Asbestos is a class of mineral fibers caused by geologic events over millions of years. An asbestos fiber is defined as a particle with a minimum 3:1 aspect ratio, which means a length three times its diameter. Laboratories also may count asbestos structures, which includes fibers, fiber bundles, clusters and matrices with asbestos characteristics.

When asbestos minerals are found in natural settings, we refer to this as “naturally-occurring asbestos” or NOA. The term asbestos includes many types of fibrous minerals, including chrysotile, known as “serpentine” fibers, and amosite, crocidolite, tremolite, anthophyllite and actinolite, known as “amphibole” fibers.

Occupational exposure to asbestos fibers in manufactured materials has resulted in health ailments such as lung cancer, mesothelioma (cancer of the linings of the lungs and abdomen), and asbestosis (scarring of lung tissues that results in constricted breathing). Long-term occupational exposure to asbestos fibers has been well documented to cause worker disability and death.

When naturally-occurring asbestos is disturbed in connection with construction, grading, quarrying, or surface mining operations, asbestos-containing dust can be generated. Because naturally-occurring asbestos can be found in the vicinity of Candlestick Point, grading and construction activities at Candlestick Point may be subject to requirements of California’s air quality law (known as the ATCM) regulating disturbance of naturally-occurring asbestos to limit the public’s exposure. As a consequence of the ATCM law, the Bay Area Air Quality Management District (BAAQMD) must approve an Asbestos Dust Mitigation Plan (known as the ADMP) in areas where naturally-occurring asbestos has been identified prior to earth-disturbing activities.

The Asbestos Dust Mitigation Plan for the Alice Griffith site includes all categories of ATCM-mandated dust control (called mitigations). The ADMP includes measures to suppress dust during earth-moving activities, prevent track-out of dust onto public roads, limit the emission of dust from soil storage piles and during offsite soil transport, and stabilize the ground after construction.
The ADMP for the Alice Griffith site further requires air monitoring for asbestos fibers because work is currently being performed such that rock or soil with naturally-occurring asbestos is being disturbed (called earth-disturbing work). The monitoring data has been posted to the OCII website, http://sfocii.org/index.aspx?page=446

**Action Level:** In order to protect public health, BAAQMD incorporated into the ADMP requirements that the developer take action to reduce the concentration of asbestos in the air whenever the ADMP-required air monitors indicate asbestos concentrations have reached the BAAQMD-defined Action Level. The BAAQMD based the action level on health risk assessment protocols established by the Cal/EPA Office of Environmental Health Hazard Assessment (OEHHA). The BAAQMD considers the action level established in the approved ADMP to be conservative and health protective because it is based on annual average concentrations and assumes continuous exposure over a 70-year lifetime. The District has stated that exceeding the action level on an occasional basis will not cause any significant increase in health risk.

**Purpose of asbestos monitoring:** The air monitoring for asbestos serves as another means to ensure that contractor asbestos control practices are consistent over time, and to flag specific dates and times when asbestos control practices should be examined in order to implement improvements. The monitoring also indicates if the Action Level has been reached, requiring work stoppage until airborne asbestos levels return to below the Action Level.

**Location of asbestos monitors:** The airborne asbestos monitoring network includes upwind, downwind and crosswind sampling locations to determine the concentration of airborne asbestos resulting from site activities that could potentially be transported off site. Airborne asbestos sampling equipment must be located to avoid sheltered or dead air spaces and areas where particle trapping may occur.
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**How the asbestos monitor works:** The asbestos air monitor operates by pulling in air at a set rate on a continuous basis past a filter which captures airborne material. The filter is housed in a cassette attached to a tripod, or equivalent, to ensure the filter cassette intake maintains a constant elevation of 4 feet above ground surface and is placed in areas clear of obstructions.

**Frequency and duration of asbestos samples:** Each high-volume air monitoring sample consists of a continuous 24-hour sampling period from approximately 3:30 PM to 3:30 PM the next day. Air monitoring is not required when no earth-disturbing activities occur, typically during weekends and holidays.

**Sampling technician responsibilities:** At the time of sample collection and set up for the next monitoring run, a field technician records in a field notebook the sample ID number, the sample location, the date and time the pump was activated, the date and time the pump was de-activated, the flow rate at the start of sampling, the flow rate at the end of sampling, the calculated average flow rate, and the calculated total volume of air pumped during the sampling run. All data is transcribed onto the chain-of-custody form that remains with the samples until they are delivered to a California-accredited analytical laboratory for analysis.

**Laboratory analysis by TEM:** All asbestos air samples are analyzed by transmission electron microscopy (TEM). This method is preferred for analysis of outdoor samples because of its ability to differentiate between asbestos fiber and other fibers and its ability to identify smaller fibers. The following exceptions are required by the ATCM and will be included: 1) The analytical sensitivity shall be 0.001 structures per cubic centimeter (0.001 s/cc); and 2) For purposes of consistency with other adjacent airborne asbestos monitoring programs, the asbestos data will be reported in structures per cubic meter (s/m³), which indicates how many asbestos structures are present in a certain volume of air, measured as a cubic meter. All asbestos structures that have an aspect ratio greater than or equal to three to one (3 to 1, length to diameter), and where the structure length is greater than or equal to 0.5 micrometers, are counted for regulatory purposes.
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**Action Level for airborne asbestos:** In the event that air monitoring results indicate levels equal to or above 16,000 s/m³ from any BAAQMD-approved air monitor, the developer shall notify the BAAQMD as soon as practical of the monitoring results indicating: the project Reference Identification Number, sampler ID and location, actual TEM structures per cubic meter, the date the sample was taken and the date analysis was reported. Additionally, all earth-disturbing activity within the monitoring network in which the level of airborne asbestos was detected as greater than or equal to 16,000 s/m³ will be suspended until dust is abated and the restart criteria is achieved.

It may be possible to have two or more monitoring networks in different parts of the larger Candlestick Redevelopment Project Area operating simultaneously. If one network experiences airborne asbestos levels equal to or above 16,000 s/m³, earth disturbing activities within that network must cease until ambient monitoring drops below 16,000 s/m³. Earth disturbing activities occurring within other monitoring networks may continue.

**Interpretation of TEM asbestos analysis reports:** Alice Griffith asbestos monitoring results show one box emphasized by a double border, labeled “CALCULATED ASBESTOS STRUCTURE CONCENTRATION Per CC Air”. This box reports the total asbestos structures found on the specific filter that was analyzed by TEM, per Cubic Centimeter volume of air that passed over the filter. The relative concentration of Asbestos Structures per Cubic Meter of air for comparison to the Action Level is calculated by the environmental consultants from the above number.