

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at www.epa.gov/ttn/chief/ap42/

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.

AP-42 Section Number: 9.9.4

Reference Number: 2

Title: How Ohio is Solving the Alfalfa Dust Problem

Schafer, R. D.

A.M.A. Archives of Industrial Health

January 1958

AP-42 Section 9.9.4
Reference 2
Report Sect. _____
Reference _____

VOLUME 17 • JANUARY 1958 • NUMBER 1
RECEIVED

JAN 14 1958

INDUSTRIAL HEALTH

The Medical Principles of Monitoring Audiometry
Hallowell Davis, Gordon Hoople, and Horace O. Parrack

A Study of the Physiological Effects of Carbon Black
Carl A. Nau, Jack Neal, and Vernie Stenbridge

Oral Administration of Edathamil Calcium Disodium (Calcium Disodium Versenate)
Leonard D. Pagnotto, Hervey B. Elkins and Iskender Bayka

Influence of Physical Activity on the Toxicity of Aerosols and Vapors
C. L. Punte, E. J. Owens, E. H. Krackow, and P. L. Cooper

Analytical Studies on Lead in Human Urine
Kenneth W. Nelson and Randall E. Hamm

Chronic Toxicity of 3-(p-Chlorophenyl)-1,1-Dimethylurea (Monuron)
Harold C. Hodge, Elliott A. Maynard, William L. Downs, and Robert D. Coye

The Biological Effects of Microwave Radiation on Air Force Personnel
George M. Knauf

Preventive Medicine in Naval Aviation Training
Philip B. Phillips and John T. Bair

Characteristics of the Organic Particulate Matter in the Atmosphere of Certain American Cities
Elbert C. Tabor, Thomas E. Hauser, James P. Lodge, and Rice H. Burttschell

The Role of the Flight Surgeon in Aviation Safety
Carl E. Wilbur

How Ohio Is Solving the Alfalfa Dust Problem
Richard D. Schafer

Prolonged Exposure of Guinea Pigs to Sulfuric Acid Aerosol
M. D. Thomas, R. H. Hendricks, F. D. Gunn, and J. Critchlow

Your Ear and Nose
Aram Glorig, D. E. Wheeler, and H. P. House

Books

AMERICAN MEDICAL ASSOCIATION PUBLICATION

How Ohio Is Solving the Alfalfa Dust Problem

RICHARD D. SCHAFER, B.C.E., Columbus, Ohio

Sources of air pollution in Ohio and the United States are coming more and more under the searching light of public opinion. The general public is in fact demanding a clean-up of air pollution sources. The alfalfa dehydration industry is no exception.

In Ohio, particularly in the northwest counties, the rapid development of the alfalfa dehydration industry has been attended by many complaints and production problems. Standardization of product and production procedures has had the beneficial result of reducing variations among plants, and today we find a modern industrial plant geared to high production, but producing a small amount of dust. Unfortunately, this amount is, in many cases, too great for the comfort of many plant neighbors. They complain of the dust, mentioning its effect on their health and comfort, and are disgruntled by the nuisance of the green-colored dust in their homes. The characteristic, and somewhat "heavy" odor is the second largest source of complaint.

Of course, in some areas the plant's public relations are in such excellent condition that people rarely complain. But in others the residents are considerably agitated and refuse to accept any compromise on dust reduction. In the latter areas complete dust suppression is the only solution which will be accepted. Experience in northwestern Ohio during the last three years clearly points to the need for an economical solution to this dust problem.

Inquiries to some 14 states producing alfalfa in large quantities brought out a similar pattern. In some of these states concerted efforts of the residents have

Submitted for publication June 12, 1957.
Air Pollution Engineer, Ohio Department of Health.

forced removal of the plants to completely isolated areas. With building rapidly expanding even this solution is not very practical. For what was once an open area oftentimes becomes "built up" with home development. When this happens the reply, "We were here first," is of little help to the industrialist.

Now, let's consider the processes used in Ohio for dehydration of alfalfa. The accompanying diagram indicates the essential equipment for dust elimination.

Alfalfa grown by farmers is chopped in the field at the same time it is cut. The chopped alfalfa is hauled in large box-like wagons to the dryer, where it is fed to a rotary drier (usually the multipass type) fired by gas or oil. Temperatures are approximately 1800 F at the feed end and 190-225 F at the discharge. The dried chopped alfalfa is then blown to the first cyclone or cooler. Here the flue gases and steam are released. Next the alfalfa is blown to a grinder cyclone, where approximately 1/4-in. hole screen is used for preliminary breakdown of the dried material. This material is then blown to a third cyclone, which feeds the final hammer mill. The mill ordinarily uses a 1/20 or 3/64-in. hole diameter screen and pulverizes the alfalfa to its final form.

The final step is blowing the material to a bagging cyclone. Discharge from this cyclone is efficiently controlled by a rotary valve feeder to a blender, a necessary part of the process machinery. The blender serves the dual purpose of blending the material, at the same time allowing the cyclone to function at greatest efficiency. When a cyclone collector is used as a storage bin, the cyclonic action is stopped and discharge of large quantities of dust

ize the importance of occu-
way safety programs when
relatively simple matter to
id shops safe environments
ent or otherwise improper
part of the host worker or
ve that aviation safety is
attain, the principal and
being that military avia-
to perform "in advance of
art."

comparison between mili-
ation safety records. The
s essentially hazardous. In
tual warfare, the occur-
s hangs on a delicate bal-
istic training for combat
nebulous margin of safety.
ially disappears when one
ilitary aircraft and tactics
ie expanding frontiers of

ontier that the flight sur-
side the aeronautical engi-
small advance henceforth in
of aircraft the demands on
at the controls become in-
while the environment be-
y less habitable. Thus, the
st find ways to adapt man
w environment as well as
ng with the engineer, to
nent itself in favor of the

at many in this audience
have the opportunity to
York and have lunch in
the wings of commercial
n this opportunity is pre-
do well to pay tribute to
rts of our present military
evoting their lives to ad-
flying.

REFERENCES

- The Epidemiology of Acci-
Health 39:504-515 (April)
- A., and Moore, R. C.: Human
Safety: A Review and Evalu-
J. Med. 256:792-799 (April
?), 890-897 (May 9) 1957.

occurs. For best dust control the cyclone must be emptied continuously, by the motor-driven rotary valve.

In some of the mills in northwest Ohio variations of this process are to be found. For example, at times the drying is done on a slow-moving grate with heat furnished from coal combustion. In one mill classification of the final product is accomplished by use of a screening process. The purpose of this is to concentrate protein content by removal of white fiber and nonprotein fibers. (Protein and carotene content must be kept uniformly high in order that premium price may be received for the final alfalfa meal.)

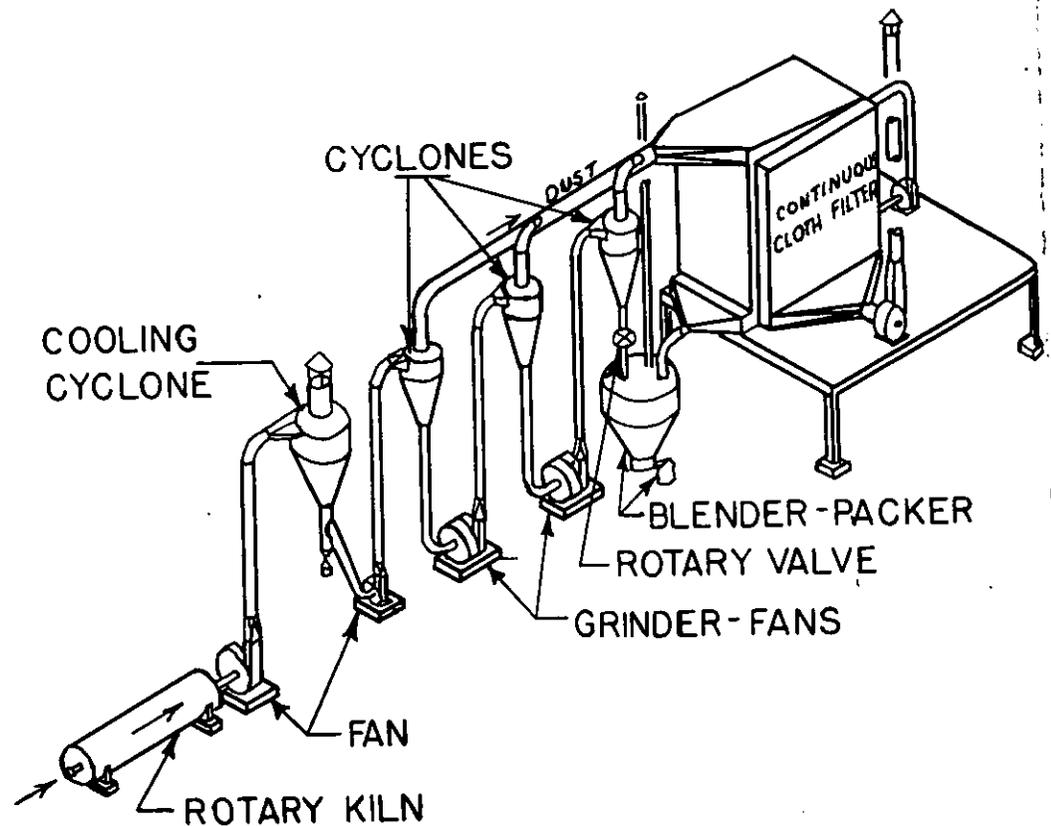
In any event, it is from the grinder and bagger cyclones that the dust escapes. Because of the very fine particles which the grinder produces, the cyclones cannot collect all of the product.

Methods of Dust Control

Now, what methods have been discovered to control this dust? Two quite recent changes have solved the dust problem for Ohio plants:

1. *Oil or Animal Fat Has Been Added to the Meal in Process.*—This causes the tiny particles to collect into large particles, as a result the efficiency of the cyclone separation is increased. But of the plants observed using this method, it is not believed a sufficient reduction occurs to satisfy the most critical neighbors. In this case the second method is advisable.

2. *A Cloth Collector is Used.*—This acts on the principle of the home vacuum cleaner, filtering the dust from the cyclone through a cloth bag. Several of the plants have installed cloth filters at considerable expense. These have proved satisfactory dust collectors.



A diagram of the application of essential equipment for dust elimination in an alfalfa dehydration plant.

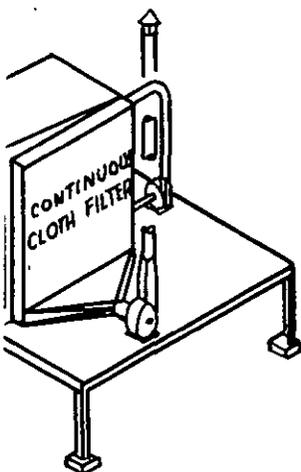
OHIO
Gr
cloth
of fir
have
ever,
have
lessn
was
chan
tage
R
cloth
vers
initi
Bec
the
red
pen
Mo
aut
tag
for

of Dust Control

hods have been discovered
lust? Two quite recent
ved the dust problem for

*ual Fat Has Been Added
Process.*—This causes the
ollect into large particles;
efficiency of the cyclone
eased. But of the plants
his method, it is not be-
reduction occurs to satisfy
ighbors. In this case the
advisable.

lector is Used.—This acts
of the home vacuum
he dust from the cyclones
ag. Several of the plants
th filters at considerable
have proved satisfactory



DER-PACKER
VALVE
FANS

Great disadvantage of the older type of cloth and collector design was the possibility of fire. As a result, high-penalty premiums have been attached for fire insurance. However, in my investigation the fires which have occurred were due principally to carelessness of the drier operator. Management was satisfied that, with proper care, the chance of fire was not a serious disadvantage.

Recent introduction of a new concept of cloth filtration, known generally as the reverse jet principle, has accomplished an initial cost reduction of nearly two-thirds. Because of the flame-resistant properties of the filter, fire hazard has been materially reduced. One large insurer attaches no penalty to the insurance of this new filter. Moreover, the filter is continuously and automatically self-cleaning, a decided advantage over the intermittent cleaning of the former type of cleaner. Collection of the

fine particles is so efficient in the two plants using the method, complaints have ceased entirely.

Application of the filter requires capping the grinder and bagging cyclones and conduction of the effluent dust to the continuous filter. The dust then separated is conveyed to the blender and becomes part of the product. The cleaned air is released to the outside atmosphere.

Summary

There is presently available a satisfactory, economical method of dust control for the alfalfa dehydration industry. Its general acceptance will enhance the financial returns of the owner and release the processor from the onus of poor public relations by relieving plant neighbors of dust.

Assistance was given by Mr. Sam Seferian, Engineer, Industrial Hygiene Division of Ohio Department of Health.

306 Ohio Departments Building (15).

elimination in an alfalfa