3% and total traffic convictions 71.2%. As a result, Hanover County has demonstrated a continuing dedication to highway safety through the enforcement of the traffic laws over an extended period of time.

Table 32

Convictions in Hanover County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	2,811	3,147	4,455	5,236
Reckless Driving	134	135	178	176
DUI	57	83	122	239
Other	<u>2,256</u>	<u>2,746</u>	<u>3,099</u>	<u>3,350</u>
Total	5,258	6,111	7,854	9,001

Hanover County's ultimate goals were to decrease fatal, injury, and total crashes on the targeted roads by 10%. Only the number of crashes on 3 of the 4 targeted roads could be analyzed because Hanover County

1940

did not provide the requested data. State Police data were used instead, and they did not include the number of crashes on Atlee Road. Crash data in Table 33 include those on the other 3 highways. The number of fatal crashes on the selective enforcement highways rose from 2 in 1981 to 5 in 1982. Although this represents a large percentage increase, random fluctuations of such small numbers produce large relative changes, and therefore, the increase in fatal crashes is not meaningful. Personal injury crashes fell from 59 in 1981 to 43 in 1982. This represents a 27.1% decline and exceeds Hanover County's goal. Moreover, personal injury crashes ranged from 52 to 59 during the previous 3 years, and the 43 in 1982 represents a significant decline from this level. The total number of crashes on the targeted highways fell from 133 in 1981 to 129 in 1982, a decrease of 2.2%. Although this decrease is smaller than the projected goal, 129 is the fewest number of crashes on these highways during the 4-year period.

Table 33

Crashes on Selective Enforcement Highways in Hanover County
1979-1982

<u>Highway</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
U.S. 33				
Fatal	3	2	0	3
Injury	19	21	23	18
Total	60	59	50	58
U.S. 301				
Fatal	2	0	0	2
Injury	10	17	19	15
Total	35	41	39	40
Route 54				
Fatal	1	3	2	0
Injury	26	14	17	10
Total	68	37	44	31
Combined				
Fatal	6	5	2	5
Injury	55	52	59	43
Total	163	137	133	129

NOTE: Data for Atlee Road not available

As a result, Hanover County met its goal to reduce injury crashes, but fell short of its goals to reduce fatal and total crashes. The severity of the crashes on these roads, however, declined. In 1981, 45.9% of all crashes resulted in a fatality or an injury, but this proportion fell to 37.2% in 1982. Thus, crashes on targeted highways were less severe during the project period.

Conclusion

Hanover County's selective enforcement program showed mixed results. The county met the goal of reducing injury crashes, but fell short of the goals of reducing fatal and total crashes. The increase in fatal crashes cannot be considered of practical significance because the number of fatal crashes were so small each year. Although the decline in total crashes did not meet the goal set, the number was the lowest in the 4-year period under analysis. These mixed results occurred in spite of the steady increase in traffic convictions from 1979 through 1982.

-1948

-1949

James City County

James City County is located on the peninsula between the York and James rivers. During 1981, the county had a population of approximately 17,800 and 15,419 registered vehicles. It is bordered by the city of Williamsburg, with a population of approximately 9,000, and York County, with a total population of 286,800. Interstate 64 and U.S. 60 cross through the county.

Problem Statement

From 1979 through 1981, James City County had a relatively stable total and injury crash problem but the number of fatalities increased. The total number of crashes ranged from 349 to 353 and injury crashes from 157 to 148. Fatal crashes, however, rose from 4 in 1979 to 8 in 1980, which changed the death rate from 1.9 to 4.1 deaths per 100 million vehicle miles of travel. This gave the county the 59th worst death rate in Virginia in 1980.

Data furnished by the sheriff's department indicate that violations of the speed limits play a significant role in the county's crash statistics. Speeding was involved in 22% of all crashes and 38% of the fatal crashes in 1980. Although speeding was only the second leading cause of all crashes, it was by far the leading cause of injury and fatal crashes.

Three highways have an especially serious crash problem. These are U.S. 60, Route 5, and Route 199. In 1980, 50% of James City County's fatal, 41.3% of the injury, and 42.1% of all crashes occurred on these highways.

Proposed Activities

James City County received two grants: \$750 for the purchase of one radar unit and \$5,050 to pay for 16 hours of overtime per week. The county expected to match both grants with local funds.

Planned selective enforcement activity was to focus on U.S. 60, Route 5, and Route 199; however, activities of the selective enforcement officers were not to be limited to these highways. Similarly, the days and hours of patrol were not to be fixed, although emphasis was to be placed on early mornings and late afternoons because these highways carry significant traffic to and from Williamsburg during the morning and evening rush hours. The project was also expected to emphasize enforcing the 55 mph. speed limit.

1980

Project Goals

- Ultimate : 1. To reduce fatal crashes on the targeted roads by 25%.
- 2. To reduce personal injury crashes on these roads by 15%.
- 3. To reduce the total number of crashes on these roads by 12%.
- Intermediate : 1. To increase the number of citations for speeding issued by 12%.
- Immediate : 1. To provide 500 hours of selective enforcement during the project period.

Conducted Activities

James City County has not provided the data requested by the evaluation team. Therefore, a description of project activities cannot be included in the narrative or used as a basis for project evaluation. The county purchased the radar unit during the summer of 1982 and all deputy sheriffs were trained to use it.

Project Results

A complete evaluation of the county's project could not be carried out because the requested data were not provided. Consequently, the evaluation team obtained data from other sources to be used as surrogate measures of success or failure of the project in James City County.

James City County's immediate goals were to purchase one radar unit and to conduct 500 hours of selective speed enforcement activity. The county purchased the radar unit and trained each deputy in its use during the summer of 1982. The number of hours of enforcement activity was not provided by the sheriff's department, so it is not known if the 500-hour goal was reached.

The county's intermediate goal was to increase citations for speeding by 12%. Because the county did not provide citation data, conviction data were used instead. Use of convictions as a surrogate measure for citations required two assumptions: (1) that the conviction rate remained constant; and (2) that the State Police, whose citations are included in the conviction data, had not varied its enforcement activities in the county.

1951

The number of convictions for the 1979-1982 period are shown in Table 34. Convictions increased during this 4-year period. There were 1,638 convictions for speed limit violations in 1981 and 2,001 in 1982. This is an increase of 22.2%, and exceeds the county's goal of a 12% increase. Moreover, speeding convictions rose 52.3%, from 1,314 to 2,001. Similarly, the total number of convictions increased 48.4%, from 2,099 in 1979 to 3,115 in 1982. Thus, it appears that James City County far surpassed its intermediate goal of increasing citations.

Table 34
Convictions in James City County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	1,314	1,649	1,638	2,001
DUI	18	20	18	58
Failure to Yield	52	41	39	44
Other	<u>715</u>	<u>838</u>	<u>851</u>	<u>1,012</u>
Total	2,099	2,548	2,546	3,115

The county's ultimate goals were to reduce fatal crashes by 25%, injury crashes by 15%, and all crashes by 12% on the three targeted highways. The number of crashes on these roads from 1979 through 1982 are given in Table 35. While the percentage change (33%) exceeded the goal set (25%), there was little practical difference in the number fatal crashes over this 4-year period. The number of fatal crashes varied from 2 in 1979 and 1982 to 4 in 1980.

Personal injury crashes fell from 66 in 1981 to 57 in 1982. This reduction of 13.6% is slightly below the county's goal of 15%. Total crashes fell from 161 to 139, a 15.8% decline, which exceeds the county's 12% goal. Thus, James City County met two of its three ultimate goals, and it very narrowly missed meeting the third goal.

1984

Table 35

Crashes on Selective Enforcement Highways in James City County
1979-1982

<u>Highway</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
U. S. 60				
Fatal	2	4	3	2
Injury	58	45	51	43
Total	124	101	121	106
Route 5				
Fatal	0	0	0	0
Injury	7	9	8	9
Total	16	22	21	18
Route 199				
Fatal	0	0	0	0
Injury	4	10	7	5
Total	18	24	19	15
Combined				
Fatal	2	4	3	2
Injury	69	64	66	57
Total	158	147	161	139

Conclusion

It appears that James City County has had a successful program. Although the actual conduct of the selective enforcement activity could not be verified for lack of data, the results of the project appeared promising. Convictions rose dramatically and crashes on the targeted highways fell in all categories. Injury crashes fell 13.6% in the county and only 0.74% statewide during the same period. Similarly, total crashes fell 15.8%, while statewide crashes fell only 4.7%. Although it could not be determined what portion of the change was attributable to the selective enforcement program, the project appeared to have had a beneficial effect.

1983

Mecklenburg County

Mecklenburg County is located in southside Virginia adjacent to the North Carolina border. It contains two major reservoirs, Buggs Island Lake and Lake Gaston, that are used for recreational purposes. Although the county has a permanent population of only 30,000, as many as 300,000 people travel within the county during the summer months. The county contains four major highways: I-85, U.S. 1, U.S. 15, and U.S. 58. This is the county's third selective enforcement grant; the first grant was in 1979 and the second began in June 1981.

Problem Statement

Mecklenburg began its first selective enforcement program in early 1979. In response, the total number of crashes fell from 424 in 1978 to 369 in 1979. The decline continued through 1980, when total crashes fell to 346. There was a 14-month hiatus of selective enforcement activity from April 1980 through May 1981, and in 1981 total crashes increased slightly to 363. The prior selective enforcement programs thus appear to have affected Mecklenburg County's crash patterns.

The sheriff's department has indicated that speeding and alcohol use were the leading causes of the county's crashes. In 1981, 29% of the total crashes were attributable to speeding and 26% involved alcohol. Together, alcohol and speeding contributed to 80% of the fatal crashes in 1981.

Five highways had a particularly serious crash problem. In 1981, U.S. 58 had 14.1% of Mecklenburg's crashes, I-85 and Route 47 each had 9.9%, U.S. 1 had 5.0%, and Route 49 had 4.7%. Of these highways, the Mecklenburg Sheriff's Department has primary responsibility for only four; the state police patrol the interstate highways.

The peak crash periods occurred during evenings and weekends. In 1981, 60% of all fatal crashes and 39.4% of the injury and total crashes occurred between 6:00 p.m. and 2:00 a.m. Further, 55.7% of all crashes occurred between noon Friday and midnight Sunday.

Proposed Activity

Mecklenburg County hired two full-time traffic safety officers with its 1981 grant and planned to keep them on the force under the current grant. Historically, the officers have set their own hours and locations in response to the county's crash patterns. Thus, it was expected that they would conduct selective enforcement in the evenings from 4:00 p.m. to midnight, on most weekends, and on all holidays.

1954

Although they were not limited to conducting their activities at specific locations, they were to emphasize patrol activity on U.S. 58, Route 47, and Route 49.

Project Goals

- Ultimate :
 1. To reduce fatal crashes county-wide by 20%.
 2. To reduce injury crashes county-wide by 10%.
 3. To reduce total crashes county-wide by 10%.

- Intermediate :
 1. To issue 12% more citations for speeding.
 2. To issue 15% more citations for drunken driving.

- Immediate :
 1. To provide 2,500 hours of selective speed and alcohol enforcement activity.

Conducted Activity

Mecklenburg County began its first selective enforcement project in March 1979 and has conducted activity in 31 of the subsequent 45 months through December 1982. Table 36 shows the monthly man-hours of selective enforcement activity for the 1979-1982 period. The current grant of \$27,000 began in June 1982 and continued through May 1983.

1985

Table 36

Monthly Man-hours of Selective Enforcement Activity in Mecklenburg
1979-1982

<u>Month</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
January	*	174	*	234
February	*	149	*	408
March	208	151	*	332
April	158	*	*	383
May	146	*	*	372
June	158	*	348	213
July	187	*	402	196
August	162	*	327	340
September	166	*	374	329
October	159	*	360	344
November	152	*	352	329
December	<u>149</u>	<u>*</u>	<u>348</u>	<u>370</u>
Total	1,645	474	2,511	3,850

*Months without selective enforcement

Mecklenburg used the selective enforcement grant to supplement existing traffic patrol activities rather than relying on it to provide the only patrol. The number of nonselective enforcement man-hours devoted to highway safety are shown in Table 37. There was little fluctuation in the number of man-hours of patrol activity funded by local funds, even when grant money funded selective enforcement. This demonstrates the county's continuing dedication to highway safety.

Table 37

Nonselective Enforcement Traffic Patrol
1979-1982

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Number of Man-hours	7,088	7,104	7,088	7,096

-1956

The days, hours, and locations of the selective enforcement activity corresponded to the original plans. The two officers usually worked the same shift but in adjacent parts of the county in order to help each other when necessary. They worked primarily from 4:00 p.m. to midnight and three weekends each month. In addition, they worked on all holidays during the grant period. Although they could patrol any highway they felt necessary, they emphasized patrolling U.S. 58, Route 47, and Route 49.

Project Results

Mecklenburg County's immediate goal was to conduct 2,500 hours of selective enforcement activity. Although 1983 data were not available, the sheriff's department conducted 3,850 hours of selective enforcement in 1982. Of these hours, 2,121 were funded by the current grant. Therefore, Mecklenburg County nearly met its goal in the first 7 months of the planned 12 months of activity.

The county's intermediate goals were to increase citations for speeding by 12% and those for DUI by 15%. The county kept only citation data during periods of selective enforcement, thus making it impossible to make comparisons across time periods. Conviction data were used as a surrogate measure of citations, with two assumptions: (1) the State Police, whose citations are included in conviction data, did not alter its highway patrol activities, and (2) the conviction rate remained constant.

The number of traffic convictions for various offenses in Mecklenburg County from 1979 to 1982 are given in Table 38. The numbers of convictions in most categories fell slightly in 1982 after having risen steadily from 1979 through 1981. Convictions for speeding fell 11.7%, from 3,842 in 1981 to 3,392 in 1982, thus the county fell short of its goal of a 12% increase. Convictions for DUI, however, rose as the sheriff's department became especially concerned about alcohol-related crashes. They increased 73.7%, from 152 in 1981 to 264 in 1982, thereby exceeding the 15% goal. Although convictions for speeding and total convictions fell slightly in 1982, both categories remained significantly above 1979 levels. Therefore, the slight decline in convictions in 1982 may be more an indication that past programs were especially effective rather than that the current program was not as effective as projected.

1987

Table 38

Convictions in Mecklenburg County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	2,611	3,511	3,842	3,392
Reckless Driving	120	95	115	104
DUI	171	139	152	264
Other	<u>1,822</u>	<u>1,878</u>	<u>2,280</u>	<u>2,033</u>
Total	4,724	5,623	6,389	5,793

Mecklenburg County's ultimate goals were to reduce fatal crashes by 20% and injury and total crashes by 10%. The number of county-wide crashes from 1979 through 1982 are shown in Table 39. All categories of crashes declined significantly. Fatal crashes fell from 5 in 1981 to 2 in 1982. This decline surpasses the county's 20% goal. Injury crashes fell from 165 to 155, a 6.1% decline, short of the county's 10% goal. Total crashes fell 14.6%, from 363 to 310, which exceeded the goal of a 10% decline. Thus, the county met two of its three ultimate goals.

Table 39

Crashes in Mecklenburg County
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	5	5	5	2
Injury	148	142	165	155
Property Damage	<u>216</u>	<u>199</u>	<u>193</u>	<u>153</u>
Total	369	346	363	310

The number of crashes on U.S. 58, Route 47, and Route 49, the highways upon which the project focused, are shown in Table 40. The number of fatal crashes declined from 3 in 1981 to 2 in 1982, injury crashes rose 13.5%, from 37 to 42, and total crashes fell 16.4%, from 104 to 87. Changes in crash rates were different when targeted highway results were compared with county-wide results. The selective enforcement highways had a smaller reduction in fatal crashes, an increase in injury crashes, and a greater reduction in total crashes.

1978

Table 40

Crashes on Targeted Highways in Mecklenburg County
1981-1982

<u>Highway</u>	<u>1981</u>	<u>1982</u>
U.S. 58		
Fatal	1	1
Injury	19	18
Total	51	37
Route 47		
Fatal	2	0
Injury	13	18
Total	36	31
Route 49		
Fatal	0	1
Injury	5	6
Total	17	19
Combined		
Fatal	3	2
Injury	37	42
Total	104	87

Conclusion

Mecklenburg County has had a selective enforcement program for 31 of the 48 months from January 1979 through December 1982. During this period, convictions have tended to rise and crashes have tended to fall. It appears that this nearly continuous selective enforcement activity has begun to alter the public's driving behavior. Convictions fell for the first time in 1982, even though the number of man-hours of highway safety patrol was higher in 1982 than in prior years. All categories of county-wide crashes dropped in 1982, but the fatal and injury results on the targeted highways were not as favorable. It appears that the public in Mecklenburg County is driving more safely than in 1979 and that this is resulting in fewer traffic convictions and fewer crashes.

1980

Prince George County

Prince George County is located in east-central Virginia and borders the cities of Petersburg and Colonial Heights. During 1981, there were approximately 25,600 people and 12,260 registered vehicles in the county. Interstate 95, U.S. 301, and U.S. 460 pass through the county. Prince George County had received selective enforcement grants in both 1980 and 1981, making this its third consecutive grant.

Problem Statement

Prince George County began its first selective enforcement project in January 1980 and conducted activity in 11 months during that year. There was a 38.5% decline in fatal crashes and a 11.5% decline in injury and total crashes from 1979 levels. The county received a second grant in 1981 and conducted selective enforcement during 9 months of the year. Fatal crashes fell an additional 75.0% and total crashes fell another 13.0%. The county's death rate has fallen from 6.8 deaths per million vehicle miles of travel in 1979, 91st worst of 95 counties, to 4.3 in 1980 and to 1.2 in 1981. In 1981, the county ranked only 19th worst statewide. Crashes in Prince George County have steadily declined during periods of selective enforcement.

Proposed Activity

For 1982, Prince George County received a grant of \$15,000. The funds were to be used to pay existing staff to conduct selective enforcement on an overtime basis. Each deputy was expected to carry out two 4-hour selective enforcement shifts per month.

The sheriff's department divided the county into four selective enforcement areas: (1) the southeastern part of the county (I-95, U.S. 301, and Route 35), (2) the eastern portion of the county (U.S. 460 and Route 156 south), (3) the northern portion of the county (Routes 10, 36, and 106), and (4) the central area of the county (Route 156 north and Route 644). The days and hours of activity were to be scheduled according to the availability of overtime manpower. Based on experience, it was expected that most of the selective enforcement activity would take place in the late afternoon and early evening.

Project Goals

- Ultimate : 1. To reduce injury crashes county-wide by 10%.
- 2. To reduce total crashes county-wide by 10%.
- Intermediate : 1. To increase by 10% the number of citations issued for speed limit violations.
- Immediate : 1. To provide 1,500 man-hours of selective speed enforcement activity.

Conducted Activities

As noted above, Prince George County has received three consecutive selective enforcement grants. The numbers of man-hours of selective enforcement activity since the first project began in January 1980 are given in Table 41. The county has conducted between 1,410 and 1,415 hours of activity during each of the 3 years, and selective enforcement was conducted during 31 of the 36 months in that period. The current project ran from February through November 1982, and the number of man-hours per month ranged from 120 to 160.

Table 41

Monthly Man-hours of Selective Enforcement in Prince George County 1980-1982

<u>Month</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
January	152	171	*
February	152	*	150
March	152	*	131
April	140	120	120
May	144	125	126
June	148	128	128
July	144	108	136
August	128	108	152
September	132	140	152
October	108	148	160
November	12	258	160
December	*	104	*
Total	1,412	1,410	1,415

* No selective enforcement

The current project was conducted on each day of the week. The number of man-hours of activity conducted by day of the week are shown in Table 42. The days of most activity were Fridays (20.1%), Mondays (18.7%), and Thursdays (16.0%). Further, approximately 65% of the selective enforcement was conducted between noon and 8:00 p.m.

Table 42

1982 Daily Man-hours of Selective Enforcement in Prince George County

<u>Day</u>	<u>Number of Hours</u>
Sunday	163
Monday	265
Tuesday	211
Wednesday	173
Thursday	227
Friday	285
Saturday	<u>91</u>
Total	1,415

The location of selective enforcement activity was determined by assigning the officer to one of the four patrol areas for each selective enforcement shift. The location assignments depended on developing crash patterns and the extent to which each area had been patrolled relative to the other areas. Once assigned, the officer generally remained in this area for the duration of the shift.

Project Results

Prince George County's immediate goal was to provide 1,500 man-hours of selective enforcement activity. The county actually conducted 1,415 hours in 1982, falling slightly short of its goal. This number of hours, however, was nearly identical to that conducted under the two previous grants.

The county's intermediate goal was to increase the number of citations issued for speed limit violations by 10%. The number of citations issued, by violation type, for the 1980 through 1982 period are shown in Table 43. Citations for speeding and reckless driving fell from 4,613 in 1981 to 4,597 in 1982, a 0.3% decline. Total citations

1982

increased from 5,726 in 1981 to 5,736 in 1982, a rise of 0.2%. Although the county fell short of its 1982 goal, nearly the same number of hours of selective enforcement were conducted in 1980 and 1981. During the first grant period (1980), citations issued for speeding and reckless driving rose 75.0% and have remained at that level. If the previous selective enforcement projects achieved their goal of encouraging voluntary compliance with the traffic laws, citations would be expected to remain relatively constant. Prince George County's failure to meet its intermediate goal cannot be attributed to lack of diligence compared to previous years.

Table 43

Citations Issued in Prince George County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding/ Reckless Driving	2,689	4,706	4,613	4,597
DUI	*	41	74	84
Other	<u>*</u>	<u>774</u>	<u>1,039</u>	<u>1,055</u>
Total	*	5,521	5,726	5,736

* Data not available

The county's ultimate goals were to reduce injury and total crashes by 10%. The number of crashes in Prince George County for 1979 through 1982 are presented in Table 44. Injury crashes fell 10.8%, from 222 in 1981 to 198 in 1982, thus the county met the goal of a 10% reduction. Total crashes, however, rose from 273 to 279, a 2.2% increase. The county thus met only one of its two ultimate goals.

-1983

Table 44

Reportable Crashes in Prince George County
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	13	8	2	3
Injury	200	177	222	198
Property Damage	<u>142</u>	<u>129</u>	<u>49</u>	<u>78</u>
Total	355	314	273	279

Although crashes may not have declined significantly between 1981 and 1982, a trend of decreasing crashes since the first project was initiated in 1980 is shown by the data in Table 44. Between 1979 and 1982, fatal crashes fell 76.9% and total crashes 21.4%. Injury crashes, however, remained at a relatively constant level over the 4-year period. From these data it appears that the 3 years of selective enforcement had an effect on the county's crash levels. It was not unexpected that crash levels did not change significantly in the third year of the program. As with citations, the number of crashes would not decline significantly in 1982 if the first two grants had successfully encouraged the public to drive more safely.

Conclusion

Although Prince George County did not meet its citation goal and met only one of its crash reduction goals in 1982, the failures may be attributable to the 21 months of selective enforcement conducted in 1980 and 1981. The purpose of the previous grants was to make the public drive more safely, and if the programs were successful, the current grant would not be expected to show further gains. The crash and citation data are consistent with this hypothesis. Citations for speeding jumped dramatically in the first year of the program and have remained at this higher level. Fatal and total crashes showed a steady decline during the first two years of the program, and remained relatively constant in 1982. It thus appears that the 3 years of selective enforcement in Prince George County had a positive effect on the number and severity of its crashes.

1984

1985

Roanoke County

Roanoke County is located in southwestern Virginia. It has a population of approximately 72,600, and it surrounds the cities of Roanoke (population 99,600), Salem (24,000), and Vinton (8,000). There were 60,645 registered vehicles in the county in 1981. The county contains portions of the following major highways: I-81, U.S. 11, U.S. 220, and U.S. 221. This is Roanoke County's fourth consecutive selective enforcement grant.

Problem Statement

Roanoke County began its first selective enforcement program in 1979. In that first year, injury crashes were reduced 9.6% and total crashes 3.4%. Total crashes were reduced an additional 8.4% in the second grant period. In the third year, however, both injury and total crashes increased.

Three highways have a disproportionate share of the county's crashes. U.S. 11, U.S. 221, and Route 419 accounted for 20.0% of the fatal, 30.6% of the injury, and 31.0% of all crashes in Roanoke County in 1980. Speeding was the second leading cause of crashes in 1980, when it was a contributing factor in 40.0% of the fatal and 26.0% of the injury crashes.

Proposed Activities

Roanoke County used its previous grants to supplement existing traffic safety programs. The current grant of \$22,555 was to be used to continue the sheriff department's practice of employing an additional officer in the traffic safety unit.

In past years, the selective enforcement activity had been conducted county-wide, but the county planned to focus much of the current project on U.S. 11, U.S. 221, and Route 419. The patrol activity, however, was not limited to these three highways. Although the days and hours of selective enforcement were not to be fixed, much of the activity was expected to take place in the late afternoon and early evening.

-1986

Project Goals

- Ultimate : 1. To reduce fatal crashes on the targeted highways by 10%.
2. To reduce injury crashes on these highways by 10%.
3. To reduce total crashes on these highways by 10%.
- Intermediate : 1. To increase the number of citations for speeding by 10%.
- Immediate : 1. To conduct 1,500 man-hours of selective enforcement of speed limits.

Conducted Activities

As planned, the primary focus of the project was on U.S. 11, U.S. 221, and Route 419. In addition, activity was conducted on roads throughout the county. According to the project director, most of the activity was conducted in late afternoons or early evenings, but the county did not keep data on the hours of operation. As a result, the number of man-hours worked and the relative emphasis on particular days or hours could not be determined.

Project Results

Roanoke County's immediate goal was to conduct 1,500 hours of selective enforcement activity. Because the county did not record the number of man-hours worked, its success in meeting this goal could not be evaluated.

The county's intermediate goal was to increase citations for speeding by 10%. Unfortunately, the county kept data for DUI and total citations only. The total number of citations fell 12.0%, from 4,796 in 1981 to 4,220 in 1982 (see Table 45). Because these figures include citations for offenses other than speeding, they are not an accurate measure of whether citations for speeding increased as a result of a specially funded speed limit enforcement program. However, it does not seem likely that this project was able to accomplish its intermediate goal of increasing the number of citations issued for speeding .

-1987

Table 45

Total Citations in Roanoke County
1979-1982

	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Citations	2,783	3,517	4,796	4,220

Although data on citations for speeding were not available, data on convictions for speeding were. Two assumptions were made in using the conviction data as a measure of citations: (1) the conviction rate remained constant and (2) the State Police, whose citations are included in the conviction data, did not alter its county-wide patrol activities from previous years. Convictions for the 1979-1982 period are given in Table 46. Convictions for speeding fell from 4,362 in 1981 to 3,792 in 1982, a 13.1% decline. Similarly, the total number of convictions fell 8.1% from 7,505 to 6,901. Even though the number of citations for speeding could not be determined, it appears from the surrogate measures that the county did not meet its intermediate goal of increasing the issuance of citations for speeding.

Table 46

Convictions in Roanoke County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	2,725	3,361	4,362	3,792
Reckless Driving	135	129	106	122
DUI	38	35	58	221
Other	<u>1,878</u>	<u>2,799</u>	<u>2,979</u>	<u>2,766</u>
Total	4,776	6,324	7,505	6,901

The county's ultimate goals were to reduce fatal, injury, and total crashes on the targeted highways by 10%. The number of crashes on U.S. 11, U.S. 221, and Route 419 from 1978 through 1982 are shown in Table 47. Between 1981 and 1982, fatal and injury crashes remained relatively constant while total crashes declined slightly. There were 3 fatal crashes each year and 124 injury crashes in 1981 and 123 in 1982. Total crashes fell from 360 in 1981 to 347 in 1982, a 7.5% decline. Thus, the

1988

county did not meet its goals of reducing fatal and total crashes by 10%.

Table 47

Crashes On Selective Enforcement Highways in Roanoke County
1978-1982

<u>Highway</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
U. S. 11					
Fatal	0	1	0	3	0
Injury	29	25	35	28	32
Total	107	109	98	92	91
U. S. 221					
Fatal	1	1	0	0	3
Injury	44	42	43	44	35
Total	124	127	110	111	103
Route 419					
Fatal	0	0	1	0	0
Injury	37	37	37	52	56
Total	139	140	110	157	153
Combined					
Fatal	1	2	1	3	3
Injury	110	104	115	124	123
Total	370	376	318	360	347

Because the targeted highways were not the sole locations of selective enforcement, county-wide crashes were used in an attempt to measure the project's impact. The number of crashes county-wide for 1978-1982 are in Table 48. Because Roanoke County had selective enforcement projects in 1979, 1980, and 1981, a 3-year average was used as the comparative measure to determine the effects of the 1982 program. Fatal crashes dropped from an average of 10 to 6 (40%), injury crashes increased from 366 to 375 (2.5%), and total crashes declined from 1,082 to 1,016 (6.1%). Thus, only the goal of reducing the number of fatal crashes was achieved.

1980

Table 48

County-wide Crashes In Roanoke County
1978-1982

<u>Crashes</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	5	10	5	15	6
Injury	345	312	376	411	375
Property Damage	<u>808</u>	<u>797</u>	<u>644</u>	<u>675</u>	<u>635</u>
Total	1,158	1,119	1,025	1,101	1,016

Because the current project was Roanoke County's fourth consecutive grant, an alternative method of analysis was used to determine whether selective enforcement of speed limits produced a reduction in the number of crashes. The 1982 crash figures were compared with 1978 figures to determine whether the current project resulted in a lower number of crashes over the pre-project period. There were 5 fatal crashes in 1978 and 6 in 1982. During other years, the number of fatal crashes varied from 5 in 1980 to 15 in 1981. There were 345 injury accidents in 1978 and 375 in 1982; the numbers ranged from 312 in 1979 to 411 in 1981. There were more fatal and injury crashes during selective enforcement periods than in 1978, when there was no selective enforcement. Total crashes in 1982, however, did not reach 1978 levels. In 1978 there were 1,158 total crashes, and in 1982 there were 1,016. During other years, the number of total crashes ranged from 1,025 in 1980 to 1,119 in 1979.

Conclusion

In general, Roanoke County's 1982 grant was ineffective in reducing fatal and injury crashes on the targeted highways. In addition, there were no reductions of fatal or injury crashes when 1982 county-wide data were compared with those for 1978, the most recent year when there was no selective enforcement activity. There were, however, some slight reductions in total crashes on the targeted highways and county-wide. These reductions did not reach the goals set by the county. In addition, Roanoke County did not achieve its goal of increasing the number of citations issued for speed limit violations. And, finally, because the county did not keep proper data, there was no way to determine if it achieved its goal of working 1,500 hours of selective speed enforcement during the 1982 grant period.

-1970

1971

Surry County

Surry County is located in eastern Virginia. It is a rural county with a population of approximately 4,900. In 1981 there were 4,376 registered vehicles in the county. No U.S. highways traverse the county and State Routes 10, 31, and 40 carry most of the traffic.

Problem Statement

In 1980, Surry County had one of the worst death rates in the Commonwealth -- 8.7 deaths per million vehicle miles of travel -- and ranked 93rd worst of the 95 counties. Data furnished by the sheriff's department indicate that speeding significantly contributes to the seriousness of the crashes in the county. In 1980, it was a contributing factor in 60.0% of the fatal and 25.0% of the injury crashes.

Most of the crashes occur on four highways. Routes 10, 31, 40, and 628/650 accounted for 60.0% of the fatal, 54.7% of the injury, and 58.0% of all crashes. Crash peaks occurred on Friday and Saturday evenings between 4:00 p.m. and midnight. During 1980, 25.2% of Surry County's crashes occurred within these hours on these two days.

Proposed Activities

Surry County received \$6,000 and planned to use the funds to pay its existing staff overtime to conduct selective enforcement activities. The county was divided into four patrol areas, each containing one of the four high-accident highways. While on a selective enforcement shift, an officer was expected to remain in an assigned patrol area. Because of the Friday and Saturday evening crash peaks, approximately 50% of the patrol activity was to be conducted on these days between the hours of 4:00 p.m. and midnight. The remaining activity was to be spread throughout the week, with special emphasis on Routes 628/650 during the hours of 6:00 a.m. to 8:00 a.m., when employees of the Surry nuclear facility were going to work.

1972

Project Goals

- Ultimate : 1. To reduce fatal crashes county-wide by 20%.
2. To reduce personal injury crashes by 10%.
3. To reduce the total number of crashes by 15%.
- Intermediate : 1. To increase the number of citations for speeding issued by 15%.
- Immediate : 1. To conduct 600 hours of selective speed enforcement.

Conducted Activities

Surry County began its selective enforcement project in March 1982, and conducted 600 hours of activity by the end of the year. The number of man-hours of activity are given in Table 49. Enforcement activity was spread relatively evenly throughout the year with the exception of December, in which only 13.5 hours were conducted. These few hours in December resulted because funding for the project was depleted.

Table 49

1982 Monthly Man-hours of Selective Enforcement in Surry County

<u>Month</u>	<u>Man-hours</u>
January	*
February	*
March	62.5
April	62.5
May	55.5
June	50.0
July	68.5
August	63.5
September	79.0
October	90.0
November	55.0
December	<u>13.5</u>
Total	600.0

* No selective enforcement

The numbers of daily man-hours of patrol activity are shown in Table 50. A total of 244.5 man-hours were conducted on Fridays and Saturdays. This figure represents 40.8% of the total and is approximately the proportion of time originally proposed to be conducted on these days. Sundays accounted for 15.2% of the time and the remaining 44.0% was conducted Mondays through Thursdays. Approximately 43.0% of the activity was conducted between 4:00 p.m. and 10:00 p.m. and 88.5% from noon until midnight. As planned, the selective enforcement officers conducted their activities in all four patrol areas, with special emphasis on Routes 10, 31, 40, and 628/650.

Table 50

1982 Daily Man-hours of Selective enforcement in Surry County

<u>Day</u>	<u>Man-hours</u>
Sunday	91.5
Monday	77.5
Tuesday	63.0
Wednesday	64.0
Thursday	59.5
Friday	129.5
Saturday	<u>115.0</u>
Total	600.0

Project Results

Surry County's immediate goal was to conduct 600 hours of selective enforcement activity. As discussed above, the county conducted exactly 600 hours, and therefore accomplished its goal.

The county's intermediate goal was to increase the number of citations for speeding by 15%. The county did not keep citation data for periods prior to the time this project was initiated. The sheriff's department issued 276 citations for speeding during the project; however there are no comparable data from 1981. As a result, convictions were used as a surrogate measure of citations. In using conviction data in this manner; it must be assumed that the conviction rate remained constant, and that the State Police, whose citations are included in the conviction data, did not change its patrol activities in Surry County.

1974

The number of convictions for the 1979-1982 period are presented in Table 51. Convictions for speeding rose from 257 in 1981 to 526 in 1982. This 104.7% increase far surpasses the county's goal of a 15% increase. Moreover, convictions have steadily risen since 1979. Speeding convictions have increased 307.8% during this 4-year period, while the total number of convictions has risen 146.8%. This steady and dramatic rise demonstrates Surry County's commitment to traffic safety.

Table 51

Convictions in Surry County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	129	135	257	526
Reckless Driving	34	20	27	22
DUI	1	5	9	8
Other	<u>197</u>	<u>164</u>	<u>290</u>	<u>335</u>
Total	361	324	583	891

The county's ultimate goals were to reduce fatal crashes by 20%, injury crashes by 10%, and total crashes by 15%. The numbers of crashes county-wide for the 1979-1982 period are in Table 52. Fatal, injury, and total crashes all declined from 1981 to 1982. Fatal crashes declined from 3 to 1, surpassing the goal set. Injury crashes fell from 56 to 53, but this 5.4% decline is below the county's goal. Total crashes fell 23.1%, from 130 to 100, surpassing the goal. Thus, the county met two of its three ultimate goals.

Table 52

Crashes in Surry County
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	3	5	3	1
Injury	73	64	56	53
Property Damage	<u>55</u>	<u>62</u>	<u>71</u>	<u>46</u>
Total	131	131	130	100

1975

The pattern of crashes in the county over these 4 years shows that total crashes remained constant until the project began, and then declined dramatically. For the 3 years prior to the project, there was no difference in the total number of crashes. In 1982, when the project began, total crashes fell by 23.1%. Injury crashes continued a general decline during the project period. The small number of fatal crashes varied over the period, although the number in 1982 was the fewest during the 4 years under consideration.

Conclusion

Surry County has had an increasing number of convictions for violations of traffic laws since 1979, and the number increased significantly during 1982. Before the project began, injury crashes had been declining, and they continued to do so during the project. Total crashes showed the most significant change with the project's commencement. They remained at a constant level for 3 years, then declined 23.1% in the year of the project. It appears that the increasing number of convictions lessened the severity of crashes, and that the large increase of convictions in 1982 led to a decrease in the total number of crashes.

1970

1977

Sussex County

Sussex County is located in southeastern Virginia. In 1981, there were approximately 8,200 people and 7,448 registered vehicles in the county. Interstate 95, U.S. 301, and U.S. 460 cross through the county.

Problem Statement

Traffic crashes had been increasing until the Sussex County Sheriff's Department began to devote manpower to highway safety. From 1977 through 1979, fatal crashes increased 53.0% and injury crashes 29.0%. After the sheriff's department began to conduct highway safety activities in 1979, total crashes declined 16.9% and continued to decline through 1981.

Speed limit violations were identified as the leading cause of crashes. In 1981, speed contributed to 10.4% of all crashes, 15.0% of the injury crashes, and 12.5% of the fatal crashes. DUI was identified as the second leading cause of crashes.

Proposed Activities

Sussex County received two grants totalling \$18,500 and proposed to use the funds to supplement its highway safety program. The first grant of \$6,500 was to be used to purchase one radar unit. The second grant, for \$12,000, was to be used to pay for selective speed enforcement activity. The patrol activities were to be conducted by the officers of the sheriff's department on an overtime basis.

Before the current project began, the sheriff's department catalogued all of Sussex County's crashes in 1981 to identify crash peaks by days, hours, and locations. In addition, citation data were compiled to identify when and where most citations were issued. Using this information, the county planned its enforcement activities for the locations and times when there was an identifiable crash problem. Special emphasis was expected on weekdays from 4:00 p.m. to 9:00 p.m. and weekends from 9:00 p.m. to 3:00 a.m.

-1978

Project Goals

- Ultimate :
 - 1. To reduce the number of speed-related fatal crashes county-wide by 15%.
 - 2. To reduce the number of speed-related personal injury crashes by 12%.
 - 3. To reduce the total number of speed-related crashes by 18%.
- Intermediate :
 - 1. To increase the number of citations issued for speed limit violations by 15%.
- Immediate :
 - 1. To provide 1,300 hours of selective speed enforcement activity.
 - 2. To purchase one radar unit.

Conducted Activities

Sussex County's selective enforcement program began in March 1982 and extended through December with the numbers of man-hours shown in Table 53. May, June, July, and November received the greatest emphasis, with 53.1% of the activity being conducted during these months. A total of 1,040 hours of selective enforcement were conducted during 1982.

The project emphasized activity during nights and weekends in response to crash peaks identified by analysis of the 1981 crash data compiled by the county. The numbers of man-hours of activity conducted are presented the by the day of the week in Table 54. Of the 758 total hours, 72.9% was conducted on Fridays, Saturdays, and Sundays, and most of the remaining activity was conducted on Thursdays. In addition, 65.6% of the activity was conducted between 4:00 p.m. and midnight.

The funds for this selective enforcement project were used to supplement Sussex County's own highway safety activities rather than to replace them. The sheriff's department began its local activities in 1979 and estimated it conducted 7,200 hours of patrol that year. This increased to 7,800 hours in 1980, to 8,100 hours in 1981, and to 8,700 hours in 1982. The 8,700 hours in 1982 were in addition to the 1,040 hours of selective enforcement conducted under the current grant.

1979

Table 53

1982 Monthly Man-hours of Selective Enforcement in Sussex County

<u>Month</u>	<u>Hours</u>
January	*
February	*
March	72
April	80
May	102
June	162
July	126
August	78
September	78
October	84
November	162
December	96
<hr/>	
Total	1,040

* No selective enforcement

Table 54

1982 Daily Man-hours of Selective Enforcement in Sussex County

<u>Day</u>	<u>Hours</u>
Sunday	240
Monday	60
Tuesday	30
Wednesday	48
Thursday	144
Friday	218
Saturday	300
<hr/>	
Total	1,040

1980

As planned, the locations of the patrol activity were allocated according to the 1981 crash peaks. The county was divided into two patrol areas and selective enforcement officers were assigned to one area each shift. Although the officers were not limited to a specific highway in each patrol area, speed limit enforcement was emphasized on U.S. 460, Route 40, and Route 35. The officers usually detected speeding violations with moving radar except on highways more suitable for stationary radar.

Project Results

Sussex County's immediate goals were to purchase one radar unit and to conduct 1,300 hours of selective enforcement. The sheriff's department purchased its radar unit soon after it began the project in March 1982. As described above, 1,040 hours of activity were carried out in 1982. Although this was short of the goal, Sussex County's increasing locally funded hours of highway patrol demonstrated a dedication to highway safety.

The intermediate goal was to increase the number of citations for speeding by 15%. The numbers of citations issued in Sussex County for the 1979-1982 period are shown in Table 55. Citations for speeding rose 458%, from 204 in 1981 to 1,140 in 1982, far surpassing the goal. This increase is only part of a continuing trend over the 4-year period. From 1979 through 1982, citations for speeding increased 1,100% and total citations increased 487%. Sussex County far surpassed its intermediate goals.

Table 55

Citations Issued in Sussex County
1979-1982

<u>Violation</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Speeding	95	36	204	1,140
Reckless Driving	29	30	74	221
DUI	35	18	22	18
Other	<u>110</u>	<u>156</u>	<u>121</u>	<u>199</u>
Total	269	240	421	1,578

1881

Sussex County's ultimate goals were to reduce speed-related fatal crashes by 15%, speed-related injury crashes by 12%, and all speed-related crashes by 15%. The numbers of speed-related crashes for the 1979-1982 period are given in Table 56. Only crashes where citations were issued are included because these are the only data available that utilize the investigating officer's analysis that the crash was speed-related. Fatal crashes rose slightly from 1981 to 1982, injury crashes rose from 12 to 14, and total crashes rose from 17 to 25. Sussex County thus did not meet any of its ultimate goals.

Table 56

Crashes in Sussex County in Which a Citation for Speeding Was Issued
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Fatal	2	2	1	2
Injury	18	16	12	14
Property Damage	16	11	4	9
	—	—	—	—
Total	36	29	17	25

Although the numbers of speed-related crashes increased in 1982, they had declined steadily during the previous 3 years when locally funded activity was rapidly increasing. Between 1979 and 1982, speed-related injury crashes fell 33.0% and speed-related total crashes fell 52.8%. Even with the increase in 1982, speed-related injury and total crashes were below 1979 and 1980 levels. Because Sussex County increased its highway patrol by 20% and the number of citations for speeding fivefold in 1982, the increase in speed-related crashes cannot be attributed to a lack of patrol activity.

1987

Conclusion

Sussex County began a highway safety program in 1979 and each succeeding year devoted more resources to the program. The current grant allowed the program to be expanded even further. In each of the 3 previous years, the sheriff's department had issued more citations and crash levels had declined steadily. Combining local and federally funded selective enforcement in 1982 resulted in a fivefold increase in the number of citations issued for speeding. The number of speed-related crashes, however, increased slightly over the 1981 level but was lower than in 1979 and 1980. If the prior 3 years of traffic patrol had effectively influenced driver behavior, then the current program would not be expected to reduce crashes significantly. While the county was not able to achieve the ultimate goals of crash reductions, it did achieve its objectives to purchase a radar unit and increase the number of citations issued.

1983

Department of State Police

The Department of State Police conducts highway safety activities throughout the state. It has the primary responsibility for patrolling the seven interstate highways which traverse Virginia and its officers patrol the state's other major highways concurrently with those of local authorities. Among their other duties, the state police are especially concerned with enforcing the 55 mph speed limit.

The Department received \$266,675 of the \$592,545, or approximately 45%, of the federal 402 funds allocated to the state for the conduct of selective speed enforcement.

Problem Statement

In 1980, there were 116,382 reportable crashes in Virginia, 39,455 of which involved injuries and 938 of which resulted in a fatality. It is estimated that these crashes led to an economic loss to the state of over \$800 million.(9) Moreover, the number of total and injury crashes rose in 1981.

Speeding is a significant cause of crashes throughout the Commonwealth. An analysis of the accident report forms indicated that excessive speed was a contributing factor in 15% of all crashes and 37% of the fatal crashes during 1980. Further, traffic surveys have indicated that nearly 40% of all motorists on Virginia's highways exceed the 55 mph speed limit.

Project Goals

- Ultimate :
 1. To reduce the state fatality rate to 2.9 fatalities per 100 million vehicle miles of travel.
 2. To reduce statewide personal injury crashes by 2%.
 3. To reduce statewide total crashes by 2%.
- Intermediate :
 1. To reduce the percentage of motorists exceeding the 55 mph speed limit from 39.9% to 30.0%.
- Immediate :
 1. To conduct 37,000 hours of selective enforcement of the 55 mph speed limit.
 2. To conduct 441 selective enforcement projects.

1984

Conducted Activities

The federally funded selective enforcement grant was only one component of the State Police's comprehensive traffic safety program. The Department also conducted selective enforcement activities using state monies, and these are conducted in the same manner as the federally funded projects. The second major component is the TAB (truck and bus) program aimed at detecting violations by large vehicles. The third program is called Operation CARE and involves selective enforcement patrol on interstates on Memorial Day, Independence Day, and Labor Day.

Each of the seven regional divisions planned its own selective enforcement patrol activities under the federally funded program. The 1981 crash data were reviewed and location and time crash peaks were identified. In response to each peak, a selective enforcement project was proposed. The State Police defined one project as selective enforcement activity conducted on one highway, or in one general area, on one day. For example, activity on one highway on two consecutive days would be considered two projects. The divisions then rank ordered the proposed projects by priority and submitted the proposals to Richmond headquarters for approval. Once approved, implementation was initiated and continued until the federal funds were exhausted.

The State Police's program began in February 1982 and continued through May of that year. During this period, 441 federally funded selective enforcement projects were conducted. The State Police's officers conducted 13,158 man-hours of activity and drove 411,367 miles while conducting this activity. This is approximately 3.7% of all of the miles driven by the Department's troopers in 1982. Most of the activity was conducted on weekends, with 87.7% of the hours being on Fridays, Saturdays, and Sundays. The primary objective of these projects was to reduce speed limit violations.

The State Police did not rely solely on federal funds for selective enforcement coverage. In an effort to determine state funded activities, vehicle miles driven were used as a surrogate measure of man-hours of selective enforcement. These data are used because the State Police did not record the number of man-hours worked and paid for with state monies. The use of vehicle miles requires the assumption that the number of miles driven per hour of activity did not vary between federal and state projects. As noted above, troopers drove 411,367 miles during federally funded projects. By comparison, they drove 494,466 miles in state-funded projects. Thus, only 45.4% of all of the selective enforcement activity in 1982 was funded by federal monies. In contrast, 65.1% of the 1981 miles and 95.8% of the 1980 miles were federally funded. These figures demonstrate that an increasing proportion of the selective enforcement coverage has been funded with state monies.

1986

Project Results

A thorough evaluation of each State Police project could not be performed. First, although the State Police have complete crash and citation data for each 1982 project, they do not have corresponding data from previous years that can be used for comparison. Second, because each project lasted one day in one location, there were not sufficient crash data for an adequate comparison. The changes on any given highway on any one day could be a random fluctuation. As a result, statewide crash data were used.

The State Police's immediate goals were to conduct 37,000 man-hours of selective speed enforcement activity in 441 individual projects. Originally, 1,300 projects were planned, but this goal was based on a grant request of \$500,000. When only \$266,675 were received, project goals were revised downward. As described above, 441 projects using 13,158 man-hours of activity were carried out. As a result, the hours-of-activity goal was not achieved, but the number-of-projects goal was reached.

The intermediate goal was to reduce the percentage of motorists exceeding the speed limit from 39.9% to 30.0%. The percentages of vehicles exceeding 55 mph, adjusted according to federal guidelines, over several federal fiscal years are given in Table 57. The State Police set the 1982 goal based on the 1979-80 percentage. The 1981-82 data on the percentage of motorists who exceeded the speed limit, which most closely corresponds to those for the project period, missed the 30.0% goal by only 0.5%. However, the percentage of motorists exceeding the speed limit in the year prior to the current project was 23.9%. There also was a statewide selective speed enforcement program in place during FY 1980-81. Because of variations in numbers of projects, hours of activity, funding levels, and crash data, and the lack of certain records, there was little opportunity to determine whether the intermediate goal was or was not achieved.

Table 57

Adjusted Percentage of Motorists Exceeding 55 MPH in Virginia

	<u>1979/80</u>	<u>1980/81</u>	<u>1981/82</u>
Percentage	39.9	23.9	30.5

1986

The State Police's ultimate goals were to reduce the death rate to 2.9 and to reduce statewide injury and total crashes by 2%. In 1982, the rural traffic death rate per 100 million vehicle miles of travel was 2.2. The rural rate was used for comparative purposes because it more closely resembles the type of situation on which State Police patrol activity may be influential.(10) The 2.2 was lower than the 1981 rate of 2.9 and the 1980 rate of 3.0. The numbers of injury and total crashes for the 1979-82 period are shown in Table 58. Both injury and total crashes declined from 1981 to 1982. There were 40,785 injury crashes in 1981 and this declined 0.7% to 40,480 in 1982. Total crashes declined 4.7%, from 117,981 in 1981 to 112,474 in 1982.

Table 58

Statewide Injury and Total Crashes
1979-1982

<u>Crashes</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
Injury	40,328	39,455	40,785	40,480
Total	128,805	116,382	117,981	112,474

Over the 1979-82 period, the total number of crashes fell significantly, while the number of injury crashes varied. Total crashes declined 12.6%, from 128,805 in 1979 to 112,474 in 1982. Although there was a slight rise in 1981, the general trend was one of steady decline. Injury crashes varied from 39,455 in 1980 to 40,785 in 1981, a rise of 3.4%. The 1979-81 3-year average number of injury crashes was 40,189. Using this figure as a baseline, there was a 0.7% increase in these crashes in 1982. The fact that injury crashes were on the rise while total crashes were declining would suggest that crashes tended to become more severe. However, this was not the case when fatal crashes were considered. During this same 4-year period, there was a 15.0% decline in fatal crashes. It is not clear why injury crashes did not decline from the 1979 level.

Conclusion

The State Police conducted a series of projects in 1982 in response to identified crash problems. The Department did not conduct selective enforcement patrol on any single roadway segment over an extended period of time, thus, it was very difficult to determine whether the speed

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enforcement activity had had an impact on citations, convictions, or crashes. Because of a lack of site specific data, statewide data were used in an effort to determine impact. These data were of limited usefulness because nonselective enforcement locations were included in the data base and highways with concurrent state and local police patrols were treated as if they were subject to only State Police activity and any resulting citation, conviction, or crash changes were taken to result from this activity alone.

An analysis of the statewide data shows that the decline in the death rate and the numbers of total crashes exceeded the goals that had been set; however, the injury-crash goal was not achieved. Moreover, while the percentage of speed limit violators decreased over the goal set, the percentage of motorists exceeding 55 mph increased during the project period over that of the previous year. As a result, the State Police's series of projects had mixed results; it achieved some 1-year goals, did not achieve others, and had a limited impact over a period of several years.

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STATISTICAL ANALYSIS

1983

An earlier discussion noted that a statistical analysis of each local project would not, in general, provide meaningful results on the effectiveness of the project in reducing crashes. The number of crashes in a community may be considered as a random and infrequent event. A second point of consideration is that in the use of several of the more important statistical tests, the number of crashes and the change in frequency required for a finding of significance often exceed the counts of those events within the locality. While the numbers of crashes that occurred in any single community being evaluated may not be large enough for the computation of a statistical test, these crashes are, however, the only objective measure of unsafe driving behavior available for use in determining project effectiveness. Because of the random nature and small number of crashes in many of the localities evaluated in this report, an alternate method for determining the effectiveness of these projects had to be developed. The research team decided that the best evaluative method was to sum the crash data from those localities with STEP's and to compare these figures to those from the remaining portions of the state that did not have, or had not had, a STEP during the past 4 years.

A lesser reason for an evaluation of this type is that project directors set goals ex ante, and these goals were expressed as percentage changes rather than as statistically significant changes. Hence, a comparison of observed frequencies with ex ante goals is more meaningful to project directors.

This technique does have weaknesses. First, the enforcement activity periods of the projects vary. Some projects occurred during specific months of the year while others were conducted throughout the entire calendar year. Second, not all of the projects were conducted solely within 1982, and the inclusion of annual data dilutes the effects of these projects. Third, the State Police conducted selective enforcement activity throughout the Commonwealth over the 4 years. This activity was so widespread that its effects could not be separated from those of local projects, even though the effects may have varied among locations and years. Fourth, the projects varied as to specificity; some projects targeted specific highways, days, or hours, while others were more general. Summing the data of differing projects dilutes the effects of the individual projects. Fifth, the selective enforcement locations ostensibly were chosen because their crash problems were relatively severe. A comparison with the remainder of the state therefore would likely yield slightly skewed results. Even with the weaknesses enumerated here, it was believed that a statistical analysis using statewide data would provide more meaningful results than would individual analysis of the projects.

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Method

A comparison of crash frequencies from localities that had FY 1982 speed enforcement grants with those from localities without selective enforcement over the most recent 4 year period was accomplished using a 2 x 2 chi-square analysis. Localities which received selective enforcement grants prior to 1982 were not included in the analysis because these communities would not be appropriate as control sites. The remaining jurisdictions in the state were, therefore, used for comparisons.

Identifying jurisdictions which had previous selective enforcement grants was not as exact as one would expect. There are a variety of highway safety programs for which Virginia receives federal money. One of these is selective alcohol enforcement. Although alcohol enforcement would presumably have many activities in common with selective traffic enforcement, alcohol enforcement tends to be far more site/time specific. It is usually limited to weekend nights, and at clearly identified locations within the community. As a result, localities which had previous alcohol projects were not considered as having previous selective speed enforcement. Hence, the crash data from these jurisdictions were included in the statewide data used for making statistical comparisons. A further problem was that the records of prior grants did not always accurately describe a project as being either a speed or an alcohol project. While the evaluation team had diligently attempted to identify communities and programs, it is with some measure of apprehension that they have categorized the data by sets of selective vs. nonselective enforcement projects.

A final problem was the insufficiency of data. Not all of the project directors responded to requests for activity, citation, and crash data. Even so, crash data for most jurisdictions were available from the Department of State Police. Data for the town of Wise were unavailable and data from Wise County were substituted for use in the analysis. Similarly, data from other jurisdictions with prior grants were unavailable (see Appendix C for a list of these communities). No attempt was made to find analogous alternative data for these seven jurisdictions. Crashes occurring in these jurisdictions were included in the figures corresponding to no selective enforcement activity.

Each set of data, those from selective enforcement jurisdictions and those from nonselective enforcement jurisdictions, was divided into two groups: (1) 1979-1981, the period prior to the current grants, and (2) 1982, the current grant period. The resulting chi-square matrix is depicted in Figure 1. The computations were carried out for fatal, injury, and total crashes.

1981

<u>Type of Activity</u>	<u>1979-81</u>	<u>1982</u>
Jurisdictions With Selective Enforcement (STEP)	X	X
Jurisdictions Without Selective Enforcement (NON-STEP)	X	X

Figure 1. Chi-Square analysis matrix.

Results

The crash data used in the computation of chi-square values are either contained in Appendices A and B or can be derived from them. The crash data for jurisdictions without selective enforcement during the 4-year period were computed by subtracting the number of crashes that occurred in jurisdictions that had a selective traffic enforcement project from the number of crashes that occurred statewide. The crash figures in Appendix A were added to the figures in Appendix B and the sums were subtracted from the statewide totals to yield the numbers of crashes in nonselective enforcement areas.

The data used, the chi-square values, and the probability of statistical significance between the distributions of fatal crashes occurring in both the STEP and Non-STEP areas are shown in Table 59. In statistical terms, it can be assumed with a high degree of certainty that the proportion of fatal crashes that occurred in localities that had special selective traffic enforcement activity was not different from the proportion of fatal crashes that occurred in the remaining portions of the state that did not have such special activities. Therefore, STEP activity did not reduce fatal crashes.

Table 59

Chi-Square Matrix for Fatal Crashes

<u>Activity</u>	<u>1979-81</u>	<u>1982</u>
STEP	454	123
Non-STEP	1,851	527
$\chi^2 = 0.147$ $df = 1$ $p = 0.704$		

Crash data, the statistical value, and the probability of a difference in injury crash proportions are given in Table 60. The results indicate that at the 99% confidence level there was a statistically significant difference in the numbers of injury crashes in the STEP and Non-STEP areas of the state.

Table 60

Chi Square Matrix for Injury Crashes

<u>Activity</u>	<u>1979-81</u>	<u>1982</u>
STEP	17,184	5,921
Non-STEP	75,711	24,855
$\chi^2 = 8.359$ $df = 1$ $p = 0.004$		

A close look at the data, however, showed that project area injury crashes moved in the wrong direction. The number of injury crashes in STEP and Non-STEP jurisdictions for the 1979 through 1982 period are shown in Table 61. Injury crashes in STEP jurisdictions rose while those in Non-STEP locales declined. These findings are just the opposite of what would be anticipated if special patrols were effective, and leads to the conclusion that STEP activity did not reduce injury crashes.

1983

Table 61

Injury Crashes in STEP and Non-STEP Locales
1979-1982

<u>Activity</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
STEP	5,779	5,629	5,776	5,921
Non-STEP	25,657	24,588	25,466	24,855

Crash data, the statistical value, and the probability of a difference in total crash proportions are shown in Table 62. The results indicate a statistically significant difference between the STEP and non-STEP localities.

Table 62

Chi-Square Matrix for All Crashes

<u>Activity</u>	<u>1979-81</u>	<u>1982</u>
STEP	51,619	15,999
Non-STEP	227,684	68,975

$\chi^2 = 5.159$
 $df = 1$
 $p = 0.022$

Total crashes, unlike injury crashes, showed a declining trend, (see Table 63). However, both STEP and Non-STEP jurisdictions had declines in 1982 as compared to 1981. Total crashes dropped 4.6% in STEP localities and 4.8% in Non-STEP localities. Thus, the decrease cannot be attributed solely to selective enforcement activity. Exogenous factors explain the chi-square value indicating a high degree of difference in the proportion of crashes that occurred in STEP and Non-STEP areas of the state.

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Table 63

Total Crashes In STEP and Non-STEP Locales
1979-1982

<u>Activity</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>
STEP	18,327	16,530	16,732	15,999
Non-STEP	82,571	72,660	72,453	68,975

Conclusion

A statistical analysis comparing crashes occurring in selective enforcement communities with crashes in the remainder of the state was performed. Fatal crashes showed no statistically significant differences. Injury and total crashes showed significant differences, but a close look at the trends disclosed that the results could not be attributed to selective enforcement. The number of injury crashes in selective enforcement jurisdictions increased while those in the remainder of the state declined. Total crashes in selective enforcement jurisdictions fell; however, they fell to a greater degree in the nonselective enforcement localities. These findings suggest that exogenous factors led to a decline in total crashes. Thus, the statistical analysis of Virginia's 1982 selective enforcement projects did not establish that the projects reduced the number of fatal, injury, or total crashes in the areas receiving special enforcement patrol during 1982.

1983

FOOTNOTES

1. Pub. L. No. 89-564, 80 Stat. 731.
2. 23 U.S.C. §402(a) (1982).
3. Id.
4. 23 C.F.R. §1204.4, Highway Safety Program No. 9, I. A. 4. (1983).
5. Va.Code Ann. §33.1-395 (Supp. 1983).
6. 23 U.S.C. §402(b)(1)(C)(1982).
7. 23 C.F.R. §1204.4 (1983).
8. 23 C.F.R. §1204.4, Chapter IV (1983).
9. Daniel John Regan and Alden L. Atkins, Estimates of the Economic and Human Consequences of Motor Vehicle Accidents in Virginia During 1980, Virginia Highway and Transportation Research Council, Charlottesville, VA., 1982.
10. The rural death rate was used rather than the statewide rate because none of the State Police's projects were conducted in cities or towns. The local police departments are wholly responsible for traffic regulations within the city limits.

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1980

APPENDIX A

Crashes in Selective Enforcement Localities
1979-1982

<u>Locality</u>	<u>Fatal</u>	<u>1979</u> <u>Injury</u>	<u>Total</u>	<u>Fatal</u>	<u>1980</u> <u>Injury</u>	<u>Total</u>
Albemarle Co.	19	380	1,269	22	376	1,239
Ashland	0	39	301	1	20	243
Charles City Co.	2	41	116	3	51	131
Chesterfield Co.	19	990	2,840	26	980	2,741
Emporia	1	35	141	0	36	119
Franklin Co.	13	214	595	9	238	602
Hanover Co.	12	322	950	14	322	857
James City Co.	4	157	351	8	155	349
Luray	0	21	146	0	17	90
Mecklenburg Co.	5	148	369	5	142	346
Petersburg	1	375	1,740	6	351	1,521
Prince George Co.	13	200	355	8	177	314
Roanoke Co.	10	312	1,119	5	376	1,025
Rocky Mount	0	42	207	1	27	167
Surry Co.	3	73	131	5	64	131
Sussex Co.	6	106	266	4	98	218
Vinton	0	32	189	0	43	182
Va. Beach	38	2,119	6,730	31	1,978	5,764
Wise Co.	<u>8</u>	<u>173</u>	<u>512</u>	<u>8</u>	<u>178</u>	<u>491</u>
Total	154	5,779	18,327	156	5,629	16,530

1988

Appendix A Continued

<u>Locality</u>	<u>1981</u>			<u>1982</u>		
	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>
Albemarle Co.	11	437	1,275	15	427	1,217
Ashland	1	25	231	0	24	243
Charles City Co.	5	48	110	3	49	110
Chesterfield Co.	20	947	2,583	18	1,104	2,669
Emporia	0	37	118	1	35	100
Franklin Co.	8	220	561	6	229	526
Hanover Co.	11	360	897	12	311	814
James City Co.	6	148	353	10	135	305
Luray	0	25	83	0	17	51
Mecklenburg Co.	5	165	363	2	155	310
Petersburg	7	335	1,504	6	379	1,025
Prince George Co.	2	222	335	3	144	324
Roanoke Co.	15	411	1,101	6	375	1,016
Rocky Mount	1	26	174	1	34	147
Surry Co.	3	56	130	1	53	100
Sussex Co.	8	80	164	5	79	193
Vinton	0	39	144	1	44	172
Virginia Beach	32	1,999	6,152	28	2,134	6,179
Wise Co.	<u>9</u>	<u>196</u>	<u>484</u>	<u>5</u>	<u>193</u>	<u>498</u>
Total	144	5,776	16,762	123	5,921	15,999

1989

APPENDIX B

Crashes in Jurisdictions That Had Prior Selective Enforcement

1979-1982

<u>Locality</u>	<u>1979</u>			<u>1980</u>		
	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>	<u>Fatal</u>	<u>Injury</u>	<u>Total</u>
Arlington	8	1,128	3,606	11	1,159	3,591
Buchanan	10	289	866	17	305	858
Cumberland Co.	0	47	125	3	39	120
Dickerson Co.	5	106	344	6	101	349
Fairfax Co.	60	4,035	13,603	52	4,298	13,310
Fredericksburg	1	147	629	4	146	655
Hampton	6	1,122	3,247	11	1,151	3,011
Herndon	0	34	159	1	54	159
King George Co.	1	82	215	4	86	202
Lynchburg	6	461	1,854	5	419	1,621
Manassas	1	99	381	0	98	347
New Kent Co.	3	96	262	7	90	234
Prince William Co.	24	963	1,797	23	962	1,908
Spotsylvania Co.	<u>14</u>	<u>283</u>	<u>819</u>	<u>11</u>	<u>330</u>	<u>827</u>
Total	139	8,892	27,907	155	9,238	27,192

2001

Appendix B Continued

<u>Locality</u>	<u>Fatal</u>	<u>1981 Injury</u>	<u>Total</u>	<u>Fatal</u>	<u>1982 Injury</u>	<u>Total</u>
Arlington	12	1,089	3,550	9	1,118	3,237
Buchanan	6	351	872	6	337	833
Cumberland Co.	3	59	151	2	40	111
Dickerson Co.	3	81	302	4	116	357
Fairfax Co.	79	4,539	14,136	56	4,636	13,708
Fredericksburg	2	144	660	0	146	538
Hampton	8	1,124	3,008	7	1,229	3,012
Herndon	0	56	195	1	60	211
King George Co.	4	77	192	5	92	204
Lynchburg	4	429	1,675	8	403	1,535
Manassas	0	100	362	0	118	335
New Kent Co.	3	73	211	2	78	234
Prince William Co.	29	1,076	2,635	19	1,023	2,422
Spotsylvania Co.	<u>12</u>	<u>345</u>	<u>817</u>	<u>13</u>	<u>307</u>	<u>763</u>
Total	165	9,543	28,766	132	9,703	27,500

APPENDIX C

Jurisdictions With Prior Selective Enforcement Projects
For Which Crash Data Were Unavailable

Bluefield
Christiansburg
Front Royal
Grundy
Lebanon
South Hill
Urbana

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