filesubmission.cpp

```cpp
/*
Shivam Walia and Om Upadhyay
*/

#include <iostream>
#include <fstream>
#include <cmath>
#include <iomanip>

using namespace std;

void latLongToXY(double latitude, double longitude, double &xCoord, double &yCoord)
{
    xCoord = longitude * (111 * cos(latitude * (M_PI / 180)));
    yCoord = latitude * 111;
}

double calculateDistance(double x1, double y1, double x2, double y2)
{
    return sqrt(pow((x2 - x1), 2) + pow((y2 - y1), 2));
}

bool spillsOverlap(double radius1, double lat1, double long1, double radius2, double lat2, double long2)
{
    double x1 = 0, y1 = 0, x2 = 0, y2 = 0;
    latLongToXY(lat1, long1, x1, y1);
    latLongToXY(lat2, long2, x2, y2);
    double distanceBetweenSpills = calculateDistance(x1, y1, x2, y2);
    double radiusSum = radius1 + radius2;
    return (distanceBetweenSpills <= radiusSum);
}

bool isLocationInSpill(double locationLat, double locationLong, double spillLat, double spillLong, double spillRadius)
{
    double locX = 0, locY = 0, spillX = 0, spillY = 0;
    latLongToXY(locationLat, locationLong, locX, locY);
    latLongToXY(spillLat, spillLong, spillX, spillY);
    return calculateDistance(locX, locY, spillX, spillY) <= spillRadius;
}

int main()
{
    ifstream spillFile("spill.txt");
    ifstream locationFile("location.txt");
    ofstream outputFile("soutput.txt");

```

```
47      string locationName = " ";
48      double locationLatitude = 0, locationLongitude = 0;
49      const int maxSpills = 10;
50
51      double spillLatitudes[maxSpills];
52      double spillLongitudes[maxSpills];
53      double spillRadii[maxSpills];
54      int numSpills = 0;
55
56      if (!spillFile.fail() && !locationFile.fail() && !outputFile.fail())
57      {
58          int spillsAffectingLocation = 0;
59          int reactionCount = 0;
60
61          spillFile >> numSpills;
62          for (int i = 0; i < numSpills; i++)
63          {
64              spillFile >> spillLatitudes[i] >> spillLongitudes[i] >> spillRadii[i];
65          }
66
67          while (locationFile >> locationName)
68          {
69              spillsAffectingLocation = 0;
70              locationFile >> locationLatitude >> locationLongitude;
71              for (int i = 0; i < numSpills; i++)
72              {
73                  if (isLocationInSpill(locationLatitude, locationLongitude,
    spillLatitudes[i], spillLongitudes[i], spillRadii[i]))
74                  {
75                      spillsAffectingLocation++;
76                  }
77              }
78              if (spillsAffectingLocation > 0)
79              {
80                  outputFile << setw(25) << locationName << ": " << setw(3) <<
    spillsAffectingLocation << " spills" << endl;
81              }
82          }
83
84          for (int i = 0; i < numSpills; i++)
85          {
86              for (int j = i + 1; j < numSpills; j++)
87              {
88                  if (spillsOverlap(spillRadii[i], spillLatitudes[i], spillLongitudes[i],
    spillRadii[j], spillLatitudes[j], spillLongitudes[j]))
89                  {
90                      reactionCount++;
91                  }
92              }
93          }
94
```

```cpp
        outputFile << setw(27) << "Total amount of reaction: " << setw(3) << reactionCount << " reactions" << endl;

        spillFile.close();
        locationFile.close();
        outputFile.close();
    }
    else
    {
        cout << "Error Opening File" << endl;
    }
}

/*
                 WEEF_Lab:   3 spills
       Ryan_Favourite_Pub:   4 spills
                WCI_School:   2 spills
     Grand_River_Hospital:   2 spills
                      RCH:   3 spills
             SJAM_School:   1 spills
           Michael_House:   1 spills
      Perimeter_Institute:   1 spills
       Waterloo_City_Hall:   3 spills
    Pineview_Nursing_Home:   1 spills
             Fiona_House:   2 spills
        St_Marys_Hospital:   3 spills
 Total amount of reaction:   8 reactions
*/
```