National Corrective Action Prioritization System (NCAPS)

BACKGROUND: **The Environmental Protection Agency (EPA) created the National Corrective Action Prioritization System (NCAPS) as a tool to: (1) Evaluate the overall environmental significance of releases of hazardous wastes and hazardous constituents at treatment, storage, and disposal (TSD) facilities regulated under the Resource, Conservation, and Recovery Act (RCRA); and, (2) determine the relative priority for performing corrective action activities at TSD facilities. The NCAPS establishes national criteria for ranking facilities as high, medium, or low priority for corrective action in order to focus limited resources on those facilities, and/or areas within a facility, which pose the greatest hazard to human health and the environment. This Information Brief describes the NCAPS ranking system, which considers the environmental setting of the facility, potential receptors, actual and potential releases of hazardous wastes or constituents, and the toxicity of constituents of concern in ranking facilities. It also provides a summary of the results of NCAPS scores for DOE facilities. According to the Resource Conservation and Recovery Information System (RCRIS), 18 DOE facilities have received NCAPS rankings.**

STATUTES: **RCRA as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA).**

REFERENCES:

1. ***National Corrective Action Prioritization System Fact Sheet*, U.S. Environmental Protection Agency, EPA 530-F-92-027, January 1993.**
2. **Memorandum on Status of the Implementation of the National Corrective Action Prioritization System (NCAPS) from the Director, Permits and State Programs Division, EPA, and the Director, RCRA Enforcement Division, EPA, to Director, Air and Waste Management Division, EPA Region II, October 10, 1991.**
3. **G. H. Colven and T. B. Salamone, *The National Corrective Action Prioritization System: The Process, Implications, and Strategies*, *Environment Reporter*, Vol. 25, No. 1, May 6, 1994.**
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What are the major objectives of the NCAPS?

The NCAPS, a menu-driven, computer-based system designed to run on an IBM or IBM-compatible system, was developed as a tool to assist EPA in focusing corrective action resources on those facilities which present the greatest risk to human health and the environment. The system is intended to provide a nationally consistent approach to assessing site-specific factors that potentially affect or drive corrective action decisions.

How does the NCAPS scoring system function?

The NCAPS generates a "high," "medium," and "low" score for each facility based on an the individual evaluation of four migration pathways or exposure routes for potential or actual contamination (ground water, surface water, air, and "on-site"). The assessment of each route includes evaluations of observed and potential releases, characteristics of the route of migration, containment practices, waste characteristics, and target populations that may be affected. The information needed for operating the system is typically obtained from initial assessments [i.e., RCRA Facility Assessments (RFAs)] of facilities conducted by EPA or authorized states.

Site-specific circumstances, such as potential releases of hazardous wastes or hazardous constituents, the type of wastes present, and characteristics of nearby populations, are converted to numerical scores for each route of migration. These scores are then converted to a total migration score or total facility score. Each of the four routes is weighted equally. A higher total migration score indicates a worse (more contaminated) facility than a lower score. A total facility score, coupled with media-specific scores are used to rank facilities as "low," "medium," or "high."

What migration pathways are evaluated under NCAPS?

The NCAPS program evaluates the following four exposure pathways:

- ***Ground Water.*** The ground water migration pathway addresses the likelihood that hazardous waste or hazardous constituents at a facility will migrate through the ground and contaminate aquifers. The ground water pathway assesses the impact of an actual or potential release on ground water resources and on individuals who use, or may use, potentially contaminated wells as a drinking water source.
- ***Surface Water.*** The surface water route considers perennial and intermittent streams, rivers, and lakes. If contaminated runoff has reached surface water or, if site characteristics make a release to surface water likely, the NCAPS assesses the potential of the release to affect humans and the environment. The system includes factors for the evaluation of flood potential, recreational exposures, and permitted discharges.
- ***Air.*** Facility-specific characteristics are used to assess the potential for release of hazardous constituents into air. If no observed releases have occurred, the system assesses the potential for exposure of people and sensitive environments to hazardous air-borne substances and the risks associated with such exposures.
- ***On-site.*** The on-site exposure route addresses the possibility that people or sensitive environments will have direct physical contact with hazardous constituents or contaminated soil on-site. NCAPS considers nearby residents that may have access to the site as well as sensitive environments and animal populations.

What criteria does the NCAPS use to evaluate individual migration pathways?

Migration pathways assessments are designed to evaluate site-specific factors that influence the ability of contaminants to migrate through an environmental medium. Each migration pathway is individually assessed for potential or observed releases, hazardous waste and migration pathway characteristics, containment, and target populations. If no observed releases have been found to occur, additional factors such as migration route characteristics are also evaluated.

How does the NCAPS assess "potential releases" and "observed releases"?

Each of the four migration routes is assessed for observed releases. If no releases have been observed, then each route is assessed for potential releases.

Observed releases are defined as documented releases of contaminants to an environmental medium. Observed releases may be documented by the following:

- RCRA Facility Assessment (RFA),
- Preliminary Review/Visual Site Inspection (PR/VSI),
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Potential releases account for the fact that not all releases may have been observed. A potential release receives a lower score than an observed release. Evidence supporting the likelihood that a potential release has occurred includes site investigator observations such as stains on the ground around storage tanks, damaged diking around surface impoundments, the odor of solvents, and poor waste management practices at the site.

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Waste characteristics include toxicity, persistence, and hazardous waste quantity. Toxicity is a measure of the potential for waste to cause adverse health effects. The NCAPS uses the Sax toxicity rankings because they are simple to apply and tend to give conservative toxicity values (Sax, 1984). If there is a lack of specific information on chemicals present, the most toxic chemical within a group as identified in 40 CFR 261.3–261.33 should be used. The volume and concentration of the contaminants is not considered.

Persistence is a measure of the chemical's resistance to biodegradation. Chemicals that easily biodegrade receive lower scores than chemicals such as halogenated hydrocarbons that resist biodegradation.

Waste quantity, as defined by the NCAPS, refers to the amount of hazardous waste capable of migrating through a migration pathway. If an observed release is scored for a route, the value entered for waste quantity should be the amount of waste actually released. If waste quantity is not known, the scorer may assign a value of small, large, or very large using best judgment considering the size of the storage and disposal areas.

How are target populations evaluated?

Targets as defined by the NCAPS are the populations that can be affected by actual or potential releases from a site. NCAPS does not consider the size of the population. The fact that one or more persons is or may be affected by a release is sufficient to assign a value. Target scoring criteria for the ground and surface water routes consider the current and potential uses of the water as well as the distance from the target.

Target evaluations of the ground and surface water pathways consider the distance to intakes which is measured from the location of the hazardous wastes and constituents to the potential contact points (i.e., ground-water well, surface water intake, recreational area, or residence). The rating factor is inversely proportional to the distance to simulate dilution of contaminants passing through the medium.

Finally, some target evaluations consider sensitive environments such as national or state parks, critical habitats, fresh water wetlands greater than two acres in size, and wildlife preserves.

How are route characteristics evaluated?

Route characteristics are intended to measure site-specific factors that influence the ability of the contaminants to migrate through an environmental medium and reach a

receptor. Route characteristics, such as depth to ground water and distance to surface water, are only evaluated for a particular route if no observed release has been found to occur in the medium.

How is containment evaluated?

Containment is a measure of the physical barriers in place that inhibit a waste from entering the environment. Such barriers include dikes, liners, covers, and diversion systems. Containment systems are rated on a scale ranging from poor to very good. The scale is designed to allow the scorer to interpret descriptions contained in site reports. Containment is only evaluated for a particular route if no observed release has been found to occur in that medium.

How are the evaluation criteria applied to each individual migration pathway?

The criteria are applied differently to each route. The following describes which criteria are evaluated for each individual pathway.

- ***Ground Water Pathway.*** Observed releases, hazardous waste characteristics, and target populations are evaluated. Target evaluation includes an assessment of the water's current and potential uses and the distance to intakes. If no observed releases have been found, route characteristics and containment are evaluated. Route characteristics evaluated for the ground water pathway include depth to the aquifer, net precipitation, and physical state of the waste, including stable solid; unstable solid; powder or ash; and liquid, gas, or sludge.
- ***Surface Water Pathway.*** Observed releases, hazardous waste characteristics, and target populations are evaluated. Target evaluation assesses the current and potential uses of the water, the distance to intakes, and the distance to sensitive environments. If no observed releases are found, route characteristics and containment are evaluated. Route characteristics evaluated for the surface water pathway include facility location, one year maximum 24-hour rainfall, distance to surface water, and physical state.
- ***Air Pathway.*** Observed, unpermitted, and ongoing releases are evaluated. Hazardous waste characteristics and target populations are assessed. Target population evaluation assesses the area's uses by examining proximity to residents, industry, and agricultural. Target evaluation also assesses the distance to sensitive environments.
- ***On-site Contamination Pathway.*** Access to the site, observed surface soil contamination, hazardous waste characteristics, and targets are evaluated. Target evaluation includes the distance to residential areas and the existence of on-site sensitive environments. If the site is not inaccessible, containment is evaluated.

How is the total site score or total migration score calculated?

Migration pathway-specific factors are used to calculate a score between zero and 100 for each migration pathway. The four route scores are then used in the following formula to obtain a total site score or total migration score between zero and 100.

$$\text{Total migration score} = \frac{\sqrt{S_{gw}^2+S_{sw}^2+S_a^2+S_o^2}}{2}$$

where,

S_{gw} = Ground water route score

S_{sw} = Surface water route score

S_a = Air route score

S_o = On-site route score

EPA has established "high," "medium," and "low" scores for the NCAPS program. A score ≥ 52 for the overall migration score, or a pre-determined "high" score in any of the four migration pathways, is ranked as ***high*** in the NCAPS. The pre-determined "high" scores for the individual migration pathways are as follows:

Ground Water. . . . . ≥ 71

Surface Water. . . . . ≥ 63

Air . . . . . ≥ 53

On-site . . . . . ≥ 71

A ***medium*** rank is given to a facility when a "high" score has not been assigned for any of the individual migration pathways, and the overall migration score ≥ 25 and < 52.

A ***low*** rank means that the facility has a score < 25 and a "high" score has not been assigned to any of the migration pathways.

Can the NCAPS score for a facility be changed?

A facility's ranking can change, based on new or additional information or as a result of remedial action being undertaken at the facility (e.g., implementation of interim measures).

Are there factors other than the NCAPS score that affect a site's corrective action priority?

Generally, facilities with high NCAPS scores will be the focus of EPA's permitting and corrective action resources before those facilities with medium and low NCAPS scores. However, the NCAPS ranking is not the sole factor in determining when a facility will be subject to EPA focus. Factors other than the NCAPS score which may affect the priority for corrective action may include:

- enforcement history of a facility,
- need to address a facility in the context of a regional environmental initiative (e.g., EPA's Great Lakes Initiative), and
- opportunities to minimize significant future impacts by taking interim measures.

Is the NCAPS similar to the HRS?

The Hazard Ranking System (HRS) scoring algorithm, used by CERCLA's Superfund program, is the foundation of the NCAPS. The NCAPS is designed to operate in a manner similar to the HRS Score Verification and Retrieval System. The HRS and the NCAPS consider many of the same factors.

While the two ranking systems are similar, the NCAPS is different from the HRS in several respects. Specifically, the NCAPS has never been subject to formal public notice and comment, and NCAPS has never been formally promulgated. Furthermore, the NCAPS is designed to be a less resource intensive system and requires less data than the HRS scoring system. In the HRS, the air migration pathway

is evaluated only if hazardous substances at a site have escaped into the air either as gases or particulate matter. In the NCAPS, site characteristics are used to assess the potential for release of hazardous wastes and constituents to the air even if no release has been documented.

Questions of policy or questions requiring policy decisions will not be dealt with in EH-231 Information Briefs unless that policy has already been established through appropriate documentation. Please refer any questions concerning material covered in this Information Brief to Jerry Coalgate, RCRA/CERCLA Division, EH-413, 202-586-6075.

Summary of NCAPS Rankings for DOE Facilities

EPA Identification Number	DOE Facility/Addresses	NCAPS Score	RFA Completed	RFI Completed	Interim Measures
CA2890012584	Lawrence Livermore National Laboratory 7000 East Avenue Livermore, CA 94551	High	Yes	Yes	No
CA2890012923	Sandia National Laboratory 7011 East Avenue Livermore, CA 94550	Low	Yes	No	No
CA2890090002	Lawrence Livermore Laboratory Site 300 Corral Hollow Road Tracy, CA 95376	High	Yes	Yes	No
CO7890010526	Rocky Flats Plant 16 mi. NW of Denver Golden, CO 80402	High	Yes	Yes	Yes
CT6890113792	Knolls Atomic Power Laboratory 1900 Day Hill Road Windsor, CT 06095	High	Yes	No	No
ID4890008952	Idaho National Engineering Laboratory INEL Reservation Scovill, ID 83415	High	Yes	Yes	No
IL3890008946	Argonne National Laboratory 9700 S. Cass Avenue Argonne, Illinois 60439	High	Yes	No	No
KY8890008982	Paducah Gas Diffusion Plant 5600 Hobbs Road Paducah, Kentucky 42001	High	Yes	Yes	Yes
NM0890010515	Los Alamos Scientific Laboratory 528 35th Street Los Alamos, NM 87544	High	Yes	Yes	Yes
NM5890110518	Sandia National Laboratory 1515 Eubank Street Albuquerque, NM 87123	High	Yes	Yes	Yes
NV3890090001	Nevada Test Site Nevada Test Site U.S. Hwy. 95 Mercury, Nevada 89023	Low	No	No	No
NYD980779540	West Valley Demonstration Project 10282 Rock Spring Road West Valley, NY 14171	High	Yes	Yes	Yes
NY7890008975	Brookhaven National Laboratory 53 Bell Avenue, Building 464 Upton, NY 11973	High	Yes	No	Yes
OH6890008976	Fernald Environmental Management 7400 Willey Road Fernald, Ohio 45030	High	Yes	Yes	Yes
OH7890008983	Portsmouth Gaseous Diffusion Plant U.S. Route 23 S Piketon, Ohio 45661	High	Yes	Yes	Yes
SC1890008989	Savannah River Site Between S.C. 125 & U.S. 278 Aiken, SC 29801	High	Yes	Yes	No
TN1890090003	Oak Ridge National Laboratory Bethel Valley Road Oak Ridge, TN 37830	High	Yes	Yes	No
TN0890090004	K-25 Site Tenn. St. Rt. 58 at Blair Road Oak Ridge, TN 37830	High	Yes	Yes	No
TX4890110527	Pantex Plant From 2373 23 mi. NE of Amarillo Amarillo, Texas 79120	High	Yes	Yes	Yes
WA1891406349	BPA Ross Complex 5411 NE Hwy. 99 Vancouver, WA 98663	Low	Yes	No	No
WA6891406344	BPA Midway Substation Priest Rapids Road, off Sate Hwy. 24 Sunnyside, WA 98944	Medium	Yes	No	No
WA7890008967	Hanford Site Richland, WA 99352	High	Yes	No	No

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What migration pathways are evaluated under NCAPS?

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NM5890110518	Sandia National Laboratory 1515 Eubank Street Albuquerque, NM 87123	High	Yes	Yes	Yes
NV3890090001	Nevada Test Site Nevada Test Site U.S. Hwy. 95 Mercury, Nevada 89023	Low	No	No	No
NYD980779540	West Valley Demonstration Project 10282 Rock Spring Road West Valley, NY 14171	High	Yes	Yes	Yes
NY7890008975	Brookhaven National Laboratory 53 Bell Avenue, Building 464 Upton, NY 11973	High	Yes	No	Yes
OH6890008976	Fernald Environmental Management 7400 Willey Road Fernald, Ohio 45030	High	Yes	Yes	Yes
OH7890008983	Portsmouth Gaseous Diffusion Plant U.S. Route 23 S Piketon, Ohio 45661	High	Yes	Yes	Yes
SC1890008989	Savannah River Site Between S.C. 125 & U.S. 278 Aiken, SC 29801	High	Yes	Yes	No
TN1890090003	Oak Ridge National Laboratory Bethel Valley Road Oak Ridge, TN 37830	High	Yes	Yes	No
TN0890090004	K-25 Site Tenn. St. Rt. 58 at Blair Road Oak Ridge, TN 37830	High	Yes	Yes	No
TX4890110527	Pantex Plant From 2373 23 mi. NE of Amarillo Amarillo, Texas 79120	High	Yes	Yes	Yes
WA1891406349	BPA Ross Complex 5411 NE Hwy. 99 Vancouver, WA 98663	Low	Yes	No	No
WA6891406344	BPA Midway Substation Priest Rapids Road, off Sate Hwy. 24 Sunnyside, WA 98944	Medium	Yes	No	No
WA7890008967	Hanford Site Richland, WA 99352	High	Yes	No	No