THE THREE MILE ISLAND NUCLEAR ACCIDENT AND BUSINESS INTERRUPTION LOSSES: TWO CASE STUDIES

by

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I. Introduction

This paper presents a discussion of two cases of business interruption losses, which were a consequence of the nuclear accident in March of 1979 at the Three Mile Island (TMI) generating plant near Middletown, Pennsylvania. The TMI event spurred a variety of class action lawsuits on behalf of a number of groups allegedly affected by the incident, including personal injury and death claims, wage losses during work stoppage, evacuation costs, property value losses, and claims by firms suffering losses in business profits, and in some cases bankruptcy. Litigation resulted in a lump sum settlement between the utility company and the combined plaintiff groups, excluding the injury and death cases, which have been litigated separately.[1] Each of the affected groups then "competed" for recovery of losses and damages, and each individual plaintiff was evaluated according to criteria for the respective groups as established by the court and its representatives. The two cases discussed in this paper fall within the last group identified above, namely, claims of commercial-type damages.

In general, commercial loss plaintiffs were routinely awarded the equivalent of two weeks of gross profits on the assumption that this was the maximum duration and extent of losses by the average area firm. In many cases, however, particularly those of firms in or near Middletown itself, it was evident that damages were more complex and longer-term in nature. For a number of these, expert analyses and appraisals were conducted and reports presented in support of individual claimants' cases.

The two cases presented herein are that of a new car dealership, and a large, family-owned grocery store, both located within the immediate TMI geographic area (within 5 miles of the plant). In the car dealership case, the evidence suggested that losses occurred over a several year period, but appeared to have largely diminished by the time this analysis was completed in 1984. In the case of the grocery store, for which business volume is heavily linked to population levels in the Middletown area, annual earning losses were seen as extending beyond the date of the loss appraisal, at least to the year 1989, and conceivably beyond that year as the long-term appeal of this area as a place of residence appeared to have been affected.

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[1] A modicum of controversy still surrounds the question of public health effects from possible radiation emissions from the plant at the time of the incident. Approximately 2000 personal injury and death cases continue in litigation at present, some 19 years after the incident.

II. The Forecast Model

The methodology employed in calculating the economic losses of the two firms followed the general lines of analysis and estimation commonly used in business interruption cases of this type.[2] This involves, first, the forecasting of incremental revenue over the affected period (weeks, months or years, depending on circumstances) that would have been realized had the busniess interference not occurred. Available data on the sales determinants of the affected firms were examined for this purpose. Second, the associated incremental costs are evaluated and quantified. Since both cases involved retail sales activity, the cost of goods sold was the major variable cost, along with other selling expenses, including for example, commissions of the auto dealer's sales force. Third, consideration is given to any extraordinary costs (such as emergency advertising) that are motivated by the interruption itself. Finally, then, profit losses are the lost revenues, minus the avoided variable costs plus any added expenses prompted by the business interruption. For both of the cases presented, a fairly rich supply of historic operating data were available as a basis upon which to develop "but-for" estimates of revenues and costs, and useful external data sources were able to be developed for purposes of formulating the appraisals.

Business interruptions are commonly typed as "closed," "open," or "infinite" in terms of the duration of damages experienced.[3] The closed category of losses includes those for which the episode of damage has ended by the time the appraisal of losses is performed. In such cases, normal sales data from before and after the interruption are available for use in developing the estimate of losses in the intervening period. Open losses are those for which the firm's sales performance has not returned to normal by the time of the appraisal, but the firm continues to operate. The two cases discussed herein fall approximately within these first two categories of losses. By the time of final hearing of the auto dealership case in 1984, the interruption had largely diminished, though a full resumption of its "normal" sales path was not yet evident. The grocery sales case had the markings of an open, or continuing loss of business volume well beyond the appraisal and final settlement date.

Both cases illustrate the fact that analysts frequently are challenged as much by having to project the end of the loss episode as by having to project the size of losses. Furthermore, as noted by experienced practitioners in this field, the question of how far into the future to compute profit losses is often a legal issue as much as an economic one.[4] In the case of the TMI damages, the court initially imposed three to four year time limits (i.e. to 1981 or 1982) on damages, but subsequently did consider evidence on losses occurring up to the time of hearings which were largely completed by the end of 1984. Thus, while in a few select cases triggered by the TMI incident, actual damages might well have continued beyond 1984 (due to the longer-term harm to a business location) the court arbitrarily set a time limit on damage estimates it would consider.[5]

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[2] For discussion of forecasting models and methodology frequently used in such business interruption cases, see Foster, Trout and Gaughan (1993) or Plummer and McGowin (1993).
[3] See Trout and Foster (1993), pp. 154-155.
[4] See Dunn (1989).
[5] See Case 2 below.

III. Case 1: Auto Sales, Inc.

A. Background

Case 1 involves a new and used car dealership ("Auto Sales, Inc.") in the community near TMI, which primarily sold a very popular foreign make, referred to in this paper as "ForCar," along with a make from one of the U.S. Big Three automakers, referred to as "Amercar." This dealership had been a successfully run enterprise for some 20 years as of the mid-1970's. In 1972 it began selling ForCar, augmenting its long-standing dealership in AmerCar. As shown in Table 1 and Figure 1, the firm's sales of ForCar had risen briskly from 1973 through 1978, roughly matching the sales path of its counterpart national average dealer. Unit sales by the average dealer nationwide, for the ForCar make of automobile, was derived from figures provided in the trade publication, Automotive News, Market Data Book. While not an exact replication of nationwide dealer growth rates over the 1973 to 1978 period, the plaintiff's sales record reasonably matches that of the national counterpart. Hence, the national average dealer growth rate was used as a benchmark in projecting the firm's sales, had the TMI incident not occurred.

Following the incident, the plaintiff's unit sales for 1979 dropped sharply, and remained off the pace for the next 4 to 5 years. (It was management's strongly held view that throughout this several year period following the March 1979 incident, sales and profits were hurt because many potential customers from outside the immediate vicinity were reluctant to buy from this dealership and return for subsequent service visits due to imagined negative health consequences in the area near the plant.)

Table 1
Auto Sales, Inc.
ForCar Unit Sales

Year	National Average Dealer* (Annual Growth Rate)		Auto Sales, Inc.	
			(Actual)	(Projected-- Absent TMI Incident)
1973	132		57	
1974	104		75	
1975	214		127	
1976	252		234	
1977	339		290	
1978	396		295	
1979	488	23.23%	172	363
1980	496	1.60%	183	368
1981	470	(5.24%)	224	349
1982	455	(3.19%)	144	338
1983	494	8.57%	221	367
1984	610	23.48%	328	453

* **Source:**   Automotive News, Market Data Book, (annual, 1973-1984) published by Crain Communications, Inc.

FIGURE 1

UNIT SALES: NATIONAL AVERAGE DEALER AND AUTO SALES, INC.
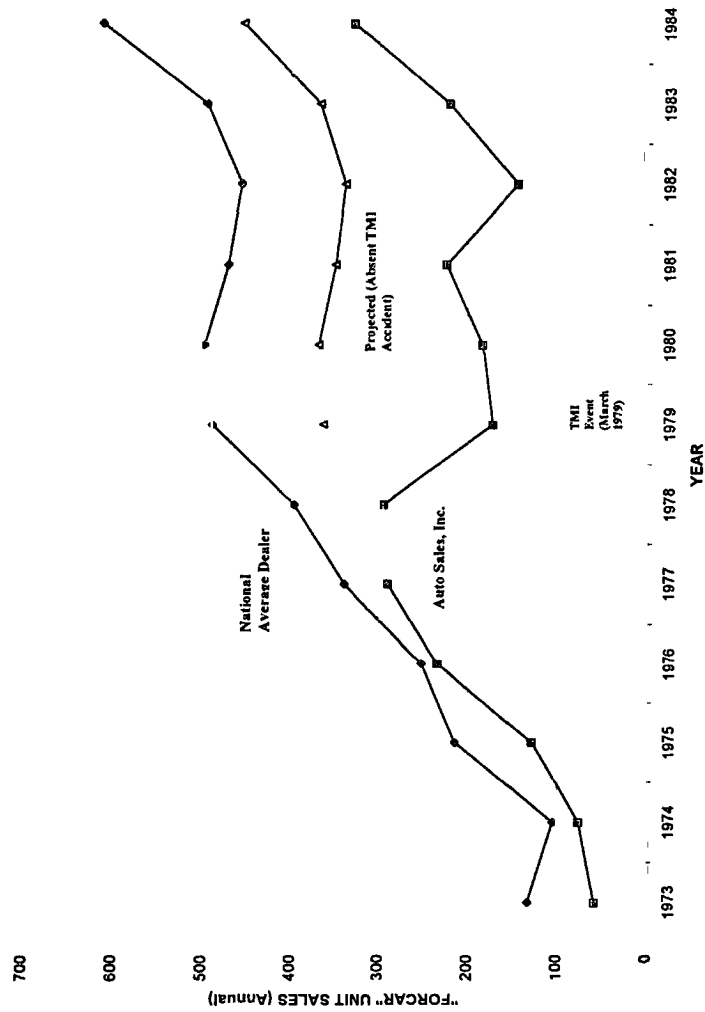
Sales of AmerCar, a product of one of the U.S. Big Three, which had been very stable prior to 1979, dropped sharply in the accident year and appeared to have been moderately dampened over the next 4 years as well. AmerCar sales appear in Table 2.

B. Estimation of Lost Sales and Profits -- ForCar

The estimate developed for the firm's losses in new car sales of both ForCar and AmerCar vehicles was based on the sales performance of dealers nationwide selling these two makes of automobiles. This benchmark, or "yardstick", represented by national average dealer unit sales, had applicability in this case as other market factors, including the number of competing dealers in the area, were constant during the affected period.[6] Use of this multi-year benchmark was particularly valuable in the present case since it appeared that the impact on the company extended for several years beyond 1979 due to the apparent, lingering tendency on the part of many residents of the greater Harrisburg region to avoid the Middletown area if they could do so. The period of impact thus included the 1981-1982 recession period, and it was assumed that this dealership would have suffered the same degree and timing of lost sales during that recession as the counterpart national average dealer. In recent decades, the state of Pennsylvania had experienced economic fluctuations of quite similar duration and amplitude as those of the nation as a whole. During the most significant recession period prior to the TMI incident, the 1973-1975 contraction, the Pennsylvania unemployment rate tracked very closely with that of the U.S. economy overall.[7] Within the more proximate Harrisburg region, recession period data, including the 1981-1982 episode, indicate a strong correlation of the region's unemployment rate with that of the national economy.[8]

[6] For a discussion of other yardstick or benchmark indicators, see Foster, Trout and Gaughan, (1993), p. 189.

[7] In the U.S. as a whole, the unemployment rate rose from some 4.8% in 1973 to 5.6% in 1974 and peaked at 8.6% in early 1975; correspondingly, in Pennsylvania the unemployment rate was 4.8% in 1973, 5.3% in 1974 and 8.4% in 1975 (See Choices for Pennsylvanians, December 1980, p.16)

[8] See: Regional Economic Update, "Unemployment Rate Characteristics of Metropolitan Area Economies," (Autumn 1995).

Table 2
Auto Sales, Inc.

Year	National Average Dealer* (Annual Growth Rate)		Auto Sales, Inc. (Actual)	Projected - Absent TMI Incident)
1974	158		36	
1975	192		79	
1976	272		104	
1977	294		102	
1978	302		114	
1979	286	(5.30%)	72	108
1980	251	(12.24%)	60	95
1981	263	4.78%	88	100
1982	254	(3.42%)	60	96
1982	320	25.98%	145	121

*Source: Automotive News, Market Data Book (annual, 1974-1983), published by
Crain Communications, Inc.

   The utilization of the unit sales record of the national average dealership was
straight- forward. The annual rates of change of the average dealer from 1978 onward were
applied to the plaintiff's pre-TMI (1978) unit sales, generating projections of annual sales
of the ForCar make for the years 1979 through 1984. Making direct use in this way of the
actual year-to-year volume of the average dealer to estimate "but-for" sales of the damaged
firm seemed especially appropriate for two reasons: 1) as noted above, it preserved the
effects of the 1981-1982 recession on projected sales for the plaintiff; and, 2) it captured the
particular timing of the growing appeal and profitability of this increasingly popular make
of automobile. Figure 1 thus includes the projected sales levels of the car over the 1979 to
1984 period, the time-frame affected by the nuclear incident.
   Table 3 summarizes the loss calculations for this make of car for the period of 1979
through 1983.[9] Subtracting actual units sold from projected levels yields lost sales, in units.
Multiplying by the average price of cars actually sold each year, and by the average gross
profit per unit from actual sales, produced estimates of lost sales revenue and lost gross
profits, respectively. Gross profit per car earned on the ForCar make varied substantially
over the 1979 to 1983 period from 13 percent to 19 percent of sales, reflecting changes in
features provided as standard equipment, sticker prices, and the mix of models sold.
   A detailed examination of the firm's accounting records indicated that the likely
added variable costs that would accompany such additional sales ranged from about 5

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[9] As noted above, the court established a more-or-less fixed end point on business loss
recovery, which in the present case meant to the end of 1983. As suggested by Figure 1,
actual losses for this firm appear to have continued into 1984, and may have extended
beyond.

percent to 6 percent of gross sales, the bulk of which was commissions of 4percent, and advertising of about ½ percent. Netting out these additional sales costs (using 5.5 percent of gross sales) from the unrealized gross profit yielded the losses in net profit on the ForCar make over the five-year period.

C. Estimation of Lost Sales and Profits -- AmerCar, Used Cars, and Parts and Service

An estimation of the firm's losses on the American make of auto it sold was similarly developed for the 1979 to 1983 period. Based also on a comparison with the national average dealer sales performance, annual sales of this make declined following the TMI incident, but were less dramatically reduced than were sales of the foreign-made vehicle. This differential effect was attributed to the fact that the clientele of the American make of car consisted more heavily of local residents of the vicinity of TMI, as opposed to customers from outside this vicinity who tended to avoid doing business in the area of the TMI plant.[10]

Table 3
Auto Sales, Inc.
ForCar: Lost Sales, Revenues, and Net Profit

| | For Car Units | | | Lost | Lost | Lost |
| | Actual | Projected | Lost | Gross | Gross | Net |
Year	Sales	Sales	Sales	Revenue	Profit	Profit
1979	172	363	191	$1,045,077	$161,096	$103,617
1980	183	368	185	1,369,837	260,269	184,928
1981	224	349	125	1,287,177	197,244	126,449
1982	144	337	194	1,463,662	190,885	110,384
1983	221	367	146	1,241,427	170,075	101,797

Losses in business volume and profit reductions were also evaluated for used car as well as service and parts sales by the dealership. The historical pattern for all three of these components of dealership business indicated a very strong linkage to new car sales. In the five years prior to 1979 the ratio of used car sales to total new car sales averaged 28.7 percent and in three of those five years, the percentages were consistently in the 28.0 percent

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[10] Sales records of the firm indicated that for the three-year period prior to the accident approximately twice as many purchasers of ForCar automobiles resided outside of Middletown and the three contiguous boroughs to that of the sales location as did purchasers of the American make of automobile.

to 28.5 percent range. Using the mid-point value in this range, or 28.25 percent, estimates of the lost used car sales volume (absent TMI) were generated from the lost ForCar and AmerCar sales, developed above. Netting out variable costs associated with used car activity yielded estimates of annual losses in net profit from this component of operations. Similarly, parts and service department losses were computed on the basis of their having averaged some 5.1 percent of total company sales in the 5 years before the 1979 incident.

With variable costs in these two departments exhibiting a steady relationship with sales, losses in net profit were then computed in straight-forward fashion.

IV. Case 2: Frank's Foods, Inc.

A. Background

Frank's Foods, a successful, family-owned, retail grocery business, is located in the main shopping district of Middletown, Pennsylvania. By the mid 1970's with a size of some 30,000 square feet, the firm had established itself as offering the full range of food and related items on a par with stores of the major chains. Annual sales revenue had been growing continuously, at an average of some 12.5 percent per year, in the four years prior to the nuclear accident. In the immediate period of the TMI incident and brief closing of the store, damages amounted to some three days of net profit losses, and spoilage of inventory of perishable and other items. These very short-run losses were estimated by the firm's ownership itself in collaboration with the firm's accountant, and totaled to some $20,300.

This author's involvement in the case was enlisted to assess the longer-term impact on the grocery firm. As a result of the nuclear incident, the image of Middletown, Pennsylvania as a place to live, had certainly been adversely affected. A study sponsored by the Nuclear Regulatory Commission in early 1980 showed that 30 percent of the residents within a 5 mile radius of the plant had considered moving because of the accident. Though out-migration of this scale did not occur, the survey was indicative of a strong change in sentiment on the part of local residents. Also, those relocating within the Harrisburg region as well as those newly-moving to the region were now more likely to avoid the Middletown area as a place of residence. General information from real estate firms with offices serving Middletown indicated a significant decline was experienced in referrals from other areas, following the accident.

Data on residential building permits indicated a reluctance to place new homes (including mobile homes) in the Middletown area. Figures were collected on permits issued for many of the major municipalities in Dauphin County (including Middletown Borough), and for the county as a whole. Annual averages from these data were calculated for each municipality for the pre-accident period of 1970-78, and for the three available post-accident years of 1979-81. While every municipality experienced a slowdown in construction in line with national trends, the decline by Middletown Borough, from an average of 123 permits per year prior to 1979 to 11 per year from 1979 on, was by far the most dramatic. (See Appendix A.)

In sum, there were numerous indications of resistance to the immediate TMI area, including Middletown, as a place of residence. This municipality is the principal source of customers for Frank's Foods, Inc. To the extent that the population in the borough was smaller over time than it would have been had the accident at TMI not occurred, the firm

experienced longer-term economic losses due to the incident. In 1982, at the time of this evaluation, all indications were that business interruption losses would thus continue beyond the time of appraisal, constituting an "open" type of loss, as defined above. Population data for Middletown and for comparison areas, which are presented below, suggested long-term losses of this nature.

B. Population Trends for Middletown and Comparison Areas: 1970-78 and 1979-82

　　　　Table 4 provides population data for Middletown Borough for the period 1970 through 1982. These data, as well as those for two other comparable areas, were drawn from annual springtime census tabulations conducted by school districts throughout Pennsylvania. For the period of 1970 to 1978 (pre-TMI), Middletown experienced growth in population averaging 1.43 percent annually. After 1978 the average annual rate of change in population fell to 0.32 percent. In the same table, comparable population data are shown for the Lower Dauphin and Central Dauphin School Districts. All three of these districts serve the function of being bedroom communities for individuals employed in the greater Harrisburg area, and their per capita income levels are similar. For the 1970-78 period, population growth in the Central Dauphin district averaged 1.83 percent per year, and it averaged 0.96 percent per year between 1978 and 1981 (1981 was the most recent data year available for the Central and Lower Dauphin districts at the time of this report). For Lower Dauphin, the data, which were available only from 1973 on, indicated 2.71 percent average annual growth from 1973 to 1978, and 1.45 percent average growth from 1978 to 1981. Though both districts experienced a slowing of population growth, neither exhibited an absolute decline and subsequent near-leveling as did Middletown. While these two otherwise similar districts after 1979 had population growth averaging some 53 percent of pre-TMI levels, Middletown's growth rate after 1979 was initially negative, then positive but minuscule after 1980. Therefore, it was reasonable to estimate that were it not for the TMI accident, Middletown's growth after 1978 would have been about the same 53 percent of its pre-TMI rate. This implies an average population growth of approximately 0.75 percent per year.

Table 4
Frank's Foods, Inc.
Population Levels and Rates of Change for
Middletown, Lower Dauphin School District, and
Central Dauphin School District: 1970-1982

Year	Middletown Borough Population	Lower Dauphin Population	Center Dauphin Population
1970	8,730		57,894
1971	8,965		58,584
1972	9,233		59,590
1973	9,452	16,827	61,640
1974	9,755	17,282	62,868
1975	9,920	18,131	64,794
1976	10,060	18,560	65,738
1977	10,103	18,793	66,649
1978	9,765	19,222	66,931
1979	9,408	19,482	67,318
1980	9,760	19,768	68,579
1981	9,803	20,073	68,878
·1982	9,879		
Average annual change prior to 1979 (per above)	1.43%	2.70%	1.83%
Average annual change subsequent to 1978 (per Above)	0.32%	1.45%	0.96%

Sources: Lower Dauphin, Central Dauphin and Middletown School Districts.

Using this 0.75 percent per year estimate of the growth rate of Middletown, absent the accident, a series of projected population levels from 1980 through 1989 were generated. These are shown in Table 5. The second column reports actual population count through 1982, and for 1983 through 1989, the probable population levels based on growth

rates after the accident (0.32 percent per year). The third column then represents the estimated loss in population in Middletown due to the accident, which served as the basis for computing the sales loss to Frank's Foods. At the time of this analysis, officials at TMI estimated that it would be 1988 or 1989 before the work of clean-up and repair of the damaged reactor was completed. Thus, the appeal of Middletown as a residential location was assumed to be impaired at least until that point in time, and therefore sales losses were estimated through the year 1989.

C. Sales and Profit Losses to Frank's Foods: 1980-1989

As shown in Appendix B, a computation was made of the annual number of store customers per person living in Middletown. For the years 1978 through 1981 this ratio remained relatively constant, and averaged 66.46. Thus, this figure was utilized in projecting the magnitude of customer losses over the period of 1982 to 1989. For the years 1980 and 1981 slightly different values, reflecting the actual ratios for these years, were used. Certainly not all customers of Frank's Foods were Middletown residents. Based on occasional surveys and personal knowledge of their clientele, ownership estimated that 40 percent of the store's customers came from outside of the borough. Hence, the above ratio was adjusted (multiplied) by a factor of 60 percent. The resulting number (66.46 x .6 = 39.87) provides the number of customer visits by Middletown residents per person in the borough of Middletown. This suggests that for a family of 4, approximately 160 visits were made to the store per year, or about 1 visit every 2.3 days. This is a reasonable frequency in view of Frank's proximity to the population and the large amount of "walk-in" trade the store had experienced.

The next step was to place a dollar value on the sales which would have been realized from the additional population. Average purchases per customer for 1980 and 1981 were $13.18 and $12.97, respectively. For the years 1982 through 1989 a rounded $13 per customer transaction was used in forming the loss computation. Thus, the yearly impacts of the TMI accident on gross sales at Frank's beginning with the first full year after the accident (1980), were calculated as shown in Table 6.

Accounting records of the firm indicated that gross profit as a percentage of gross sales had averaged 21.14 percent over the period of 1978 to 1982, and presumably was not affected by the TMI incident. It was assumed that this same gross profit percentage would have been realized on the lost sales due to TMI. In turn, virtually all of the added gross profit would have accrued as net(pre-tax) profit to the firm. This is the case because such modest additional volumes of business (representing about 1 percent of sales in 1980) would not have triggered significant added costs; the firm's labor, utility, advertising, and other operating costs would remain essentially unchanged. Thus, the resulting loss of net profit to Frank's Foods was estimated at 20 percent of the loss in yearly gross sales. For the two years prior to completion of this report in late 1982 (1980 and 1981) the lost profit was $33,883. For the years 1982 through 1989 losses in net profit were effectively computed in present value terms as of 1982 (see Table 6 note) and sum to $281,442.

Table 5

Frank's Foods, Inc.
Projections of Middletown Population

Year	Projected Population of Middletown - Absent TMI Accident	Population of Middletown - as Affected by TMI Accident (actual population)*	Population Loss Due to TMI Accident
1979	9,838	9,408	
1980	9,912	9,760	152
1981	9,986	9,803	183
1982	10,061	9,879	182
1983	10,137	9,910 (est.)	227
1984	10,213	9,942 (est.)	271
1985	10,289	9,974 (est.)	315
1986	10,367	10,006 (est.)	361
1987	10,444	10,038 (est.)	406
1988	10,532	10,070 (est.)	453
1989	10,602	10,102 (est.)	500

* Population figures for 1983 through 1989 are based on a 0.32 percent per year growth rate, the average growth rate in the post accident period through the year 1982, the last year for which data were available at the time of this analysis.

Table 6
Frank's Foods, Inc.
Losses in Population and Sales

Year	Middletown Population Differential Due to TMI		# of Middletown Customer Visits Per Year Per Middletown Resident		Average Expenditure Per Customer	Loss in Gross Sales*
1980	-152	x	38.30	x	$13.18	$76,729
1981	-183	x	39.05	x	12.97	92,685
1982	-182	x	39.87	x	13.00	94,332
1983	-227	x	39.87	x	13.00	117,656
1984	-271	x	39.87	x	13.00	140,462
1985	-315	x	39.87	x	13.00	163,268
1986	-361	x	39.87	x	13.00	187,110
1987	-406	x	39.87	x	13.00	210,434
1988	-453	x	39.87	x	13.00	243,794
1989	-500	x	39.87	x	13.00	259,155

Total Loss in Gross Sales $ 1,576,625

* Future dollar values in this column (for the years 1983 through 1989) were neither adjusted upward for the inflation in product prices which would occur, nor discounted to factor out the time value of money (i.e., the interest rate). It was assumed these two factors would approximately offset each other.

IV. Conclusions

The conventional and widely-used business interruption model served well as a general framework for determining losses in the two cases described above. In each case, however, relatively unique data sources were drawn upon for estimating the most difficult component of such business loss appraisals, namely, the "but-for" estimate of revenue. In the auto dealership case, the yardstick measure derived from average national dealer sales proved to be a credible predictor for this purpose. Such trade association data may constitute a fruitful source of information for forensic economists undertaking similar forecasts in other retail, wholesale or production activities. The author also notes that the use of a large visual exhibit of the actual vs. projected sales, shown in Figure 1, served quite

effectively in the courtroom presentation of this case.

Damages to the grocery store (beyond the immediate closing and spoilage losses) were seen as longer-term and "open," in effect constituting a delayed and cumulating consequence of the accident, as reduced population growth affected sales. Projection of lost sales in this case was by nature more speculative than that of the first case. Both the quality and time-length of school census population data used for estimating lost revenue were of some concern. Ultimately, the estimate of a 500 person, or 5 percent, dampening in the population of Middletown by a point ten years after the accident seemed within the bounds of reasonableness.

A related issue was whether there might be continuing, though perhaps diminishing, losses which extended beyond the damages described in this paper, generating some loss in going concern value for the subject firms. In the TMI litigation, the court in most cases ruled out consideration of losses beyond 1983, and thus effectively denied compensation for loss in value resulting from future earnings losses. Aside from the calculation of grocery store losses over the 1982 to 1989 period, no loss in value from future profit reductions was developed in this author's work. If, prior to settlement, either of the firms had been sold, or was under sales negotiations, loss in value would have been raised as an issue and given consideration by the court. Speculation about more permanent damage to firms in the Middletown area (and loss in value) presumably would have hinged on the absence of an eventual "decay" in the health concerns and negative image of the Middletown area as a retail location. Both enterprises, of course, had the opportunity in the long run to mitigate any expected longer-term losses through relocation, or the opening of satellite locations away from the original places of business.

Appendix A
Frank's Foods, Inc.
Building Permits in Major Municipalities of Dauphin County
and Dauphin County: 1970-1978 and 1979-1981

	Annual Average Number of Permits Issues 1970-1989	Annual Average Number of Permits Issues 1979-1981	Ratio of 1979-1981 Average to 1970-1978 Average
Derry Township	157.3	64.3	0.41
Harrisburg City	69.0	41.0	0.59
Hummelstown Boro	15.3	10.3	0.67
Lower Paxton Township	644.2	278.3	0.43
Lower Swatara Township	59.2	39.3	0.66
Londonderry Township	26.4	16.0	0.61
South Hanover Township	53.5	35.6	0.67
Steelton Boro	21.8	9.6	0.44
Swatara Township	202.2	90.3	0.45
West Hanover Township	52.2	33.3	0.64
Dauphin County	1837.2	883.3	0.48
Middletown Borough	123.6	11.3	0.09

Source: Tri-County Regional Planning Commission, Harrisburg, Pennsylvania

Appendix B
Frank's Foods, Inc.

Projections of Customer Visits as
Related to the Population of Middletown

Year	Number of Customer Visits	Middletown Population	Ratio of Number of Customer Visits to Population of Middletown
1978	659,202	9,765	67.50
1979	652,950	9,408	69.40
1980	622,987	9,760	63.83
1981	638,105	9,803	65.09
Average for 1978-1981			66.46

References

Choices for Pennsylvanians, Technical Report of the Pennsylvania State Planning Board, Harrisburg, PA, December 1980.

Dunn, Robert L., *Recovery of Damages for Lost Profits*, 3rd ed. Kentfield, CA: Lawpress, 1989.

Foster, Carroll B., Robert R. Trout and Patrick A. Gaughan, "Losses in Commercial Litigation;" *Journal of Forensic Economics*, Fall 1993, 6 (3), 179-196.

Plummer, James and Gerald McGowin, "Key Issues in Measuring Lost Profits," *Journal of Forensic Economics*, Fall 1993, 6 (3), 231-239.

Regional Economic Update, "Unemployment Rate Characteristics of Metropolitan Area Economies," PNC Bank Corp., Economics Division, Pittsburgh, PA, Autumn 1995.

Trout, Robert R. and Carroll B. Foster, "Economic Analysis of Business Interruption Losses," in Litigation Economics, edited by Patrick Gaughan and Robert J. Thornton, Greenwich, CN: JAI Press, 1993.