3.2.6 Select Facilities for Modeling

The values used for the input parameters mentioned in the previous section influence the results of the emission and dispersion modeling. Some of the input parameters are used directly, but most are combined in order to supply the necessary inputs for the modeling equations. In order to limit the PM modeling runs to those facilities that pose the greatest risk to populations, the input parameters (or combined parameters) that have the greatest influence on the modeling results were identified. The two parameters (both of which are combinations of various inputs) that have the greatest influence on emissions are listed below, accompanied by the formulas used to calculate their values.

Parameter		Formula
CKD Unit Area Disturbed (m^2)	=	CKD Unit Exposed Area (m^2) x % Area Disturbed
Vehicle Miles Traveled per Day	=	# Round Trips per Day x Length of Road One Way (mi) x 2

Other parameters, such as the amount of CKD wasted annually and the availability of controls at the waste pile, were considered as secondary criteria where relevant.

Based on the actual values calculated for the parameters listed above, the following cement facilities were selected as the highest emissions facility within each climatic region (no facilities were located in Region 1). For a full list of the values for the variable inputs and the calculated values for these two influential parameters, see Exhibit 3-2. Listed below are the high-emissions facility selected from each of the climatic regions, accompanied by the reasoning behind each selection (note that all comparisons are only valid <u>within</u> the given climatic region).

Climatic Region 2: National Lebec

<u>CKD Unit Area Disturbed</u>. The value for National Lebec is slightly higher than the next highest value (15,800 m^2 vs. 15,259 m^2). Additionally, the second highest value is for a facility that pelletizes and wets the CKD, both of which would significantly reduce emissions at that facility.

<u>Vehicle Miles Traveled per Day (VMT)</u>. Although the value for National Lebec is slightly lower than the highest value (9.2 mi. vs. 10.6 mi.), the facility with the highest value uses pelletization and wetting within the "handling train," thus decreasing the emissions.

<u>Other Factors</u>. The surrounding population for the National Lebec facility is extremely low (e.g., a total of 13 people in the modeling region). To account for any bias that such a low population might have on the population risk results, another facility from this same climatic region (Ash Grove Foreman) with similar expected emissions but much larger surrounding population was also modeled.

Climatic Region 3: Holnam Ada

CKD Unit Area Disturbed. The value for Holnam Ada is over four times that of the next largest facility.

VMT. The value for Holnam Ada is almost twice that of the next highest facility.

Climatic Region 4: Lafarge Alpena

CKD Unit Area Disturbed. The value for Lafarge Alpena is slightly higher than the next highest value.

VMT. The VMT value for Lafarge Alpena is slightly higher than the next highest value.

Other factors. While the previous two factors may not provide much discrimination between Lafarge Alpena and the next highest facility, the amount of CKD wasted at Lafarge Alpena is clearly much greater (twice as much) than the value for the next highest facility.

Climatic Region 5: Tarmac Medley

CKD Unit Area Disturbed. The selected facility, Tarmac Medley, only has about 60 percent as large of a disturbed area as the highest facility.

VMT. Tarmac Medley has ten times the VMT as the other high emissions facility in this climatic region, and it is for this reason that Tarmac Medley was selected.

Other factors. In addition, Tarmac wastes almost ten times as much CKD as the next highest facility.

Climatic Region 6: Signal Mountain

CKD Unit Area Disturbed. Although the value for Signal Mountain is about half that of the highest value, the facility with the highest value uses wetting at the pile (EPA assumed that wetting leads to around a 50 percent emissions reduction).

VMT. The VMT for Signal Mountain is over three times the VMT value of the next highest facility.

Climatic Region 7: Holnam Holly Hill

CKD Unit Area Disturbed. Holnam Holly Hill's area is significantly higher (approximately 50 percent greater) than the next highest value.

VMT. The value for Holnam Holly Hill is approximately eight times that of the next highest facility.

3.2.7 Define Exposure Points

For modeling airborne contamination in general, a reasonable number of exposure points must be determined for predicting concentrations to reflect spatial variations. The spatial variations are necessary for more accurately predicting the number of people exposed to particular concentrations of PM (i.e., to estimate population risk).

Based on the modeling framework selected (see Section 3.2.2), EPA used a rectangular network of receptors which extends out five kilometers[8] from the facility boundary in all directions. The grid, which was centered on the source of the emissions, contained a variable receptor spacing. (ISC3ST allows for either uniform or non-uniform grid spacing, as well as discrete receptor locations.) The Agency used a receptor grid with intervals of 500 meters within the first 2,000 meters around the facility. Outside this "close" grid, the receptor intervals increased to 1,000 meters.

3.2.8 Model Emissions and Dispersion and Characterize Populations Effects

EPA estimated PM_{10} and $PM_{2.5}$ emissions from the various sources at the facilities selected, using the relevant equations from AP-42 and the input data discussed above.

The dispersion model (ISC3ST) estimates PM concentrations for every point in the receptor grid. Estimates of the number of people who are potentially exposed to various levels of PM concentrations can be obtained by combining predicted concentrations at receptor points with data on the locations of U.S. Census blocks and the actual 1990 residential populations associated with these blocks. The PM concentration for a given census block that falls within the modeling grid is estimated by interpolating concentrations at the receptor points to the block centroids. The interpolation scheme is based on a weighted average of all receptor point concentrations in the modeling domain. The weighting factor is the inverse of the square of the distance between the location of the centroid and the surrounding receptor points. The entire residential population of that Census block is then assumed to be exposed to the concentration predicted for the block centroid.

As is the case with all interpolation schemes, the interpolated concentrations will always be equal to or less than the maximum projected concentration at any receptor point. An alternative procedure would be to assign to the block centroid the predicted concentration located at the nearest modeled receptor point. The interpolation procedure used for this analysis is likely to result in somewhat lower maxima than the alternative procedure since the influence of certain predicted concentrations could be reduced. The current approach, however, is more likely to provide better overall estimates of populations exposed, especially if predicted concentration gradients are steep among the receptor points (since the concentration estimate at the block centroid includes information about all modeled receptor points).

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[8] Note that, to be consistent with routine PM air modeling practices, EPA chose five kilometers as the maximum distance defining the area for which the Agency would need to gather data on potentially exposed populations. For the previous analyses, data were gathered for total populations within five miles of the CKD facilities.

3.3 RESULTS

Four sets of results are presented below: (1) estimates of fugitive CKD emissions from the six high-emitting cement plants selected for modeling; (2) estimates of the downwind PM concentrations and exposed populations at the highest emitter of these six plants; (3) estimates of exposed populations at each of the 52 cement plants examined; and (4) estimates of exposed populations around the universe of all 108 cement plants.

3.3.1 Emissions from Selected Facilities

Exhibit 3-3 presents estimated PM emissions at the highest-emitting facility in each of the six climatic regions with cement manufacturing plants (again, no facility is located in Climatic Region 1). Results are presented for both PM_{10} and $PM_{2.5}$ in grams per second (g/s). Emissions from all the possible sources at each facility are shown but totaled in two different ways, first assuming that bulldozing occurs and second assuming there is no bulldozing.

Comparing results across emission sources, bulldozing the CKD disposal pile would be the largest source of emissions by far, if it were to actually occur at each facility. PM_{10} emissions from bulldozing range from 1.4 to 6 times higher than the next largest source at each plant. Bulldozing is known to occur at a few facilities, such as at the Lafarge cement plant in Fredonia, Kansas, where temporary CKD piles are periodically leveled with a bulldozer. Such activity is a large source of emissions because it kicks up a lot of dust and it significantly disturbs the CKD pile surface, leaving the dust more susceptible to wind erosion. EPA, however, has no information on whether any bulldozing occurs at the selected model facilities, and if so, what that bulldozing actually entails. Therefore, the total emissions with bulldozing in Exhibit 3-3 can be used as upper-bound estimates, assuming some form of bulldozing for CKD pile maintenance occurs. The total emissions without bulldozing are believed to be more realistic and more representative of typical CKD management practices.

When emissions from bulldozing are taken out, the two largest sources of emissions at each facility are estimated to be (1) CKD pile (monofill) wind erosion, and (2) dust suspended from the road used by trucks driving back and forth between the facility and the CKD pile. Together, these two sources comprise from 63 to 90 percent of the total PM_{10} emissions (without bulldozing) from each facility. However, one source is not always greater than the other. PM_{10} emissions from the road are four to six times greater than pile emissions at National Lebec and Tarmac Medley, while PM_{10} emissions from the pile are three times greater than road emissions at Holnam Ada. PM_{10} emissions from the pile and road are about equal at the other three facilities. The pattern is similar for $PM_{2.5}$.

Comparing results across facilities, Holnam Ada is estimated to be the largest emitter when no bulldozing is assumed. The total PM_{10} emissions without bulldozing at Holnam Ada are 1.4 times (42 percent higher than) the emissions at the next closest facility, Lafarge Alpena. The $PM_{2.5}$ emissions are at least 1.7 times (70 percent) higher than elsewhere. The relatively high emissions from Holnam Ada are believed to be the result of two factors. First, the CKD pile at Holnam Ada is very large, with an adjusted area (exposed area times percent area disturbed) 1.1 to 58 times greater than piles at the other five facilities. Monofill wind erosion by itself at Holnam Ada is a much larger source than all the other sources combined at the other facilities, except Lafarge Alpena whose total emissions

without bulldozing (7.1 g/s of PM_{10}) are roughly the same as the monofill wind erosion at Holnam Ada (7 g/s of PM_{10}). Second, the road between the Holnam Ada facility and its CKD pile is seven miles long, which is seven times longer than the next longest road. The effect of this long road, however, is mitigated somewhat because it is paved and thus has lower emissions per unit length than the dirt roads that exist at the other facilities examined.

3.3.2 Ambient PM Concentrations and Exposed Populations at the Highest-Emitting Facility

Based on the emissions estimates above, EPA chose to first model dispersion and downwind concentrations of PM at Holnam Ada. This initial modeling was intended to serve as a screen. If it showed that dispersion at the highest-emitting facility results in ambient PM concentrations below the NAAQS at all receptor points, then it might be reasonable to conclude that PM concentrations at the other facilities, which emit less, are also below the NAAQS. This conclusion would be valid only if differences in meteorology at the other facilities influence the PM concentrations less than differences in emissions (in other words, highly unfavorable meteorologic conditions that result in higher downwind concentrations despite lower emissions are not likely to occur).

Initial results for Holnam Ada, using the large receptor grid with intervals of 500 meters near the facility, indicated the annual average and 24-hour NAAQS for both PM_{10} and $PM_{2.5}$ would be exceeded farther than 500 away but not as far as 1,000 meters away from emission sources. EPA then re-modeled the facility using the closer grid to, in effect, "zoom in" and determine more precisely the distance at which PM concentrations fall below the NAAQS. The PM_{10} results using the closer grid are shown in Exhibits 3-4 and 3-5. The axes in these exhibits define a grid with 100-meter intervals in both directions. The numbers in each cell are the PM_{10} concentrations estimated to be caused by onsite CKD management, not accounting for ambient background concentrations or particulates emitted from other nearby sources. Three grades of shading are used to signify predicted concentrations above the NAAQS: (1) the darkest shading represents areas directly over emission sources, including the facility at the upper right, the road passing diagonally down to the left, and the large CKD pile at the bottom modeled as a rectangle; (2) the medium shading represents areas on the plant property; and (3) the lightest shading represents areas offsite. Concentrations that are not shaded are below the NAAQS.

As shown in Exhibit 3-4, the predicted 24-hour average concentrations of PM_{10} exceed the corresponding NAAQS out to 900 meters from the property line. Exhibit 3-5 shows that the predicted annual average concentrations of PM_{10} exceed the NAAQS as far away as 600 meters offsite. Although not shown, the pattern of results for $PM_{2.5}$ is the same.

The latest census data for the Ada vicinity indicate that no people live in the areas predicted to have NAAQS exceedances. Therefore, even though CKD management on the Holnam property is predicted to cause NAAQS exceedances as far away as 900 meters offsite, it does not by itself result in a single resident being exposed above the NAAQS.

Exhibit 3-3
Emissions Estimates for Selected High-Emitting Facilities

Emissions Source	Facilities					
	National Lebec (Region 2)	Holnam Ada (Region 3)	Lafarge Alpena (Region 4)	Tarmac Medley (Region 5)	Signal Mountain Chattanooga (Region 6)	Holnam Holly Hill (Region 7)
	PM10 (g/s)	PM10 (g/s)	PM10 (g/s)	PM10 (g/s)	PM10 (g/s)	PM10 (g/s)
Interim storage wind erosion	0.00	0.00	0.00	0.00	0.00	0.00
Material handling	0.09	0.55	0.90	0.02	0.09	0.30
Unpaved/paved road	0.76	2.16	2.46	0.07	1.08	1.60
Entrainment from truck	0.04	0.29	0.11	0.01	0.08	0.10
Temporary Storage wind erosion	0.05	0.15	0.15	0.01	0.11	0.13
Bulldozing	2.80	10.06	18.98	0.38	3.04	6.76
Monofill wind erosion	0.21	6.97	3.50	0.01	1.41	1.71
Total with bulldozing	3.94	20.18	26.10	0.50	5.80	10.60
Total without bulldozing	1.15	10.12	7.12	0.12	2.76	3.84

Emissions Source	Facilities					
	National Lebec (Region 2)	Holnam Ada (Region 3)	Lafarge Alpena (Region 4)	Tarmac Medley (Region 5)	Signal Mountain Chattanooga (Region 6)	Holnam Holly Hill (Region 7)
	PM2.5 (g/s)	PM2.5 (g/s)	PM2.5 (g/s)	PM2.5 (g/s)	PM2.5 (g/s)	PM2.5 (g/s)
Interim storage wind erosion	0.00	0.00	0.00	0.00	0.00	0.00
Material handling	0.03	0.17	0.28	0.01	0.03	0.10
Unpaved/paved road	0.20	0.99	0.65	0.02	0.29	0.42
Entrainment from truck	0.02	0.12	0.04	0.00	0.03	0.04
Temporary Storage wind erosion	0.02	0.06	0.06	0.01	0.04	0.05
Bulldozing	1.06	3.79	7.16	0.14	1.15	2.55
Monofill wind erosion	0.08	2.79	1.40	0.00	0.56	0.68
Total with bulldozing	1.40	7.92	9.59	0.18	2.10	3.84
Total without bulldozing	0.35	4.12	2.43	0.04	0.95	1.29

3.3.3 Exposed Populations at 52 Cement Plants Examined

Because emissions from Holnam Ada are predicted to be much larger than emissions from other facilities, EPA believes the estimated distance of 900 meters for NAAQS exceedances at Holnam Ada is an upper-bound distance (without bulldozing). Notwithstanding differences in results caused by different meteorologic conditions and terrain, the lower emissions at other facilities should result in PM concentrations falling below the NAAQS at closer distances.

In an effort to better represent other facilities, EPA modeled emissions and dispersion under four additional scenarios. Of these four scenarios, the first two were hypothetical scenarios created by adjusting the conditions modeled for Holnam Ada. First, EPA modeled a CKD pile one-half the size of the pile at Holnam Ada combined with a one-mile, rather than a seven-mile, paved road. Second, EPA modeled a CKD pile one-half the size of the Holnam Ada pile combined with a one-mile unpaved road. These two hypothetical scenarios were thought to better approximate the emission conditions that actually exist at some of the remaining high-emission facilities. (Note that both of these scenarios were modeled using the Holnam Ada meteorology and surrounding topography.) For the remaining two scenarios, EPA chose to model emissions and dispersion for the Lafarge Alpena and Signal Mountain Chattanooga facilities, which are the next two highest-emission facilities after Holnam Ada (see Exhibit 3-3), and also represent climatic regions that contain, relatively, a large number of the 52 facilities examined.

The estimated PM_{10} concentrations for the first two hypothetical scenarios are presented in Exhibits 3-6 through 3-9. As shown, both scenarios resulted in the 24-hour average NAAQS being exceeded out to a distance of 500 meters and the annual average NAAQS being exceeded out to a distance of 400 meters. Again, the pattern of results for $PM_{2.5}$ is the same.

The estimated PM_{10} concentrations for the Signal Mountain Chattanooga facility are presented in Exhibits 3-10 and 3-11, and the estimated PM_{10} concentrations for the Lafarge Alpena facility are presented in Exhibits 3-13 and 3-14. As shown, at both these facilities, the dispersion resulted in the 24-hour average NAAQS being exceeded out to a distance of 100 meters and the annual average NAAQS being exceeded also out to a distance of 100 meters. As before, the pattern of results for $PM_{2.5}$ is very similar to results for PM_{10}. The only exceedances of NAAQS by $PM_{2.5}$ particles are for the estimated 24-hour average concentration, out to a distance of 100 meters for the Signal Mountain Chattanooga facility, and 100 meters also for the Lafarge Alpena facility (see Exhibits 3-12 and 3-15). Census data for the vicinities of the Signal Mountain Chattanooga and Lafarge Alpena facilities indicate that no people live in the areas predicted to have NAAQS exceedances. Therefore, even though CKD management on the properties of these two facilities is predicted to cause NAAQS exceedances as far away as 200 meters offsite, it does not by itself result in a single resident being exposed above the NAAQS.

Recognizing that the two scenarios examined for Holnam Ada are likely to overestimate the magnitude and areal extent of NAAQS exceedances at other cement plants, EPA determined that as a first step, it would be reasonably conservative to assume that everyone living within 500 meters of the other facilities is exposed to PM concentrations above the NAAQS, as long as the facilities do not manage CKD in a manner that effectively contains it from fugitive emissions (such as in the form of a slurry). Starting from this point, EPA further determined that the results from the scenarios at the

Signal Mountain Chattanooga and Lafarge Alpena facilities indicate that NAAQS exceedances are likely to be at distances much closer to the facility or waste pile than the 500 meters. Thus, the Agency reasoned that it would be more realistic to derive "distances for NAAQS exceedances" that are specific for each facility, or, at least, for a group of facilities within a specific climatic region. These distances were derived first for the set of "high-emitting" facilities (see Exhibit 3-3) by multiplying the 500 meters by the ratio of each facility's emissions estimate to that at Holnam Ada. (The minimum distance or the "floor" for the "distance for NAAQS exceedances" was set to be 100 meters.) The distances derived for each climatic region's representative facility were then used for all the remaining facilities within that region, all of which are estimated to have emissions lower than the representative facility. The "distances for NAAQS exceedances" calculated are as follows:

Facility	Region	Distance to NAAQS Exceedance	Basis for Estimation
National Lebec	2	100 m	ratio of emissions X 500 m
Holnam Ada	3	500 m	emissions and dispersion modeling
Lafarge Alpena	4	100 m	emissions and dispersion modeling
Tarmac Medley	5	100 m	ratio of emissions X 500 m
Signal Mountain Chattanoooga	6	100 m	emissions and dispersion modeling
Holnam Holly Hill	7	200 m	ratio of emissions X 500 m

Use of 500 meters – across all facilities – as the "fenceline" for determining the number of people exposed to NAAQS exceedances yields the results shown in Exhibit 3-16. These results indicate that a total of 10 facilities have at least one person living within 500 meters of the plant who may be exposed to airborne PM concentrations in excess of the NAAQS. All the other facilities are likely to have no offsite populations exposed above the NAAQS, either because there are no residences within 500 meters (36 facilities), CKD is watered and unlikely to be emitted at levels above the NAAQS (three facilities), or site-specific modeling and analysis indicate that no people live in areas where the NAAQS are exceeded (three facilities, i.e., Holnam Ada, Signal Mountain Chattanooga, and Lafarge Alpena). As the next step, for the 10 facilities, EPA used the facility-specific "distances to NAAQS exceedances" (either 100 or 200 meters, determined using the representative facilities' emissions ratios) and re-derived the estimates of populations potentially exposed using USGS topographic maps along with GIS tools to map block-level census data. This refinement step indicated that only two of the 10 facilities have populations within 100 or 200 meters, i.e., Ash Grove in Inkom, Idaho (3 people), and Southdown in Knoxville, Tennessee (15 people). In sum, therefore, the results indicate that across all facilities, a total of 18 people may be exposed to airborne PM concentrations in excess of the NAAQS. (Note, however, that there is more uncertainty associated with estimating the number of people living within 100/200 meters of the facility compared to 500 meters of the facility -- see discussion in the limitations section.)

3.3.4 Exposed Populations at All Cement Plants

As with the indirect exposures analysis, the focus of the PM analysis was on assessing exposures at 82 of the total 108 cement facilities. Again, these 82 facilities can be denoted as the "known universe." The remaining 26 facilities were excluded because a lack of relevant data (e.g., data on constituents in CKD wastes or on types of waste management practices) prevented them from being assessed directly; as before, these 26 facilities can be denoted as the "unknown universe." To derive a composite picture of potential population effects due to PM exposures across the full universe of cement facilities, EPA first estimated the potential population effects within the unknown universe by extrapolating from results within the known universe, and then estimated the potential population effects for the full universe of facilities.

For population effects due to PM exposures, EPA determined that it would be appropriate to first define the "bounds" of the results for the full universe of cement facilities, and then derive a "best estimate" with the understanding that the best estimate will be less certain compared to the bounds.

To define a lower bound measure of the population effects, it is reasonable to assume that every single facility in the unknown universe is as "risky" as the lowest-effects facility in the known universe. Being the lowest-effects facility in the known universe implies that, within 500 meters (and, therefore, within 200 or 100 meters) of the facility boundary, there are no people exposed to levels above the NAAQS. Thus, the lower bound measure of the population effects is that, across all 108 facilities, a total of *18* people living within 500 meters of the facility boundary may be exposed to airborne PM concentrations in excess of the NAAQS.

To define the upper bound measure of the population effects EPA assumed that, even for the remaining 26 facilities, the use of the 500 meters "fenceline" for determining the number of people exposed to NAAQS exceedances is more reasonable than using 200 or 100 meters. This is primarily because the sizes of piles at these facilities are smaller than that at Holnam Ada, and therefore, exceedances beyond 500 meters are unlikely. At the same time, EPA did not have sufficient information to be able to say that exceedances are likely to be only up to 100 or 200 meters. Therefore, the Agency estimates that, across all the 26 facilities in the unknown universe, a total of approximately 4,100 people live within 500 meters of the facility boundary. (Note that this estimate is less certain than that derived for the 82 facilities in the known universe, because of uncertainties in knowledge of the specific locations of the facilities and waste piles.) Thus, the upper bound measure of the population effects is that, across all 108 facilities, a total of approximately *4,118* people living within 500 meters of the facility boundary may be exposed to airborne PM concentrations in excess of the NAAQS.

The method for deriving a best estimate measure for PM exposures is different from that used in the indirect exposures analysis because, in the latter, deriving a best estimate meant assuming that the distribution of risks among the 26 facilities (the smaller, unknown universe) is similar to the distribution of risks among the 82 facilities (the larger, known universe). This assumption was necessary because EPA could not derive a facility-specific risk estimate for any of these 26 facilities. In such a case, the results from the known universe could be directly extrapolated to the unknown universe, using one or more "weighting factors" that are common to both universes and are expected

to be related to the potential risks. The most relevant fact known about the 26 "unknown universe" facilities was the quantity of CKD wasted; thus, waste quantity was used for the weighting.

In contrast, for the PM exposures analysis, EPA had sufficient information such that the Agency could derive a facility-specific estimate of population affected for each of these 26 facilities. There would be several uncertainties, however, associated with these predictions; thus, EPA recognizes that more refined estimates in all likelihood would be lower than these predicted values. One way that EPA chose to make the best estimate measure more realistic was to determine which among the 26 facilities would have no releases from the waste piles because they were watered/wetted. Using information from the updated 1995 CKD Survey, EPA determined that about 25 of the 70 respondent facilities use watering/wetting to control releases from waste management units. Thus, EPA designated (using a random number series) a corresponding proportion of the 26 facilities in the unknown as having watering/wetting controls, effectively eliminating any releases. Based on the same reasons discussed for the upper bound measure, EPA decided that, for the best estimate measure, the use of the 500 meters "fenceline" for determining the number of people exposed to NAAQS exceedances is more reasonable than using 200 or 100 meters. With these assumptions, the Agency estimates that, across all the 26 facilities in the unknown universe, a total of approximately 2,360 people are likely to be exposed (because they live within 500 meters of the facilities where releases occur). The best estimate measure of the population effects, therefore, is as follows: across all 108 facilities, a total of approximately *2,378* people living within 500 meters of the facility boundary may be exposed to airborne PM concentrations in excess of the NAAQS.

Exhibit 3-4
24-hour Average PM_{10} Concentrations at Holnam Ada (Close Grid)

*	ISCST3	(95250)	Holnam	Ada	Facility	(no	bulldozing)	OK	-1991														
*	MODELIN	OPTIONS	USED											SOURCE									
*	CONC	RURAL	FLAT	DFAULT										ABOVE 150 ug/m3 - INSIDE FACILITY									
*	PLOT	FILE	OF	HIGH	1ST	HIGH	24-HR	VALUES	FOR	SOURCE	GROUP	ALL		ABOVE 150 ug/m3 - OUTSIDE FACILITY									
*	FOR	A	TOTAL	OF	780	RECEPTORS																	
*	FORMAT	(3(1X,F13 5),1X,F8 2,3X,A5,2X,A8,2X,A4,6X,A8)																					
*	X	Y	AVERAG	CONC	ZELEV	AVE	GRP	HIVAL	NET	ID													
*	704450	704550	704650	704750	704850	704950	705050	705150	705250	705350	705450	705550	705650	705750	705850	705950	706050	706250	706350	706450	706553	706600	706700
3841185	40 53	46 6	51 95	56 72	63.15	85 42	109.12	130 01	125 1	147 29		151.17	152.81	138 71	127.51	105.08	86 44	62 8	50 11	46 34	45 66	44 6	42 28
3841085	39.89	44.05	51 11	57.46	63.54	77.17	103 02	132 47	150.34	158.32	175.91	178.62	170.87	158.55	146.38	121 89	93 62	61.07	56 03	53.91	49 32	47 43	43 04
3840985	40.13	44.33	48.42	56.27	64	72 01	94 44	127.07	164.7	170.43	203.63	213.2	193.67	183.67	171.28	144.76	100 24	68.29	65 09	57.46			
3840885	37 23	42 56	47 95	53.72	62 5	71 97	84.36	117 56	163.8	211.86	245.09	259.72	240.79	222.69	211.35	177.38	118 23	79 46			51.4	47 27	40 95
3840785	33.65	38.87	45.28	52.17	59.47	71.05	82.9	106	152.75	227.49	309.89	335.02	322.66	292.53	284.24	232.35	141 12			56 4	49.45	46 44	38 35
3840685	31 93	35.71	40 9	48.42	57 43	67 71	82 61	100 23	140.48	216.64	523.74	759.27	751.69	723.66	663.2	563.87		84.01	65 71	55 38	46 84	41 96	36 44
3840585	29.08	33.87	38.8	43 89	52 29	64 15	77 57	102 04	133.53	202.62	517.89	745.51	734.91	715.31				78 45	62 06	53 21	41 93	39 41	36 25
3840485	29 2	31 1	35 94	42.37	49.24	57 77	72.92	91 52	129 14	185.39	500.09	731.31	718.81					79 4	61.59	46 75	41.09	39 36	37 03
3840385	31.01	33.46	36.62	40.63	45.9	55.47	66.31	84 96	117 72	183.9	480.51							77.65	56.44	47 27	43 64	41.7	35 38
3840285	34.42	37.2	40.51	44.85	50.66	58.1	69.18	85.9	122 2	185.32								72.18	58	52 22	42 63	38 19	28.9
3840185	36.56	39.91	44 18	49.34	55.14	62 75	74.14	88.74	120.41	179.13								78 6	65.47	47 64	34 67	34.96	33 88
3840085	40 14	43.79	47 62	51 79	57 73	66.03	76.5	90.36	119.77	171.77											35.75	31 9	25 59
3839985	38.64	42.85	47.67	53.27	60.06	68 65	79.9	95 4	117.99	170.27											35 14	32 69	28 38
3839885	37.11	40.94	45 21	50.2	56.35	64 53	76.34	92.81	116 78	162.74											37 84	35 29	30 73
3839785	36.92	40.11	43 84	48.51	54.59	62.71	73.58	88.23	109 19	152.81											40.49	37 82	32 99
3839685	38.3	41 02	44 02	47 54	51.87	57 47	64.9	75.24	91.26	130.97											42 88	40 53	35 87
3839585	36.5	38 52	40 68	42.89	44.93	49 58	57.54	67.76	89.87	106 75	141 86	196.58	218.7	223.83	251.78	252.18	140.2	80 06	58.18	51.43	48 39	44 67	37 23
3839485	29.96	32.66	35.77	39.43	44.27	50	61 39	66.61	76 24	87.2	110	149.01	162.66	190.08	191.36	185.26	138.56	78.16	62.08	51.69	41 83	40.38	38 79
3839385	30.84	33.53	36.72	40.91	47.59	51.37	53 82	59.4	62	77.86	92.97	123.87	134.2	140 25	154.45	153.56	141.22	66.83	62.36	51.07	46 28	42.09	35 15
3839285	31 69	34.94	39.53	42.37	41.62	45 85	48.36	48.79	59.44	69.32	79.07	107.49	113.98	116.41	128.11	129.6	125.4	63.74	54.13	50 88	43 86	42.54	38 9
3839185	33.89	36 2	34 12	37.26	39.63	40 5	39.95	47 18	56.21	62 5	71 66	95.47	100.75	98.43	108 23	111.23	106.11	66.53	44 47	44 74	42 41	40 9	37 76
3839085	30 07	31 54	33 49	34 59	34 54	33.61	38.22	46.82	52.62	56.94	65.98	86.1	91.18	83.35	92.79	96.54	92.91	69 05	48 98	36 64	37 39	36 94	35 91
3838985	29 14	30.17	30.4	29 82	28.8	31 17	39.26	45.48	49.22	52 05	61.49	78.48	81.97	71 57	81.01	84.45	84.68	71.59	51 25	34.88	30 56	31 25	31 92
3838885	27.23	26.88	25 99	25.01	25.46	32 88	39 36	43.63	46 02	47 68	57.69	72.23	73 57	64 56	71	74 98	76 95	73.3	53 84	38 31	28 53	25 27	26 85
3838785	23.9	22.86	21 91	21 35	27.4	33.83	38 82	41 61	42 94	43.66	54.28	66.92	66 38	59 07	62.2	67 12	70 09	72 46	56.26	40 44	29 41	26 74	21 84
3838685	20.26	19 37	18.96	22 73	28 79	34 16	37 87	39.41	40 02	39.85	51.22	61 96	60 16	54 39	54.56	60 13	64 19	68.3	58 14	42 85	30 23	27 35	22 32

Exhibit 3-5
Annual Average PM_{10} Concentrations at Holnam Ada (Close Grid)

*	ISCST3	(95250)	Holnam	Ada	Facility	(no	bulldozing)	OK	-1991														
*	MODELIN	OPTIONS	USED											SOURCE									
*	CONC	RURAL	FLAT	DFAULT										ABOVE 50 ug/m3 - INSIDE FACILITY									
*	PLOT	FILE	OF	ANNUAL	VALUES	FOR	SOURCE	GROUP	ALL					ABOVE 50 ug/m3 - OUTSIDE FACILITY									
*	FOR	A	TOTAL	OF	780	RECEPTORS																	
*	FORMAT	(3(1X,F13.5),1X,F8.2,2X,A6,2X,A8,2X,I8,2X,A8)																					
*	X	Y	AVERAG	CONC	ZELEV	AVE	GRP	NUM	HRS	NET	ID												
*	704450	704550	704650	704750	704850	704950	705050	705150	705250	705350	705450	705550	705650	705750	705850	705950	706050	706250	706350	706450	706553	706600	706700
3841185	4.33	5.17	6.24	7.59	9.32	11.61	14.59	18.49	23.67	29.48	33.92	35.87	34.66	30.48	24.25	18.04	13.11	7.48	6.06	5.1	4.39	4.15	3.69
3841085	4.16	4.93	5.98	7.34	9.13	11.55	14.81	19.24	25.39	33.19	39.94	43.24	42.33	37.44	29.47	20.99	14.58	8.04	6.49	5.48	4.83	4.66	4.6
3840985	3.99	4.73	5.71	7.04	8.82	11.3	14.81	19.76	27.06	37.36	48.06	53.52	53.19	47.55	37.3	25.06	16.36	8.69	7.04	6.09			
3840885	3.78	4.49	5.43	6.71	8.46	10.91	14.55	19.94	28.34	41.88	59.77	69.15	69.67	63.56	50.32	31.19	18.53	9.52			6.38	4.99	3.7
3840785	3.61	4.28	5.16	6.37	8.05	10.44	14.05	19.67	28.96	46.03	79.45	97.42	99.43	93.16	76.68	42.19	21.23			6.15	4.68	4.21	3.37
3840685	3.4	4.04	4.86	6.01	7.63	9.96	13.47	19.15	28.87	48.44	144.96	260.76	264.14	258.06	239.35	141.98		10.27	7.2	5.51	4.33	3.9	3.14
3840585	3.13	3.73	4.51	5.55	7.04	9.29	12.68	18.28	28.31	49.74	170.62	333.67	338.36	332.67			25.29	9.29	6.76	5.2	4.05	3.64	2.96
3840485	2.9	3.45	4.19	5.21	6.63	8.76	12.14	17.71	27.9	50.08	174.99	341.8	348.32				25.33	9.1	6.57	4.94	3.82	3.43	2.76
3840385	2.78	3.29	3.99	4.95	6.3	8.34	11.56	16.94	26.92	48.83	181.37						25.91	9.14	6.4	4.77	3.64	3.28	2.64
3840285	2.73	3.21	3.85	4.74	6.03	7.9	10.86	15.91	25.22	46.58							26.1	9.05	6.31	4.61	3.49	3.12	2.5
3840185	2.7	3.15	3.75	4.58	5.77	7.5	10.14	14.57	23.01	43.21							25.68	8.86	6.17	4.48	3.36	2.99	2.39
3840085	2.71	3.16	3.73	4.49	5.52	7.02	9.34	13.15	20.54	38.79											3.28	2.92	2.34
3839985	2.71	3.14	3.69	4.4	5.34	6.65	8.59	11.75	17.82	33.64											3.23	2.9	2.34
3839885	2.73	3.13	3.63	4.26	5.11	6.26	7.88	10.44	15.32	27.84											3.19	2.87	2.33
3839785	2.68	3.06	3.53	4.12	4.89	5.9	7.3	9.48	13.34	22.25											3.13	2.84	2.34
3839685	2.67	3.03	3.46	4	4.67	5.55	6.78	8.64	11.78	18.14											3.16	2.9	2.41
3839585	2.69	3.04	3.45	3.94	4.55	5.32	6.4	7.98	10.48	14.61	23.32	32.63	35.72	36.36	34.06	24.95	14.24	6.76	5.04	3.95	3.2	2.92	2.43
3839485	2.69	2.99	3.34	3.76	4.26	4.89	5.76	6.94	8.71	11.59	16.4	21.45	23.83	24.46	22.85	18.07	12.24	6.39	4.94	3.93	3.2	2.95	2.51
3839385	2.59	2.85	3.14	3.48	3.89	4.38	5.03	5.95	7.34	9.61	12.73	15.97	17.92	18.36	17.05	14.22	10.53	5.91	4.7	3.81	3.16	2.92	2.49
3839285	2.45	2.68	2.92	3.18	3.48	3.87	4.4	5.17	6.38	8.23	10.38	12.74	14.21	14.51	13.5	11.62	9.03	5.45	4.4	3.64	3.06	2.85	2.47
3839185	2.31	2.49	2.66	2.86	3.1	3.43	3.89	4.6	5.7	7.17	8.8	10.58	11.64	11.83	11.11	9.79	7.88	5.01	4.12	3.43	2.9	2.71	2.4
3839085	2.14	2.27	2.41	2.57	2.78	3.07	3.51	4.2	5.18	6.36	7.63	9	9.78	9.87	9.37	8.43	7	4.67	3.86	3.23	2.75	2.58	2.28
3838985	1.96	2.07	2.18	2.32	2.51	2.8	3.24	3.89	4.75	5.74	6.75	7.78	8.36	8.39	8.05	7.37	6.3	4.43	3.62	3.06	2.6	2.43	2.16
3838885	1.8	1.88	1.98	2.11	2.3	2.59	3.04	3.64	4.41	5.22	6.03	6.82	7.25	7.27	7.02	6.52	5.69	4.15	3.45	2.91	2.48	2.31	2.04
3838785	1.65	1.72	1.81	1.94	2.14	2.45	2.88	3.44	4.11	4.79	5.42	6.04	6.36	6.39	6.2	5.83	5.17	3.88	3.33	2.79	2.38	2.22	1.93
3838685	1.51	1.58	1.67	1.81	2.02	2.33	2.75	3.28	3.85	4.41	4.91	5.4	5.65	5.7	5.53	5.24	4.71	3.64	3.19	2.7	2.29	2.14	1.86