

## 6.0 SMOKE TESTING

Smoke testing was performed to investigate and identify potential inflow sources in sewer Catchment Areas 1, 3, and 4. These catchment areas were designated as priority inflow areas in the Phase 1 Part 1 CSO Control Plan report. The testing was performed in all line sections within each of the 3 priority sewer catchment areas, totaling approximately 80,500 linear feet of sanitary sewer. The smoke testing results indicated that there are two classes of sources, those that are *direct* connections to the sanitary sewer and those that are *indirect* connections to the sanitary sewers. The direct and indirect sources were further classified as *public* or *private* connections. The findings identified sources that are believed to be connected to the sewer system, or allow inflow into the system by some means.

### Smoke Testing Results

- A total of 91 sources of inflow were identified and are estimated to contribute approximately 2,500,000 gallons per day (gpd) of inflow.
- Of those 91 sources, 65 sources are private sources such as roof drains and yard drains. These 65 sources are estimated to contribute approximately 615,000 gpd of inflow.
- The remaining 26 sources are on public property and include catch basins connected to the sewer, manholes below grade, and other collection system issues. These 26 sources are estimated to contribute approximately 1,885,000 gpd of inflow.

### Rehabilitation Recommendations

Based on the results of the smoke testing, the three priority sewer catchments contain inflow sources that contribute significant inflow to the sewer system. Direct connections require correction or rehabilitation to prevent inflow from entering the sanitary system. Indirect flows may require additional investigation to determine if a connection between a catch basin, drain, or cleanout and the sanitary sewer exists and if that connection is active or capped and failing. The following are recommendations to reduce inflow into the sanitary sewer:

1. Direct Connections to the Sanitary Sewer
  - a. Public
    - Disconnecting catch basins from the sanitary sewer and reconnecting to existing storm drainage or installation of new storm drains.

- Repairing or replacing leaking or damaged caps to prevent inflow from entering the sanitary sewer system.
  - Disconnecting or capping cross connections between the sanitary sewer and the storm drain to prevent flows from passing from one system to the other.
  - Capping of cleanouts on public property to prevent surface water from entering the sanitary sewer.
- b. Private
- Develop a program to require private property owners to disconnect roof drains and rain leaders from sanitary sewers and redirect flow to the ground surface or into an existing storm drain (if capacity allows).
  - Develop a program to require private property owners to disconnect yard, driveway, foundation and sidewalk drains from the sanitary sewer and redirect flow into the storm drain system (if capacity allows) or into infiltration sumps.
2. Indirect Connections to the Sanitary Sewer
- a. Public
- Perform dye flooding of catch basins and drain manholes with suspected connections to the sanitary sewer to confirm connection or verify leakage of caps.
- b. Private
- Coordinate with private property owners to dye test or excavate adjacent to the foundation where smoke is observed.

### **Conclusions**

1. It is recommended that the City prioritize disconnecting and reconnecting the public catch basins with the highest estimated inflow and eliminate all cross connections in order to reduce inflow.
2. As a lower priority, the City should continue investigating the indirect connections to the sanitary sewer system.
3. The City should develop a program requiring private property owners to disconnect rain leaders and yard drains.

To date, the City has implemented a program to notify private property owners to disconnect sources of inflow identified during the smoke testing. Initial notifications were sent to owners on November 15, 2006 and follow up notifications were sent to owners who failed to respond to the initial correspondence on December 11, 2006. Sample notification letters are located in Chapter 5. A similar program has been initiated to eliminate other inflow sources as a result of house to house surveys. The locations of the connected roof leaders confirmed during the smoke testing are provided in the Technical Memorandum.

A detailed description of the smoke testing investigation for inflow sources including procedures, results, classification of inflow sources and flow estimates by priority catchment area, recommendations, and conclusions is presented in the Technical Memorandum.