

# **RCRA**

## **Integrated Corrective Action Plan Application Guidance Document and Checklist**



---

**Colorado Department  
of Public Health  
and Environment**

**HAZARDOUS MATERIALS AND WASTE MANAGEMENT DIVISION**  
Colorado Department of Public Health and Environment  
**(303) 692-3300**

First Edition  
January 2000

## ***Purpose of this Guidance***

*This is intended as general guidance for generators of hazardous waste and is meant to assist in compliance with the hazardous waste regulations. The guidance is not meant to modify or replace the adopted regulations which undergo periodic revisions. In the event of a conflict between this guidance and adopted regulations, the regulations prevail. Some portions of the hazardous waste regulations are complex and this guidance does not go into details of these complex situations. If a regulatory situation is not described in the guidance or clarification is desired, an official interpretation of a specific hazardous waste regulation can be requested by writing to the Hazardous Materials and Waste Management Division at the address on page 16.*

*We would appreciate any comments or suggestions for making improvements in future editions. Suggestions or comments can be sent to the address on page 16.*

**Note: This document has been reformatted to improve accessibility in Portable Document Format (PDF). This opportunity was also used to update the contact information. Sections were re-numbered to provide style consistency with other Division guidance documents. No other substantive changes were made unless specifically noted.**

# TABLE OF CONTENTS

1.0 INTRODUCTION.....	1
2.0 COMPONENTS OF AN INTEGRATED CORRECTIVE ACTION PLAN APPLICATION .....	2
2.1. General Site Information.....	2
2.2. Site History .....	2
2.3. Site Characterization.....	3
2.3.1. General Sampling & Analytical Methods.....	3
2.3.2. Support Information and Data to be Included .....	4
2.4. Evaluating Applicable Standards And Determination Of Risk.....	5
2.4.1. Standards and Cleanup Levels.....	5
2.4.2 Risk-Based Assessment.....	6
2.5 Preparation Of The Integrated Corrective Action Plan.....	8
2.6 Preparation Of Completion Reports.....	8
2.6.1 Soil Remediation by Excavation .....	9
2.6.2 In-Situ Soil Remediation .....	9
2.6.3 Groundwater Remediation.....	9
3.0 INTEGRATED CORRECTIVE ACTION PLAN CHECKLIST .....	10
4.0 CONTACT INFORMATION .....	16
5.0 GLOSSARY.....	17
6.0 RELATED CDPHE REFERENCES.....	18

## 1.0 INTRODUCTION

There has been a significant increase in the number of facilities that have neither a Resource Conservation and Recovery Act (RCRA) permit nor interim status under the Colorado Hazardous Waste Regulations [6 CCR 1007-3] Part 100, but that require corrective action or closure due to releases of hazardous waste into the environment. Technically, these facilities have illegally disposed of hazardous waste without a permit. The Colorado Department of Public Health and Environment (CDPHE or the Department) has historically been required to either issue a unilateral enforcement order or negotiate a consent order to provide an enforceable mechanism for oversight of corrective action or closure at these unpermitted facilities.

Recent amendments to the Colorado Hazardous Waste Regulations provide the opportunity for a facility to conduct corrective action or closure without being issued a unilateral enforcement order or negotiate a consent order under certain circumstances. Section 100.26 was added to regulations to allow a facility to submit either an integrated corrective action plan or a phased corrective action plan. An Integrated Corrective Action Plan (ICAP) would be similar to plans currently covered by the Voluntary Cleanup and Redevelopment Act when the nature and extent of contamination are already known. An ICAP must include site characterization data that fully describes the vertical and horizontal extent of contamination and either a remediation plan or a request for no further action based on meeting state standards or site-specific risk-based cleanup goals. A Phased Corrective Action Plan (PCAP) would provide a phased approach to investigation of the full vertical and horizontal extent of contamination and cleanup activities, as necessary, based on state standards or site-specific risk-based cleanup goals. The application process allows a facility to conduct corrective action or closure under this mechanism for an entire facility or for just a portion of the facility.

These new rules avoid the stigma of an enforcement order and provide an enforceable oversight mechanism for RCRA cleanup actions that may be more time-efficient and less costly. In the event that a facility disputes elements of the Department's decision on the corrective action plan, the rule expressly states that the decision may be appealed under section 25-15-305, C.R.S. The new regulations also allow the Department to assess document review and activity fees under Section 100.32. This enables the Department to recover its costs associated with corrective action plan oversight without the added time and costs associated with enforcement or consent orders.

The purpose of this guidance document is to assist owners of eligible RCRA sites in preparing the necessary information for an Integrated Corrective Action Plan application. Separate guidance will be developed for a Phased Corrective Action Plan application. A well-prepared application will facilitate Department review of the technical information provided and expedite a decision on the submitted ICAP. This document contains a narrative description of the information required for a complete ICAP application followed by an application checklist. Although not required, it is recommended that the completed checklist be submitted with the application. This ensures that the applicant is submitting an application containing all necessary information and assists the Department reviewer in quickly locating the information within the application.

## **2.0 COMPONENTS OF AN INTEGRATED CORRECTIVE ACTION PLAN APPLICATION**

An Integrated Corrective Action Plan (ICAP) application should contain most of the elements discussed below. Although not all information requirements apply to all sites, the applicant should review this narrative carefully, and include in their application any information which is relevant to the property in question. While it may at first appear that some information is not relevant to a particular property, closer examination often shows that the information is important to the Department reviewer in determining if the proposed corrective action plan is feasible for the site or if the site has been adequately evaluated before a remediation plan was developed. This will help minimize wasted time and efforts directed toward site cleanup and help keep costs down for the applicant.

### **2.1. General Site Information**

The first major component of the ICAP application is general information regarding site ownership, contact information, location of the property, EPA identification number for the property, current site uses of the property, and a summary of the type(s) and source(s) of contamination at the site.

### **2.2. Site History**

The second major component of the application is a thorough investigation of the site history including current and previous uses of the site. The Department strongly believes that historical knowledge is needed in order to identify all potential contaminant sources and direct appropriate characterization efforts of the site. An evaluation of past site uses and waste-handling practices should be conducted for at least 20 years into the historical record. It may be appropriate to review facility records going further back in cases where wastes of a more persistent nature were handled on-site. If records do not go back that far, it should be stated as such with the reference noted.

The Department strongly supports a pro-active approach to informing neighboring communities of corrective action activities at a facility. Because many of the important decisions in a corrective action are made during the site investigation and characterization, describing the surrounding community by identifying local officials, citizen concerns, potential for environmental impacts of facilities activities on the adjacent community, and historic interaction between the facility and the community should be done as part of the Site History component of the application. The level of the interaction between the community, the facility and the Department depends largely on the visibility of the site and the environmental issue.

Historical information should include the following: operational history of the property, a description of all businesses or activities on the property, history of releases of hazardous substances on the property, history of management activities of hazardous wastes at the property, notifications to county emergency response personnel as required under the Emergency Planning and Community Right-to-know statutes (EPCRA/CERCLA), notifications made to state and/or federal agencies reporting spills or accidental releases, a list of all hazardous substances used at the facility, a list of all wastes generated by activities conducted at the site, a list of all permits obtained from state and federal agencies related to activities at the property, and a brief description of current site uses and zoning restrictions for the subject facility and areas

contiguous to the property. Submission of any prior environmental assessments conducted by qualified environmental professionals performed on the site is encouraged.

### **2.3. Site Characterization**

The third major component of the application is a narrative description of site characterization efforts and a discussion of the data collected. It is important for the applicant to tie site characterization into the historical information gathered on the site to ensure that assessment efforts were looking for the right contaminants in the right places. In cases where soil contamination has the potential to contaminate ground or surface water, these media should be assessed. The intent of a site assessment is to define the nature and full areal extent of contamination in all environmental media. An effective remediation plan can't be developed without this information. Occasionally in the process of investigating the extent of contamination at a facility, contamination from an upgradient offsite source is found. Impact from an upgradient source does not negate the need for investigating potential sources and extent of contamination on the applicant's site. The applicant remains responsible for any and all contamination resulting from activities at their facility.

Site assessments should be prepared by a qualified environmental professional. A qualified environmental professional is a person possessing a formal education in a suitable technical field and a minimum of five years of experience in the preparation of environmental studies and assessments.

#### **2.3.1. General Sampling & Analytical Methods**

All sources of hazardous wastes which have the potential to impact human health or the environment must be evaluated. The sampling plan should utilize the knowledge gained from the site historical search in order to identify potential sources. A narrative should explain the reasoning behind each sample location as well as any justification for eliminating assessment of any source areas. If adequate historical documentation is lacking, then a random selection of sampling locations may be appropriate, in addition to an evaluation of conditions at the upgradient and downgradient property boundaries. The application should include as attachments data summary tables, raw field data, borehole logs, laboratory analytical results, and any other relevant information that is not otherwise included in the narrative portion of the report.

The Colorado Hazardous Waste Regulations generally do not require particular analytical methods except in a few specific cases. In cases where the Department has preferred or required analytical methods as provided in regulation or Department policy, it is recommended that these methods be used in order to avoid disagreements during the review of the ICAP application.

Since approval of the ICAP application applies only to conditions on the property at the time of submission of the application, recent data is required. Groundwater data which is older than one year at the time of receipt of the application normally will not be considered as indicative of current conditions. This does not prevent the applicant from making a case as to why this data should be considered. Although current data is preferred, exceptions may be made for soil data that is over a year old. Additionally, all historical soil or groundwater data should be submitted if it is coupled with more recent data in order to indicate conditions with the passage of time.

### **2.3.1.1. Soil Sampling Locations**

When it is appropriate to demonstrate background levels in soil, the Department recommends a minimum of three samples be collected to account for natural constituent occurrences and inherent variability. Sample locations for background levels should be in areas which have not been impacted by the release of concern or any on-site activities. In all cases, an explanation of the sampling method employed and locations selected is necessary for those reviewing the application.

Some contaminants tend to group heterogeneously in the subsurface. In such cases, the following sampling protocol is suggested: 1) sample the interface between fines/silts and larger grains and 2) in clays, sample the sand lenses. Lithologies containing precipitates or excess organic carbon should be sampled. To characterize a site where contaminants have been deposited in a homogeneous manner, such as air deposition, a simple random sampling method to collect a suitable number of samples may be appropriate.

### **2.3.1.2. Water Sampling**

Monitoring wells should be installed that are capable of defining the groundwater gradient to verify that water quality downgradient of any sources is being monitored. The wells should be installed following acceptable monitoring well installation procedures and have a screened interval appropriate for the contaminant and aquifer characteristics. Use of pre-existing wells and/or existing data may be appropriate if it adds to the overall understanding of the site. In addition to monitoring well data, if groundwater is present in an excavation, or is anticipated to be in close vertical proximity to the bottom of an excavation, it should be sampled and analyzed.

### **2.3.2. Support Information and Data to be Included**

Multiple maps, drawn to scale, are necessary for the reviewer to adequately place the site within its surroundings and also detail site-specific conditions and environmental concerns. One map should show the site's location within the city or county. A second map should detail natural and manmade structures (e.g. drainage ditches, schools, surface waters) as well as suspected or known contaminated sites in close proximity to the subject property. A third map should indicate site specific conditions (e.g. groundwater flow direction, sampling locations, utilities, structures, etc). Other maps may be provided as needed to illustrate other relevant information.

Environmental data should be summarized in the narrative section of the application and plotted on a site map as appropriate. Raw data such as boring logs and well construction diagrams should be provided as appendices to the report. Boring logs and well construction diagrams should include: blow counts, weather conditions at the time of drilling, field screening readings, lithology, screened interval, drilling date and driller's name, sampling intervals, groundwater level (initially and after stabilization) and all other pertinent information. A potentiometric map should be prepared which details the direction of groundwater flow. Pre-existing offsite wells may be used to help determine groundwater flow direction, but the Department will likely require the use of onsite wells too. The assessment report should document the common reference elevation used for all monitoring wells. Material Safety Data Sheets (MSDS) for the contaminant(s) of concern may also be included as an appendix.

For complex sites and those sites where timing is critical, the Department recommends using the checklist to ensure that the application is complete. Submission of all the information contained on the checklist is not always necessary; the applicant should determine which parts apply to the site in question. Submission of the checklist is not a requirement of the application, but does provide a useful tool for the Department reviewer and can decrease document review time.

## **2.4. Evaluating Applicable Standards And Determination Of Risk**

The fourth major component of the application is an evaluation of established State cleanup standards and remediation objectives.

### **2.4.1. Standards and Cleanup Levels**

Regulatory standards exist for many constituents in groundwater, surface water, and drinking water, but there are few published standards for soil contamination. In the event that there are no established soil cleanup standards, remediation must occur to levels that are protective of human health (under the appropriate residential, commercial or industrial scenario) and the environment (groundwater, surface water, and soils). The Department has proposed soil remediation objectives for certain frequently encountered contaminants and is in the process of finalizing a soils remediation guidance document. In addition, soil remediation objectives generated by other states or EPA may be applicable if the applicant demonstrates the relevance of the proposed remediation objective with respect to conditions at their site (i.e. similar geology, the standard is health-based and applicable to a similar site use). The application must include a discussion which identifies any Colorado standard or remediation objective which exists for the contaminants of concern. This discussion should include whether the proposed plan will meet these standards or objectives. If it will not, or if no applicable standard or remediation objective exists, the application should then go on to use a risk based approach to cleanup and show that the risk posed by an alternative cleanup level is acceptable.

If the site has groundwater contamination and the proposal is to demonstrate that the current contamination does not pose a risk or that contaminant source removal is an adequate option, then a monitoring plan which demonstrates one or both of the following should be included:

- 1) Exceedence of a given level, (likely the Colorado Basic Ground Water Standards) at a Point of Compliance (POC) will not occur and/or
- 2) The plume is contained within certain bounds and demonstrates in-situ degradation processes will result in a decrease to an established standard within the time frame of the monitoring program.

A Point of Compliance well (as defined in the Basic Standards for Ground Water Regulation 41) is a monitoring well or system of wells beyond the downgradient extent of the contamination or at the property boundary (whichever is closest to the source of the contamination) which is capable of monitoring the migration or potential migration of contaminants from the site. A POC should be selected with care as any exceedence of State groundwater standards at the POC may negate the applicant's assessment of risk as presented in the application and potentially result in a negation of the Department's ICAP approval. A suitable groundwater monitoring program would include a description of the upgradient sampling point, the downgradient POC,

the frequency and duration of the monitoring plan, the proposed laboratory analyses, as well as conditions under which the program might be terminated. The applicant may want to include a contingency plan that would be implemented in the event that a POC became impacted by groundwater contamination.

### **2.4.2 Risk-Based Assessment**

A site-specific risk assessment prepared using standard EPA policy or a calculation of appropriate cleanup levels using the CDPHE Hazardous Materials and Waste Management Division's *"Interim Final Policy and Guidance On Risk Assessment For Corrective Action At RCRA Facilities"* (November 16, 1993) or equivalent guidance is an option for any applicant. Site-specific risk assessments often entail substantial resources on the part of the applicant and the Department. This approach may be necessary if the applicant's proposed cleanup levels deviate from the established standards and remediation objectives, if the site is complex, if there are receptors (completed pathways) and/or if the applicant is proposing less than complete removal of the contamination.

However, in many cases where the site is not complex or there is a single contaminant of concern, a less rigorous approach to risk assessment may be adequate. Such an approach would include: 1) a narrative description presenting a summary of all the site-specific information and contaminant levels; 2) a determination regarding the likelihood of impacting targets or completing exposure pathways; and 3) justification for use of an alternative cleanup standard and how the items noted above will ensure that it is equally protective of human health and the environment. Factors to consider are detailed below.

#### **2.4.2.1 Groundwater & Surface Water Usage**

A water well search listing the locations of any wells located on the site or on areas within a one-half mile radius of the site and a description of the use of those wells should always be provided. An explanation is needed for the current and proposed use of on-site groundwater. In many cases, a listing of wells from the State Engineer's Records may not fully document groundwater usage locally. If the contamination exists in an older section of an urban area, there may be existing unregistered wells warranting a door-to-door survey to assess exposure.

#### **2.4.2.2 Vapor Migration**

If the contaminant is of a volatile and/or flammable nature, the application should indicate how the proposed future site use will not present a hazardous situation or promote the migration of already existing contamination. Examples of exposure might be construction of a building basement where a volatile contaminant exists in close proximity and may infiltrate through the foundation.

#### **2.4.2.3 Geology & Hydrogeology**

The site's geology and hydrogeology affect the extent of contaminant migration. Factors to consider include grain size, fractures, carbon content, depth to groundwater, transmissivity, and areal extent of the aquifer. The ability of the site's geology and hydrogeology to minimize contaminant migration and impact of natural degradation may be factored into the selection of an appropriate remedy.

#### **2.4.2.4 Groundwater Monitoring**

Groundwater monitoring may be used as a means to ensure that the proposed remedial actions do not present an unacceptable risk to nearby properties and groundwater quality. The intent of any groundwater monitoring program should be to evaluate the present state of the contaminant plume (is it decreasing in size, stable or increasing?) and to verify that the current and potential future state does not pose a risk to human health and the environment.

#### **2.4.2.5 Other Exposure Pathways**

Assessment of other exposure pathways may be appropriate on a site-specific basis. Examples include potential impacts to surface water and threats posed to wildlife. Evaluation of the pathway should take into account the proposed site use, potential future site uses, and the ability for the contaminant to impact targets in excess of levels considered protective of human health and the environment.

#### **2.4.2.6 Site Use**

Site use information is required for all applications as the applicant's evaluation of the risk is based on current and proposed future site use and potential for exposure. Current and potential future site uses directly affect remedy selection, any conditions placed on the remedy selected, and the enforceability of these conditions. If the applicant's proposed cleanup levels deviate from the established standards or remediation objectives or if the applicant is proposing less than complete removal of the contamination, the Department will need additional assurances that future owners of the site will be protected from any contamination remaining on the property, especially if there is a potential that future owners may disturb this contamination. If the property is under a closure/post-closure permit or enforcement order, the owner/operator must adhere to the conditions of the permit or order. If the property changes ownership, the permit or order stays with the property and is enforceable on the new owner/operator. If the property is not covered by a permit or enforcement order, however, long-term enforceability of property restrictions and/or institutional controls may be in question. One approach to this issue may be enforceable restrictions and/or notification to the Department if site use or conditions change significantly from those used in the risk evaluation.

The Department may be more open to less conservative, more realistic projections on future site usage if the agency is assured that the limitations placed on the site will, in fact, be kept in place. A site owner that is willing to accept more state oversight (e.g. long term restrictions) may have more remedy selection options than one that wants to clean up the site and have state oversight be over as quickly as possible (e.g. No Further Action letter).

#### **2.4.2.7 Ecological Risk**

In addition to human health risk, ecological risk must also be evaluated, with facilities on or near surface water bodies requiring particular attention. Threatened and endangered species have special status in environmental law. All species of concern which may be impacted by the release must be identified and included in the evaluation of potential corrective actions and cleanup levels.

## **2.5 Preparation Of The Integrated Corrective Action Plan**

The fifth major component of the application is a plan for addressing any contamination found. During the course of implementing corrective action plans, be aware that ICAP approval does not absolve the applicant of their obligations for meeting all other applicable regulations (for example, proper handling and disposal of wastes generated or requirements for a permit to treat or store hazardous waste).

A plan should be developed describing how corrective action information will be conveyed to concerned members of the surrounding community. The plan should be responsive to the level of concern expressed by community members and flexible enough to respond to changes in the level of concern.

The ICAP assessment report should demonstrate how state standards and remediation objectives or appropriate risk reduction will be achieved. It should include cleanup techniques, cleanup levels, verification sampling, material handling plans, and any other information which would lead the Department to accept that the remedy is protective of human health and the environment. The corrective action plan should be described in sufficient detail to evaluate whether or not the applicant will be capable of remediating all contamination identified at the property within an agreed upon reasonable amount of time. If site conditions and risk assessment warrant it, a request for no further action may be a viable remediation option.

A map indicating areas to be remediated, the location of confirmatory samples, locations of monitoring wells, and areas where contamination may not be remediated is necessary. At sites where capping is the remediation choice, the map should show areas of capped and exposed soil. A contingency plan for dealing with unexpected types of contamination should be provided when intrusive activities are planned. If in the course of remediation, the applicant encounters conditions different from those presented in the remediation plan (e.g. additional sources or substantially greater quantities of contamination, substantial impact to the groundwater where previously it was not suspected) the applicant should contact the Department and all efforts will be made to address any needed modifications in a timely manner. If conditions are found to be substantially different than as presented in the ICAP, approval of the ICAP may become void and a new corrective action plan would need to be developed.

If a remedy is selected that requires long term operation and maintenance of treatment systems, a plan should be included which describes how the system will be operated to ensure that it functions as designed without interruptions. The plan should also include all sampling and analytical methods to be utilized, as well as a description of the monitoring plan implemented to verify the gradual and eventual attainment of appropriate standards or remediation objectives. It may be necessary to implement enforceable restrictions for sites that rely on long term monitoring and engineering or institutional controls for waste that has been left in-place.

## **2.6 Preparation Of Completion Reports**

The sixth major element of the ICAP is the completion report submitted after all remedial actions have been completed. The emphasis in preparing completion reports is highly dependent on the type of contamination present at the site and the various media which have been remediated. The guidance provided below is grouped according to the type of remediation which has occurred at the site. In all cases, the framework of the completion report (e.g. location and

number of confirmatory samples, proposed monitoring program, etc.) should be presented in the application and submitted for approval by the Department. The final completion report should discuss any deviations from the original plan as well as any conditions encountered which were different from the original understanding of the site.

### **2.6.1 Soil Remediation by Excavation**

If the remedial actions included soil excavation, confirmatory samples must be obtained from the floor and walls of the excavation. It is up to the site owner/operator to determine how many samples are needed to be representative of the conditions in the excavation. If contamination is to be left in place, additional samples should be collected from the areas of highest contamination, as verified visually or with a field screening instrument.

Compositing of samples is not recommended for volatile compounds. Discrete samples should be collected instead. An explanation of the sampling method should be provided in the narrative as well as any modifications to the above recommendations used to better characterize the remedial efforts. Depth of samples collected should always be provided. Waste disposal manifests need not be included with the completion report, but must be made available if requested.

### **2.6.2 In-Situ Soil Remediation**

In order to determine if the soil remediation has met the proposed remediation goals, the Department recommends that the applicant install a minimum of two completion borings. For sites with larger source areas, additional sampling would be needed to determine the effectiveness of the remediation efforts. In all cases, at least one of the borings must be drilled in the area previously identified as possessing the highest levels of contamination. Completion of the borings should employ an appropriate field screening device and the borings should be logged. At least one soil sample from each boring must be submitted for laboratory analysis. This sample should be the sample closest to or in the contaminated source area.

### **2.6.3 Groundwater Remediation**

Monitoring should continue after active remediation has ceased until the following two questions can be answered: 1. Has the groundwater which was most severely impacted by the source had a chance to flow past the POC during the monitoring period? 2. If there is contamination remaining on-site or off-site, is it mobile at levels that may present a risk in the future?

In order to determine the length of the monitoring period, the velocity of the groundwater must be calculated. For example, if the POC is located 100 feet from the source area and groundwater flows at 50 feet/year, then monitoring should continue for a minimum of two years (50 feet/year X 2 years = 100 feet). Other factors to take into consideration when deciding on a frequency and length of monitoring are as follows: aquifer and contaminant characteristics such as gradient, partition coefficients, original contaminant levels, residual contaminant levels, and all other pertinent information. At each regular monitoring event, a map showing groundwater flow direction, depth to groundwater, and sampling locations should be prepared. Tabular presentation of data, grouped by individual monitoring wells, is encouraged. The completion report should verify that the specific goals proposed in the ICAP have been met.

**3.0 INTEGRATED CORRECTIVE ACTION PLAN CHECKLIST**

I. GENERAL SITE INFORMATION	Page
Name(s) and address(es) of the owner and operator of the facility	
Contact person and phone number for the facility	
Location of the facility including the address and legal description of the site	
EPA Identification Number for the facility	
Brief description of the type and source of contamination	
Current site use	

II. SITE HISTORY	Page
A. The applicant should describe the operational history of the property in detail, including the most current use of the property.	
B. A description of all business/activities that occupy or occupied the site as far back as record/knowledge allows; description of surrounding community.	
C. A brief description of all operations which may have resulted in the release of hazardous substances or petroleum products at the site, both past and present, including the dates activities occurred at the property, and dates during which the contaminants were released into the environment. This information is important in evaluating program applicability.	
D. A list of all site specific notifications made as a result of any management activities of hazardous substances conducted at the site, including any and all EPA identification numbers obtained for management of hazardous substances at the site from either the State or EPA.	
E. A list of all notifications to county emergency response personnel for the storage of reportable quantities of hazardous substances required under Emergency Planning and Community Right-to-know statutes.	
F. A list of all notifications made to State and/or federal agencies such as reporting of spills and/or accidental releases.	
G. A list of all known hazardous substances used at the site, with volume estimates and discussion of relative toxicities. The hazardous substances used, volumes and toxicities are important in the overall evaluation of risk and sampling efforts.	
H. A list of all wastes generated by current activities conducted at the site. Although not required to be submitted with the application, manifests for shipments of hazardous wastes off-site should be available for review if requested.	
I. A list of all permits obtained from state or federal agencies required as result of the activities conducted at the site so the Department can evaluate what potential sources may be at the site.	
J. A brief description of the current and proposed future site uses and zoning restrictions of the subject property and areas contiguous to the site.	
K. A list of any enforcement orders or orders on consent issued in the past regarding the operations at the facility or other releases.	

III. SITE CHARACTERIZATION	Page
A. The applicant should describe the <u>physical characteristics</u> of the site, including a map to scale, and an accompanying narrative showing and describing the following:	
- topography	
- all surface water bodies and wastewater discharge points	
- groundwater monitoring and supply wells	
- facility process units and loading docks	
- chemical and/or fuel transfer and pumping stations	
- railroad tracks and rail car loading areas	
- spill collection sumps and/or drainage collection areas	
- wastewater treatment units	
- surface and stormwater runoff retention ponds and discharge points	
- building drainage or wastewater discharge points	
- all above or below ground storage tanks	
- underground or above ground piping	
- air emission control scrubber units	
- water cooling systems or refrigeration units	
- sewer lines	
- french drain system	
- water recovery sumps and building foundations	
- surface impoundments	
- waste storage and/or disposal areas/pits, landfills	
- chemical or product storage areas	
- leach fields	
- dry wells or waste disposal sumps	
B. If <u>groundwater contamination</u> exists or the release has the potential to impact groundwater, the applicant should provide the following information for areas within a one-half mile radius of the site:	
- The state engineers office listing of all wells within one half mile radius of the site, together with a map to scale showing the locations of these wells.	
- Documentation of due diligence in verifying the presence or absence of unregistered wells supplying groundwater for domestic use, when the potential for such wells is deemed likely as in older residential neighborhoods or in rural areas.	
- A statement about each well within the half-mile radius of the site, stating whether the well is used as a water supply well or groundwater monitoring well.	
- Lithologic logs for all on-site wells; copies of field log notes may be appropriate.	
- Well construction diagrams for all on-site wells showing screened interval, casing type, and construction details including gravel pack interval, bentonite seal thickness, and cemented interval.	
- Description of the current and potential future uses of on-site and off-site groundwater in sufficient detail to evaluate human health and environmental risk pathways. In addition, the applicant should provide a discussion of any state and/or local laws that restrict the use of on-site groundwater	
C. The applicant should provide information concerning the <u>nature and extent</u> of any contamination and releases of hazardous wastes which have occurred at the site, including but not limited to:	

III. SITE CHARACTERIZATION (continued)	Page
<p>- Identification of the chemical nature and extent, both onsite and offsite, of contamination that has been released into soil, groundwater or surface water at the property, and/or releases of substances from each of the source areas identified, including estimated volumes and concentrations of substances discharged at each area, discharge point, or leakage point. The source, nature, extent, and estimated volumes of the release are important in the overall evaluation of risk. If deemed necessary, the results of indoor air investigations to evaluate impacts due to volatile organic compounds should also be presented.</p>	
<p>- A map to scale showing the depth to groundwater across the site, direction and rate of groundwater movement across the site using a minimum of three measuring points.</p>	
<p>- A discussion of all hydraulic tests performed at the site to characterize the hydrogeologic properties of any aquifers onsite and in the area.</p>	
<p>- All reports and/or correspondence which detail site soil, groundwater and/or surface water conditions at the site, including analytical laboratory reports for all samples and analyses.</p>	
<p>- A discussion of how all environmental samples were collected, including rationale involved in sampling locations, parameters, and methodology, a description of sampling locations, sampling methodology and analytical methodology, and information on well construction details and lithologic logs. All sample analyses performed and presented as part of the environmental assessment should be appropriate and sufficient to fully characterize all constituents which may have impacted soil, air, surface water and/or groundwater on the property. The applicant should use EPA approved analytical methods when characterizing the soil, air, surface water and/or groundwater.</p>	

IV. EVALUATING APPLICABLE STANDARDS/RISK DETERMINATION	Page
<p>A. The applicant should provide a description of any applicable standards, guidance, or remediation objectives (federal, state, or other) establishing acceptable cleanup levels for contaminants in soils, surface water, and groundwater.</p>	
<p>B. The applicant should provide a description of the human and environmental exposure to contamination at the site based on the property's current use and potential future uses including:</p>	
<p>- A table or list of site contaminants indicating which media are contaminated and the estimated vertical and areal extent of contamination in each medium.</p>	
<p>- A table or list of site contaminants, indicating the maximum concentrations of each contaminant detected onsite where the contaminant was discharged to the environment and/or where the worst effects of the discharge are believed to exist. This information is required so that an understanding of the source and nature of the contaminants can be made as it relates to risk.</p>	
<p>- A table or list of site contaminants indicating whether the contaminant has a published State standard or remediation objective, the published standard or objective, and the medium the standard or objective applies to. This is important in evaluating whether the proposed corrective actions will meet established standards or if the proposed risk-based cleanup objectives are appropriate for the site.</p>	
<p>- A list of ecological receptors of concern and an evaluation of potential pathways.</p>	

IV. EVALUATING APPLICABLE STANDARDS/RISK DETERMINATION (cont'd)	Page
- A description and list of potential human and/or environmental exposure pathways pertinent to the current and potential future use of the property. This is important in assessing exposure risk as part of the overall evaluation of the proposed corrective action.	
- A list and map defining all source areas, areas of contamination or contaminant discharge areas. These areas need to be defined to indicate the proximity of contaminants with respect to receptors and sampling efforts.	
- A discussion of contaminant mobilities, including estimates of contaminants to be transported by wind, volatilization, or dissolution in water. For those contaminants that are determined to be mobile and have the potential to migrate and contaminate the underlying groundwater resources, the applicant should also evaluate the leachability and mobility of the contaminants. This evaluation should consider, but not be limited to the following: leachability/mobility of the contamination; health-based groundwater standards for the contamination; geological characteristics of the vadose zone that would enhance or restrict contaminant migration to groundwater, including but not limited to grain size, fractures and carbon content; and depth to groundwater. This evaluation, and any supporting documentation, should be included in the plan submitted.	
C. The applicant should then provide, using the information contained in the site assessment, a risk based analysis of all exposure pathways which details how the proposed remediation will obtain acceptable risk levels. This analysis must show that the corrective actions proposed will attain an acceptable risk or permanently break pathways.	

V. PREPARATION OF THE INTEGRATED CORRECTIVE ACTION PLAN	Page
A. A detailed description of the remediation alternative or alternatives selected which will be used to remove or stabilize contamination released into the environment, or threatened to be released into the environment. The remediation alternative proposed may include a request for no further action, if appropriate. Acceptance of the proposed alternative(s) will be based on the site meeting State standards or risk-based cleanup goals within an agreed upon time frame.	
B. A map identifying areas to be remediated, the area where the remediation system will be located if it differs from the contaminated areas, the locations of confirmation samples, the locations of monitoring wells, areas where contaminated media will be temporarily be stored, and areas where contamination will not be actively remediated.	
C. A plan meeting the level of community interest in, and concerns about, the corrective action and facility.	
D. Remediation system design diagrams showing how the system will be constructed in the field.	
E. A remediation system operation and maintenance plan that describes, at a minimum, how the system will be operated to ensure that it functions as designed without interruptions and a sampling program that will be used to monitor its effectiveness in achieving the desired goal.	
F. The plan should describe the sampling program that will be used to verify that treatment of the contaminated media has resulted in attainment of the proposed cleanup goals.	

V. PREPARATION OF THE INTEGRATED CORRECTIVE ACTION PLAN (con'd)	Page
G. The plan should specify the actions the applicant will take to comply with the corrective action or closure requirements of Sections 264/265 with a schedule of implementation, including the date the ICAP becomes effective and the date a completion report will be submitted.	
VI. PREPARATION OF COMPLETION REPORT	Page
A. The cleanup completion report is used to demonstrate that the remediation was completed according to the application and that the established cleanup goals have been achieved. The following items should be included in the completion report:	
- A final list of all site contaminants, along with the remaining concentrations.	
- A brief description of the remedy implemented, focusing primarily on any deviations from the original plan.	
- A final list describing which media were not actively remediated and the estimated vertical and areal extent of contamination remaining in each medium.	
- A final list and map defining all source areas, areas of contamination or contaminant discharge areas.	
- A description of any long term monitoring plans and engineering or institutional controls used with a description of the mechanisms in place to assure the controls remain as designed.	
B. For sites that involve soil contamination remediation by excavation, the following information should be provided:	
- Results of confirmatory soil sampling.	
- Explanation of the sampling method in the narrative as well as any modifications to the confirmatory sampling recommended above. This is used to evaluate the remedial efforts.	
- If contamination is to be left in place, additional samples should be collected from the area of the worst contamination, as verified visually or with a field sampling device.	
- Depth of samples collected .	
- Availability of waste disposal manifests.	
C. For sites that involve in-situ soil remediation, the following information should be provided:	
- Completion of a minimum of two soil borings, with at least one completed in the area identified in the site assessment as the area of highest contamination. For larger areas of contamination, additional borings and sampling may be required.	
- Completion of the borings should employ a field screening device and borings should be logged.	
- Soil sample submitted for analysis from each boring should be the sample closest to or in the contaminated source area.	
D. For sites that involve groundwater remediation, the following information should be provided:	
- Field testing should include aquifer and contaminant characteristics such as gradient, partition coefficients, original and residual contaminant levels, etc.	
- At each regular monitoring event, a map showing groundwater flow direction, depth to groundwater, and sampling locations.	
- Tabular presentation of data collected.	

VI. PREPARATION OF COMPLETION REPORT (cont'd)	Page
E. Summary of field activities, remedial activities, and any deviations from the original ICAP.	
F. Pertinent figures and drawings of the remedial system as built.	
G. Conclusions made after all remedial activities are completed.	

#### 4.0 CONTACT INFORMATION

24-hour Emergency Response Line ( <b>New statewide toll-free</b> )	(877) 518-5608
Colorado Department of Public Health and Environment (CDPHE)	(303) 692-2000 (800) 886-7689
Hazardous Materials and Waste Management Division (HMWMD) toll-free	(303) 692-3300 (888) 569-1831
HMWMD Technical Assistance Line toll-free	(303) 692-3320 (888) 569-1831 ext. 3320

CDPHE Website	<a href="http://www.cdphe.state.co.us/">http://www.cdphe.state.co.us/</a>
HMWMD Website	<a href="http://www.cdphe.state.co.us/hm/">http://www.cdphe.state.co.us/hm/</a>
Downloadable Regulations	<a href="http://www.cdphe.state.co.us/regulate.asp">http://www.cdphe.state.co.us/regulate.asp</a>
HMWMD Internet e-mail	<a href="mailto:comments.hmwmd@state.co.us">comments.hmwmd@state.co.us</a>

Other Phone Numbers:

National Response Center	(800) 424-8802
RCRA/Superfund Hotline	(800) 424-9346

Send questions in writing to:

Colorado Department of Public Health and Environment  
Hazardous Materials and Waste Management Division  
Technical Assistance  
4300 Cherry Creek Drive South  
Denver, CO 80246-1530

OR

FAX (303) 759-5355

Please provide as much detail as possible regarding your question and the waste or process to which it applies.

## 5.0 GLOSSARY

**CDPHE** - Colorado Department of Public Health and Environment

**CERCLA** - Comprehensive Environmental Response, Compensation, and Liability Act

**contamination** - that condition where the concentration level of a pollutant exceeds naturally occurring background levels

**C.R.S.** - Colorado Revised Statutes

**EPA** - Environmental Protection Agency

**EPCRA** - Emergency Planning and Community Right-to-know Act

**groundwater** - any subsurface waters in a zone of saturation which are or can be brought to the surface of the ground or to surface waters through wells, springs, seeps or other discharge areas

**HMWMD** - Hazardous Materials and Waste Management Division

**ICAP** - Integrated Corrective Action Plan

**MCL** - Maximum Contaminant Level - the maximum permissible level of a contaminant in drinking water

**MSDS** - Material Safety Data Sheets

**PCAP** - Phased Corrective Action Plan

**POC** - Point of Compliance - a vertical surface that is located at some specified distance hydrologically downgradient of the activity being monitored for compliance

**RCRA** - Resource Conservation and Recovery Act

**site boundary** - the outermost perimeter of the property or lease boundary of a facility for which the owner and/or operator has control

**standard** - a narrative and/or numeric restriction established by the Colorado Department of Public Health and Environment and applied to groundwater or soils to protect human health and the environment

**waters of the state** – any and all surface and subsurface waters which are contained in or flow in or through Colorado, including dry gullies or storm sewers that discharge to surface waters. This term does not include waters in sewage systems, waters in treatment works of disposal systems, waters in potable water distribution systems, and all water withdrawn for use until use and treatment have been completed.

## 6.0 RELATED CDPHE REFERENCES

*These documents are available on our website or by contacting the HMWMD technical assistance line.*

### *RCRA Policy and Guidance*

Groundwater VOC Sample Preservation Policy (6/98)  
Guidance for Analysis of Indoor Air Samples (4/00)  
Guide to Generator Requirements of the Colorado Hazardous Waste Regulations (10/01) *Updated*  
Guide to Implementing the Division's Wastewater Treatment Unit Policy (1/00), Includes Policy on Wastewater Treatment Unit Exemption (6/91)  
Hazardous Waste Control Program PENALTY POLICY (1/00)  
Hazardous Waste Identification Guidance Document (9/98)  
Hazardous Waste Recycling Guidance Document (1/99)  
Hazardous Waste Transporters Guidance Document (11/99)  
Interim Final Policy and Guidance on Investigation Derived Waste (IDW) at RCRA Facilities  
Interim Final Policy and Guidance on Risk Assessments for Corrective Action at RCRA Facilities (11/93)  
Personnel Training & Emergency Response/Preparedness and Prevention for Small Quantity Generators (4/98)  
Personnel Training for Large Quantity Generators of Hazardous Waste (3/97)  
Preparedness and Prevention Contingency Plan Emergency Procedures for Large Quantity Generators of Hazardous Waste (3/97)  
Proposed Soil Remediation Objectives Policy Document (12/97)  
RCRA Integrated Corrective Action Plan Application Guidance Document and Checklist (1/00)  
Satellite Accumulation for Small and Large Quantity Generators of Hazardous Waste (2/98)  
Solid Waste Definition and Solid and Hazardous Waste Exclusions Guidance Document (9/98)  
State of Colorado Policy: Early Transfer of Federal Property (6/98)  
Summary Table of Hazardous Waste Generator Requirements (3/01)  
Treatment of Hazardous Waste by Generators Guidance Document (4/00)

### *RCRA Compliance Bulletins*

Batteries (11/98)  
Contaminated Shop Towels and Reusable Absorbents (7/96)  
EPA Identification Number (7/96)  
Lead-Based Paint Abatement and Waste Management (10/00)  
Lighting Wastes (12/99)  
Management of Waste Aerosol Cans (1/97)  
Photographic, X-ray and Dental Wastes (7/97)  
Universal Waste Rule (11/01) *Updated*  
Used Antifreeze (7/96)

*Available by contacting the US EPA or the HMWMD Records Center*

RCRA Public Participation Manual, EPA530-R-96-007, September 1996.