

## 4. PRODUCTION, IMPORT/EXPORT, USE, AND DISPOSAL

### 4.1 PRODUCTION

DNOC is prepared by sulfonating *o*-cresol with excess sulfuric acid at 80-100 °C and subsequently nitrating 4,6-disulfonic-*o*-cresol (produced by the sulfuric acid) with nitric acid or nitrous fumes (Harvey 1953). 2,6-Dinitro-*p*-cresol is prepared by nitrating *p*-cresol with nitric acid in acetic acid or a nitric acid-sulfuric acid mixture (Harvey 1953). Neither 4,6-dinitro-*m*-cresol nor 3,5-dinitro-*o*-cresol can be produced on a commercial level by the simple nitration of *o*- or *m*-cresol (Harvey 1953). The Sea Lion Company of Texas City, Texas, is currently the only manufacturer of DNOC as an end product (SRI 1994; TR192 1994). The current production volume of this compound is not known, but the production volume was between 0.1 and 1.0 million pounds in 1977 (EPA 1988a). PMC Inc. of Chicago, Illinois, is a current manufacturer of 2,6-dinitro-*p*-cresol, and the Sandoz Chemicals Corporation of Charlotte, North Carolina, manufactures another form of dinitro-*p*-cresol (SRI 1994). The current production volume for 2,6-dinitro-*p*-cresol is not known, but 10,000-100,000 pounds were produced in the United States in 1977 (EPA 1988a). No information on the manufacturer or the production volume for 4,6-dinitro-*m*-cresol or 3,5-dinitro-*o*-cresol was located in the literature. There is no indication in the literature that these two compounds are manufactured in the United States since they are not in either *1992 Directory of Chemical Producers* (SRI 1992) or the *1992-1993 Aldrich Catalog Handbook of Fine Chemicals*, which lists over 31,000 chemicals. Table 4-1 reports the number of facilities in the United States that manufacture and process DNOC, the intended use of the products, and the range of maximum amounts that are stored on site. The data reported in Table 4-1 are derived from the Toxic Release Inventory (TRI) of EPA (TR192 1994). The TRI data should be used with caution since only certain types of facilities were required to report. Hence, Table 4-1 is not an exhaustive list.

### 4.2 IMPORT/EXPORT

Comprehensive current data on the import/export of the dinitrocresols were not located in the literature. However, three U.S. companies imported small amounts (<100,000 pounds or 45,300 kg.) of DNOC in 1977 (EPA 1988a). Two tariff categories are defined covering a variety of meta- and ortho- forms of dinitrocresols. During 1992, tariffs were collected from imports totaling 10,719 kg of dinitrocresols; during 1993, tariffs were collected from imports totaling 800 kg of dinitrocresols

Table 4-1. Facilities that Manufacture or Process 4,6-dinitro-*o*-cresol

Facility	Location <sup>a</sup>	Range of maximum amounts on site in pounds	Activities and uses
CHEVRON CHEMICAL CO.	SAINT JAMES, LA	100-999	As a formulation component
FIRST CHEMICAL CORP.	PASCAGOULA, MS	1,000-9,999	Produce; As a by-product
STERLING CHEMICALS INC.	TEXAS CITY, TX	10,000-99,999	As a chemical processing aid
SEA LION TECH. INC.	TEXAS CITY, TX	100,000-999,999	Produce
AIR PRODUCTS MFG. CORP.	PASADENA, TX	100-999	Produce; As a by-product
HUNTSMAN CHEMICAL CORP.	PASADENA, TX	10,000-99,999	As a chemical processing aid

Source: TR192 1994

<sup>a</sup> Post office state abbreviation used

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(NTDB 1994). The available information suggests a decrease in the import volumes since the late 1970s.

##### 4.3 USE

DNOC is a nonsystemic stomach poison and contact insecticide. In the United States, the EPA canceled its registration as a pesticide agent starting in 1991 (EPA 1993b; Farm Chemicals Handbook 1993; HSDB 1994). It is strongly phytotoxic for broad-leaved plants, and its use as an insecticide in the United States has been limited to dormant sprays, especially for such fruit trees as apples or peaches. As a contact herbicide, it was used to control broad-leaved weeds in cereals and to desiccate potato and leguminous seed crops before harvesting (Worthing 1987). 2,4-Dinitro-6-sec-butylphenol, which is less expensive and a more effective herbicide, had begun to replace DNOC by the late 1980s (EPA 1988a). 4,6-Dinitro-*o*-cresol has been used as a free radical polymerization inhibitor (EPA 1988a). 2,6-Dinitro-*p*-cresol is used as an intermediate for synthesis of fungicides and biologically active compounds, dyes and pharmaceuticals, and as a polymerization inhibitor for vinyl aromatic compounds (EPA 1988a; Hawley 1981).

##### 4.4 DISPOSAL

Rotary kiln incineration at a temperature range of 820-1,000 °C and residence times of seconds for liquid and gaseous wastes and hours for solids can totally destroy dinitrocresols. Fluidized bed incineration at a temperature range of 450-980 °C and residence times of seconds for liquid and gaseous wastes and longer for solid wastes can also destroy dinitrocresols. Mixing dinitrocresols with a more flammable solvent may facilitate incineration. Containers used for dinitrocresols that are not to be reused can be disposed by burial in a designated landfill (HSDB 1994).

