

Surface Water

The area of surface water resources potentially exposed should be estimated by applying the principles included in the examples provided below.

Example 1: A release occurs and most of the oil or hazardous substance enters a creek, stream, or river instantaneously or over a short time interval (pulse input is assumed). The maximum concentration at any downstream location, past the initial mixing distance, is estimated by:

$$C_p = 25(W_i)/(T^{0.7} Q)$$

where C_p is the peak concentration, in milligrams/liter (mg/L),

W_i is the total reported (or estimated) weight of the undiluted substance released, in pounds,

Q is the discharge of the creek, stream, or river, in cubic feet/second, and

T is the time, in hours, when the peak concentration is estimated to reach a downstream location L , in miles from the entry point.

The time T may be estimated from:

$$T = 1.5(L)/V_s$$

where T and L are defined as above and

V_s is the mean stream velocity, in feet per second.

The mean stream velocity may be estimated from available discharge measurements or from estimates of slope of the water surface S (foot drop per foot distance downstream) and estimates of discharge Q (defined above) using the following equations:

for pool and riffle reaches $V_s = 0.38(Q^{0.40})(S^{0.20})$,

or

for channel-controlled reaches

$$V_s = 2.69(Q^{0.26})(S^{0.28}).$$

Estimates of S may be made from the slope of the channel, if necessary.

As the peak concentrations become attenuated by downstream transport, the plume containing the released substance becomes elongated. The time the plume might take to pass a particular point downstream may be estimated using the following equation:

$$T_p = 9.25 \times 10^6 W_i / (Q C_p)$$

where

T_p is the time estimate, in hours, and W_i , C_p , and Q are defined above.

Example 2: A release occurs and most of the oil or hazardous substance enters a creek, stream, or river very slowly or over a long time period (sustained input assumed). The maximum concentration at any downstream location, past the initial mixing distance, is estimated by:

$$C_p = C(q)/(Q +$$

where C_p and Q are defined above,

C is the average concentration of the released substance during the period of release, in mg/L, and

q is the discharge rate of the release into the streamflow, in cubic feet/second.

For the above computations, the initial mixing distance may be estimated by:

$$L_m = (1.7 \times 10^{-5}) V_s B^2 / (D^{1.5} S^{0.5})$$

where

L_m is the initial mixing distance, in miles,

V_s is defined above,

B is the average stream surface width, in ft,

D is the mean depth of the stream, in ft, and

S is the estimated water-surface slope, in ft/ft.

Example 3: A release occurs and the oil or hazardous substance enters a pond, lake, reservoir, or coastal body of water. The concentration of soluble released substance in the surface water body may be estimated by:

$$C_p = CV_c / (V_w + V_c)$$

where

C_p and C are defined above,

V_c is the estimated total volume of substance released, in volumetric units, and

V_w is the estimated volume of the surface water body, in the same volumetric units used for V_c .

[51 FR 27725, Aug. 1, 1986, as amended at 52 FR 9100, Mar. 20, 1987]

APPENDIX II TO PART 11—FORMAT FOR DATA INPUTS AND MODIFICATIONS TO THE NRDAM/CME

This appendix specifies the format for data inputs and modifications to the NRDAM/CME under §11.41. Consult the back of this appendix for definitions.

Starting Point for the NRDAM/CME

The NRDAM/CME begins its calculations at the point that the released substance entered water in an area represented by its geographic database. Any water within the geographic boundaries of the NRDAM/CME is a "coastal or marine environment." The authorized official must determine all data inputs and modifications as of the time and location that the released substance entered a coastal or marine environment. In the case of a release that began in water in an area within the boundaries of the NRDAM/CME, this point will be the same as the point of the release. However, for releases that begin on land or that begin outside the boundaries of the NRDAM/CME, this point will not be the point of the release but rather the point at which the released substance migrates into a coastal or marine environment.

Required Data Inputs

Documentation of the source of the data inputs; and

Identity of Substance

For release of single substance:

Name of the substance that entered a coastal or marine environment as it appears in Table 7.1, Volume I of the NRDAM/CME technical document (incorporated by reference, see §11.18).

For releases of two or more substances or a release of a mixture of two or more substances:

Name of only one of the substances that entered a coastal or marine environment as it appears in Table 7.1, Volume I of the NRDAM/CME technical document.

Mass or Volume

For release of single substance:

Mass or volume of identified substance that entered a coastal or marine environment stated in tonnes, barrels, gallons, liters, pounds, or kilograms.

For releases of two or more substances or a release of a mixture of two or more substances:

Mass or volume of the one identified substance (rather than total mass) that entered a coastal or marine environment stated in tonnes, barrels, gallons, liters, pounds, or kilograms.

Duration

Length of time over which the identified substance entered a coastal or marine environment stated in hours.

Time

Year, month, day, and hour when the identified substance first entered a coastal or marine environment.

Location

Latitude and longitude, stated in degrees and decimal minutes, where the identified substance entered a coastal or marine environment.

Winds

At least one set of data on prevailing wind conditions for each day of the 30-day period beginning 24 hours before the identified substance entered a coastal or marine environment. Each set must include:

Wind velocity stated in knots or meters per second; and

Corresponding wind direction stated in the degree angle of the wind's origin.

[One possible source of information is the National Climatic Data Center, Asheville, NC (703) 271-4800.]

Response Actions

If removed from water surface:

A rectangular geographic area encompassing the surface water area over which the released substance was likely to have

spread, stated in terms of the northern- and southern-most latitude, and the eastern- and western-most longitude;

One or more time frames for removal stated in terms of the number of days and hours after the identified substance entered a coastal or marine environment that removal began and ended; and

For each time frame, volume of the identified substance removed from the water surface (not the total volume of contaminated water or sediments removed) stated in barrels, gallons, or cubic meters.

If removed from shoreline:

A rectangular geographic area encompassing the shoreline area over which the released substance was likely to have spread, stated in terms of the northern- and southern-most latitude, and the eastern- and western-most longitude;

One or more time frames for removal stated in terms of the number of days and hours after the identified substance entered a coastal or marine environment that removal began and ended; and

For each time frame, volume of the identified substance removed (not the total volume of contaminated water or sediments removed) stated in barrels, gallons, or cubic meters.

Closures

Documentation that the closure was ordered by an appropriate agency as a result of the release;

Province(s) in which closure occurred; and
For beaches:

Whether the beach was Federal or State (including municipal or county);

Number of days of closure stated by calendar month; and

Length of shoreline closed, stated in kilometers, for each month in which closure occurred.

For fisheries and shellfish harvest areas:

Whether area closed was seaward open water, landward open water, or structured;

Number of days of closure; and

Area closed stated in square kilometers.

For furbearer hunting or trapping areas and waterfowl hunting areas:

Number of days of closure; and

Area closed stated in square kilometers.

Implicit Price Deflator

Quarterly implicit price deflator for the Gross National Product (base year 1992) for the quarter in which the identified substance entered a coastal or marine environment. [See the Survey of Current Business, published by the U.S. Department of Commerce/Bureau of Economic Analysis, 1441 L Street, NW, Washington, D.C., 20230, (202) 606-9900.]

Currents

For a rectangular geographic area encompassing the area affected by the release stated in terms of the northern- and southern-most latitude, and the eastern- and western-most longitude:

At least one set of data concerning background (mean) current consisting of—

An east-west (U) velocity stated in centimeters per second or knots;

A north-south (V) velocity stated in centimeters per second or knots; and

Latitude and longitude of the origin of the U and V velocity components.

At least one set of data concerning tidal current at time of flood stage (i.e., rising tide) consisting of—

An east-west (U) velocity stated in centimeters per second or knots;

A north-south (V) velocity stated in centimeters per second or knots; and

Latitude and longitude of the origin of the U and V velocity components.

[Possible sources of information are: the National Ocean Service, U.S. Department of Commerce, Riverdale, MD (310) 436-6990; and the Eldridge Tide and Pilot Book, Robert Eldridge White Publisher, Boston, MA (617) 742-3045.]

Tides

Hour of high tide on the day that the identified substance entered a coastal or marine environment;

Tidal range at point that the identified substance entered a coastal or marine environment stated in meters; and

Whether the tide in the area affected by the release is diurnal (i.e., completes one full cycle every day) or semi-diurnal (i.e., completes two full cycles every day).

Modifications to the NRDAM/CME Databases (if Any)

Documentation of the source of the modification; and

For air temperature:

Air temperature, stated in degrees Celsius, assigned by the NRDAM/CME at the point that the identified substance entered a coastal or marine environment (see Table III.3.2, Volume III of the NRDAM/CME technical document); and

Substitute air temperature stated in degrees Celsius.

For water temperature at the surface:

Water temperature at the surface, stated in degrees Celsius, assigned by the NRDAM/CME at the point that the identified substance entered a coastal or marine environment (see Table III.3.3, Volume III of the NRDAM/CME technical document); and

Substitute water temperature stated in degrees Celsius.

For total suspended sediment concentration:

Total suspended sediment concentration, stated in milligrams per liter, assigned by the NRDAM/CME at the point that the identified substance entered a coastal or marine environment (see Section 3, Volume I of the NRDAM/CME technical document); and

Substitute suspended sediment concentration stated in milligrams per liter.

For mean settling velocity of suspended solids:

Mean settling velocity of suspended sediments, stated in meters per day, assigned by the NRDAM/CME at the point that the identified substance entered a coastal or marine environment (see Section 3, Volume I of the NRDAM/CME technical document); and

Substitute suspended sediment concentration stated in milligrams per liter.

For habitat type:

Latitude and longitude bounds of area for which the habitat type is being modified;

Habitat type assigned by the NRDAM/CME (see Section 3.4, Volume III of the NRDAM/CME technical document); and

Substitute habitat type.

For releases in Alaska, if the authorized official leaves the ice modeling function off, he or she must provide documentation that ice was absent at the site of the release.

Definitions

Background (mean) current—net long-term current flow (i.e., one direction only), attributable to forces such as winds, river flow, water density, and tides, that remains when all the oscillatory (tidal) components have been removed either mathematically or by measurement techniques.

Landward open water—a body of water that does not contain vegetation (e.g., wetland, seagrass, or kelp) or invertebrate reef (e.g., coral reef) and is classified as “landward” in Table 6.2, Volume I of the NRDAM/CME technical document.

Province—one of the geographic areas delineated in Table 6.1, Volume I of the NRDAM/CME technical document.

Seaward open water—a body of water that does not contain vegetation (e.g., wetlands, seagrass, or kelp) or invertebrate reef (e.g., coral reef) and is classified as “seaward” in Table 6.2, Volume I of the NRDAM/CME technical document.

Structured—in an area that contains vegetation (e.g., wetlands, seagrass, or kelp) or invertebrate reef (e.g., coral reef).

Tidal current—currents caused by alternating rise and fall of the sea level due to the gravitational forces between the earth, moon, and sun.

Tidal range—difference between the highest and lowest height of the tide.

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