

## 6. DEMAND ESTIMATION FOR EVACUATION SCENARIOS

An evacuation “case” defines a combination of Evacuation Region and Evacuation Scenario. The definitions of “Region” and “Scenario” are as follows:

|          |                                                                                                                                                                                                                                           |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Region   | A grouping of contiguous evacuation ERPAs, that forms either a “keyhole” sector-based area, or a circular area within the EPZ, that must be evacuated in response to a radiological emergency.                                            |
| Scenario | A combination of circumstances, including time of day, day of week, season, and weather conditions. Scenarios define the number of people in each of the affected population groups and their respective mobilization time distributions. |

A total of 35 Regions were defined which encompass all the groupings of ERPAs considered. These Regions are defined in Table 6-1. The ERPA configurations are identified in Figure 6-1. Each keyhole sector-based area consists of a central circle centered at the Indian Point Energy Center (IPEC), and three adjoining sectors, each with a central angle of 22.5 degrees. These sectors extend to a distance of 5 miles from IPEC (Regions R4 to R19), or 10 miles (Regions R20 to R35). The azimuth of the center sector defines the orientation of these Regions.

A total of 14 Scenarios were evaluated for all Regions. Thus, there are a total of  $14 \times 35 = 490$  evacuation cases. Table 6-2 is a description of all Scenarios.

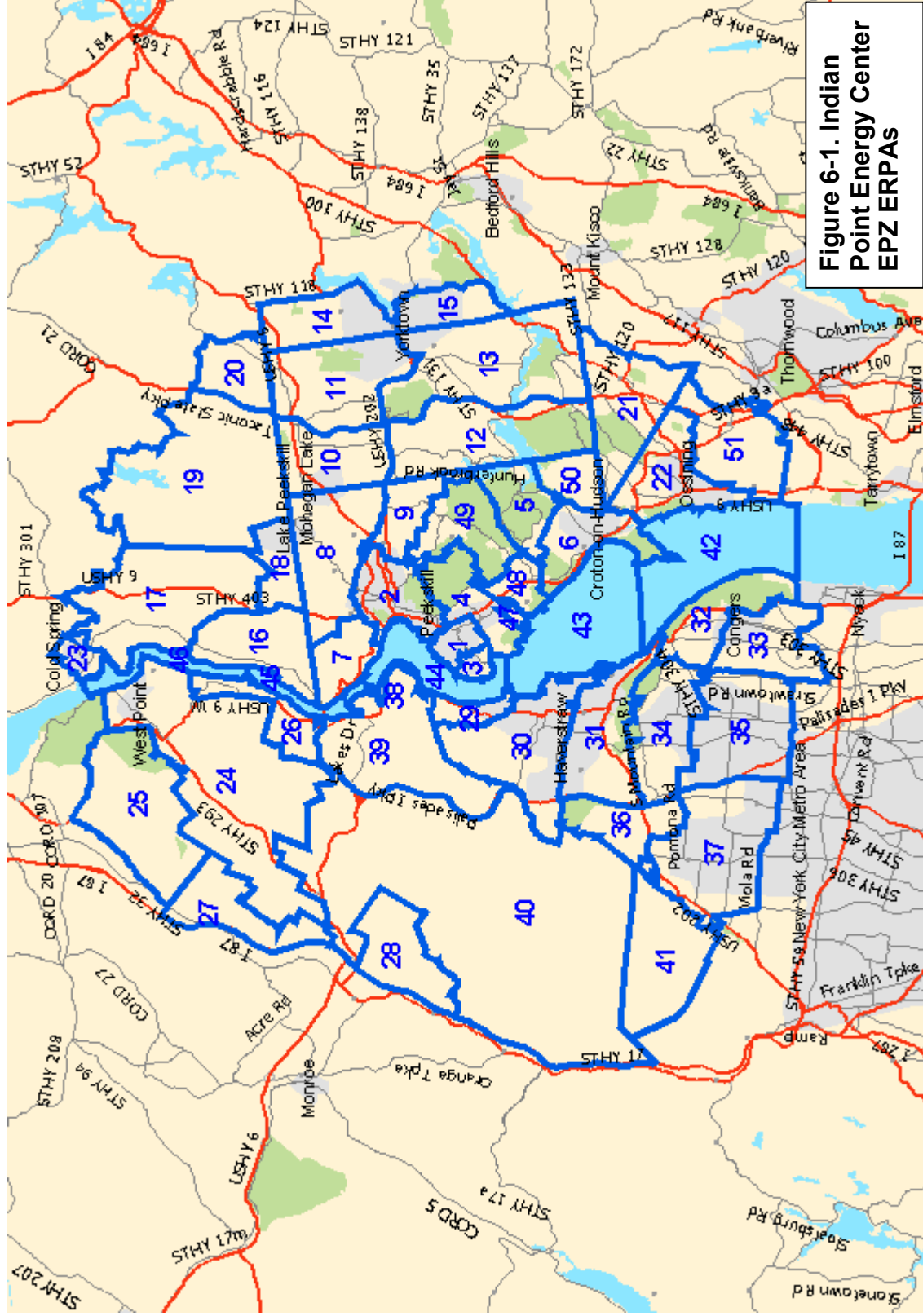
Each combination of region and scenario implies a specific population to be evacuated. Table 6-3 presents the percentage of each population group assumed to evacuate for each scenario. Table 6-4 presents the population and vehicle counts for each scenario.

**Table 6-1. Definition of Evacuation Regions**

| <b>REGION</b>                            | <b>ERPAs IN ORANGE COUNTY</b> | <b>ERPAs IN PUTNAM COUNTY</b> | <b>ERPAs IN ROCKLAND COUNTY</b> | <b>ERPAs IN WESTCHESTER COUNTY</b> | <b>DESCRIPTION OF REGION</b> | <b>ERPAs IN REGION</b>                          |
|------------------------------------------|-------------------------------|-------------------------------|---------------------------------|------------------------------------|------------------------------|-------------------------------------------------|
| <b>R1</b>                                | 39                            | NONE                          | 29, 38, 39                      | 1-4, 7, 44                         | Entire 2 mile ring           | 1-4, 7, 29, 38, 39, 44                          |
| <b>R2</b>                                | 26, 39, 40                    | 16, 18, 45                    | 29-31, 38-40                    | 1-9, 43, 44, 47-49                 | Entire 5 mile ring           | 1-9, 16, 18, 24, 26, 29-31, 38-40, 43-45, 47-49 |
| <b>R3</b>                                | 24-28, 39, 40                 | 16-20, 23, 45, 46             | 29-41                           | 1-15, 21, 22, 42-44, 47-51         | Full EPZ                     | 1-51                                            |
| <b>2 Mile Ring and Sector to 5 Miles</b> |                               |                               |                                 |                                    |                              |                                                 |
| <b>R4</b>                                | 26, 39, 45                    | 16, 18, 45                    | 29, 38, 39                      | 1-4, 7, 8, 44                      | N                            | 1-4, 7, 8, 16, 18, 26, 29, 38, 39, 44, 45       |
| <b>R5</b>                                | 39, 45                        | 16, 18, 45                    | 29, 38, 39, 44, 45              | 1-4, 7-9, 44, 45                   | NNE                          | 1-4, 7-9, 16, 18, 29, 38, 39, 44, 45            |
| <b>R6</b>                                | 39                            | 16, 18                        | 29, 38, 39, 44                  | 1-4, 7-9, 44, 49                   | NE                           | 1-4, 7-9, 16, 18, 29, 38, 39, 44, 49            |
| <b>R7</b>                                | 39                            | NONE                          | 29, 38, 39, 44                  | 1-4, 7-9, 44, 49                   | ENE                          | 1-4, 7-9, 29, 38, 39, 44, 49                    |
| <b>R8</b>                                | 39                            | NONE                          | 29, 38, 39, 44                  | 1-5, 7-9, 44, 48, 49               | E                            | 1-5, 7-9, 29, 38, 39, 44, 48, 49                |
| <b>R9</b>                                | 39                            | NONE                          | 29, 38, 39, 44                  | 1-7, 9, 44, 47-49                  | ESE                          | 1-7, 9, 29, 38, 39, 44, 47-49                   |
| <b>R10</b>                               | 39                            | NONE                          | 29, 38, 39, 43, 44              | 1-7, 43, 44, 47-49                 | SE                           | 1-7, 29, 38, 39, 43, 44, 47-49                  |
| <b>R11</b>                               | 39                            | NONE                          | 29-31, 38, 39, 43, 44           | 1-7, 43, 44, 47-49                 | SSE                          | 1-7, 29-31, 38, 39, 43, 44, 47-49               |
| <b>R12</b>                               | 39                            | NONE                          | 29-31, 38, 39, 43, 44           | 1-4, 6, 7, 43, 44, 47, 48          | S                            | 1-4, 6, 7, 29-31, 38, 39, 43, 44, 47, 48        |
| <b>R13</b>                               | 39                            | NONE                          | 29-31, 38, 39, 43, 44           | 1-4, 7, 43, 44                     | SSW                          | 1-4, 7, 29-31, 38, 39, 43, 44                   |
| <b>R14</b>                               | 39, 40                        | NONE                          | 29-31, 38-40, 43, 44            | 1-4, 7, 43, 44                     | SW                           | 1-4, 7, 29-31, 38-40, 43, 44                    |
| <b>R15</b>                               | 39, 40                        | NONE                          | 29-31, 38-40, 44                | 1-4, 7, 44                         | WSW                          | 1-4, 7, 29-31, 38-40, 44                        |
| <b>R16</b>                               | 39, 40                        | NONE                          | 29, 30, 38-40, 44               | 1-4, 7, 44                         | W                            | 1-4, 7, 29, 30, 38-40, 44                       |
| <b>R17</b>                               | 24, 26, 39, 40, 45            | 45                            | 29, 30, 38-40, 44, 45           | 1-4, 7, 44, 45                     | WNW                          | 1-4, 7, 24, 26, 29, 30, 38-40, 44, 45           |
| <b>R18</b>                               | 24, 26, 39, 40, 45            | 16, 45                        | 29, 38-40, 44, 45               | 1-4, 7, 44, 45                     | NW                           | 1-4, 7, 16, 24, 26, 29, 38-40, 44, 45           |
| <b>R19</b>                               | 24, 26, 39, 40, 45            | 16, 45                        | 29, 38, 39, 40, 44, 45          | 1-4, 7, 8, 44, 45                  | NNW                          | 1-4, 7, 8, 16, 24, 26, 29, 38, 39, 40, 44, 45   |

**Table 6-1. Definition of Evacuation Regions**  
(Concluded)

| REGION                                        | ERPAs IN ORANGE COUNTY | ERPAs IN PUTNAM COUNTY | ERPAs IN ROCKLAND COUNTY | ERPAs IN WESTCHESTER COUNTY       | DESCRIPTION OF REGION | ERPAs IN REGION                                               |
|-----------------------------------------------|------------------------|------------------------|--------------------------|-----------------------------------|-----------------------|---------------------------------------------------------------|
| <b>5 Mile Ring and Sector to EPZ Boundary</b> |                        |                        |                          |                                   |                       |                                                               |
| <b>R20</b>                                    | 24-26, 39, 40          | 16-19, 23, 45, 46      | 29-31, 38-40             | 1-9, 43, 44, 47-49                | N                     | 1-9, 16-19, 23-26, 29-31, 38-40, 43-49                        |
| <b>R21</b>                                    | 24, 26, 39, 40         | 16-20, 23, 45, 46      | 29-31, 38-40             | 1-10, 43, 44, 47-49               | NNE                   | 1-10, 16-20, 23, 24, 26, 29-31, 38-40, 43-49                  |
| <b>R22</b>                                    | 24, 26, 39, 40         | 16-20, 45              | 29-31, 38-40             | 1-14, 43, 44, 47-49               | NE                    | 1-14, 16-20, 24, 26, 29-31, 38-40, 43-45, 47-49               |
| <b>R23</b>                                    | 24, 26, 39, 40         | 16, 18, 19, 20, 45     | 29-31, 38-40             | 1-15, 43, 44, 47-49               | ENE                   | 1-16, 18-20, 24, 26, 29-31, 38-40, 43-45, 47-49               |
| <b>R24</b>                                    | 24, 26, 39, 40         | 16, 18, 20, 45         | 29-31, 38-40             | 1-15, 21, 43, 44, 47-50           | E                     | 1-16, 18, 20, 21, 24, 26, 29-31, 38-40, 43-45, 47-50          |
| <b>R25</b>                                    | 24, 26, 39, 40         | 16, 18, 45             | 29-31, 38-40             | 1-9, 11-15, 21, 22, 43, 44, 47-51 | ESE                   | 1-9, 11-16, 18, 21, 22, 24, 26, 29-31, 38-40, 43-45, 47-51    |
| <b>R26</b>                                    | 24, 26, 39, 40         | 16, 18, 45             | 29-32, 38-40             | 1-9, 12, 13, 21, 22, 42-44, 47-51 | SE                    | 1-9, 12-13, 16, 18, 21-22, 24, 26, 29-32, 38-40, 42-45, 47-51 |
| <b>R27</b>                                    | 24, 26, 39, 40         | 16, 18, 45             | 29-35, 38-40             | 1-9, 12, 21, 22, 42-44, 47-51     | SSE                   | 1-9, 12, 16, 18, 21, 22, 24, 26, 29-35, 38-40, 42-45, 47-51   |
| <b>R28</b>                                    | 24, 26, 39, 40         | 16, 18, 45             | 29-40                    | 1-9, 22, 42-44, 47-49, 51         | S                     | 1-9, 16, 18, 22, 24, 26, 29-40, 42-45, 47-49, 51              |
| <b>R29</b>                                    | 24, 26, 39, 40         | 16, 18, 45             | 29-41                    | 1-9, 42-44, 47-49                 | SSW                   | 1-9, 16, 18, 24, 26, 29-45, 47-49                             |
| <b>R30</b>                                    | 24, 26, 39, 40         | 16, 18, 45             | 29-31, 34-41             | 1-9, 43, 44, 47-49                | SW                    | 1-9, 16, 18, 24, 26, 29-31, 34-41, 43-45, 47-49               |
| <b>R31</b>                                    | 24, 26, 28, 39, 40     | 16, 18, 45             | 29-31, 34, 36-41         | 1-9, 43, 44, 47-49                | WSW                   | 1-9, 16, 18, 24, 26, 28-31, 34, 36-41, 43-45, 47-49           |
| <b>R32</b>                                    | 24, 26-28, 39, 40      | 16, 18, 45             | 29-31, 38-41             | 1-9, 43, 44, 47-49                | W                     | 1-9, 16, 18, 24, 26-31, 38-41, 43-45, 47-49                   |
| <b>R33</b>                                    | 24-28, 39, 40          | 16, 18, 45             | 29-31, 38-40             | 1-9, 43, 44, 47-49                | WNW                   | 1-9, 16, 18, 24-31, 38-40, 43-45, 47-49                       |
| <b>R34</b>                                    | 24-28, 39, 40          | 16, 18, 45             | 29-31, 38-40             | 1-9, 43, 44, 47-49                | NW                    | 1-9, 16, 18, 24-31, 38-40, 43-45, 47-49                       |
| <b>R35</b>                                    | 24-27, 39, 40          | 16-18, 23, 45, 46      | 29-31, 38-40             | 1-9, 43, 44, 47-49                | NNW                   | 1-9, 16-18, 23-27, 29-31, 38-40, 43-49                        |



**Table 6-2. Evacuation Scenario Definitions**

| <b>Scenario</b> | <b>Season</b> | <b>Day of Week</b>  | <b>Time of Day</b> | <b>Weather</b> | <b>Special</b>           |
|-----------------|---------------|---------------------|--------------------|----------------|--------------------------|
| 1               | Summer        | Midweek             | Midday             | Good           | None                     |
| 2               | Summer        | Midweek             | Midday             | Rain           | None                     |
| 3               | Summer        | Weekend             | Midday             | Good           | None                     |
| 4               | Summer        | Weekend             | Midday             | Rain           | None                     |
| 5               | Summer        | Midweek,<br>Weekend | Evening            | Good           | None                     |
| 6               | Winter        | Midweek             | Midday             | Good           | None                     |
| 7               | Winter        | Midweek             | Midday             | Rain           | None                     |
| 8               | Winter        | Midweek             | Midday             | Snow           | None                     |
| 9               | Winter        | Weekend             | Midday             | Good           | None                     |
| 10              | Winter        | Weekend             | Midday             | Rain           | None                     |
| 11              | Winter        | Weekend             | Midday             | Snow           | None                     |
| 12              | Winter        | Midweek,<br>Weekend | Evening            | Good           | None                     |
| 13              | Autumn        | Weekend             | Midday             | Good           | West Point<br>Football   |
| 14              | Spring        | Midweek             | Midday             | Good           | West Point<br>Graduation |

Note: Schools are assumed to be in session for the Winter, Autumn and Spring seasons (midweek, midday).

**Table 6-3. Percent of Population Groups for Various Scenarios**

| Scenarios | Residents With Commuters in Household | Residents With No Commuters in Household | Employees | Transients | Shadow | Special Events | School Buses | Transit Buses | External Through Traffic |
|-----------|---------------------------------------|------------------------------------------|-----------|------------|--------|----------------|--------------|---------------|--------------------------|
| 1         | 100%                                  | 100%                                     | 96%       | 50%        | 46%    | 0%             | 100%         | 100%          | 100%                     |
| 2         | 100%                                  | 100%                                     | 96%       | 50%        | 46%    | 0%             | 100%         | 100%          | 100%                     |
| 3         | 10%                                   | 235%                                     | 47%       | 100%       | 38%    | 0%             | 100%         | 100%          | 100%                     |
| 4         | 10%                                   | 235%                                     | 47%       | 100%       | 38%    | 0%             | 100%         | 100%          | 100%                     |
| 5         | 10%                                   | 235%                                     | 10%       | 40%        | 32%    | 0%             | 100%         | 100%          | 60%                      |
| 6         | 100%                                  | 100%                                     | 100%      | 32%        | 47%    | 0%             | 100%         | 100%          | 100%                     |
| 7         | 100%                                  | 100%                                     | 100%      | 23%        | 47%    | 0%             | 100%         | 100%          | 100%                     |
| 8         | 100%                                  | 100%                                     | 100%      | 12%        | 47%    | 0%             | 100%         | 100%          | 100%                     |
| 9         | 10%                                   | 235%                                     | 47%       | 40%        | 38%    | 0%             | 30%          | 100%          | 100%                     |
| 10        | 10%                                   | 235%                                     | 47%       | 28%        | 38%    | 0%             | 30%          | 100%          | 100%                     |
| 11        | 10%                                   | 235%                                     | 47%       | 14%        | 38%    | 0%             | 30%          | 100%          | 100%                     |
| 12        | 10%                                   | 235%                                     | 10%       | 20%        | 32%    | 0%             | 0%           | 100%          | 60%                      |
| 13        | 10%                                   | 235%                                     | 47%       | 40%        | 38%    | 100%           | 30%          | 100%          | 100%                     |
| 14        | 10%                                   | 235%                                     | 47%       | 40%        | 38%    | 25%            | 30%          | 100%          | 100%                     |

**Residents With Commuters in Household**..... Households of EPZ residents who await the return of commuters prior to beginning the evacuation trip.

**Residents With No Commuters in Household**... Households of EPZ residents who do not have or will not await the return of commuters prior to beginning the evacuation trip.

**Employees**..... EPZ employees who live outside of the EPZ.

**Transients** ..... People who are in the EPZ at the time of an accident for recreational or other (non-employment) purposes.

**Shadow** ..... Residents and employees in the shadow region (outside of the EPZ) who will spontaneously decide to relocate during the evacuation. The basis for the values shown is a 30% relocation of shadow residents along with a proportional percentage of shadow employees. The percentage of shadow employees is computed using the scenario-specific ratio of EPZ employees to residents.

**Special Events** ..... Additional vehicles in the West Point area associated with a football weekend or a commencement ceremony.

**School and Transit Buses** ..... Vehicle-equivalents present on the road during evacuation servicing schools and transit-dependent people.

**External Through Traffic**..... Traffic on local highways and major arterial roads at the start of the evacuation. This traffic is stopped by access control approximately 1-2 hours after the evacuation begins.

**Table 6-4. Vehicle Estimates for  
Various Combinations of Regions and Scenarios**

| Scenarios | Residents<br>with<br>Commuters | Residents<br>without<br>Commuters | Employees | Transients | Shadow | Special<br>Events | School<br>Buses | Transit<br>Buses | External<br>Traffic | Total<br>Scenario<br>Vehicles |
|-----------|--------------------------------|-----------------------------------|-----------|------------|--------|-------------------|-----------------|------------------|---------------------|-------------------------------|
| 1         | 74,234                         | 49,529                            | 67,912    | 19,309     | 63,020 | -                 | 1,912           | 2,063            | 24,026              | 302,006                       |
| 2         | 74,234                         | 49,529                            | 67,912    | 19,309     | 63,020 | -                 | 1,912           | 2,063            | 24,026              | 302,007                       |
| 3         | 7,423                          | 116,393                           | 33,249    | 38,617     | 51,618 | -                 | 1,912           | 2,063            | 24,026              | 275,304                       |
| 4         | 7,423                          | 116,393                           | 33,249    | 38,617     | 51,618 | -                 | 1,912           | 2,063            | 24,026              | 275,305                       |
| 5         | 7,423                          | 116,393                           | 7,074     | 15,447     | 43,016 | -                 | 1,912           | 2,063            | 14,415              | 207,748                       |
| 6         | 74,234                         | 49,529                            | 70,742    | 12,357     | 63,950 | -                 | 1,912           | 2,063            | 24,026              | 298,819                       |
| 7         | 74,234                         | 49,529                            | 70,742    | 8,882      | 63,950 | -                 | 1,912           | 2,063            | 24,026              | 295,345                       |
| 8         | 74,234                         | 49,529                            | 70,742    | 4,634      | 63,950 | -                 | 1,912           | 2,063            | 24,026              | 291,098                       |
| 9         | 7,423                          | 116,393                           | 33,249    | 15,447     | 51,618 | -                 | 574             | 2,063            | 24,026              | 250,802                       |
| 10        | 7,423                          | 116,393                           | 33,249    | 10,813     | 51,618 | -                 | 574             | 2,063            | 24,026              | 246,169                       |
| 11        | 7,423                          | 116,393                           | 33,249    | 5,406      | 51,618 | -                 | 574             | 2,063            | 24,026              | 240,763                       |
| 12        | 7,423                          | 116,393                           | 7,074     | 7,723      | 43,016 | -                 | -               | 2,063            | 14,415              | 198,119                       |
| 13        | 7,423                          | 116,393                           | 33,249    | 15,447     | 51,618 | 12,367            | 574             | 2,063            | 24,026              | 263,173                       |
| 14        | 74,234                         | 49,529                            | 70,742    | 12,357     | 63,950 | 3,092             | 1,912           | 2,063            | 24,026              | 301,919                       |