CLAIMS

1. A separator for separating contaminants within an effluent stream, comprising:

an inlet conduit configured to receive from an abatement apparatus said effluent stream containing contaminants flowing in a first major direction from a lower portion of said separator towards an upper portion of said separator;

a spray nozzle configured to spray an entraining fluid within said inlet conduit in said first major direction to entrain said contaminants within said effluent stream;

a first flow redirection structure located downstream of said inlet conduit; and

a first separation conduit located downstream of said first flow redirection structure, wherein said first flow redirection structure is configured to redirect flow of said effluent stream and said entraining fluid from an axial flow from the inlet conduit to a circumferential flow in a second major direction opposing said first major direction within said first separation conduit;

a second flow redirection structure located downstream of said first separation conduit; and

a second separation conduit located downstream of said second flow redirection structure, wherein said second flow redirection structure is configured to redirect flow of said effluent stream and said entraining fluid to said first major direction opposing said second major direction within said second separation conduit, and wherein said second flow redirection structure comprises second radial elements extending between said first separation conduit and said second separation conduit.

2. The separator of claim 1, wherein said inlet conduit enlarges in said first major direction towards said first flow redirection structure.

3. The separator of claim 1 or claim 2, wherein said first flow redirection structure is located between said inlet conduit and said first separation conduit.

4. The separator of any preceding claim, comprising a second flow redirection structure located downstream of said first separation conduit and a second separation conduit located downstream of said second flow redirection structure, wherein said second flow redirection structure is configured to redirect flow of said effluent stream and said entraining fluid to said first major direction opposing said second major direction within said second separation conduit.

5. The separator of claim 4, wherein said second flow redirection structure is located between said first separation conduit and said second separation conduit.

6. The separator of claim 4 or 5, wherein said first separation conduit and said second separation conduit coaxially surround said inlet conduit.

7. The separator of any preceding claim, wherein at least one of said first flow redirection structure and said second flow redirection structure is configured to present a curved surface to said effluent stream and said entraining fluid to redirect flow of said effluent stream and said entraining fluid.

8. The separator of any preceding claim, wherein said first flow redirection structure comprises first radial elements extending between said inlet conduit and said first separation conduit.

9. The separator of claim 8, wherein said first radial elements are positioned circumferentially around said inlet conduit.

10. The separator of claim 8 or claim 9, wherein said inlet conduit defines a longitudinal axis, and wherein said first radial elements are configured to impart a rotational flow about said longitudinal axis to said effluent stream and said entraining fluid within said first separation conduit.

11. The separator of any one of claims 8 to 10, wherein said first radial elements are shaped to present a curved surface to said effluent stream and said entraining fluid to impart said rotational flow.

12. The separator of any one of claims 8 to 11 when dependent on any one of claims 4 to 7, wherein said first radial elements define an exhaust conduit fluidly coupled to said second separation conduit and configured to convey said effluent stream from said second separation conduit to an exhaust.

13. The separator of any one of claims 4 to 12, wherein said second flow redirection structure comprises second radial elements extending between said first separation conduit and said second separation conduit.

14. The separator of claim 13, wherein said second radial elements are positioned circumferentially around said first separation conduit and said second separation conduit.

15. The separator of claim 13 or claim 14, wherein said second radial elements are configured to inhibit rotational flow of said effluent stream and said entraining fluid within said first separation conduit and said second separation conduit.

16. The separator of any of claims 4 to 15 when dependent on claim 4, wherein said second flow redirection structure defines at least one outlet positioned to drain accumulated entraining fluid into a sump.

17. A method for separating contaminants from an effluent stream using a separator comprising:

receiving the effluent stream at an inlet conduit of the separator in a first major direction from a lower portion of said separator towards an upper portion of said separator;

spraying an entraining fluid within said inlet conduit in said first major direction to entrain said contaminants;

redirecting the flow of entraining fluid and effluent stream from an axial flow from the inlet conduit to a circumferential flow in a second major direction opposing the first major direction using a first flow redirection structure positioned downstream of the inlet conduit; and

separating the entraining fluid containing contaminants from the effluent stream using a first separation conduit.