Nevada
Environmental
Restoration
Project

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Corrective Action Investigation Plan:
Area 2 Photo Skid 16
Wastewater Pit

Corrective Action Unit 332

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January, 1997

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AREA 2 PHOTO SKID 16 WASTEWATER PIT**

CORRECTIVE ACTION UNIT 332

DOE Nevada Operations Office
Las Vegas, Nevada

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**CORRECTIVE ACTION INVESTIGATION PLAN:
AREA 2 PHOTO SKID 16 WASTEWATER PIT**

CORRECTIVE ACTION UNIT 332

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List of Acronyms and Abbreviations

BN	Bechtel Nevada
CADD	Corrective Action Decision Document
CAIP	Corrective Action Investigation Plan(s)
CAS	Corrective Action Site(s)
CAU	Corrective Action Unit(s)
CFR	<i>Code of Federal Regulations</i>
CLP	Contract Laboratory Program
cm	Centimeter(s)
Cs-137	Cesium-137
DOE	U.S. Department of Energy
DOE/NV	U.S. Department of Energy, Nevada Operations Office
DOT	U.S. Department of Transportation
DQA	Data Quality Assessment
DQO	Data quality objective(s)
EG&G/EM	EG&G Energy Measurements, Inc.
EPA	U.S. Environmental Protection Agency
EQL	Estimated Quantitation Limit
FFACO	Federal Facility Agreement and Consent Order
ft	Foot (feet)
G	Glass
gal	Gallon(s)
H ₂ SO ₄	Sulfuric acid
HASP	Health and Safety Plan
IDW	Investigation-derived waste
IT	IT Corporation
L	Liter(s)
LLNL	Lawrence Livermore National Laboratory
m	Meter(s)
MCL	Maximum Contaminant Level
mg/kg	Milligram(s) per kilogram
mg/L	Milligram(s) per liter

List of Acronyms and Abbreviations (Continued)

mL	Milliliter(s)
MSDS	Material Safety Data Sheet(s)
NDEP	Nevada Division of Environmental Protection
NTS	Nevada Test Site
PE	Polyethylene
POC	Performance Objective Criteria
ppm	Part(s) per million
QA/QC	Quality assurance and quality control
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation and Recovery Act
REEC _o	Reynolds Electrical & Engineering Co., Inc.
SARA	Superfund Amendments and Reauthorization Act
SVOC	Semivolatile organic compound(s)
TCLP	Toxicity Characteristic Leaching Procedure(s)
TPH	Total petroleum hydrocarbon(s)
VOC	Volatile organic compound(s)
°C	Degree(s) Celsius
µg/L	Microgram(s) per liter

1.0 Introduction

This Corrective Action Investigation Plan (CAIP) has been developed in accordance with the *Federal Facility Agreement and Consent Order* (FFACO) agreed to by the U.S. Department of Energy, Nevada Operations Office (DOE/NV), the Nevada Division of Environmental Protection (NDEP), and the U.S. Department of Defense. A CAIP is a site-specific work plan for a Corrective Action Unit (CAU) or Corrective Action Site (CAS) (FFACO, 1996).

This CAIP contains a detailed description and plan for an environmental investigation of the Area 2 Photo Skid 16 Wastewater Pit, which is CAS No. 02-42-03 in CAU No. 332. The site is located in Area 2 of the Nevada Test Site (NTS) (Figures 1-1 and 1-2). This CAIP will be implemented in accordance with the FFACO (1996), the *Industrial Sites Quality Assurance Project Plan* (QAPP) (DOE, 1996), and all applicable NDEP and U.S. Department of Energy (DOE) policies, regulations, and orders.

1.1 Purpose

The Photo Skid Wastewater Pit was used for disposal of photo chemical process waste, and there is a concern that such disposal may have released photo chemicals and metals to the soil beneath the pit and adjacent to it. The purpose of this investigation is to identify the presence and nature of contamination present in and adjacent to the wastewater pit and to determine the appropriate course of environmental response action for the site. The potential courses of action for the site are clean closure through remediation, closure in place (with or without remediation), or no further action.

1.2 Scope

The scope of this investigation will include the following:

- Soil sample collection using hollow-stem auger drilling techniques
- Sample analysis
- Data evaluation
- Management of investigation-derived waste (IDW)
- Publication of a Corrective Action Decision Document (CADD)

Figure 1-1
 Location of the Nevada Test Site

6201A02 11/12/96

Figure 1-2
 Location of the Area 2 Photo Skid Wastewater Pit

1.3 Federal Facility Agreement and Consent Order Requirements

The FFACO requires that CAIPs address the following elements: management, technical aspects, quality assurance, health and safety, public involvement, field sampling, and waste management (all of which have been accounted for in project documentation). The technical aspects of this project are described in this CAIP. Field and laboratory quality assurance and quality control (QA/QC) issues are detailed in the Industrial Sites QAPP (DOE, 1996), and the specific aspects of field QA/QC are also discussed in approved procedures. The health and safety aspects of this project are documented in the DOE/NV *Environmental Restoration Project Health and Safety Plan* (HASP) (DOE, 1994) and will also be supplemented with a site-specific HASP written prior to commencement of field work. Public involvement is documented in the *Public Involvement Plan* in Appendix V of the FFACO (1996). Field sampling activities are documented in Section 4.0 of this CAIP, and waste management is discussed in Section 5.0. Reporting requirements and project schedule information are discussed in Section 6.0 of this CAIP.

2.0 Facility Description

2.1 Historical Information and Site Description

The Area 2 Photo Skid No. 16 was used by EG&G Energy Measurements, Inc. (EG&G/EM) for photographic processing. From 1984 to 1991, EG&G/EM discharged photographic process wastewater into an unlined pit adjacent to the skid. Other wastewater generated at the building drained into a separate wastewater management system. The wastewater pit was identified in a 1987 DOE Environmental Survey (DOE, 1988) to be a site requiring characterization and closure because it was a source of unquantified, uncontrolled, and unpermitted wastewater discharge. The wastewater survey noted, however, that the pit was observed to be dry and inactive at the time of the survey which occurred in June and July of 1987. In 1991, EG&G/EM installed a silver recovery system for the photo processors and rerouted the photo processing wastewater into a sewage system (EG&G/EM, 1993). Figure 2-1 shows the location of the site with respect to the immediate features of Area 2, and Figure 2-2 is a detailed site map of the area of concern.

The photo skid was used for photographic processing of film for projects related to weapons testing. The skid had Kodak RA4 and GPX automatic film processing systems and processed black and white still photography for events and color still photography for documentaries.

The skid is a modular building with no windows. On the south wall of the skid, two PVC pipes exit the building wall and are routed below the ground surface. One pipe is labeled "chemical waste," and the second pipe is labeled "water waste." Appendix A contains a plan and detail of the original waste effluent system for the photo skid (the plan and detail were obtained from the DOE Engineering Record Library at the NTS) (Holmes & Narver, 1984). The treatment system installed in 1991 consisted of Kodak filter cartridges to recover silver from the fixer solution and pH adjustment to neutralize the skid's wastewater.

The outer dimensions of the pit are approximately 30 x 30 meters (m) (100 x 100 feet [ft]), and the pit is approximately 2 m (7 ft) deep at its deepest point. A 1-m (3-ft) high wooden slat fence surrounds the pit. The walls of the pit are steep-sided (25- to 40-degree slopes), and the floor is covered with a layer of gravel of unknown thickness. The 15-centimeter (cm) (6-inch) diameter PVC discharge pipe enters the pit on the northeast side, at a point approximately 60 cm (2 ft) above the pit floor.

Figure 2-1
 Map of the Photo Skid Wastewater Pit
 and Immediate Area

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Figure 2-2
 Photo Skid Wastewater
 Pit Site Map

6301A04 11/12/96

The site is located on the west side of Yucca Flat on an alluvial fan that slopes eastward from the Eleana Range to Yucca Flat; the site is underlain by over 600 m (1,970 ft) of alluvium. The elevation of the site is approximately 1,370 m (4,500 ft) above sea level, and the water table within the alluvium is approximately 760 m (2,490 ft) above sea level (Plate 5 of IT, 1996). Therefore, the depth to the water table is approximately 600 m (1,970 ft).

2.2 Investigative Background

IT Corporation (IT) conducted a site walk on June 25, 1996, to confirm background information and to determine and verify current site conditions. In addition to the site visit, other sources of information were reviewed, and those sources of information are referenced here and listed in Section 7.0.

2.3 Release Information

Reportedly, only one effluent sample was collected and analyzed during the period from 1984 to 1991. The sample collected by Reynolds Electrical & Engineering Co., Inc. (REECo) in May 1987 had a pH of 6.8; and concentrations of lead, <0.05 parts per million (ppm); silver, 0.045 ppm; and chromium, 0.02 ppm (EG&G/EM, 1993).

Further information regarding the nature of the wastewater is included in a September 23, 1988, letter from J. Kesler of EG&G/EM to O.L. Haworth of REECo. The letter enclosed Material Safety Data Sheets (MSDSs) for photochemicals used at the photo skid and their approximate rate of use. The letter and MSDS sheets are attached to this document as Appendix B. The photo chemicals and their rate of use (Appendix B) are summarized in Table 2-1. The individual components present in each photo chemical (Appendix B) are listed in Table 2-2.

Additional information about the wastewater was discussed in a July 1, 1992, letter from J.P. Maddox of EG&G/EM to F.E. Bingham of REECo. The letter stated:

“On April 28, 1992, Jim Kesler spoke with Floyd Munson, EG&G/EM, senior photo technician, regarding the types of photo effluents that may have been discharged to the pit. According to Munson, only photo effluents went to the pit via the chemical drain. Sanitary sewer was never plumbed to the pit that anyone knows of. The work request to disconnect the skid from the pit only addressed the chemical drain. Since the modification to the chemical drain stopped all effluent from going to the pit, that provides reasonable assurance that no gray water, sewage or other wastes were discharged.”

Table 2-1
Photo Chemicals and Their Estimated Rate of Use*

Photo Chemical		Average Use Rate
Kodak Ektaprint II Developer Replenisher RT	Developer Replenisher RT Parts A, B, C, D	10 gallons (gal) (38 liters [L]) per month, each part
	Bleach - Fix, Replenisher RT Parts A, B	10 gal (38 L) per month, each part
Kodak Rapid Fixer	Parts A, B	10 gal (38 L) per month, each part
Kodak Duraflo RT	Developer Replenisher Parts A, B	10 gal (38 L) per month, each part
	Developer Starter	10 gal (38 L) per month
Kodak Flexicolor	Developer Replenisher Parts A, B, C	5 gal (19 L) per month, each part
	Bleach Replenisher Parts A, B, C	5 gal (19 L) per month, each part
	Fixer Replenisher	5 gal (19 L) per month, each part
Water use was estimated as 180 gal (680 L) per hour over an average operating frequency of 80 hours per month		
The replenishing rate was 200 milliliters (0.05 gal) per 180 gal (680 L) of water		

* Information in this table is based on information provided in Appendix B.

The majority of the photochemicals degrade to nitrogen and sulfur compounds. The alkali nature of the soil is such that the chemicals should be present as nitrate and sulfate in soil. Silver and chromium are components of film and may have been released in the effluent, particularly before the installation of the silver recovery system in 1991. No organic solvents were released because they were not used in the processing equipment or for equipment cleaning (EG&G/EM, 1993).

Table 2-2
Photo Chemicals and Their Components*
(Page 1 of 3)

Photo Chemical	Components (in order of weight percent)	Chemical Abstract System Reg. No.
Kodak Ektaprint 2 Developer Replenisher RT, Part A	benzyl alcohol	100-51-6
	triethanolamine	102-71-6
	water	7732-18-5
Kodak Ektaprint 2 Developer Replenisher RT, Part B	water	7732-18-5
	hydroxylamine sulfate	10039-54-0
	lithium chloride	7447-41-8
Kodak Ektaprint 2 Developer Replenisher RT, Part C	water	7732-18-5
	4-(ethyl-N-2-methanesulfonylaminoethyl)-2-methylphenylenediaminesesqui-sulfate monohydrate	25646-71-3
	potassium sulfite	10117-38-1
Kodak Ektaprint 2 Developer Replenisher RT, Part D	water	7732-18-5
	potassium carbonate	584-08-7
	potassium hydroxide	1310-58-3
Kodak Ektaprint 2 Bleach-Fix Replenisher RT, Part A	water	7732-18-5
	ammonium thiosulfate	7783-18-8
	sodium metabisulfite	7681-57-4
Kodak Ektaprint 2 Bleach-Fix Replenisher RT, Part B	water	7732-18-5
	ammonium{(ethylenedinitrilo)tetraaceto}terrate (III)	21265-50-9
	ethylenediaminetetraacetic acid	60-00-4
Kodak Rapid Fixer, Part A	water	7732-18-5
	ammonium thiosulfate	7783-18-8
	sodium acetate	127-09-3
	boric acid	10043-35-3
Kodak Rapid Fixer, Part B	water	7732-18-5
	aluminum sulfate	10043-01-3
	sulfuric acid	7664-93-9

Table 2-2
Photo Chemicals and Their Components*
(Page 2 of 3)

Photo Chemical	Components (in order of weight percent)	Chemical Abstract System Reg. No.
Kodak Duraflo RT Developer Replenisher, Part A	water	7732-18-5
	potassium carbonate	584-08-7
	sodium sulfite	7757-83-7
	hydroquinone	123-31-9
	potassium hydroxide	1310-58-3
Kodak Duraflo RT Developer Replenisher, Part B	water	7732-18-5
	sodium bisulfite	7631-90-5
	glutaraldehyde bis-bisulfite	7420-89-5
	sodium sulfite	7757-83-7
Kodak Duraflo RT Developer Starter	water	7732-18-5
	sodium bromide	7647-15-6
	acetic acid	64-19-7
Kodak Flexicolor Developer Replenisher, Part A	water	7732-18-5
	potassium carbonate	584-08-7
	pentetic acid, pentasodium salt	140-01-2
	sodium bisulfite	7631-90-5
Kodak Flexicolor Developer Replenisher, Part B	water	7732-18-5
	hydroxylamine sulfate	10039-54-0
Kodak Flexicolor Developer Replenisher, Part C	water	7732-18-5
	4-(N-ethyl-N-2-hydroxyethyl)-2-methylphenylenediamine sulfate	25646-77-9
	sodium metabisulfite	7681-57-4
Kodak Flexicolor Bleach Replenisher, Part A	water	7732-18-5
	ammonium bromide	12124-97-9
	potassium nitrate	7757-79-1
	acetic acid	64-19-7

Table 2-2
Photo Chemicals and Their Components*
 (Page 3 of 3)

Photo Chemical	Components (in order of weight percent)	Chemical Abstract System Reg. No.
Kodak Flexicolor Bleach Replenisher, Part B	water	7732-18-5
	ammonium{(ethylenedinitrilo)tetraaceto}-ferrate (III)	21265-50-9
	ammonia	1336-21-6
Kodak Flexicolor Fixer and Replenisher	ammonium thiosulfate	7783-18-8
	water	7732-18-5
	sodium sulfite	7757-83-7
	ammonium sulfite	10196-04-0

* Information in this table is based on information provided in Appendix B.

The list of potential contaminants was checked against the following regulatory lists to identify regulated chemicals:

- The two metals, silver and chromium, are Resource Conservation and Recovery Act (RCRA) characteristic (silver waste code, D011; chromium, D007).
- Hydroquinone is listed in SARA Section 313 (ES, 1988).
- Some chemicals are not specifically listed in SARA or RCRA, but do have values in hazard communication rules and guidelines: acetic acid, sodium bisulfite, sodium metabisulfite, triethanolamine, and sulfuric acid.
- The Nevada Corrective Action Regulations (NAC, 1996) stipulates maximum soil concentrations for nitrate (nitrite and sulfate only in cases where the groundwater pathway is the primary pathway of exposure).

Based on all available information, the potential contaminants that may be encountered in the pit and underlying soil are the following:

- Photo chemicals (Table 2-2 and Appendix B) that have degraded to nitrate/nitrite and sulfate/sulfite
- Metals from photo processing: silver and chromium

3.0 Objectives

The history of releases to the wastewater pit is such that there is an environmental concern that requires some level of characterization to gain site closure. A characterization investigation has been designed using the data quality objectives (DQOs) process outlined by the U.S. Environmental Protection Agency (EPA) in their *Guidance for the Data Quality Objectives Process* (EPA, 1994a) and *Data Quality Objectives Process for Superfund* (EPA, 1994b). The DQO process is a planning process that provides a systematic approach to defining the criteria and objectives that data collection should satisfy. DQOs have been developed using the step-wise planning process outlined by the EPA. The DQOs are qualitative and quantitative statements derived from the step-wise process that clarify the study objective, define the most appropriate type of data to collect, determine the most appropriate conditions from which to collect the data, and specify tolerable limits on decision errors which will be used as the basis for establishing the quantity and quality of data needed to support the decision.

Ultimately, the DQO process yields a thoughtfully designed study that has well-defined and attainable objectives, is designed to meet objectives, and is sufficiently detailed to be defensible, but not overly detailed to result in wasting resources. The DQOs for this site are based on the following conceptual site model. Sections 3.1 to 3.7 present the results of the seven-step DQO planning process for the Area 2 Photo Skid 16 Wastewater Pit.

Conceptual Model

A physical model was developed to postulate exposure pathways by which receptors could be exposed to contaminants potentially present in or released from the wastewater pit. The physical model is based on facts and assumptions and particularly the historical information and site description presented in Section 2.0.

The following are known facts regarding the Photo Skid Wastewater Pit:

- Site visits and construction plans have established the location and dimensions of the wastewater pit.
- The wastewater pit was excavated into unconsolidated, *in situ* alluvial deposits; is unlined; and is underlain by unconsolidated alluvium. The water table (groundwater) within the alluvium is approximately 600 m (1,970 ft) below ground surface.

- The wastewater pit was used for disposing aqueous photo chemical waste between 1984 and 1991; the wastewater pit has not been used for waste disposal since 1991.
- The wastewater pit was built specifically to serve as a sump in which to dispose of aqueous waste from the photo skid. Sanitary waste from the photo skid was not disposed of in the wastewater pit. Sanitary waste from several facilities was disposed of in an adjacent leachfield after primary treatment in a septic tank. The septic tank and leachfield are not included in this corrective action unit and are not included in this CAIP.
- The waste stream from 1984 to 1991 consisted of aqueous process waste from the photo skid. The process waste included the chemicals and quantities described in Section 2.3 (including Tables 2-1 and 2-2) of this document. Based on the rate of use presented in Table 2-1, the volume of aqueous waste disposal was approximately 54,500 L (14,400 gal) of water per month and 549 L (145 gal) of photo chemicals per month.
- No efforts have been made to maintain or close the wastewater pit since discontinuing its use in 1991. The plumbing in the photo skid was changed in 1991 so that the effluent line to the wastewater pit is no longer directly connected to the photo skid.
- The nature and extent of potential contamination at the wastewater pit has not been previously investigated.

The following statements are assumptions regarding the Photo Skid Wastewater Pit:

- The waste that was disposed in the wastewater pit included only aqueous photo processing waste as described in Section 2.3.
- Groundwater has not been impacted because photochemicals were not disposed of in large quantities; the depth to groundwater is approximately 600 m (1,970 ft), and the environmental conditions at the site (i.e., the heat, low rainfall, and high rate of evapotranspiration) are not conducive to downward migration of contaminants present in soil.
- Contaminant concentrations in soil are highest when close to the discharge point of the pipe and the deepest point of the floor of the pit (the discharge point and deepest spot are located within 3 m [10 ft] of each other), and soil concentrations decrease laterally and downward away from the discharge point.
- Soil in the pit floor and beneath the pit floor is contaminated with photo chemical waste due to site activities. A potential for human exposure to potentially contaminated soil exists.

The facts and assumptions listed above were used to build a schematic cross section, Figure 3-1, that illustrates the physical conditions of the site. The facts and assumptions were also used to develop a possible exposure scenario whereby people may be exposed to waste disposed in the wastewater pit. The possible exposure scenario is illustrated in Figure 3-2.

3.1 Problem Statement

In this section, the problem is defined so that the focus of the study is clearly understood.

3.1.1 DQO Planning Team

The DQOs for this project were developed by an interdisciplinary team that held a DQO planning meeting on July 9, 1996. The DQO planning team members included the DOE Subproject Manager and Technical Lead, a representative from the Nevada Division of Environmental Protection, two geologists from IT who have experience in sampling design, a chemist from IT, and the manager of the Quality Assurance Program at the IT Las Vegas office.

3.1.2 Description of the Problem

The Area 2 Photo Skid 16 Wastewater Pit is one of several potentially contaminated sites on the NTS, collectively called the Industrial Sites group. The DOE is required by the FFACO to address the potential environmental impact of such sites.

A review of site history has determined that there is potential contamination in and below the floor of the wastewater pit due to past releases of photoprocessing wastewater. The nature and extent of the contamination has been hypothesized, but is undocumented. The contamination is a concern because humans may be exposed to the soil contamination, and the soil contamination could act as a future source of groundwater contamination. The contaminants of concern are silver, chromium, nitrate/nitrite, and sulfate/sulfite.

3.1.3 Deadlines

The FFACO (1996) specifies that the corrective action process for the site must meet the following deadlines:

- 12-02-96, complete the Corrective Action Investigation Plan
- 7-31-97, complete the Corrective Action Decision Document
- 3-31-98, complete the Corrective Action Plan
- 9-30-98, complete the Closure Report

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Figure 3-1
 Schematic Cross-Section of the
 Photo Skid Wastewater Pit

Figure 3-2
Conceptual Site Model for
Photo Skid Wastewater Pit

3.2 Identification of the Decision

This section defines the questions that the study will attempt to address.

3.2.1 Study Questions

The study questions are as follows:

- Are the RCRA constituents, silver and chromium, above soil action levels?
- Are the Clean Water Act (ES, 1988) constituents (nitrate, nitrite and sulfate) above soil action levels?
- What is the extent of the soil contaminants that exceed action levels?

3.2.2 Possible Actions

Ultimately, the nature and extent of contamination will be evaluated to select a course of action for the site that meets regulatory requirements and is protective of human health and the environment. Possible actions are recommendations of no further action, closure in place, and clean closure.

3.2.3 Decision Statement

Determine if the nature of contamination at the wastewater pit is below action levels, such that the site can be recommended for no further action. If the nature of contamination exceeds action levels, determine if the nature and extent of contamination warrant a recommendation of closure in place or clean closure.

3.3 Identification of Inputs to the Decision

This section identifies the information that will be required to resolve the decision statement. The informational needs for this project are presented in Table 3-1.

3.4 Definition of the Study Boundaries

3.4.1 Spatial and Temporal Boundaries of the Study

The vertical extent of contamination is assumed to extend from the floor of the wastewater pit to a depth of 1 ft to 10 ft (30 cm to 3 m) below the pit floor. The lateral extent of contamination at the pit floor is assumed to be constrained within the approximate areal extent of the floor of the wastewater pit. Beneath the floor of the wastewater pit, the lateral extent of contamination may be greater, particularly if downward-migrating groundwater encountered a low permeability layer

Table 3-1
Inputs to the Decision

Information needed to resolve the decision	Concentration of chromium, silver, nitrate, nitrite, and sulfate in soil of the pit floor, beneath the pit floor, and adjacent to the pit
Sources of information	The concentrations can be measured from soil samples.
Basis for establishing action levels for contaminants of concern	Chromium and silver: the definition of hazardous waste characteristics under RCRA (40 CFR 261.24 [1996], Table 1) Nitrate, nitrite, and sulfate: (NAC, 1996)
Potential sampling technique and analytical methods	A common and economical sample collection method used for similar soil investigations is to collect soil samples with a split-spoon sampler. Chromium and silver need to be analyzed by Toxicity Characteristic Leaching Procedure (TCLP). Nitrate, nitrite, and sulfate can be analyzed by wet chemistry methods.

(e.g., caliche layer or low permeability bed of silt or clay) that caused groundwater to spread laterally.

The study must identify the maximum contaminant soil concentrations which are assumed to be immediately adjacent to the point of discharge on the floor of the wastewater pit. Concentrations are assumed to decrease laterally and downward, away from the point of discharge because of the attenuating properties of soil and the dilution that is coincident with transport and dispersion.

If contaminant concentrations exceed action levels, then a quantitative assessment of the extent of contamination will be required to make decisions.

The site is not anticipated to contain contaminants in soil at concentrations greater than action levels; therefore, it is unlikely that the site is or could be a source of groundwater contamination. Additionally, if contamination is present, it will be managed so that potential release of a leachate plume is prevented. If it is determined after soil sampling that groundwater may be impacted, the NDEP will be notified, and the groundwater pathway may be investigated.

The data will reflect the condition of potential contaminants leaching into groundwater over a period of thirty years.

3.4.2 Constraints on Data Collection

There are no physical constraints on data collection activities; the site is easily reached by a well-maintained road. The southeast side of the pit is sloped so that a two-wheel drive vehicle can drive into and out of the pit without difficulty.

The site is accessible at all times. The only temporal constraints on data collection activities are the FFACO (1996) deadlines listed in Section 3.1.

3.5 Development of Decision Rules

This section describes the parameters that will be used to make the decisions for the site, specifies the action levels that must be considered when making a decision regarding the site, and describes a procedure for making a decision for the site.

3.5.1 Parameters of Interest

Individual sample results will be compared to action levels. In cases where field duplicates are collected, the arithmetic mean of the sample results will be compared to action levels.

Spatial trends in analytical results will be used qualitatively to assess the nature and extent of any contaminant that occurs at a concentration above an action level.

3.5.2 Action Levels

The Area 2 Photo Skid 16 Wastewater Pit shall be subject to a particular set of action levels when making closure decisions. The particular action levels are the following:

- TCLP concentration limits for defining hazardous waste characteristics of solids under RCRA (40 CFR 261.24 [1996], Table 1)
- 1,000 milligrams per kilogram (mg/kg) nitrate (as N) in soil, 100 mg/kg nitrite (as N) in soil, and 25,000 mg/kg sulfate in soil, per the NAC (1996) (per the policy, 100 times the groundwater Maximum Contaminant Level [MCL]. Note that sulfate only has a secondary MCL, and there is no MCL for sulfite). Note also that there are no action levels for nitrate or nitrite and sulfate in soil if the "Corrective Action Regulations" (NAC, 1996) are interpreted literally. The policy stipulates maximum soil concentrations for nitrate, nitrite (NAC, 1996), and sulfate only in cases where the groundwater pathway is the *primary pathway of exposure*.

- Isotopic activities or total activities (e.g., total alpha, total gamma, or total beta activities) above the Performance Objective Criteria (POC) set forth by Bechtel Nevada (BN, 1995)
- For any parameters not covered in the above action levels, action levels will be taken from the concentration limits in the proposed RCRA Subpart S rule for corrective action (*Federal Register*, v. 55, no. 145, 07/27/90).
- 100 mg/kg total petroleum hydrocarbons (TPHs) in soil, per the "Corrective Action Regulations" (NAC, 1996).

Section 3.7 lists the parameters of concern and their corresponding action levels.

3.5.3 Criteria for Choosing Among Alternative Actions

If soil concentrations in the vicinity of the wastewater pit are below the action levels listed above, then no further action will be taken. If soil concentrations exceed the aforementioned criteria, then closure in place or clean closure will be the course of action. Engineering studies will be presented in the CADD to evaluate potential action alternatives.

3.6 Specifications on Decision Error Limits

In this section, tolerable limits on decision errors are discussed. The tolerable limits are used to establish performance goals for the data collection design.

The null hypothesis or baseline condition is that the site is contaminated, and contamination is present at concentrations greater than the closure limits. The alternative hypothesis is that the site is clean, or that contamination, if present, is at concentrations less than the closure limits.

There are two types of decision errors that can happen, a false positive and a false negative. A false positive occurs when the null hypothesis is rejected when it is, in fact, true (i.e., a contaminated area is determined to be clean). A false negative occurs when the null hypothesis is not rejected when it is, in fact, false (i.e., a clean area is determined to be contaminated).

Decision errors may occur due to errors in laboratory analyses because of improper sample handling (collection, preservation, and shipment) and because of inappropriate sampling design. The investigations of Industrial Sites at the NTS, such as this investigation, follow rigorous QA/QC procedures that ensure that the potential for error due to laboratory analyses or sample

handling is as low as possible (DOE, 1996). The following text discusses how decision error will be minimized through the design of the sampling.

The location of the highest contaminant concentration is predicted to be adjacent to the outfall in the shallow soil of the pit floor. If samples are collected from the immediate vicinity of the outfall, there is virtually no chance of a false positive occurring from incorrect sampling.

A false negative could occur if a sample is contaminated during or after sample collection or if the analysis reports a concentration that is higher than the real concentration.

A sampling design that samples the probable hot spot will minimize the potential for a false positive. The potential for a false positive or false negative can be minimized by using routine analytical methods and by adhering to the QA/QC procedures mandated by the Industrial Sites QAPP (DOE, 1996).

Recommendations to Minimize Decision Error

- Collect biased samples to ensure that the area of highest potential contaminant concentration is sampled, and collect spatially distributed samples to ensure that spatial variability of potential contamination is investigated.
- Obtain Contract Laboratory Program (CLP)-like laboratory packages for all analyses, and perform data validation on 10 percent of the environmental samples.
- Collect one field duplicate per 20 environmental samples, one equipment rinsate per 20 environmental samples, one field blank per 20 environmental samples, and one equipment rinsate blank for each unique sample event and/or type of equipment decontamination activity.
- Follow analytical procedures and QA procedures outlined in the Industrial Sites QAPP (DOE, 1996). Such procedures are designed to achieve programmatic quality goals and to reach well-defined programmatic goals for precision, accuracy, and comparability in laboratory analyses.
- Analyze all soil samples for the parameters of concern: silver and chromium via TCLP, and nitrate, nitrite, and sulfate via wet chemistry methods.

- Per request by the NDEP, collect three soil samples for gamma spectroscopy analysis (report cesium-137 [Cs-137] and any other radionuclide identified through computerized library search of radionuclide database), TPH, total volatile organic compounds (VOCs) and semivolatile organic compounds (SVOCs), and TCLP metals listed in Table 3-1.

3.7 Optimization of the Design for Obtaining Data

This step of the DQO process identifies a resource-effective data collection design that is expected to satisfy the data quality objectives. The details of the planned field investigation are presented in Section 4.0 of this CAIP.

The sampling strategy is to collect biased soil samples from the floor and immediately below the floor of the wastewater pit; such samples will characterize the area that is likely to have the highest concentrations of potential contaminants. Other soil samples will be collected outside the footprint of the wastewater pit to determine if potential contaminants have spread laterally away from the wastewater pit.

The proposed characterization sampling is designed on the basis of the conceptual site model. If characterization results show that the conceptual site model is not plausible, then an additional phase of sampling may be needed, and the NDEP will be notified. However, the proposed sampling is sufficient to define any remediation areas to ± 10 feet laterally and ± 5 feet vertically. Any remediation that may be performed would use sampling during remediation to minimize remedial areas.

The investigation will drill four borings (Figure 3-3) to collect soil samples for stratigraphic description and laboratory analyses. The investigation will use the hollow-stem auger or a similar drilling method and collect continuous soil samples/soil cores using a split-spoon sampler or an equivalent sampling tool. The stratigraphy encountered in the first boring will be reviewed by the lead geologist, and the conceptual site model may be modified to account for the stratigraphic data. If the conceptual model is modified, then the NDEP will be notified, and the sampling strategy for the remaining three borings may be adjusted.

- Drill the first boring at the lowest point on the floor of the wastewater pit to a depth of 3 m (10 ft). Collect soil samples for analyses from the first encountered soil layer, at a depth of 1.4 to 1.7 m (4.5 to 5.5 ft), and from the bottom of the boring. The depth of the middle soil sample may be adjusted to sample a stratum that shows visual evidence or

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Figure 3-3
 Proposed Soil Boring Locations for the
 Photo Skid Wastewater Pit

field screening evidence of contamination (e.g., soil discoloration and odor or field screening results from an organic vapor detector).

- Use a hand-auger to collect a single soil sample from directly below the outfall pipe. Collect the soil sample from the first encountered soil layer.
- Drill a second boring on the floor of the wastewater pit at a point on the opposite edge of the pit. Collect three samples using the sampling strategy employed for the first boring.
- Drill the third boring at a point 3 m (10 ft) southeast of the edge of the wastewater pit. Collect soil samples for analysis from depths that are equivalent to 1.5 m and 3 m (5 ft and 10 ft) below the floor of the wastewater pit.
- Drill the fourth boring at a point 3 m (10 ft) southwest of the edge of the wastewater pit. Collect soil samples for analysis from depths that are equivalent to 1.5 m and 3 m (5 ft and 10 ft) below the floor of the wastewater pit.
- Analyze eleven discrete environmental soil samples.
- Analyze all soil samples for the parameters of concern: silver and chromium via TCLP, and nitrate, nitrite, and sulfate via wet chemistry methods.
- Per request by the NDEP, choose three subsurface soil samples from inside the pit to be composited for gamma spectroscopy analysis (report Cs-137 and any other radionuclide identified through computerized library search of gamma spectroscopy results), total TPH, total VOCs and SVOCs, and TCLP metals listed in Table 3-1. These three samples should be collected from locations biased toward the highest potential of contamination.

The analytical methods and detection limits listed in Table 3-1 will be used. Note that all parameters will be analyzed by methods that give a detection limit lower than the level of concern.

Table 3-1
Site Characterization and Analytical Chemical Requirements

Parameter Group	Analytical Method	Sample Medium	Parameters to be Analyzed and Reported	Minimum Detectable Soil Concentration ^a	Regulatory Limit or Closure Standard for Soil
General Chemistry Parameters of Concern	353.1 ^b 353.1 300.0	Water	Nitrate as N Nitrite as N Sulfate	0.5 mg/kg 0.5 mg/kg 10 mg/kg	1,000 mg/kg 100 mg/kg 25,000 mg/kg
		Soil			
TCLP Metals of Concern	1311/6010 7470 ^c	Water	Chromium Silver	0.025 mg/L 0.020 mg/L	5.0 mg/L 5.0 mg/L
		Soil			
TCLP Metals	1311/6010 7470 ^c	Water	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	0.300 mg/L 0.200 mg/L 0.005 mg/L 0.010 mg/L 0.100 mg/L 0.0002 mg/L 0.250 mg/L 0.010 mg/L	5.0 mg/L 100.0 mg/L 1.0 mg/L 5.0 mg/L 5.0 mg/L 0.20 mg/L 1.0 mg/L 5.0 mg/L
		Soil			
Total Volatile Organic Compounds	8240 ^c	Water	Standard compound list for Method 8240	Multiple (DOE, 1996)	Multiple
		Soil			
Total Semivolatile Organic Compounds	8270 ^c	Water	Standard compound list for Method 8270	Multiple (DOE, 1996)	Multiple
		Soil			
Gamma Emitting Radionuclides	EPA 901.1 ^d	Water	Report Cs-137 and any other radionuclide identified in a computerized library search of gamma spectroscopy results	Multiple (DOE, 1996)	DOE Order 5400.5
	HASL 300 ^e 4.5.2.3	Soil			
Total Petroleum Hydrocarbons	8015M ^f	Water	TPH referenced to diesel-waste oil range	25 mg/kg	100 mg/kg
		Soil			

^aEstimated Quantitation Limit (EQL) as given in analytical method

^bMethods for the Chemical Analysis of Water and Wastes, EPA

Environmental Monitoring Systems Laboratory, EPA-600/4-79-020, 1979

^cU.S. Environmental Protection Agency Test Methods for Evaluating Solid Waste, 3rd Edition, Parts 1-4, SW-846, 1986

^dPrescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA, 1980

^eEnvironmental Measurements Laboratory Procedure Manual, HASL-300, DOE, 1992

^fEPA SW-846 Method 8015, modified according to State of California Department of Health Sciences, Leaking Underground Fuel Tank Field Manual, 1986

mg/kg = Milligrams per kilogram

mg/L = Milligrams per liter

Cs-137 = Cesium-137

4.0 Corrective Action Investigation

This section describes the sampling approach and analyses for investigating the Area 2 Photo Skid 16 Wastewater Pit. All sampling and analyses activities will be performed per the methods and requirements outlined in the Industrial Sites QAPP (DOE, 1996) and with other applicable contractor-approved procedures. Requirements for field and laboratory environmental sampling QA/QC are contained in the Industrial Sites QAPP (DOE, 1996).

4.1 Soil Sampling and Analysis Approach

The investigation will drill four borings at locations shown in Figure 3-3 to collect soil samples for stratigraphic description and laboratory analyses. The investigation will use the hollow-stem auger or a similar drilling method and collect continuous soil samples/soil cores using a split-spoon sampler or equivalent sampling tool. The stratigraphy encountered in the first boring will be reviewed by the lead geologist, and the conceptual site model may be modified to account for the stratigraphic data. If the conceptual model is modified, then the NDEP will be notified, and the sampling strategy for the remaining three borings may be adjusted.

- Drill the first boring at the lowest point on the floor of the wastewater pit to a depth of 3 m (10 ft). Collect soil samples for analyses from the first encountered soil layer at a depth of 1.4 m to 1.7 m (4.5 ft to 5.5 ft) and from the bottom of the boring. The depth of the second soil sample may be adjusted to sample a stratum that shows visual evidence or field screening evidence of contamination (e.g., soil discoloration and odor or field screening results from an photoionizing organic vapor detector).
- Use a hand-auger to collect a single soil sample from directly below the outfall pipe. Collect the soil sample from the first encountered soil layer.
- Drill a second boring on the floor of the wastewater pit, at a point on the opposite edge of the pit. Collect three samples using the sampling strategy employed for the first boring.
- Drill the third boring at a point 3 m (10 ft) southeast of the edge of the wastewater pit. Collect soil samples for analysis from depths that are equivalent to 1.5 m and 3 m (5 ft and 10 ft) below the floor of the wastewater pit.
- Drill the fourth boring at a point 3 m (10 ft) southwest of the edge of the wastewater pit. Collect soil samples for analysis from depths that are equivalent to 1.5 m and 3 m (5 ft and 10 ft) below the floor of the wastewater pit.
- Analyze eleven discrete environmental soil samples.

- Analyze one composite sample comprised of three discrete subsurface soil samples from locations biased toward the highest potential of contamination for all of the constituents in Table 4-1.
- Analyze all soil samples for the parameters of concern: silver and chromium via TCLP, and nitrate or nitrite and sulfate via wet chemistry methods.
- Choose five soil samples from a statistically random selection of five locations (0 cm to 30 cm bgs) inside the pit to be composited for one "full suite" analysis. This analysis will consist of gamma spectroscopy analysis (report Cs-137 and any other radionuclide identified through computerized library search of radionuclide database), TPH, total VOCs and SVOCs, and TCLP metals listed in Table 3-1.
- Use the analytical methods listed in Table 4-1.
- Obtain CLP-like laboratory packages for all analyses, and perform data validation on 10 percent of the environmental samples.
- Collect one field duplicate per 20 environmental samples, one equipment rinsate per 20 environmental samples, one field blank per 20 environmental samples, and one equipment rinsate blank for each unique sample event and/or type of equipment decontamination activity.

Most of the sampling methods and analytical methods are described in detail in the Industrial Sites QAPP (DOE, 1996). The analytical requirements for nitrate, nitrite, and sulfate are not covered in the QAPP. Those analytical requirements are presented here in Table 4-2.

Upon recovery of each split-spoon sampler, an aliquot will be immediately collected for measurement of organic vapors in headspace using a photoionizing organic vapor detector. Field instruments will be used to screen the open boring for organic vapors and alpha and beta/gamma activities. The soil in the split-spoon will be retained for possible analysis per the sampling procedure described above.

All equipment which contacts the soil will be decontaminated between each sampling event and between each boring using approved procedures. This will minimize the potential for cross-contamination between sample locations. All samples collected for laboratory analysis will be grab samples of fresh sample media (rather than reusing the screening sample media). Records will be kept of the soil description; field screening measurements; the date, time, and sample interval (depth); and all other relevant data. If field screening indicates that contamination is more extensive

than predicted, the field investigation may continue deeper; or, in the worst case, sampling would completely cease; the NDEP would be notified; and the investigation may have to be replanned. All boring locations will be cleared for underground obstructions or utilities before drilling. All borings will be filled to the surface with grout to minimize the potential for downward contaminant migration.

Table 4-1
Summary of Soil Sampling Requirements

Parameter Group	Analytical Method	Sample Medium	Parameters to be Analyzed and Reported	Number of Soil Samples	Number of Soil Duplicate Samples	Number of Aqueous QC Samples
General Chemistry Parameters of Concern	353.1 ^a 353.1 300.0	Water	Nitrate as N Nitrite as N Sulfate	11	1	2
		Soil				
TCLP Metals of Concern	1311/6010 ^b 7470	Soil	Chromium Silver	11	0	0
TCLP Metals	1311/6010 ^b 7470	Soil	Arsenic Barium Cadmium Chromium Lead Mercury Selenium Silver	3	1	2
Total Volatile Organic Compounds	8240 ^b	Water	Standard compound list for Method 8240	3	1	3
		Soil				
Total Semivolatile Organic Compounds	8270 ^b	Water	Standard compound list for Method 8270	3	1	2
		Soil				
Gamma Emitting Radionuclides	EPA 901.1 ^c	Water	Report Cs-137 and any other radionuclide identified in library search	3	1	2
	HASL 300 ^d 4.5.2.3	Soil				
Total Petroleum Hydrocarbons	8015M ^a	Soil	TPHs referenced to diesel-waste oil range	3	1	2
		Water				

^a Methods for the Chemical Analysis of Water and Wastes, EPA Environmental Monitoring Systems Laboratory, EPA-600/4-79-020, 1979

^b U.S. Environmental Protection Agency Test Methods for Evaluating Solid Waste, 3rd Edition, Parts 1-4, SW-846, 1986

^c Prescribed Procedures for Measurement of Radioactivity in Drinking Water, EPA, 1980

^d Environmental Measurements Laboratory Procedure Manual, HASL-300, DOE, 1992

^e EPA SW-846 Method 8015, modified according to State of California Department of Health Sciences, Leaking Underground Fuel Tank Field Manual, 1986

Table 4-2
Wet Chemistry Analytical Requirements

Parameter	Method ^a	Medium	Sample Container	Minimum Sample Amount	Holding Time ^b	Preservative	Minimum Reporting Requirements ^c
Nitrate	353.1	Soil	PE or G	8 ounces	14 days	Ice	0.5 mg/kg
		Water	PE or G	250 mL	14 days	H ₂ SO ₄ to pH<2 Ice	50 µg/L
Nitrite	353.1	Soil	PE or G	8 ounces	14 days	Ice	0.5 mg/kg
		Water	PE or G	250 mL	14 days	H ₂ SO ₄ to pH<2 Ice	50 µg/L
Sulfate	300.0	Soil	PE or G	8 ounces	28 days	Ice	10 mg/kg
		Water	PE or G	250 mL	28 days	H ₂ SO ₄ to pH<2 Ice	1000 µg/L

^aStandard Methods for the Examination of Water and Wastewater, American Public Health Association, 1992

^bHolding time calculated from verified time of sample collection

^cEQL as given in the analytical method

G = Glass
 PE = Polyethylene
 H₂SO₄ = Sulfuric acid
 mg/kg = Milligrams per kilogram
 mL = Milliliter
 °C = Degrees Celsius
 µg/L = Micrograms per liter

5.0 Waste Management Plan for Area 2 Photo Skid

The requirements for management of the wastes derived from the characterization will be determined based on regulatory requirements, field observations, and the results of laboratory analysis of site characterization samples. Contractor and DOE administrative controls (e.g., decontamination procedures and characterization strategies) will minimize waste generated during site investigation activities. Hazardous and/or mixed waste, if it is generated, will be managed and disposed of in accordance with DOE Orders, U.S. Department of Transportation (DOT), and RCRA regulations. Decontamination activities will be performed in accordance with approved procedures, as specified in the field sampling instructions, and will be designated according to the contaminations of concern present at the site. Waste management practices are detailed below.

5.1 Waste Minimization

The characterization activities have been designed to minimize the amount of IDW produced. The only waste produced will be drill cuttings (soil), used personal protective equipment, and decontamination waste.

5.2 Potential Waste Streams

Based on preliminary investigations and process knowledge, no radioactive wastes or mixed wastes are anticipated. It is also unlikely that hazardous wastes will be generated in large quantities from the sampling activities.

Waste generated during the characterization activities may include, but are not limited to, the following:

- Decontamination rinsate
- Contaminated disposal sampling equipment (e.g., plastic, paper, aluminum foil, and sampling containers)
- Personal protective equipment
- Potentially contaminated soil

It is estimated that approximately six 55-gallon drums of waste may be generated.

5.3 Waste Determination

Solid materials other than soil wastes are wastes only by the virtue of contact with contaminated media. The same is true of decontamination rinsate. Therefore, sampling and analysis of the IDW, separate from site characterization analyses, will not be required.

5.4 Waste Management

The data generated as a result of contaminant characterization will be used to assign the appropriate waste type (i.e., hazardous, mixed waste, low-level waste, TPH, or ordinary) to the IDW.

Suspected hazardous wastes will be managed in accordance with 40 CFR 260-270 (1996) and State of Nevada hazardous waste management regulations, interpreted as follows. Suspected hazardous wastes will be placed in DOT-compliant drums, which will be locked or fitted with tamper-indicating devices. The containers shall be compatible with the waste in accordance with the requirements of 40 CFR 265.172 (1996). Containers shall be handled and inspected in accordance with the requirements of 40 CFR 265.173 and 174 (1996), respectively.

Incompatible wastes shall be managed in accordance with 40 CFR 265.177 (1996), based on process knowledge (i.e., shall not be placed in the same container and shall be separated such that in the event of a spill, leak, or release, suspected incompatible wastes shall not contact one another).

Wastes shall be characterized in accordance with the requirements of 40 CFR 262.11 (1996). Characterization will be based on laboratory results, process knowledge, or a combination thereof. Wastes pending characterization will be marked with "Hazardous Waste Awaiting Analysis" labels until regulatory status can be determined through the receipt and evaluation of laboratory results. Once a waste determination has been made, the waste containers shall be relabeled to reflect the correct regulatory status. Waste shall be traceable to its source and/or samples considered analogous to the waste (such as waste drill core associated with a sample). Traceability shall be maintained by numbering containers and keeping appropriate records which trace waste to samples, areas, or products. After receipt of analytical results, RCRA-regulated hazardous wastes will be labeled and marked in accordance with the requirements of 40 CFR 262.32 (1996), and State of Nevada requirements, such as writing the *EPA Waste Code* on the hazardous waste label. If the waste is not RCRA-regulated hazardous waste, the label will be removed and the waste managed as radioactive or sanitary waste.

The RCRA-regulated hazardous wastes will be accumulated at the site of generation in accordance with 40 CFR 262.34 (1996). If more than 55 gal of waste is generated at the site (which is expected) and if a waste determination cannot be made within 90 days, a request for an extension will be made to NDEP. This request will be made prior to 90 days after the accumulation start date, as specified in 40 CFR 262.34 (1996). The waste will be transported to the permitted hazardous waste storage pad in Area 5 of the Nevada Test Site. The waste will ultimately be shipped to an off-site permitted treatment, storage, and disposal facility by an appropriately licensed and permitted hazardous waste hauler. A Uniform Hazardous Waste Manifest shall be completed prior to shipping hazardous waste off site in accordance with the requirements of 40 CFR 262.20, 262.21, 262.22, and 262.23 (1996).

If low-level waste is generated, it will be managed in accordance with the *Nevada Test Site Waste Acceptance Criteria*. It is not expected that mixed waste will be generated. Where there is conflict in regulations or requirements, the most stringent shall apply. For example, the 90-day accumulation time limit and weekly inspections per RCRA regulations 40 CFR 262.34 (1996) will be applied to mixed waste even though it is not required for radioactive waste. Conversely, while RCRA does not require traceability through the use of waste tracking tags, the waste acceptance program for LLW does; therefore, waste tracking tags shall be used for nonliquid waste. In general, mixed waste shall be managed in the same manner as hazardous waste. Suspected mixed waste will be managed in accordance with applicable regulations and requirements and will be marked with "Hazardous Waste Awaiting Analysis" label pending characterization and confirmation of its regulatory status. However, mixed waste shall be transported to the Nevada Test Site transuranic waste storage pad for storage pending treatment or disposal. Mixed waste with hazardous waste constituents below land disposal restrictions may be disposed of at the Area 5 Radioactive Waste Management Site under interim status.

6.0 Reporting

Following approval of this CAIP, the following is a tentative schedule of activities (in working days):

- Day 0: Preparation for field work will begin.
- Day 30: The field work, including field screening and sampling, will begin.
- Day 45: The field work will be completed and samples shipped to the laboratory for analysis.
- Day 90: The quality-assured laboratory analytical sample data will be available for NDEP review upon request.
- Day 150: The CADD will be submitted to NDEP.

The following information will be reported in the CADD:

- Introduction (including purpose, scope, an FFACO cross-walk) and a discussion about the need for further action
- The results of the corrective action investigation. A Data Quality Assessment (DQA) will be performed and presented in the CADD. While the formal DQA process discussed in EPA guidance documents (EPA, 1996) is heavily focused on statistical analysis of data, the sampling program set forth in the CAIP is primarily a biased sampling strategy. Therefore, certain elements of the five step process do not apply to the data collected at the Area 2 Photo Skid. However, the aspects of the DQA process which deal with data review will be applied. Chemical, radiological, and physical data will be critically reviewed and interpreted by senior scientists in each of these disciplines prior to use in decision-making. This DQA will compare the results of the investigation with the DQOs and discuss whether the DQOs were satisfied, and if not, then the investigation will be iterated. Any data rejected for use in decision-making will have a corresponding explanation.
- A corrective measures study, including initial screening of alternatives, evaluation of alternatives, and comparison of alternatives
- The recommended alternative

7.0 References

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Appendix A

Area 2 Photo Skid Water and Waste Plan

CABLE FABRICATION BLDG

PLAN
SCALE - 1"=50'

DETAIL
SCALE - NONE

VIEW A
SCALE - NONE

MATERIAL LIST

ITEM NO.	NO. REQUIRED	DESCRIPTION	VENDOR CAT. NO. OR EQUAL
①	50 FT.	4" VYLON V-46 SEWER PIPE	
②	3 EA.	45° VYLON V-46 " FITTING	KEENAN SUPPLY CO.
③	2 EA.	STD ELL VYLON " "	
④	2 EA.	WYE VYLON V-46 " "	LAS VEGAS
⑤	2 EA.	4" V-46 COUPLER " "	
⑥	2 EA.	CLEANOUT	
⑦	1 EA.	6"x6"x4" TEE - VYLON V-46	
⑧	1 EA.	SERVICE SADDLES, 2" TAPPING FOR 10" PIPE WITH FEMALE 1P THREADS	MUELLER H-16113 OR EQUAL
⑨	1 EA.	VALVE BOX WITH LID AND PLUG MUELLER OR EQUAL	H-10318 1" VALVE RIEGO 1207-2891
⑩	90'	2" SCH 40 PVC PIPE	MUELLER MOD 110 OR EQUAL
⑪	1 EA.	CORPORATION STOP MALE 1P THREADS 2" COMPRESSION END FOR PVC PIPE	WATTS MFD 1500 OR EQUAL
⑫	1 EA.	1" PRESSURE REDUCING VALVE 1 BOX	

GENERAL NOTES

- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE NTS STANDARD CONSTRUCTION SPECIFICATIONS AND THE UNIFORM PLUMBING CODE.
- ALL SEWER PIPE SHALL BE LAID TRUE TO LINE AND GRADE IN ACCORDANCE WITH SECTION 29.4.3 OF THE NTS STANDARD CONSTRUCTION SPECIFICATIONS.
- ALL CONCRETE SHALL HAVE A COMPRESSIVE STRENGTH OF 3000 psi IN SEVEN DAYS.
- TESTING SHALL BE IN ACCORDANCE WITH SECTION 29.13 OF THE NTS STANDARD CONSTRUCTION SPECIFICATIONS FOR SEWER LATERAL CONSTRUCTION.
- ALL CONSTRUCTION SHALL BE INSPECTED BY A HOLMES & NARVER, INC., INSPECTOR.
- ALL WATER LINES ABOVE GROUND SHALL BE INSULATED AND WRAPPED TO PREVENT FREEZING.
- ALL WATER LINES SHALL BE BURIED TO A MINIMUM DEPTH OF 36".
- TESTING AND DISINFECTING SHALL BE IN ACCORDANCE WITH A.M.W.A. STD. C.601.
- AN ELECTRICALLY CONDUCTIVE WIRE SHALL BE INSTALLED WITH THE PIPING TO FACILITATE LOCATING BY GROUNDING.

NO.	DATE	REVISIONS	BY	CK	A.E.	APP.
U.S. DEPARTMENT OF ENERGY						
NEVADA OPERATIONS OFFICE			LAS VEGAS, NEVADA			
DESIGNED:	NEVADA TEST SITE-AREA 2 — LLNL					
DRAWN:	AREA 2 ANNEX					
CHECKED:	PHOTO SKID-WATER & WASTE PLAN					
PROJECT ENGINEER:	PLAN & DETAILS					
SUBMITTED:	AGENCY APPROVAL:	DOE APPROVAL:	DATE:			
HOLMES & NARVER INC.	Robert C. Brown	Robert C. Brown	6-11-94			
HOLMES & NARVER INC. ENGINEERS-CONSTRUCTORS ENERGY SUPPORT DIVISION 2753 SOUTH HIGHLAND DRIVE LAS VEGAS, NEVADA			D. D. NO. DRAWING NUMBER JS002-054-C1			
SHEET 1 OF 1						

Appendix B

Area 2 Photo Skid Photographic Chemicals

EG&G ENERGY MEASUREMENTS

Las Vegas Area Operations

EG&G ENERGY MEASUREMENTS, INC., P.O. BOX 1912 LAS VEGAS, NEVADA 89125 TEL (702) 295-5511

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MHS 20

23 September 1988

Mr. Orin L. Haworth, M/S 706
Reynolds Electrical & Engineering Co., Inc.
P. O. Box 98521
Las Vegas, NV 89193-8521

Subject: AREA 2 PHOTO SKID PHOTOGRAPHIC CHEMICALS

Dear Mr. Haworth:

The enclosed MSDS's for photo chemicals used at the Area 2 photo skid and their approximate use rate have been forwarded for your evaluation of the regulatory status of the processing effluents generated at the subject skid.

If your assessment of the situation indicates the need for sampling, please advise this office of any support that REECo may provide.

Very truly yours,

Jim Kesler
Environmental Specialist

JWK:smk

Enclosure a/s

cc: Jack Maddox, w/enclosure
Pat Murphy, w/enclosure

Information

Frank Bingham, DOE/NV, w/enclosure
Steve Mellington, DOE/NV, w/enclosure
Mark Van der Puy, DOE/NV, w/enclosure

<u>PHOTO CHEMICAL</u>	<u>AVERAGE USE RATE</u>
KODAK EKTAPRINT II Developer Replenisher RT Parts A, B, C, D	10 gal./mo. each part
Bleach - Fix, Replenisher RT Parts A, B	10 gal./mo. each part
KODAK Rapid Fixer Parts A, B	10 gal./mo. each part
KODAK Duraflo RT Developer Replenisher Parts A, B	10 gal./mo. each part
Developer Starter	10 gal./mo.
KODAK Flexicolor Developer Replenisher Parts A, B, C	5 gal./mo. each part
Bleach Replenisher Parts A, B	5 gal./mo. each part
Fixer Replenisher	5 gal./mo.

Estimated Operating Parameters

water use - 180 gal./hr.
replenishing rate - 200 ml/180 gal. water
average operating frequency - 80 hr./mo.

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

CAIP Photo Skid
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Date: 1/16/97
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For Emergency Health, Safety, and Environmental Information, call: (716) 722-5151

For other information call: (716) 722-2121. Date of Preparation: 4/13/82

SECTION I. IDENTIFICATION

- Product Name: KODAK EKTAPRINT 2 Developer Replenisher RT, Part A
- Formula: Aqueous Mixture
- Formula Date: 1/16/81
- Kodak Photographic Chemicals Catalog Number(s): CAT 186 5310 - To Make 5 Gallons; CAT 186 5278 - To Make 25 Gallons
- Solution Number: 4308
- Kodak Accession Number: 365625
- *Kodak Hazard Rating Codes: R: 2 S: 2 F: 1 C: 0

*The Kodak Health Hazard Rating Code for Respiratory (R) exposure and Skin and Eye (S) exposure is on a scale of Low = 1; Moderate = 2; and High = 3. The Kodak Fire (F) and Reactivity (C) Hazard Codes are on an ascending scale from 0 to 4. F denotes relative flammability and C denotes relative reactivity or instability. Subcategories of C: (W) - water reactive, (A) - pyrophoric, (X) - oxidizer.

DO NOT CONFUSE WITH NFPA CODES!

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. COMPONENT(S):	Percent	TLV*	Kodak Accession No.	CAS Reg. No.
*Benzyl alcohol	50-55	---	900040	100-51-6
*Triethanolamine	30-35	---	901599	102-71-6
Water	10-15	---	035290	7732-18-5

[*Principal Hazardous Component(s)]

B. PRECAUTIONARY LABEL STATEMENT(S):

WARNING! Causes irritation of skin and eyes.
Vapor irritating.
Use with adequate ventilation.
Do not get in eyes, on skin, on clothing.
In case of contact, flush skin or eyes with plenty of
water; for eyes, get medical attention.

K-0008.600A
81-0167

SECTION V. PHYSICAL DATA

- Appearance and Odor: Clear, amber solution; amine odor
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 15 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Applicable
- Vapor Density (Air = 1): ~ 3.65
- Volatile Fraction by Weight: ~ 65 %
- Specific Gravity (H₂O = 1): 1.09
- n: ~ 10.7
- Solubility in Water (by Weight): Complete

SECTION VI. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Flammable Limits in Air (% by volume in air): None
- Extinguishing Media: Water spray, CO₂
- Special Fire Fighting Procedures: None
- Special Fire and Explosion Hazards: None

SECTION VII. REACTIVITY DATA

- Stability: Stable
- Incompatibility: None
- Hazardous Decomposition Products:
 - As with any other organic material, combustion will produce carbon dioxide and probably carbon monoxide.
 - Oxides of Nitrogen may also be present.
- Hazardous Polymerization: Will not occur.

SECTION VIII. TOXICITY AND HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: Not Applicable

EXPOSURE EFFECTS:

- Inhalation: Vapor may cause upper respiratory tract irritation.
- Eyes: Contact with the liquid or vapor may cause eye irritation.
- Skin: Causes irritation.
 - Prolonged skin contact may result in toxic amounts being absorbed through the skin.

C. FIRST AID:

- Inhalation: Remove from exposure, treat symptomatically, and get medical attention if symptoms persist.
- Eyes: Immediately flush eyes with plenty of water and get medical attention.

Skin: Flush in with plenty of water.

If severe skin irritation or central nervous system depression occurs, get medical attention.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. RESPIRATORY PROTECTION:

An appropriate NIOSH-approved respirator for organic vapor should be worn if needed.

B. VENTILATION:

Local Exhaust: Recommended

Mechanical (General): Recommend at least ten air changes per hour for good general room ventilation.

C. SKIN AND EYE PROTECTION:

Protective gloves should be worn.

Safety glasses should be worn.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

None

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Wear suitable protective equipment.

Avoid inhalation and/or skin contact.

Small Amount - flush material to sewer with large amounts of water.

Large amount - absorb material in vermiculite or other suitable absorbent and place in impervious container.

Contract with licensed chemical waste disposal agency.

Federal, state, and local regulations take precedence.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact: 1.2

This chemical formulation has a high biological oxygen demand, and it is expected to cause significant oxygen depletion in aquatic systems. Other than problems caused by oxygen depletion, this chemical formulation is expected to have a low potential to affect aquatic organisms, secondary waste treatment microorganisms and the germination and growth of some plants. The components of this chemical formulation are expected to be readily biodegradable and are not likely to bioconcentrate. If diluted with a large amount of water, a small quantity of this chemical formulation released into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

Transportation information may be obtained by requesting an EXTERNAL TRANSPORTATION ADDENDUM sheet by catalog number(s) from Kodak Publications Data Services, Eastman Kodak Company, 343 State Street, Rochester, New York 14650.

SECTION XII. REFERENCES

1. Unpublished Data. Health, Safety, and Human Factors Laboratory. Eastman Kodak Company, Rochester, New York.
2. Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, New York, N.Y., 1977.

The information herein is believed to be correct as of the date hereof, but is provided without warranty of any kind.

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call (716) 722-5151
For all other purposes, call the Marketing and Distribution Center in your area.

Date of Preparation: 1/13/83 Revised Approved by U.S. Department of Labor

SECTION I. IDENTIFICATION

- Product Name: KODAK EKTAPRINT 2 Developer Replenisher RT, Part B
- Formula: Aqueous Mixture
- Formula Date: 1/16/81
- Kodak Photographic Chemicals Catalog Number(s): CAT 186 5310 - To Make 5 Gallons; CAT 186 5278 - To Make 25 Gallons
- Solution Number: 4659
- Kodak Accession Number: 365872

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. COMPONENT(S):	Percent	TLV*	Kodak Accession No.	CAS Reg. No.
Water	70-75	---	035290	7732-18-5
*Hydroxylamine sulfate	15-20	---	904718	10039-54-0
Lithium chloride	5-10	---	908202	7447-41-8

[*Principal Hazardous Component(s)]

B. PRECAUTIONARY LABEL STATEMENT(S):

WARNING: May cause skin irritation and allergic skin reaction.
 Avoid contact with skin and eyes.
 In case of contact, immediately flush with plenty of water;
 for eyes, get medical attention.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear, colorless solution; odorless
- Boiling Point: $> 100^{\circ}\text{C}$ ($> 212^{\circ}\text{F}$) @ 760 mmHg
- Vapor Pressure: ~ 17 mmHg @ 20°C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: $\sim 75\%$
- Specific Gravity ($\text{H}_2\text{O} = 1$): 1.16
- pH: ~ 2.8
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: Non
- Flammable Limits in Air (% by volume in air): None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures: None
- Unusual Fire and Explosion Hazards: None

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility:
 - None with common materials and contaminants with which the product can reasonably come into contact.
- Hazardous Decomposition Products: None
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. THRESHOLD LIMIT VALUES: Not Applicable

B. EXPOSURE EFFECTS

Eyes: Causes eye irritation.

Skin: Prolonged or repeated skin contact may cause skin irritation and may result in an allergic skin reaction.

C. FIRST AID:

Eyes: Immediately flush eyes with plenty of water and get medical attention.

Skin: Flush skin with plenty of water.
If skin irritation or an allergic skin reaction develops, get medical attention.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. RESPIRATORY PROTECTION: None should be needed.

B. VENTILATION:

Local Exhaust: None should be needed.

Mechanical (General): Recommended

C. SKIN AND EYE PROTECTION:

Protective gloves should be worn.

Safety glasses should be worn.

The routine use of a non-alkaline (acid) type of hand cleaner will help minimize the possibility of allergic skin reaction.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

None

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Wear suitable protective equipment.

Flush material to sewer with large amounts of water.

The direct instantaneous discharge to a receiving body of water of an amount of this chemical formulation which will rapidly produce, by dilution, a final concentration of 0.1 mg/L or less is not expected to cause an adverse environmental effect.

Federal, state, and local regulations take precedence.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:^{1,2,3,4}

This chemical formulation has a moderate biological oxygen demand, and it is expected to cause some oxygen depletion in aquatic systems. It is expected to have a high potential to affect aquatic organisms, and the germination and growth of some plants. It is expected to have a low potential to affect secondary waste treatment microorganisms. The components of this chemical formulation are expected to be biodegradable and are not likely to bioconcentrate. The direct instantaneous discharge to a receiving body of water of an amount of this chemical formulation which will rapidly produce, by dilution, a final concentration of 0.1 mg/L or less is not expected to cause an adverse environmental effect. However, after dilution with a large amount of water, followed by secondary waste treatment, the chemicals in this formulation are not expected to have any adverse environmental impact.

SECTION XI. TRANSPORTATION

Transportation information may be obtained by requesting an EXTERNAL TRANSPORTATION ADDENDUM sheet by catalog number(s) from Kodak Publications Data Services, Eastman Kodak Company, 343 State Street, Rochester, New York 14650.

SECTION XII. REFERENCES

1. Unpublished Data. Health, Safety, and Human Factors Laboratory.
Eastman Kodak Company, Rochester, New York.
2. Battelle's Columbus Laboratories, Water Quality Critical Data Book -
Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the
Literature Through 1968, for the U.S. Environmental Protection Agency,
Project No. 18050 GWV, Contract No. 68-01-007, May 1971.
3. National Association of Photographic Manufacturers, Inc. and
Hydroscience, Inc., Environmental Effects of Photoprocessing Chemicals,
National Association of Photographic Manufacturers, Harrison, New York,
1974, 2 vols.
4. Kodak Publication J-41, BOD₅ and COD of Photographic Chemicals,
Eastman Kodak Co., 1981

The information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers.

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

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Date: 1/16/97
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For Emergency Health, Safety, and Environmental Information, call 716 722-5151
For other purposes, call the Marketing and Distribution Center in your area.

Revised Date of Preparation: 9/25/87

Kodak Accession Number: 365747

SECTION I. IDENTIFICATION

- Product Name: KODAK EKTAPRINT 2 Developer Replenisher RT, Part C.
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 186 5310 - To Make 5 Gallons CAT 186 5278 - To Make 25 Gallons
- Solution Number: 4410
- Kodak's Hazard Rating Codes: R: 2 S: 3 F: 1 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A.	PRINCIPAL COMPONENT(S):	Weight Percent	TLV(R)	Kodak Accession No.	CAS Reg. No.
	Water	70-50	---	035290	7732-18-5
	*4-(Ethyl-N-2-methanesulfonylaminoethyl)-2-methylphenylenediamine sesquisulfate monohydrate	25-30	---	905401	25646-71-3
	Potassium sulfite	1-5	---	907064	10117-38-1

*Principal Hazardous Component(s)

B. PRECAUTIONARY LABEL STATEMENT(S):

CONTAINS: 4-(Ethyl-N-2-methanesulfonylaminoethyl)-2-methyl-phenylene diaminesesquisulfate monohydrate

WARNING

HARMFUL IF SWALLOWED

VAPOR IRRITATING

CAUSES SKIN AND EYE IRRITATION

CAN CAUSE ALLERGIC SKIN REACTION

Avoid breathing vapor.

Avoid contact with eyes, skin, and clothing.

Use with adequate ventilation.

Wash thoroughly after handling.

First Aid: In case of eye contact, immediately flush with plenty of water for at least 15 minutes. In case of skin contact, immediately wash with soap and plenty of water. If inhaled, remove to fresh air. If swallowed, if conscious, immediately rinse mouth and induce vomiting by giving 2 glasses of water and touching back of throat with finger or blunt object. Call a physician immediately.

K-0011.600C
81-0169

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear, amber solution; sharp odor
- Boiling Point: GT 100 C (GT 212 F) @ 760 mmHg
- Vapor Pressure: approx 18 mmHg @ 20 C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): approx 0.6
- Volatile Fraction by Weight: approx 75 %
- Specific Gravity (H2O = 1): 1.11
- pH: approx. 1.1
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Water spray, Dry chemical, CO2, Alcohol foam
- Special Fire Fighting Procedures:
Wear self-contained breathing apparatus and protective clothing.
- Unusual Fire and Explosion Hazards:
Fire or excessive heat may cause production of hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong oxidizers, Mineral acids, or Strong alkali
- Hazardous Decomposition Products:
Combustion will produce carbon dioxide and probably carbon monoxide. Oxides of nitrogen and sulfur may also be present.
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. THRESHOLD LIMIT VALUE:

Not Applicable. However, sulfur dioxide gas is liberated from the concentrate; its TLV is 2 ppm (ACGIH, 1981).

B. EXPOSURE EFFECTS:

Inhalation: Sulfur dioxide gas in low concentration can cause upper respiratory tract irritation.

Eyes: Contact with the liquid can cause eye irritation. Sulfur dioxide gas may cause eye irritation.

Skin: Prolonged or repeated skin contact can cause skin irritation. May cause an allergic skin reaction.

Ingestion: May be harmful if swallowed.

K-0011.600C
81-0169

C. FIRST AID:

Inhalation: Remove from exposure, treat symptomatically, and get medical attention if symptoms persist.

Eyes: Immediately flush eyes with plenty of water and get medical attention.

Skin: Flush skin with plenty of water. If skin irritation or an allergic skin reaction develops, get medical attention.

Ingestion: If swallowed, if conscious, rinse mouth and induce vomiting immediately by giving 1 or 2 glasses of water and touching back of throat with finger or blunt object and/or induce vomiting with syrup of ipecac. Never give anything by mouth to an unconscious person.

CALL A PHYSICIAN AT ONCE

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. RESPIRATORY PROTECTION:

An appropriate NIOSH-approved respirator for sulfur dioxide gas should be worn if needed.

B. VENTILATION:

Local Exhaust: If needed to control sulfur dioxide gas.

Mechanical (General): Recommend at least ten air changes per hour for good general room ventilation.

C. SKIN AND EYE PROTECTION:

Protective gloves should be worn.

Safety glasses should be worn.

The routine use of a non-alkaline (acid) type of hand cleaner will help minimize the possibility of allergic skin reaction.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Keep container tightly closed and away from mineral acids, or strong alkali.

Keep from contact with oxidizing materials.

K-0011.600C
81-0169

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Avoid inhalation and skin contact.
Wear suitable protective equipment.
Neutralize with baking soda (sodium bicarbonate).
Small Amount - flush material to sewer with large amounts of water.
Large Amount - contract with licensed chemical waste disposal agency.
The direct instantaneous discharge to a receiving body of water of an amount of this chemical formulation which will rapidly produce, by dilution, a final concentration of 0.1 mg/L or less is not expected to cause an adverse environmental effect.
Federal, state, and local regulations take precedence.

SECTION X. ENVIRONMENTAL EFFECTS DATA

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact: (1-5)

This chemical formulation is a strongly acidic aqueous solution, and this property may cause adverse environmental effects. It is expected to have a low biological oxygen demand, and it is not expected to cause oxygen depletion in aquatic systems. It is expected to have high potential to affect aquatic organisms and secondary waste treatment microorganisms and a moderate potential to affect the germination of some plants. It is expected to have a low potential to affect the growth of some plants. The organic component of this chemical formulation is biodegraded or biotransformed to materials which are not likely to bioconcentrate and which have a low potential to affect aquatic organisms or secondary waste treatment microorganisms. The components of this chemical formulation are not likely to bioconcentrate. The direct instantaneous discharge to a receiving body of water of an amount of this formulation which will rapidly produce, by dilution, a final concentration of 0.1 mg/L, or less, is not expected to cause an adverse environmental effect. After dilution with a large amount of water, followed by secondary waste treatment, the chemicals in this formulation are not expected to have any adverse environmental impact.

SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

K-0011.600C
87-0174

SECTION XII. REFERENCES

1. Unpublished data, Health and Environment Laboratories, Eastman Kodak Company, Rochester, NY.
2. National Association of Photographic Manufacturers, Inc, and Hydrosience, Inc., Environmental Effects of Photoprocessing Chemicals, National Association of Photographic Manufacturers, Harrison, New York. 1974, 2 vols.
3. Battelle's Columbus Laboratories, Water Quality Criteria Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-0007, May 1971.
4. Kodak Publication J-41, BOD5 and COD of Photographic Chemicals, Eastman Kodak Co., 1981.
5. McKee, J.E. and Wolf, H.W., Eds., Water Quality Criteria, State of California, Publication No. 3-A, 1963.

The information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers.

K-0011.600C
@186 5310*
@186 5278*
81-0169

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

CAIP Photo Skid
Appendix B
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Date: 1/16/97
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For Emergency Health, Safety, and Environmental Information, call: (716) 722-5151

For other information call: (716) 722-2121. Date of Preparation: 3/30/82

SECTION I. IDENTIFICATION

- Product Name: KODAK EKTAPRINT 2 Developer Replenisher RT, Part D
- Formula: Aqueous Mixture
- Formula Date: 1/16/81
- Kodak Photographic Chemicals Catalog Number(s): CAT 186 5310 - To Make 5 Gallons; CAT 186 5278 - To Make 25 Gallons
- Solution Number: 4598
- Kodak Accession Number: 365831
- *Kodak Hazard Rating Codes: R: 1 S: 3 F: 0 C: 0

*The Kodak Health Hazard Rating Code for Respiratory (R) exposure and Skin and Eye (S) exposure is on a scale of Low = 1; Moderate = 2; and High = 3. The Kodak Fire (F) and Reactivity (C) Hazard Codes are on an ascending scale from 0 to 4. F denotes relative flammability and C denotes relative reactivity or instability. Subcategories of C: (W) - water reactive, (A) - pyrophoric, (X) - oxidizer.

DO NOT CONFUSE WITH NFPA CODES!

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. COMPONENT(S):	Percent	TLV ^o	Kodak Accession No.	CAS Reg. No.
Water	55-60	---	035290	7732-18-5
*Potassium carbonate	30-35	---	900409	584-08-7
*Potassium hydroxide	1-5	2 mg/m3 Ceiling	901383	1310-58-3

[*Principal Hazardous Component(s)]

B. PRECAUTIONARY LABEL STATEMENT(S):

WARNING! Causes eye burns.
Causes skin irritation.
Do not get in eyes.
Avoid prolonged or repeated contact with skin.
In case of contact, immediately flush with plenty of water;
for eyes, get medical attention.
Note to physician: Caustic solution. Treat accordingly.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear, colorless solution; odorless
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 17 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Applicable
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 60 %
- Specific Gravity (H₂O = 1): 1.42
- pH: > 13
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Flammable Limits in Air (% by volume in air): None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures: None
- Unusual Fire and Explosion Hazards: None

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Avoid strong mineral acids.
- Hazardous Decomposition Products:
As with any other organic material, combustion will produce carbon dioxide and probably carbon monoxide.
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. THRESHOLD LIMIT VALUE: See Section II

B. EXPOSURE EFFECTS:

Eyes: Causes eye burns.

Skin: Prolonged or repeated skin contact may cause skin irritation and/or burns.

C. FIRST AID:

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.

Skin: Immediately flush skin with plenty of water for at least 15 minutes and get medical attention if symptoms are present after washing.

Remove contaminated clothing and shoes.

Laundry contaminated clothing before reuse.

Discard contaminated shoes.

Note to Physicians: Caustic solution. Treat accordingly.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. RESPIRATORY PROTECTION: None should be needed.

B. VENTILATION:

Local Exhaust: None should be needed.

Mechanical (General): Recommended

C. SKIN AND EYE PROTECTION:

Protective gloves should be worn.

The use of safety glasses with side shields or goggles are recommended.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Store away from strong mineral acids.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Avoid inhalation and/or skin contact.

Wear suitable protective equipment.

Neutralize with sodium bisulfate.

Flush material to sewer with large amounts of water.

Federal, state, and local regulations take precedence.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:^{1,2}

This chemical formulation is a strongly alkaline aqueous solution, and this property is the only one expected to cause adverse environment effects. If this formulation is diluted sufficiently, no adverse environmental impact would be expected.

SECTION XI. TRANSPORTATION

Transportation information may be obtained by requesting an EXTERNAL TRANSPORTATION ADDENDUM sheet by catalog number(s) from Kodak Publications Data Services, Eastman Kodak Company, 343 State Street, Rochester, New York 14650.

SECTION XII. REFERENCES

1. Unpublished Data. Health, Safety, and Human Factors Laboratory.
Eastman Kodak Company, Rochester, New York.
 2. Battelle's Columbus Laboratories, Water Quality Critical Data Book -
Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the
Literature Through 1968, for the U.S. Environmental Protection Agency,
Project No. 18050 GWV, Contract No. 68-01-007, May 1971.
-

The information herein is believed to be correct as of the date hereof,
but is provided without warranty of any kind.

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

CAIP Photo Skid
Appendix B
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For Emergency Health, Safety, and Environmental Information, call 716 722-5151
For there purposes, call the Marketing and Distribution Center in your area.

Revised Date of Preparation: 9/25/87

Kodak Accession Number: 365745

SECTION I. IDENTIFICATION

- Product Name: KODAK EKTAPRINT 2 Bleach-Fix and Replenisher RT, Part A
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 186 5351 - To Make 25 Gallons; CAT 186 5377 - To Make 5 Gallons
- Solution Number: 4504
- Kodak Hazard Rating Codes: R: 1 S: 1 F: 0 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A.	COMPONENT(S):	Percent	TLV(R)	Kodak Accession No.	CAS Reg. No.
	Water	50-55	---	035290	7732-18-5
	Ammonium thiosulfate	35-40	---	909586	7783-18-8
	Sodium metabisulfite	5-10	5 mg/m3	903498	7681-57-4

B. PRECAUTIONARY LABEL STATEMENT(S):

LOW HAZARD FOR RECOMMENDED HANDLING

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear, light green solution; sharp odor
- Boiling Point: GT 100 C (GT 212 F) @ 760 mmHg
- Vapor Pressure: approx 17 mmHg @ 20 C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): approx 0.6
- Volatile Fraction by Weight: approx 55 %
- Specific Gravity (H2O = 1): 1.29
- pH: approx 5.6
- Solubility in Water (by Weight): Complete

K-0003.010C
82-0217

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None, noncombustible
- Extinguishing Media: Use appropriate agent for surrounding fire.
- Special Fire Fighting Procedures:
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards:
Fire or excessive heat may cause production of hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Mineral acids, or Strong alkali.
- Hazardous Decomposition Products: Thermal decomposition may produce oxides of sulfur and ammonia gas.
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

- A. THRESHOLD LIMIT VALUE: See Section II
- B. EXPOSURE EFFECTS: Low hazard
- C. FIRST AID: In case of contact, flush areas with plenty of water.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

- A. VENTILATION:
Good general ventilation should be sufficient.
- B. SKIN AND EYE PROTECTION:
For operations where prolonged or repeated skin contact may occur, impervious gloves should be worn.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Keep container tightly closed and away from mineral acids, or strong alkali.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush material to sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

SECTION X. ENVIRONMENTAL EFFECTS DATA

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact: (1-5)

This chemical formulation is a moderately acidic aqueous solution, and this property may cause adverse environmental effects. It is expected to have a moderate biological oxygen demand, and may cause some oxygen depletion in aquatic systems. It is expected to have a moderate to high potential to affect the growth of some plants. It is expected to have a low potential to affect aquatic organisms, secondary waste treatment microorganisms, and the germination of some plants. When diluted with a large amount of water, this formulation released directly or indirectly into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

SECTION XII. REFERENCES

1. Unpublished data, Health and Environment Laboratories, Eastman Kodak Company, Rochester, NY.
2. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-007, May 1971.
3. National Association of Photographic Manufacturers, Inc. and Hydrosience, Inc., Environmental Effects of Photoprocessing Chemicals, National Association of Photographic Manufacturers, Harrison, NY, 1974, 2 Vols.
4. Kodak Publication J-41, BOD5 and COD of Photographic Chemicals, Eastman Kodak Co., 1981.
5. McKee, J.E. and Wolf, H.W., Eds., Water Quality Criteria, State of California, Publication No. 3-A, 1963.

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K-0003.010C
@186-5377*
@186-5351*
82-0217

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

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For Emergency Health, Safety, and Environmental Information, call (716) 722-5151
For all other purposes, call the Marketing and Distribution Center in your area.

Date of Preparation: 4/4/83

Approved by U.S. Department of Labor

SECTION I. IDENTIFICATION

- Product Name: KODAK EKTAPRINT 2 Bleach-Fix and Replenisher RT, Part B
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 186 5393 - To Make 25 Gallons; CAT 186 5377 - To Make 5 Gallons
- Solution Number: 4328
- Kodak Accession Number: 365657

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. COMPONENT(S):	Percent	TLV*	Kodak Accession No.	CAS Reg. No.
Water	50-55	---	035290	7732-18-5
Ammonium[(ethylenedinitrilo)tetraaceto]-ferrate (III)	35-45		142479	21265-50-9
Ethylenediaminetetraacetic acid	5-10	---	905416	60-00-4

B. PRECAUTIONARY LABEL STATEMENT(S):

No health hazard warning language is needed on the containers.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Opaque, reddish-brown solution; ammoniacal odor
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 17 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 50 %
- Specific Gravity (H₂O = 1): 1.25
- pH: ~ 7.0
- Solubility in Water (by Weight): Complete

K-0003.020B
82-0218

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Flammable Limits in Air (% by volume in air): None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures:
 - Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards:
 - Fire or excessive heat may cause production of hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility:
 - None with common materials and contaminants with which the product may reasonably come into contact.
- Hazardous Decomposition Products:
 - Carbon dioxide, ammonia, oxides of nitrogen
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

- A. THRESHOLD LIMIT VALUE: See Section II
- B. EXPOSURE EFFECTS: Low hazard
- C. FIRST AID: In case of contact, flush areas with plenty of water.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

- A. RESPIRATORY PROTECTION: None should be needed.
- B. VENTILATION:

Local Exhaust: None should be needed.

Mechanical (General): Recommended

- C. SKIN AND EYE PROTECTION:

None should be needed, but good industrial hygiene practice should be followed.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

None

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush material to sewer with large amounts of water.
Federal, state, and local regulations take precedence.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact: 1,2,3,4

This chemical formulation has a low biological oxygen demand, and it is expected to cause little oxygen depletion in aquatic systems. It is expected to have a moderate potential to affect secondary waste treatment microorganisms. It is expected to have a low potential to affect aquatic organisms. The components of this chemical formulation are not likely to bioconcentrate. If diluted with a large amount of water, a moderate quantity of this chemical formulation released directly or indirectly into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

Transportation information may be obtained by requesting an EXTERNAL TRANSPORTATION ADDENDUM sheet by catalog number(s) from Kodak Publications Data Services, Eastman Kodak Company, 343 State Street, Rochester, New York 14650.

SECTION XII. REFERENCES

1. Unpublished Data. Health, Safety, and Human Factors Laboratory. Eastman Kodak Company, Rochester, New York.
 2. Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, New York, N.Y., 1977.
 3. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-007, May 1971.
 4. Kodak Publication J-41, BOD₅ and COD of Photographic Chemicals, Eastman Kodak Co., 1981.
-

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@186-5377*
@186-5393*
82-0218

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

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For Emergency Health, Safety, and Environmental Information, call (716) 722-5151
For all other purposes, call the Marketing and Distribution Center in your area.

Date of Preparation: 7/30/83

Approved by U.S. Department of Labor

SECTION I. IDENTIFICATION

- Product Name: KODAK Rapid Fixer, Part A
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 186 6342 - 52 Gallons; CAT 128 2839 - 30 Gallons; CAT 197 3247 - 5 Gallons; CAT 146 4114 - To Make 5 Gallons; CAT 146 4106 - To Make 1 Gallon
- Solution Number: 4896
- Kodak Accession Number: 427810

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

PRINCIPAL			Kodak	
A. COMPONENT(S):	Percent	TLV [®]	Accession No.	CAS Reg. No.
Water	40-50	---	035290	7732-18-5
Ammonium thiosulfate	40-50	---	909586	7783-18-8
Sodium acetate	5-10	---	900227	127-09-3
Boric acid	< 5	---	901064	10043-35-3

B. PRECAUTIONARY LABEL STATEMENT(S):

Commercial Label

No health hazard warning language is needed on the containers.

Household Label

Contains boric acid

CAUTION! HARMFUL IF TAKEN INTERNALLY.
If swallowed, induce vomiting.
Call a physician at once.
KEEP OUT OF THE REACH OF CHILDREN

D-0018.000F
82-1264

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear light yellow solution; slight sulfur dioxide and acetic acid odor
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 18 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 50 %
- Specific Gravity (H₂O = 1): 1.305
- pH: 4.37
- Solubility in Water: Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures:
 - Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards:
 - Fire or excessive heat may cause production of hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong alkali
- Hazardous Decomposition Products: Ammonia
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

- A. EXPOSURE LIMITS: Not Applicable
- B. EXPOSURE EFFECTS: Low hazard

Ingestion: Harmful if taken internally.

- C. FIRST AID: In case of eye contact, flush with plenty of water.

Ingestion: If swallowed, if conscious, rinse mouth and induce vomiting immediately by giving 1 or 2 glasses of water and touching back of throat with finger or blunt object. Never give anything by mouth to an unconscious person.

CALL A PHYSICIAN AT ONCE.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. RESPIRATORY PROTECTION: None should be needed.

B. VENTILATION:

Local Exhaust: None should be needed.

Mechanical (General): Recommended.

C. SKIN AND EYE PROTECTION:

None should be needed, but good industrial hygiene practice should be followed.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Avoid contact with strong alkali.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush material to sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact: 1,2,3,4

This chemical formulation has a high biological oxygen demand, and it is expected to cause significant oxygen depletion in aquatic systems. It is expected to have a low potential to affect aquatic organisms. It is expected to have a moderate potential to affect secondary waste treatment microorganisms. It is expected to have a moderate to high potential to affect the germination and growth of some plants. The components of this chemical formulation are biodegradable and are not likely to bioconcentrate. If diluted with a large amount of water, this chemical formulation released directly or indirectly into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

Transportation information may be obtained by requesting an EXTERNAL TRANSPORTATION ADDENDUM sheet by catalog number(s) from Kodak Publications Data Services, Eastman Kodak Company, 343 State Street, Rochester, New York 14650.

SECTION XII. REFERENCES

1. Toxicity results are from unpublished data, Health, Safety, and Human Factors Laboratory, Eastman Kodak Company, Rochester, New York.
 2. Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, New York, N.Y., 1977.
 3. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-007, May 1971.
 4. National Association of Photographic Manufacturers, Inc. and Hydrosience, Inc., Environmental Effects of Photoprocessing Chemicals, National Association of Photographic Manufacturers, Harrison, New York, 1974, 2 vols.
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@146-4106*
@146-4114*
@197-3247*
@128-2839*
@186-6342*

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

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For Emergency Health, Safety, and Environmental Information, call 716 722-5151
For other purposes, call the Marketing and Distribution Center in your area

Revised Date of Preparation: 6/12/87

Kodak Accession Number: 365686

SECTION I. IDENTIFICATION

- Product Name: KODAK Rapid Fixer, Part B
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 173 3013 - 72 ounces; CAT 197 3221 - 5 Gallons; CAT 146 4106 - To Make 1 Gallon; CAT 146 4114 - To Make 5 Gallons
- Solution Number: 4415
- Kodak Hazard Rating Codes: R: 1 S: 2 F: 0 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A.	COMPONENT(S):	Percent	TLV(R)	Kodak Accession No.	CAS Reg. No.
	Water	65-75	---	035290	7732-18-5
	Aluminum sulfate	15-20	2 mg/m3	907954	10043-01-3
	*Sulfuric acid	10-15	1 mg/m3**	907485	7664-93-9

*Principal Hazardous Component(s)

See Section VI-A for additional information on exposure limits.

B. PRECAUTIONARY LABEL STATEMENT(S):

Household Label

Contains sulfuric acid

DANGER

X POISON X

HARMFUL IF SWALLOWED

CAUSES SKIN AND EYE IRRITATION

First Aid: In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. In case of skin contact, immediately wash with soap and plenty of water. If swallowed do NOT induce vomiting. If conscious, immediately give a glass of milk or water. CALL A PHYSICIAN IMMEDIATELY. KEEP OUT OF REACH OF CHILDREN

(Label continued on page 2)

D-0019.000J
82-0041

Commercial Label:

Contains sulfuric acid

WARNING

CAUSES SKIN AND EYE IRRITATION

AVOID CONTACT WITH EYES, SKIN, AND CLOTHING

First Aid: In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention. In case of skin contact, immediately wash with soap and plenty of water.

SECTION III. PHYSICAL DATA

- Boiling Point: GT 100 C (GT 212 F) @ 760 mmHg
- Vapor Pressure: approx 17 mmHg @ 20 C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): approx 0.6
- Volatile Fraction by Weight: approx 71 %
- Specific Gravity (H2O = 1): 1.30
- pH: approx 1.0
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Flammable Limits in Air (% by volume in air): None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures: None
- Unusual Fire and Explosion Hazards: None

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Alkali
- Hazardous Decomposition Products: None
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. THRESHOLD LIMIT VALUE:

See Section II

OSHA Permissible Exposure Limit (PEL): 1 mg/m3 (sulfuric acid)

B. EXPOSURE EFFECTS:

Eyes: causes eye irritation.

Skin: Prolonged or repeated skin contact causes irritation.

Ingestion: May cause irritation or burns of the esophagus.

C. FIRST AID:

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.

D-0019.000J
82-0041

Skin: Immediately wash skin with soap and plenty of water.
Remove contaminated clothing and shoes. Get medical
attention if symptoms are present after washing.
Launder contaminated clothing before reuse.

Ingestion: Do not induce vomiting. Give milk or water.
CALL A PHYSICIAN AT ONCE.

D. TOXICITY DATA:

Test	Species	Result(2)	Classification (3)
Acute Oral LD50	Rat	0.5 - 5.0 g/Kg	Slightly toxic
Skin Irritation	Guinea Pig	Moderate irritation	
Skin Sensitization	Guinea Pig	None sensitized	
Eye Irritation	Rabbit	Moderate irritation	

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. RESPIRATORY PROTECTION: None should be needed.

B. VENTILATION:

Local Exhaust: None should be needed.

Mechanical (General): Recommended

C. SKIN AND EYE PROTECTION:

Protective gloves should be worn.

Safety glasses with side shields or goggles are recommended.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

None

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Wear suitable protective equipment.

Neutralize with sodium carbonate.

Flush material to sewer with large amounts of water.

Federal, state, and local regulations take precedence.

SECTION X. ENVIRONMENTAL EFFECTS DATA

This chemical formulation has not been tested for environmental effects. Some published data are available for the major components of this chemical formulation and these data have been used to provide the following estimate of environmental impact: 1

This chemical formulation is a strongly acidic aqueous solution, and this property is the only one expected to cause adverse environment effects. This chemical formulation has a low biological oxygen demand, and it is expected to cause little oxygen depletion in aquatic systems. It is expected to have a low potential to affect aquatic organisms. The components of this chemical formulation are not likely to bioconcentrate. If diluted with a large amount of water, a moderate quantity of this chemical formulation released into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

SECTION XII. REFERENCES

1. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-J1-007, May 1971.
2. Unpublished data, Health and Environment Laboratories, Eastman Kodak Company, Rochester, NY.
3. Hodge, H.C. and Sterner, J.H., American Industrial Hygiene Association Quarterly, 10, 93 (1949).

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D-0019.000J
@146-4114*
@146-4106*
@197-3221*
@173-3013*
82-0041

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call 716 722-5151.
For other purposes, call the Marketing and Distribution Center in your area.

Date of Preparation: 6/19/84

Approved by U.S. Department of Labor

SECTION I. IDENTIFICATION

- Product Name: KODAK DURAFLO RT Developer Replenisher, Part A
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 102 3209 - To Make 20 Gallons
- Solution Number: 5048
- Kodak Accession Number: 427919
- Kodak Hazard Rating Codes: R: 1 S: 3 F: 0 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. PRINCIPAL COMPONENT(S):	Weight Percent	TLV(R)	Kodak Accession No.	CAS Reg. No.
Water	60-70	---	035290	7732-18-5
Potassium carbonate	10-15	---	900409	584-08-7
Sodium sulfite	5-10	---	901148	7757-83-7
*Hydroquinone	1-5	2 mg/m3	900356	123-31-9
*Potassium hydroxide	1-5	2 mg/m3 Ceiling	901383	1310-58-3

*Principal Hazardous Component(s)

B. PRECAUTIONARY LABEL STATEMENT(S):

WARNING! Causes eye burns.
May cause skin irritation and allergic skin reaction.
Avoid contact with skin and eyes.
In case of contact, immediately flush with plenty of water; for eyes, get medical attention.
Note to physician: Caustic solution. Treat accordingly.

C-0051.700
84-0011

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SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear, slightly yellow solution; odorless
- Boiling Point: GT 100 C (GT 212 F) @ 760 mmHg
- Vapor Pressure: approx 18 mmHg @ 20 C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): approx 0.6
- Volatile Fraction by Weight: approx 70 %
- Specific Gravity (H2O = 1): 1.268
- pH: GT 12.0
- Solubility in Water (by Weight): Complete

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SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures:
- Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards:
- Fire or excessive heat may cause production of hazardous decomposition products.

=====

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong acids
- Hazardous Decomposition Products:
- Oxides of sulfur and carbon may be present.
- Hazardous Polymerization: Will not occur.

=====

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

- A. EXPOSURE LIMITS: See Section II
- B. EXPOSURE EFFECTS:
 - Eyes: Causes burns.
 - Skin: Prolonged or repeated skin contact may cause skin irritation.
May cause an allergic skin reaction.
- C. FIRST AID:
 - Eyes: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.
 - Skin: Flush skin with plenty of water and wash with a non-alkaline (acid) type of skin cleanser.
If skin irritation or an allergic skin reaction develops, get medical attention.
Note to Physicians: Caustic solution. Treat accordingly.

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SECTION VII. VENTILATION AND PERSONAL PROTECTION

Good general ventilation* should be sufficient.

*Typically 10 room volumes per hour is considered good general ventilation: Ventilation rates should be matched to conditions of use.

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A. SKIN AND EYE PROTECTION:

Wear safety glasses with side shields or goggles.
For operations where prolonged or repeated skin contact may occur, impervious gloves should be worn.
The routine use of a non-alkaline (acid) type of skin cleanser and regular cleaning of working surfaces, gloves, etc, will help minimize the possibility of allergic skin reaction.

=====

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Avoid contact with strong acids.

=====

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Neutralize with sodium bisulfate.
Flush material to an acid-free sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

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SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:1-11

This chemical formulation is a strongly alkaline aqueous solution, and this property may cause adverse environmental effects. This chemical formulation is expected to have a low biological oxygen demand, and it is expected to cause little oxygen depletion in aquatic systems. It is expected to have a high potential to affect aquatic organisms. It is expected to have a low to moderate potential to affect secondary waste treatment microorganisms and the germination and growth of some plants. The components of this chemical formulation are expected to be readily biodegradable and are not likely to bioconcentrate. The direct instantaneous discharge to a receiving body of water of an amount of this chemical formulation which will rapidly produce, by dilution, a final concentration of 0.1 mg/L or less is not expected to cause an adverse environmental effect. After dilution with a large amount of water, followed by secondary waste treatment, the chemicals in this formulation are not expected to have any adverse environmental impact.

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SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

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SECTION XII. REFERENCES

1. Toxicity results are from unpublished data, Health and Environment Laboratories, Eastman Kodak Company, Rochester, New York.
2. Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, New York, N.Y., 1977.
3. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-0007, May 1971.
4. National Association of Photographic Manufacturers, Inc. and Hydrosience, Inc., Environmental Effects of Photoprocessing Chemicals, National Association of Photographic Manufacturers, Harrison, New York, 1974, 2 Vols.
5. Kodak Publication J-41, "BOD5 and COD of Photographic Chemicals", Eastman Kodak Co., 1981.
6. Bridie, A.L., Wolff, C.J.M. and Winter, M., "BOD and COD of Some Petrochemicals," Water Res., 13(7), 627-30 (1979).
7. McKee, J.E. and Wolf, H.W., Eds., "Water Quality Criteria," State of California, Publication No. 3-A, 1963.
8. Bridie, A.L., Wolff, C.J.M. and Winter, M., "The Acute Toxicity of Some Petrochemicals to Goldfish," Water Res., 13(7), 623-6 (1979).
9. Bringmann, G. and Kuehn, R., "Results of the Damaging Effect of Water Pollutants on Daphnia magna," Z. Wasser Abwasser Forsch., 10(5), 161-6 (1977) (in German).
10. Bringmann, G. and Kuehn, R., "Results of Toxic Action of Water Pollutants on Daphnia magna (Straus) Tested by an Improved Standardized Procedure," Z. Wasser Abwasser Forsch., 15(1), 1-6 (1982) (in German).
11. Juhnke, I. and Luedemann, D., "Results of the Study of 200 Chemical Compounds on Acute Fish Toxicity Using the Golden Orfe Test," Z. Wasser Abwasser Forsch., 11(5), 161-4 (1978) (in German).

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2102-3209*
84-0011

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call (716) 722-5151
For all other purposes, call the Marketing and Distribution Center in your area.

Date of Preparation: 6/12/94 Approved by U.S. Department of Labor

SECTION I. IDENTIFICATION

- Product Name: KODAK DURAFLO RT Developer Replenisher, Part B
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 102 3308 - To Make 20 Gallons
- Solution Number: 5051
- Kodak Accession Number: 427920

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. PRINCIPAL COMPONENT(S)	Weight Percent	TLV*	Kodak Accession No.	CAS Reg. No.
Water	60-70	---	835290	7732-18-5
Sodium bisulfite	10-15	5 mg/m ³	900760	7631-90-5
Glutaraldehyde bis-bisulfite	5-10	---	909855	7420-89-5
Sodium sulfite	5-10	---	901148	7757-83-7

B. PRECAUTIONARY LABEL STATEMENT(S):

No health hazard warning language is needed on the containers.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear, yellow-white solution; slightly sweet odor
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 18 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 65 %
- Specific Gravity (N.O. = 1): 1.227
- pH: ~ 6.1
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures:
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards:
Fire or excessive heat may cause production of hazardous decomposition products.

84 0012

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong mineral acids
- Hazardous Decomposition Products: Sulfur dioxide
- Hazardous Polymerization: Will not occur.

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SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS: See Section II

B. EXPOSURE EFFECTS:

Inhalation: Low hazard for usual industrial handling.

Eyes: No specific hazard known to Eastman Kodak Company. However, any material that contacts the eye may be irritating.

Skin: Low hazard for usual industrial handling.

C. FIRST AID: In case of eye contact, flush with plenty of water.

SECTION VII. VENTILATION AND PERSONAL PROTECTION

Good general ventilation* should be sufficient to control airborne levels.

*Typically 10 room volumes per hour is considered good general ventilation: Ventilation rates should be matched to conditions of use.

A. SKIN AND EYE PROTECTION:

Safety glasses should be worn in any type of industrial chemical handling.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Avoid contact with strong mineral acids.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush to an acid-free sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:

This chemical formulation is expected to have a low biological oxygen demand, and it is expected to cause little oxygen depletion in aquatic systems. It is expected to have a low potential to affect aquatic organisms, secondary waste treatment microorganisms, and the germination and growth of some plants. The components of this chemical formulation are expected to be biodegradable and are not likely to bioconcentrate. When diluted with water, this chemical formulation released directly or indirectly into the environment is not expected to have a significant impact.

84-0012

SECTION XI TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

SECTION XII REFERENCES

1. Toxicity results are from unpublished data, Health and Environment Laboratories, Eastman Kodak Company, Rochester, New York.
2. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GRV, Contract No. 68-01-0007, May 1971.
3. National Association of Photographic Manufacturers, Inc. and Hydrosience, Inc., Environmental Effects of Photoprocessing Chemicals, National Association of Photographic Manufacturers, Harrison, New York, 1974, 2 Vols
4. Kodak Publication J-41, "800, and C00 of Photographic Chemicals", Eastman Kodak Co., 1981.

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MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call 716 722-5151
For other purposes, call the Marketing and Distribution Center in your area.

Date of Preparation: 6/25/84

Approved by U.S. Department of Labor

SECTION I. IDENTIFICATION

- Product Name: KODAK DURAFLO RT Developer Starter
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 101 6690 - 1 Quart
- Solution Number: 5001
- Kodak Accession Number: 427898
- Kodak Hazard Rating Codes: R: 2 S: 3 F: 1 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A.	COMPONENT(S):	Weight Percent	TLV(R)	Kodak Accession No.	CAS Reg. No.
	Water	55-60	---	035290	7732-18-5
	Sodium bromide	25-30	---	900879	7647-15-6
	*Acetic acid	15-20	10 ppm	900763	64-19-7

*Principal Hazardous Component(s)

B. PRECAUTIONARY LABEL STATEMENT(S):

CAUTION May cause burns.

Avoid contact with skin, eyes, and clothing.

Use with adequate ventilation.

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get medical attention.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear, colorless solution; vinegar odor
- Boiling Point: - GT 100 C (GT 212 F) @ 760 mmHg
- Vapor Pressure: approx 18 mmHg @ 20 C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): 0.7
- Volatile Fraction by Weight: approx 70 %
- Specific Gravity (H2O = 1): 1.286
- pH: approx 2.0
- Solubility in Water (by Weight): Complete

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84-0016

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Water spray; Dry chemical; CO2
- Special Fire Fighting Procedures:
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards: None

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong bases
- Hazardous Decomposition Products: None
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS: See Section II

B. EXPOSURE EFFECTS:

Inhalation: Vapor may cause upper respiratory tract irritation.

Eyes: Liquid may cause burns.
Vapor may cause eye irritation.

Skin: May cause burns.

C. FIRST AID:

Inhalation: Remove to fresh air. Treat symptomatically. Get medical attention if symptoms persist.

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.

Skin: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention if symptoms persist. Wash contaminated clothing before reuse.

SECTION VII. VENTILATION AND PERSONAL PROTECTION

A. VENTILATION:

Good general ventilation* should be used. Local exhaust ventilation or an enclosed handling system may be needed to control air contamination to acceptable levels.

*Typically 10 room volumes per hour is considered good general ventilation: Ventilation rates should be matched to conditions of use.

B. RESPIRATORY PROTECTION:

A NIOSH approved acid gas respirator should be worn if needed.
If respirators are used, a program should be instituted to assure compliance with OSHA standard 29CFR 1910.134.

C. SKIN AND EYE PROTECTION:

Wear safety glasses with side shields or goggles.
For operations where prolonged or repeated skin contact may occur, impervious gloves should be worn.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Store away from strong bases.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Neutralize with baking soda (sodium bicarbonate).
Flush material to sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:1-9

This chemical formulation is a moderately acidic aqueous solution, and this property is the only one expected to cause adverse environmental effects. This chemical formulation is expected to have a moderate biological oxygen demand, and it is expected to cause some oxygen depletion in aquatic systems. If undiluted or unneutralized, it is expected to have a moderate to high potential to affect the germination of some plants. It is expected to have a low potential to affect aquatic organisms, secondary waste treatment microorganisms, and the growth of some plants. The components of this chemical formulation are readily biodegradable and are not likely to bioconcentrate. When diluted or neutralized with water, this chemical formulation released directly or indirectly into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

SECTION XII. REFERENCES

1. Toxicity results are from unpublished data, Health and Environment Laboratories, Eastman Kodak Company, Rochester, New York.
2. Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, New York, N.Y., 1977.
3. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-0007, May 1971.
4. Kodak Publication J-41, "BOD5 and COD of Photographic Chemicals", Eastman Kodak Co., 1981.
5. McKee, J.E. and Wolf, H.W., Eds., "Water Quality Criteria," State of California, Publication No. 3-A, 1963.
6. Bringmann, G. and Kuehn, R., "Results of the Damaging Effect of Water Pollutants on Daphnia magna," Z. Wasser Abwasser Forsch., 10(5), 161-6 (1977) (in German).
7. Bringmann, G. and Kuehn, R., "Results of Toxic Action of Water Pollutants on Daphnia magna (Straus) Tested by an Improved Standardized Procedure," Z. Wasser Abwasser Forsch., 15(1), 1-6 (1982) (in German).
8. Juhnke, I. and Luedemann, D., "Results of the Study of 200 Chemical Compounds on Acute Fish Toxicity Using the Golden Orfe Test," Z. Wasser Abwasser Forsch., 11(5), 161-4 (1978) (in German).
9. Pomona College, Medicinal Chemistry Project, "Chemical Parameter Data Base," Leo, A.J. and Hansch, C., Eds., Seaver Chemistry Laboratory, Claremont, California, June 22, 1983.

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C-0052.500
@101-6690*
84-0016

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call 716-722-5151
For all other purposes, call the Marketing and Distribution Center in your area

Revised Date of Preparation: 11/7/86 Kodak Accession Number: 454110

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong acids
- Hazardous Decomposition Products: None
- Hazardous Polymerization: Will not occur.

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SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS: Not Applicable

B. EXPOSURE EFFECTS:

Inhalation: Low hazard for usual industrial handling.

Eyes: Causes irritation.

Skin: Causes irritation.

C. FIRST AID:

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.

Skin: Immediately flush skin with plenty of water for at least 15 minutes and get medical attention if symptoms are present after washing.

SECTION VII. VENTILATION AND PERSONAL PROTECTION

A. VENTILATION:

Good general ventilation should be sufficient.

B. SKIN AND EYE PROTECTION:

Safety glasses should be worn.
Impervious gloves should be worn.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Keep container tightly closed and away from acids.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush material to sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:

This chemical formulation is a moderately alkaline aqueous solution, and this property may cause adverse environment effects. This chemical formulation has a low biological oxygen demand, and it is expected to cause little oxygen depletion in aquatic systems. It is expected to have a low potential to affect aquatic organisms, secondary waste treatment microorganisms, and the germination and growth of some plants. The components of this chemical formulation are not likely to bioconcentrate. When diluted with water, this chemical formulation released directly or indirectly into the environment is not expected to have a significant impact.

8-0027.0000
84-0220

SECTION I. IDENTIFICATION

- Product Name: KODAK FLEXICOLOR Developer Replenisher, Part A
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 191 9042 - To Make 5 Gallons
- Solution Number: 5077
- Kodak's Internal Hazard Rating Codes: R: 1 S: 2 F: 0 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. PRINCIPAL COMPONENT(S):	Weight Percent	TLV*	Kodak Accession No.	CAS Reg. No.
Water	55-60	---	035290	7732-18-5
*Potassium carbonate	30-35	---	900409	584-08-7
Pentetic acid, pentasodium salt	1-5	---	909112	140-01-2
Sodium bisulfite 1-5	---	---	900760	7631-90-5

*Principal Hazardous Components

B. PRECAUTIONARY LABEL STATEMENT(S):

CONTAINS: potassium carbonate
CAUSES SKIN AND EYE IRRITATION
Avoid contact with eyes, skin, and clothing.
First Aid: In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. In case of eye contact, get medical attention.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear colorless solution; odorless
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 18 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 66 %
- Specific Gravity (N.O. = 1): 1.426
- pH: ~ 11.3
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures:
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards: None

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SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

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SECTION XII. REFERENCES

1. Unpublished data, Health and Environment Laboratories, Eastman Kodak Company, Rochester, New York.
 2. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-0007, May 1971.
 3. McKee, J.E. and Wolf, H.W., Eds., "Water Quality Criteria," State of California, Publication No. 3-A, 1963.
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EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call (716) 722 5151
or all other purposes, call the Marketing and Distribution Center in your area

Revised Date of Preparation: 10/9/85 Kodak Accession Number: 365901

SECTION I. IDENTIFICATION

- Product Name: KODAK FLEXICOLOR Developer Replenisher, Part B
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 191 9042 - To Make 5 Gallons, CAT 153 2753 - To Make 25 Gallons; CAT 163 7636 - To Make 75 Gallons
- Solution Number: 3505
- Kodak's Internal Hazard Rating Codes: R: 1 S: 2 F: 0 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. COMPONENT(S)	Weight Percent	TLV*	Kodak Accession No	CAS Reg. No
Water	70-75	---	035290	7732 18 5
*Hydroxylamine sulfate	25-30	---	900150	10039-54-0

*Principal Hazardous Component(s)

B. PRECAUTIONARY LABEL STATEMENT(S):

CONTAINS: hydroxylamine sulfate
WARNING!
HARMFUL IF ABSORBED THROUGH SKIN
CAUSES SKIN AND EYE IRRITATION
CAN CAUSE ALLERGIC SKIN REACTION
Avoid contact with eyes, skin, and clothing.
Wash thoroughly after handling.
First Aid: In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing. Wash contaminated clothing before reuse. Get medical attention.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear solution; odorless
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 18 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 75 %
- Specific Gravity (H₂O = 1): 1.17
- pH: ~ 3.0
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Use agent appropriate for surrounding fire.
- Special Fire Fighting Procedures: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards: None

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong alkali, strong oxidizers
- Hazardous Decomposition Products: None
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. THRESHOLD LIMIT VALUE: Not Applicable

B. EXPOSURE EFFECTS:

Inhalation: Low hazard for usual industrial handling.

Eyes: Causes irritation.

Skin: Causes irritation.
Harmful if absorbed through the skin.

C. FIRST AID:

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.

Skin: Flush skin with plenty of water for at least 15 minutes.
Remove contaminated clothing.
Wash contaminated clothing before reuse.
Get medical attention if symptoms persist.
If skin irritation or an allergic skin reaction develops, get medical attention.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. VENTILATION:

Good general ventilation should be sufficient.

B. SKIN AND EYE PROTECTION:

Protective gloves should be worn.
Safety glasses with side shields should be worn.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Keep from contact with oxidizing materials.
Store away from strong alkali.

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SECTION IX SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush material to sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:

This chemical formulation is a moderately acidic aqueous solution. This chemical formulation has a low biological oxygen demand, and it is expected to cause little oxygen depletion in aquatic systems. It is expected to have a high potential to affect aquatic organisms, secondary waste treatment microorganisms, and the germination of some plants. It is expected to have a low potential to affect the growth of some plants. The components of this chemical formulation are not likely to bioconcentrate. If diluted with a large amount of water, a small quantity of this chemical formulation released into the environment is not expected to have a significant impact.

SECTION XI TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

SECTION XII REFERENCES

1. Unpublished Data. Health, Safety, and Human Factors Laboratory, Eastman Kodak Company, Rochester, New York.
2. National Association of Photographic Manufacturers, Inc. and Hydrosience, Inc., Environmental Effects of Photoprocessing Chemicals, National Association of Photographic Manufacturers, Harrison, New York, 1974, 2 vols.

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MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call 716-722-5151
For other purposes, call the Marketing and Distribution Center in your area

Revised Date of Preparation: 4/8/86 Kodak Accession Number: 334898

SECTION I. IDENTIFICATION

- Product Name: KODAK FLEXICOLOR Developer Replenisher, Part C
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 191 9042 - 10, Make 5 Gallons
- Solution Number: 3496
- Kodak's Internal Hazard Rating Codes: R: 2 S: 3 F: 1 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. PRINCIPAL COMPONENT(S):	Weight Percent	ACGIH TLV(R)	Kodak Accession No	CAS Reg. No.
Water	66-65	---	035290	7732-18-5
*4-(N-Ethyl-N-2-hydroxyethyl)-2-methylphenylenediamine sulfate	35-40	---	904984	25646-77-9
Sodium metabisulfite	1-5	5 mg/m3	903-96	7681-57-4

*Principal Hazardous Component(s)

B. PRECAUTIONARY LABEL STATEMENT(S):

CONTAINS: 4-(N-Ethyl-N-2-hydroxyethyl)-2-methylphenylenediamine sulfate

WARNING!

HAZARDOUS IF SWALLOWED

MAY CAUSE KIDNEY INJURY

VAPOR IRRITATING

CAUSES SKIN AND EYE IRRITATION

CAN CAUSE ALLERGIC SKIN REACTION

Avoid breathing vapor.

Avoid contact with eyes, skin, and clothing.

Use with adequate ventilation.

Wash thoroughly after handling.

(Label continued on next page)

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81-0143

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First Aid: In case of eye contact, immediately flush with plenty of water for at least 15 minutes. In case of skin contact, immediately wash with soap and plenty of water. If inhaled, remove to fresh air. If swallowed, if conscious, immediately rinse mouth and induce vomiting by giving 2 glasses of water and touching back of throat with finger or blunt object. Call a physician immediately.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Reddish-brown solution, sulfur dioxide odor
- Boiling Point: GT 100 C (GT 212 F) @ 760 mmHg
- Vapor Pressure: ca. 18 mmHg @ 20 C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ca. 0.6
- Volatile Fraction by weight: ca. 0.0 %
- Specific Gravity (H2O = 1): 1.15
- pH: ca. 2.1
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Water spray; Dry chem. Carbon dioxide
- Special Fire Fighting Procedures: wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards: Fire or excessive heat may cause production of hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Strong oxidizers, strong acids, strong alkali
- Hazardous Decomposition Products: As with any other organic material, combustion will produce carbon dioxide and probably carbon monoxide. Oxides of nitrogen and sulfur may also be present.
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS:

See Section II.

In addition, sulfur dioxide gas is liberated from the concentrate; its TLV is 2 ppm (ACGIH 1985-86).

B. EXPOSURE EFFECTS:

Inhalation: Sulfur dioxide gas in low concentrations can cause upper respiratory tract irritation.

81-0143

-3-

Eyes: Liquid causes irritation.
Sulfur dioxide gas may cause eye irritation.

Skin: Causes irritation.
May cause allergic skin reaction.

Ingestion: Harmful if swallowed.
May cause kidney injury.

C FIRST AID:

Inhalation: Remove to fresh air. Treat symptomatically. Get medical attention if symptoms persist.

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.

Skin: Flush skin with plenty of water and wash with a non-alkaline (acid) type of skin cleanser.
If skin irritation or an allergic skin reaction develops, get medical attention.

Ingestion: If swallowed, if conscious, induce vomiting immediately by giving 1 or 2 glasses of water and touching back of throat with finger or blunt object and/or induce vomiting with syrup of ipecac. Never give anything by mouth to an unconscious person.
CALL A PHYSICIAN AT ONCE.

SECTION VII. VENTILATION AND PERSONAL PROTECTION

A. VENTILATION:

Good general ventilation* should be used. Local exhaust ventilation or an enclosed handling system may be needed to control air contamination.

*Typically 10 room volumes per hour is considered good general ventilation: Ventilation rates should be matched to conditions of use.

B. RESPIRATORY PROTECTION:

A NIOSH-approved acid gas respirator should be worn if needed. If respirators are used, a program should be instituted to assure compliance with OSHA standard 29CFR 1910.134

C. SKIN AND EYE PROTECTION:

Impervious gloves should be worn
Safety glasses with side shields or goggles should be worn.
The routine use of a non-alkaline (acid) type of hand cleaner will help minimize the possibility of allergic skin reaction.

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SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Keep from contact with oxidizing materials.
Keep container tightly closed and away from strong acids and strong alkali.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush to an acid-free sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

SECTION X. ENVIRONMENTAL EFFECTS DATA

This chemical formulation has a low biological oxygen demand, and it is expected to cause little oxygen depletion in aquatic systems. It is expected to have a high potential to affect aquatic organisms, secondary waste treatment microorganisms, and the germination of some plants. It is expected to have a low potential to affect the growth of some plants. The direct instantaneous discharge to a receiving body of water of an amount of this chemical formulation which will rapidly produce, by dilution, a final concentration of 0.1 mg/L or less is not expected to cause an adverse environmental effect. However, after dilution with a large amount of water, followed by secondary waste treatment, the chemicals in this formulation are not expected to have any adverse environmental impact.1,2,3

SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

SECTION XII. REFERENCES

1. Unpublished Data. Health, Safety, and Human Factors Laboratory Eastman Kodak Company, Rochester, New York.
2. National Association of Photographic Manufacturers, Inc. and Hydrosience, Inc., Environmental Effects of Photoprocessing Chemicals, National Association of Photographic Manufacturers, Harrison, NY, 1974, 2 Vols.
3. Kodak Publication J-41, BOD5 and COD of Photographic Chemicals, Eastman Kodak Co., 1981.

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MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call 716-722-5151
For all other purposes, call the Marketing and Distribution Center in your area

Revised Date of Preparation: 10/9/85 Kodak Accession Number: 355033

SECTION I. IDENTIFICATION

- Product Name: KODAK FLEXICOLOR Bleach Replenisher, Part A
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 123 7734 - To Make 12 1/2 Gallons; CAT 123 7759 - To Make 5 Gallons; Cat 123 7775 - To Make 75 Gallons
- Solution Number: 3887
- Kodak's Internal Hazard Rating Codes: R: 1 S: 1 F: 0 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. COMPONENT(S):	Weight Percent	TLV*	Kodak Accession No.	CAS Reg No.
Water	50-55	---	035290	7732-18-5
Ammonium bromide	30-35	---	902601	12124-97-9
Potassium nitrate	5-10	---	905357	7757-79-1
Acetic acid	1-5	10 ppm	900763	64-19-7

B. PRECAUTIONARY LABEL STATEMENT(S):

LOW HAZARD FOR RECOMMENDED HANDLING

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear water-white solution; vinegar odor
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 18 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 55 %
- Specific Gravity (M.O = 1): 1.31
- pH: ~ 2.5
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Use agent appropriate for surrounding fire.
- Special Fire Fighting Procedures:
 - Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards:
 - Fire or excessive heat may cause production of hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility:
 - Strong alkali, combustible materials
- Hazardous Decomposition Products:
 - As with any other organic material, combustion will produce carbon dioxide and probably carbon monoxide.
 - Oxides of nitrogen may also be present.
 - Ammonia, bromine, hydrogen bromide gas
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS: See Section II

B. EXPOSURE EFFECTS:

Inhalation: Low hazard for usual industrial handling.

Eyes: No specific hazard known to Eastman Kodak Company. However, any material that contacts the eye may be irritating.

Skin: Low hazard for usual industrial handling.

C. FIRST AID: In case of eye contact, flush with plenty of water.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. VENTILATION:

Good general ventilation should be sufficient.

B. SKIN AND EYE PROTECTION:

None should be needed, but good industrial hygiene practice should be followed.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Keep container tightly closed and away from alkali.
Dried product residue can increase the burning rate of combustible materials. Avoid contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Neutralize with baking soda (sodium bicarbonate).
Flush material to sewer with large amounts of water.
Discharge, treatment, or disposal may be subject to federal, state, or local laws.

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SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:

This chemical formulation has a moderate biological oxygen demand, and it is expected to cause some oxygen depletion in aquatic systems. It is expected to have a low potential to affect aquatic organisms, secondary waste treatment microorganisms, and the growth of some plants. It is expected to have a moderate potential to affect the germination of some plants. The components of this chemical formulation are biodegradable and are not likely to bioconcentrate. If diluted with a large amount of water, a moderate quantity of this chemical formulation released into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

SECTION XII. REFERENCES

1. Unpublished Data. Health, Safety, and Human Factors Laboratory. Eastman Kodak Company, Rochester, New York.
2. Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, New York, N.Y., 1977.
3. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-007, May 1971.
4. Kodak Publication J-41, BOD and COD of Photographic Chemicals, Eastman Kodak Co., 1981.

The information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers.

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

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For Emergency Health, Safety, and Environmental Information, call (716) 722-5151
For all other purposes, call the Marketing and Distribution Center in your area.

Date of Preparation: 4/20/83

Approved by U.S. Department of Labor

SECTION I. IDENTIFICATION

- Product Name: KODAK FLEXICOLOR Bleach Replenisher, Part B
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 123 8419 - To Make 12 1/2 Gallons; CAT 123 7759 - To Make 5 Gallons; CAT 123 8435 - To Make 75 Gallons
- Solution Number: 3422
- Kodak Accession Number: 354877

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

A. COMPONENT(S):	Percent	TLV*	Kodak Accession No.	CAS Reg. No.
Water	45-55	---	035290	7732-18-5
Ammonium [(ethylenedinitrilo)tetraaceto]-ferrate (III)	40-45	---	142479	21265-50-9
Ammonia	1-5	25 ppm	900562	1336-21-6

B. PRECAUTIONARY LABEL STATEMENT(S):

No health hazard warning language is needed on the containers.

SECTION III. PHYSICAL DATA

- Appearance and Odor: Opaque, reddish-brown solution; slight ammoniacal odor
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 18 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 55 %
- Specific Gravity (H₂O = 1): 1.29
- pH: ~ 7.0
- Solubility in Water (by Weight): Complete

Q-0014.000B
82-0201

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Flammable Limits in Air (% by volume in air): None
- Extinguishing Media: Not Applicable
- Special Fire Fighting Procedures:
Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards:
Fire or excessive heat may cause production of hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Metals
- Hazardous Decomposition Products: Ammonia
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

- A. THRESHOLD LIMIT VALUE: See Section II
- B. EXPOSURE EFFECTS: Low hazard
- C. FIRST AID: In case of contact, flush areas with plenty of water.
- D. ANIMAL TOXICITY DATA

<u>Test</u>	<u>Species</u>	<u>Result</u> ⁽¹⁾	<u>Classification</u> ⁽²⁾
Oral LD ₅₀	Rat	0.5 - 5.0 g/kg	Slightly toxic
Skin Irritation	Rabbit	Slight irritation	
Eye Irritation	Rabbit	Slight irritation	

SECTION VII. PERSONAL PROTECTION AND CONTROLS

- A. RESPIRATORY PROTECTION: None should be needed.
- B. VENTILATION:

Local Exhaust: None should be needed.

Mechanical (General): Recommended

- C. SKIN AND EYE PROTECTION:

None should be needed, but good industrial hygiene practice should be followed.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Avoid contact with metals.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush material to sewer with large amounts of water.
Federal, state, and local regulations take precedence.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:^{1,3,4,5}

This chemical formulation is expected to have a moderate potential to affect aquatic organisms and the germination of some plants. It is expected to have a low potential to affect secondary waste treatment microorganisms. The components of this chemical formulation are expected to be biodegradable and are not likely to bioconcentrate. If diluted with a large amount of water, a small quantity of this chemical formulation released directly or indirectly into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

Transportation information may be obtained by requesting an EXTERNAL TRANSPORTATION ADDENDUM sheet by catalog number(s) from Kodak Publications Data Services, Eastman Kodak Company, 343 State Street, Rochester, New York 14650.

SECTION XII. REFERENCES

1. Unpublished Data. Health, Safety, and Human Factors Laboratory. Eastman Kodak Company, Rochester, New York.
2. Hodge, H.C., and Sterner, J.H., Am. Indust. Hyg. Assn. Quart. 10:93, 1949.
3. Verschueren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand Reinhold Company, New York, N.Y., 1977.

4. Battelle's Columbus Laboratories, Water Quality Critical Data Book - Vol. 3 - Effects of Chemicals on Aquatic Life - Selected Data from the Literature Through 1968, for the U.S. Environmental Protection Agency, Project No. 18050 GWV, Contract No. 68-01-007, May 1971.
5. National Association of Photographic Manufacturers, Inc. and Hydrosience, Inc., Environmental Effects of Photoprocessing Chemicals, National Association of Photographic Manufacturers, Harrison, New York, 1974, 2 vols.

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82-0201

MATERIAL SAFETY DATA SHEET

EASTMAN KODAK COMPANY
343 State Street
Rochester, New York 14650

For Emergency Health, Safety, and Environmental Information, call (716) 722-5151
or all other purposes, call the Marketing and Distribution Center in your area.

Revised Date of Preparation: 10/9/85

Kodak Accession Number: 365599

SECTION I. IDENTIFICATION

- Product Name: KODAK FLEXICOLOR Fixer and Replenisher
- Formula: Aqueous Mixture
- Kodak Photographic Chemicals Catalog Number(s): CAT 156 5175 - To Make 1 Gallon; CAT 159 7392 - To Make 25 Gallons; CAT 163 7735 - To Make 75 Gallons; CAT 169 3837 - To Make 5 Gallons
- Solution Number: 4273
- Kodak's Internal Hazard Rating Codes: R: 1 S: 1 F: 0 C: 0

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

PRINCIPAL COMPONENT(S)	Weight Percent	TLV*	Kodak Accession No.	CAS Reg. No.
Ammonium thiosulfate	50-55	---	909586	7783-18-8
Water	35-40	---	035290	7732-18-5
Sodium sulfite	1-5	---	901148	7757-83-7
Ammonium sulfite	1-5	---	063434	10196-04-0

B. PRECAUTIONARY LABEL STATEMENT(S):

LOW HAZARD FOR RECOMMENDED HANDLING

SECTION III. PHYSICAL DATA

- Appearance and Odor: Clear, slightly yellow solution; odorless
- Boiling Point: > 100 °C (> 212 °F) @ 760 mmHg
- Vapor Pressure: ~ 18 mmHg @ 20 °C
- Evaporation Rate (n-butyl acetate = 1): Not Available
- Vapor Density (Air = 1): ~ 0.6
- Volatile Fraction by Weight: ~ 40 %
- Specific Gravity (H₂O = 1): 1.3
- pH: ~ 6.2
- Solubility in Water (by Weight): Complete

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: None
- Extinguishing Media: Use agent appropriate for surrounding fire.
- Special Fire Fighting Procedures: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
- Unusual Fire and Explosion Hazards: Fire or excessive heat may cause production of hazardous decomposition products.

SECTION V. REACTIVITY DATA

- Stability: Stable
- Incompatibility: Mineral acids and alkali
- Hazardous Decomposition Products: Sulfur dioxide and ammonia
- Hazardous Polymerization: Will not occur.

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. THRESHOLD LIMIT VALUE: See Section II

B. EXPOSURE EFFECTS:

Inhalation: Low hazard for usual industrial handling.

Eyes: No specific hazard known to Eastman Kodak Company. However, any material that contacts the eye may be irritating.

Skin: Low hazard for usual industrial handling.

C. FIRST AID: In case of eye contact, flush with plenty of water.

SECTION VII. PERSONAL PROTECTION AND CONTROLS

A. VENTILATION:

Good general ventilation should be sufficient.

B. SKIN AND EYE PROTECTION:

Safety glasses should be worn in any type of industrial chemical handling.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Avoid contact with mineral acids and alkali.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Flush material to an acid-free sewer with large amounts of water. Discharge, treatment, or disposal may be subject to federal, state, or local laws.

SECTION X. ENVIRONMENTAL EFFECTS DATA

A. SUMMARY:

This chemical formulation has not been tested for environmental effects. Some laboratory test data and published data are available for the major components of this chemical formulation, and these data have been used to provide the following estimate of environmental impact:

This chemical formulation has a moderate biological oxygen demand, and it is expected to cause some oxygen depletion in aquatic systems. It is expected to have a low to moderate potential to affect aquatic organisms, secondary waste treatment microorganisms, and the germination and growth of some plants. The components of this chemical formulation are not likely to bioconcentrate. If diluted with a large amount of water, a moderate quantity of this chemical formulation released directly or indirectly into the environment is not expected to have a significant impact.

SECTION XI. TRANSPORTATION

For transportation information regarding this product, please phone the Eastman Kodak Distribution Center nearest you: Rochester, NY (716) 254-1300; Oak Brook, IL (312) 654-5300; Chamblee, GA (404) 455-0123; Dallas, TX (214) 241-1611; Whittier, CA (213) 945-1255; Honolulu, HI (808) 833-1661.

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