Pendimethalin

Chemical Information
Pendimethalin is a orange-yellow crystalline solid and is formulated in liquid, solid, and granular forms, and also as an emulsifiable concentrate.
CAS Number - 40487-42-1
Alternate Names - 3, 4-xylidine, benzenamine, penoxalin
General Uses - Pendimethalin is used as a pre-emergence and postemergence herbicide on cotton, dry onions, dry bulb shallots, edible beans, corn, legumes, garlic, grain, nonbearing fruit, nut crops, peanuts, potatoes, rice, soybeans, sugar cane, sunflowers, sweet corn, and sweet lupine. It is also used for pre-emergence control of many annual grasses and certain broadleaf weeds. Pendimethalin is applied by broadcasting, directed spray, and soil treatment.
Potential Hazards - This chemical is considered to have low acute toxicity and was added to the TRI based on liver toxicity. It is slightly toxic via exposure to it by eating or drinking contaminated food or water.

Summary Analysis– Pendimethalin

- In 2003, 8 facilities reported 429,551 pounds of pendimethalin. This quantity comprised 0.5 percent of the total quantity of PCs. In 2003, there was about a 95 percent increase in the total quantity of pendimethalin, compared to the quantity reported in 1999.
- In 1999-2003, land disposal was increasingly used to manage pendimethalin.
- Of the 8 facilities that reported pendimethalin in 2003, 1 facility accounted for over 65 percent of the total quantity of this chemical. Five of the 8 facilities reported almost 98 percent of the total PC quantity.
- In 2003, over 94 percent of the pendimethalin was reported by facilities in Regions 4 and 7. The quantity of pendimethalin reported in both these Regions increased significantly, compared to the quantities reported in 1999. In 2003 alone, Region 4 facilities reported an increase of over 73 percent, compared to the previous year. Facilities in Region 7 reported a decrease of almost 17 percent in 2003, compared to the previous year.
- Facilities in only 4 states reported a quantity of pendimethalin in 2003. Facilities in Missouri and Florida reported 93 percent of the total quantity of pendimethalin in 2003. Facilities in both these states reported a significant increase in 2003, compared to quantities reported in 1999.
- In 2003, only 8 facilities in 3 industry sectors reported pendimethalin. Facilities in both SIC 2879 (Pesticides and agricultural chemicals, nec) and SIC 2062 (Cane sugar refining) reported an increase of over 100,000 pounds of pendimethalin, compared to quantities reported in 1999. In 2003, SIC 2879 facilities reported a 17 percent decrease compared to the quantity reported in 2002.

National Trends – Pendimethalin. Exhibit 4.170 presents the total PC quantity (pounds) of pendimethalin reported in 1999 to 2003, showing the disposal, treatment, energy recovery, as well as recycling quantities. In 2003, the 429,551 pounds of pendimethalin represented 0.5 percent of the total quantity of PCs. In 2003, there was more than a 95 percent increase in the total quantity of pendimethalin, compared to the quantity reported in 1999. There also was a slight increase in the number of facilities reporting this chemical, with 8 facilities reporting a PC quantity of pendimethalin in 2003.

In 1999-2003, land disposal was increasingly used to manage pendimethalin. In 2003, the quantity of pendimethalin disposed almost doubled, compared to the previous two years. The use of treatment to manage pendimethalin in 1999-2003 was somewhat variable, ranging from a low of 129,625 pounds in 2001 to a high of 649,602 pounds in 2000. In 2003, almost 290,000 pounds of pendimethalin were treated. No energy recovery for pendimethalin was reported. Aside from over 41,000 pounds of pendimethalin recycled in 2002, less than 6,000 pounds was recycled in any given year since 1999.

Exhibit 4. 170. National-Level Information for Pendimethalin (1999-2003)

	1999	**2000**	**2001**	**2002**	**2003**	**Percent Change (1999-2003)**	**Management Method -- Percent of Quantity of this Chemical in 2003**
Number of Facilities	6	8	12	11	8	33.3%	
Disposal Quantity (lbs.)	5,406	24,529	70,570	72,404	139,764	2485.3%	32.5%
Energy Recovery Quantity (lbs.)	0	0	0	0	0	NA	0.0%
Treatment Quantity (lbs.)	214,385	649,602	129,625	349,423	289,787	35.2%	67.5%
Priority Chemical Quantity (lbs.)	219,791	674,131	200,195	421,827	429,551	95.4%	
Recycling Quantity (lbs.)	4,000	2,000	6,000	41,401	4,360	9.0%	

Exhibit 4.171 shows the number of facilities that reported pendimethalin within various quantity ranges. Of the 8 facilities (Exhibit 4.178) that reported pendimethalin in 2003, 1 facility accounted for over 65 percent of the total quantity of this chemical. Five of the 8 facilities reported almost 98 percent of the total PC quantity of pendimethalin in 2003.

Exhibit 4. 171. Distribution of Facilities that Reported Quantities for pendimethalin (2003)

Pendimethalin (429,551 pounds)		
Quantity Reported	**Number of Facilities Reporting this quantity (2003)**	**Percent of Total Quantity for this Priority Chemical**
up to 10 pounds	0	0.0%
between 11 - 100 pounds	0	0.0%
between 101 -1,000 pounds	0	0.0%
between 1,001 - 10,000 pounds	3	2.3%
between 10,001 - 100,000 pounds	4	32.5%
between 100,001 - 1 million pounds	1	65.2%
> 1 million pounds	0	0.0%

EPA Region Trends- Pendimethalin. Exhibit 4.172 shows the quantity (pounds) of pendimethalin reported in 6 EPA Regions by facilities in 1999 to 2003. In 2003, facilities in Regions 4 and 7 reported about 94 percent of the pendimethalin. The quantity of pendimethalin reported by facilities in both these Regions increased significantly, compared to the quantities reported in 1999. In 2003 alone, Region 4 facilities reported an increase of over 73 percent,

compared to the quantity reported in 2002. Facilities in Region 7, despite a 58 percent increase since 1999, reported a decrease of almost 17 percent in 2003, compared to the previous year.

In 2003, no pendimethalin was reported by facilities in 3 of these Regions that had previously reported a quantity in 1999-2002. Facilities in Region 5 reported 25,550 pounds – about 21 percent less than the quantity reported in 1999 but more than double the quantity reported in 2002.

Exhibit 4. 172. Quantity of Pendimethalin Reported by EPA Regions (1999-2003)

EPA REGION	1999	2000	2001	2002	2003	Percent Change in Quantity (1999-2003)	Percent Of the Total Priority Chemical quantity (2003)
2	0	6,316	346	665	0	NA	0.0%
4	4,096	20,342	69,555	68,909	119,470	2816.7%	27.8%
5	32,405	13,082	7,984	11,246	25,505	-21.3%	5.9%
6	2,785	0	0	0	0	-100.0%	0.0%
7	180,505	634,391	122,181	341,007	284,576	57.7%	66.2%
9	0	0	129	0	0	NA	0.0%
Total	219,791	674,131	200,195	421,827	429,551	95.4%	

Exhibit 4. 173. Distribution of Facilities Reporting Pendimethalin in 2003 & Quantity of Pendimethalin Reported in 2003 per Region

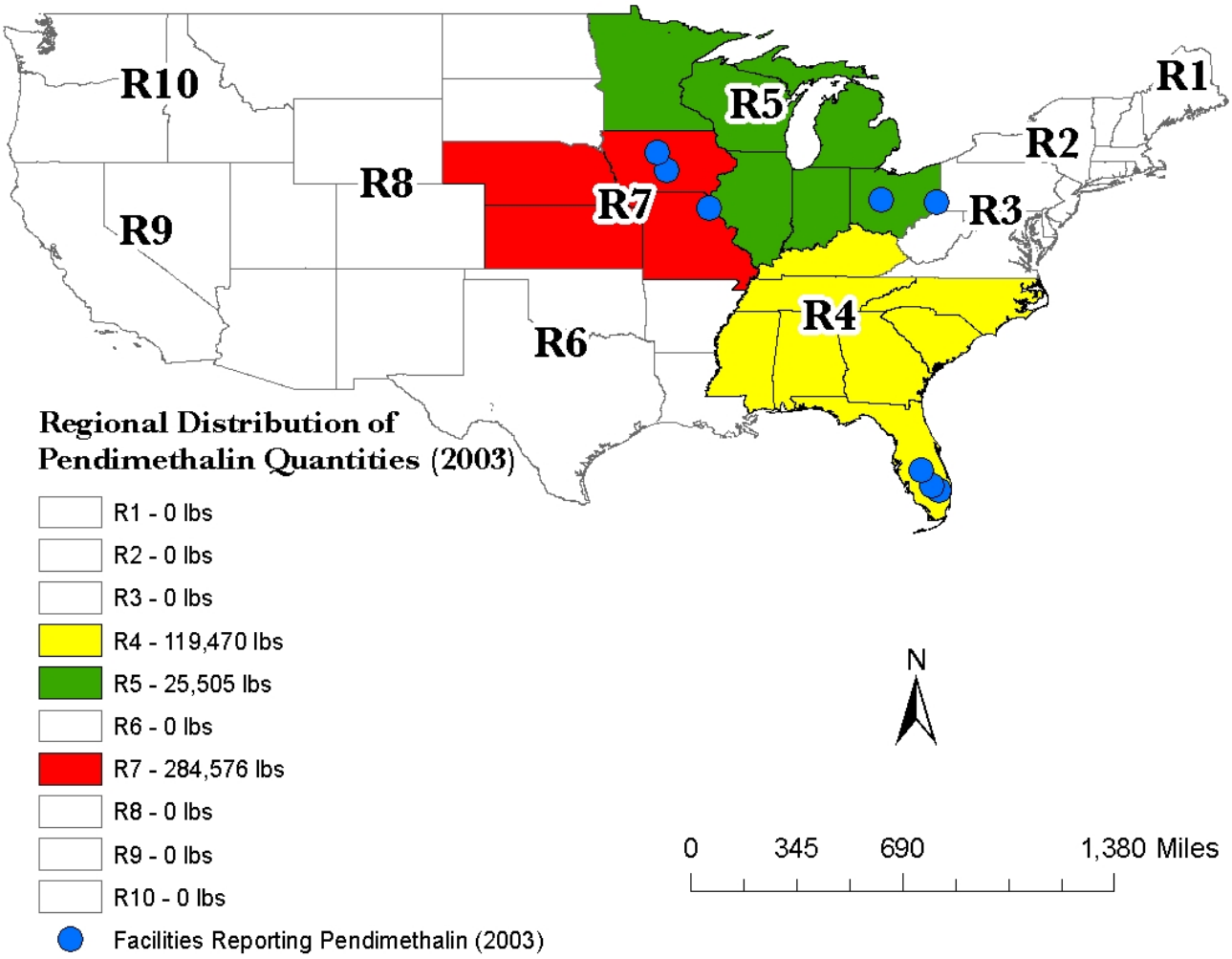

Exhibit 4.174 shows how pendimethalin was managed by facilities in the 3 Regions in 2003. About 68 percent of the pendimethalin was treated (primarily onsite); land disposal (primarily onsite) was used for about 32 percent of the pendimethalin. In 2003, some recycling of pendimethalin was reported by facilities in Regions 4 and 5.

Exhibit 4. 174. Management Methods for Pendimethalin, By EPA Region (2003)

EPA Region	Disposal		Energy Recovery		Treatment		Recycling	
	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
4	101,961	17,509	0	0	0	0	624	0
5	0	20,293	0	0	0	5,212	3,736	0
7	1	0	0	0	270,000	14,575	0	0

State Trends- Pendimethalin. Exhibit 4.175 shows the quantity of PC quantity of pendimethalin that was reported by facilities in 10 states between 1999 and 2003. In 2003, only 4 state facilities reported a quantity of pendimethalin (Exhibits 4.176 and 4.177); facilities in Missouri and Florida reported 93 percent of the total quantity.

Exhibit 4. 175. State-Level Information for Pendimethalin (1999-2003)

State	1999	2000	2001	2002	2003	Change in Quantity (1999-2003)	Percent Change in Quantity (1999-2003)	Percent of Total Quantity of this Priority Chemical (2003)
Missouri	174,005	630,401	111,401	339,641	280,131	106,126	61.0%	65.2%
Florida	4,096	20,342	61,613	57,219	119,470	115,374	2816.7%	27.8%
Ohio	32,405	13,082	7,984	11,246	25,505	-6,900	-21.3%	5.9%
Iowa	6,500	3,990	10,780	1,350	4,445	-2,055	-31.6%	1.0%
Alabama	0	0	418	640	0	0	NA	0.0%
Arkansas	2,785	0	0	0	0	-2,785	-100.0%	0.0%
California	0	0	129	0	0	0	NA	0.0%
Georgia	0	0	7,524	11,050	0	0	NA	0.0%
Nebraska	0	0	0	16	0	0	NA	0.0%
New Jersey	0	6,316	346	665	0	0	NA	0.0%

Exhibit 4. 176. Trends Analysis on States with Largest Quantity Increase and Decrease (1999 – 2003): Facilities in Florida and Ohio

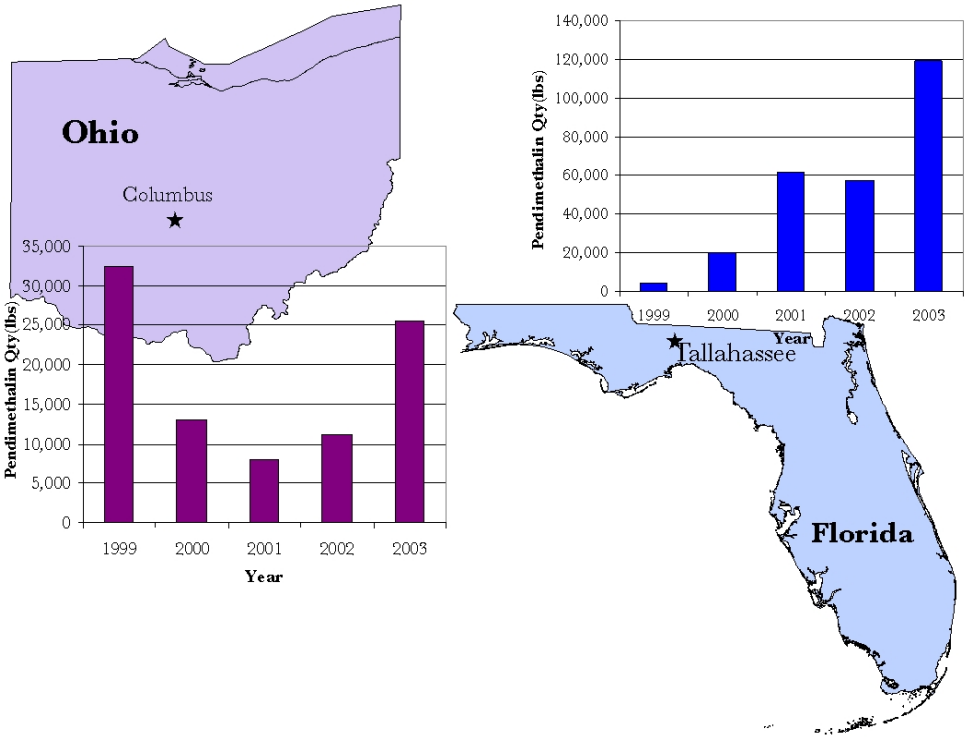

Exhibit 4. 177. Trends Analysis of States Reporting 4 Largest Quantities of Pendimethalin (2003)

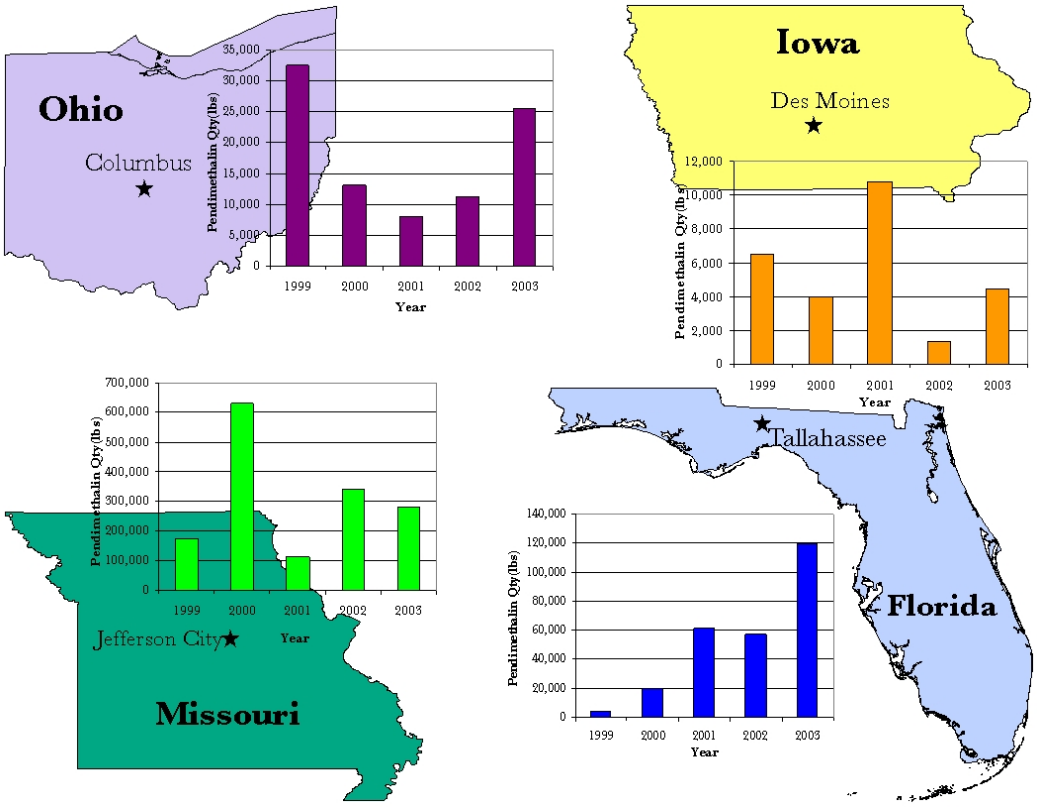

Exhibit 4.178 shows how pendimethalin was managed by 8 facilities in these 4 states in 2003. The facility in Missouri treated (mostly onsite) virtually 100 percent of their pendimethalin. Three facilities in Florida used disposal (primarily onsite). One facility in Ohio used offsite treatment while the other Ohio facility disposed their pendimethalin offsite. Both Iowa facilities used offsite treatment.

Exhibit 4. 178. Management of Pendimethalin in States (2003)

State	Total Priority Chemical Quantity (2003)	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
Missouri	280,131	1	0	0	0	270,000	10,130	0	0
Florida	119,470	101,961	17,509	0	0	0	0	624	0
Ohio	25,505	0	20,293	0	0	0	5,212	3,736	0
Iowa	4,445	0	0	0	0	0	4,445	0	0

Industry Sector (SIC) Trends- Pendimethalin. Exhibit 4.179 shows the PC quantity (pounds) of pendimethalin by industry sectors (SIC codes) where facilities reported a PC quantity of pendimethalin in 1999-2003. In 2003, only 8 facilities in 3 industry sectors reported pendimethalin. Facilities in both SIC 2879 (Pesticides and agricultural chemicals, nec) and SIC 2062 (Cane sugar refining) reported an increase of over 100,000 pounds of pendimethalin, compared to quantities reported in 1999. In 2003, SIC 2879 facilities reported a 17 percent decrease compared to the previous year quantity. Facilities in SIC 2062 initially reported this

chemical in 2001and their quantity has increased steadily since then – to almost 102,000 pounds in 2003.

Exhibit 4. 179. Industry Sector-Level Information for Pendimethalin (1999-2003)

Primary SIC Code	SIC Description	Number of Facilities for this SIC Code (2003)	1999	2000	2001	2002	2003	Change in Quantity (1999-2003)	Percent Change in Quantity (1999-2003)	Percent of Total Quantity of this Priority Chemical (2003)
2879	Pesticides and agricultural chemicals, nec	3	180,505	640,375	122,342	341,007	284,576	104,071	57.7%	66.2%
2062	Cane sugar refining	2	0	0	20,889	56,499	101,961	101,961	NA	23.7%
2875	Fertilizers, mixing only	3	36,501	13,082	56,650	23,656	43,014	6,513	17.8%	10.0%
2061	Raw cane sugar	0	0	20,342	0	0	0	0	NA	0.0%
2869	Industrial organic chemicals, nec	0	0	332	185	665	0	0	NA	0.0%
2874	Phosphatic fertilizers	0	0	0	129	0	0	0	NA	0.0%
5191	Farm supplies	0	2,785	0	0	0	0	-2,785	-100.0%	0.0%

Exhibit 4.180 shows how pendimethalin was managed in 3 industry sectors where 8 facilities reported this PC in 2003. Onsite treatment was the primary method used by facilities in SIC 2879. The two facilities in SIC 2062 used onsite land disposal for 100 percent of their pendimethalin. Offsite land disposal was used by 2 facilities in SIC 2875 for the entire quantity of their pendimethalin; one other facility in this industry sector used offsite treatment. In 2003, 2 of the SIC 2875 facilities reported some recycling of pendimethalin

Exhibit 4. 180. Management of Pendimethalin in Industry Sectors (SIC Codes) (2003)

SIC Code	SIC Description	Onsite Disposal	Offsite Disposal	Onsite Energy Recovery	Offsite Energy Recovery	Onsite Treatment	Offsite Treatment	Onsite Recycling	Offsite Recycling
2879	Pesticides and agricultural chemicals, nec	1	0	0	0	270,000	14,575	0	0
2062	Cane sugar refining	101,961	0	0	0	0	0	0	0
2875	Fertilizers, mixing only	0	37,802	0	0	0	5,212	4,360	0

Recycling. Exhibit 4.181 provides some indication of the extent to which facilities in certain industry sectors recycled at least 100 pounds of pendimethalin in 1999-2003, rather than manage it as a waste. For those year(s), the facility did not report a PC quantity, i.e., a quantity managed via land disposal, energy recovery, or treatment.

Exhibit 4. 181. Facilities reporting Recycling but not a Priority Chemical quantity (1999-2003)

			1999		2000		2001		2002		2003	
Number of Facilities	**EPA Region**	**State**	**Onsite Recycle**	**Offsite Recycle**	**Onsite Recycle**	**Offsite Recycle**	**Onsite Recycle**	**Offsite Recycle**	**Onsite Recycle**	**Offsite Recycle**	**Onsite Recycle**	**Offsite Recycle**
SIC 2874 --Phosphatic fertilizers												
1	9	California	2,000	0	2,000	0	0	0	0	0	0	0