

DOCUMENTATION OF ENVIRONMENTAL INDICATOR DETERMINATION

RCRA Corrective Action Environmental Indicator (EI) RCRIS code (CA750) Migration of Contaminated Groundwater Under Control

Facility Name: BASF/American Cyanamid Agricultural PR

Facility Address: P.R. State Road #2, Km. 47.3, Manatí, Puerto Rico

Facility EPA ID #: PRD091065102

DEFINITIONS

Definition of Environmental Indicators (for the RCRA Corrective Action)

Environmental Indicators (1) (EI) are measures being used by the RCRA Corrective Action program to go beyond programmatic activity measures (e.g., reports received and approved, etc.) to track changes in the quality of the environment. The two EI developed to-date indicate the quality of the environment in relation to current human exposures to contamination and the migration of contaminated groundwater. An EI for non-human (ecological) receptors is intended to be developed in the future.

Definition of "Migration of Contaminated Groundwater Under Control" EI

A positive "Migration of Contaminated Groundwater Under Control" EI determination ("YE" status code) indicates that the migration of "contaminated" groundwater has stabilized, and that monitoring will be conducted to confirm that contaminated groundwater remains within the original "area of contaminated groundwater" (for all groundwater "contamination" subject to RCRA corrective action at or from the identified facility (i.e., site-wide)).

Relationship of EI to Final Remedies

While Final remedies remain the long-term objective of the RCRA Corrective Action program the EI are near term objectives which are currently being used as Program measures for the Government Performance and Results Act of 1993, GPRA). The "Migration of Contaminated Groundwater Under Control" EI pertains ONLY to the physical migration (i.e., further spread) of contaminated ground water and contaminants within groundwater (e.g., non-aqueous phase liquids or NAPLs). Achieving this EI does not substitute for achieving other stabilization or final remedy requirements and expectations associated with sources of contamination and the need to restore, wherever practicable, contaminated groundwater to be suitable for its designated current and future uses.

Duration / Applicability of EI Determinations

EI Determinations status codes should remain in RCRIS national database ONLY as long as they remain true (i.e., RCRIS status codes must be changed when the regulatory authorities become aware of contrary information).

AVAILABLE, RELEVANT AND SIGNIFICANT INFORMATION

1. Has all available relevant/significant information on known and reasonably suspected releases to the groundwater media, subject to RCRA Corrective Action (e.g., from Solid Waste Management Units (SWMU), Regulated Units (RU), and Areas of Concern (AOC)), been considered in this EI determination?

If yes - check here and continue with #2 below.

If no - re-evaluate existing data, or

If data are not available, skip to #8 and enter "IN" (more information needed) status code.

GROUND WATER KNOWN OR REASONABLY SUSPECTED TO BE CONTAMINATED

2. Is groundwater known or reasonably suspected to be "contaminated"¹ above appropriately protective "levels" (i.e., applicable promulgated standards, as well as other appropriate standards, guidelines, guidance, or criteria) from releases subject to RCRA Corrective Action, anywhere at, or from, the facility?

If yes – continue after identifying key contaminants, citing appropriate "levels," and referencing supporting documentation.

If no – skip to #8 and enter "YE" status code, after citing appropriate "levels," and referencing supporting documentation to demonstrate that groundwater is not "contaminated."

If unknown – skip to #8 and enter "IN" status code.

Rationale

BASF Agricultural Products (BASF) de PR facility (the "Site") is located in north central Puerto Rico at State Road No. 2 Km. 47.3 in the Municipality of Manatí (refer to *Attachment 1*). BASF manufacturing operations at Manatí have been dedicated to the formulation of liquid herbicides since February 2009. As the facility is currently operating, access to its premises is controlled by security at all times. Ongoing manufacturing operations at the Site occupy approximately 21.41 acres of a total of 27.37 acres of land owned by the company. (Ref. 3)

The facility is located within the Northern Coast Limestone Belt of Puerto Rico, overlying a sensitive aquifer system comprised of the Aguada and Aymamón limestone formations. This aquifer system represents an important water source for the Puerto Rico Aqueduct and Sewer Authority (PRASA), industries and agricultural users in the region. The aquifer is closely related to the nearby Tortugero Lagoon and normal groundwater flow is north-north east in the direction of the lagoon. A large, natural sinkhole lies approximately 300 feet southwest of the facility. The sinkhole is permitted as an injection

¹ "Contamination" and "contaminated" describes media containing contaminants (in any form, NAPL and/or dissolved, vapors, or solids, that are subject to RCRA) in concentrations in excess of appropriate "levels" (appropriate for the protection of the groundwater resource and its beneficial uses).

well to receive storm water runoff from the facility. The nearest major surface water body is the Rio Grande de Manatí, located approximately 1.25 miles southwest of the facility. (Ref. 1)

Potable water for the facility is provided by the Puerto Rico Aqueduct and Sewer Authority (PRASA). Although there are no groundwater wells located within the facility premises, process and fire water for the Site is provided by two groundwater extraction wells located at the adjoining Davis & Geck facility (D&G). These extraction wells, labeled North (#104114) and South (#104115), are operated by D&G and maintained by BASF. (Ref. 3) The North well is 286 feet deep and screened at 230 feet below land surface (bls) while the South well is 285 feet deep and is screened at 219 feet bls. (Ref. 2) Refer to *Attachment 3* for a diagram showing the location of the D&G groundwater extraction wells.

BASF acquired the Manatí Site in July 1, 2000 from the American Home Products Corporation (AHPC). AHPC, in turn, purchased the facility from Cyanamid Agricultural de PR, Inc. (Cyanamid) in November 24, 1994. (Ref. 3) Since March 1976, Cyanamid Agricultural de PR² owned and operated this facility and was engaged in the manufacturing of veterinary products. (Ref. 2)

A RCRA Facility Assessment (RFA) conducted at this facility by the PREQB in late 1990 identified eleven (11) SWMUs and four (4) AOCs. The 1990 RFA recommended no further action for all SWMUs and AOCs except for the Solvent Recovery Area (SWMU #6). EQB recommended further sampling at SWMU #6 due to observation of dark stains on the distillation tank's surface and on the trench surface. (Ref. 1)

In early 2000, AHPC commissioned an Environmental Site Assessment (ESA)³ to assess the overall environmental conditions of the site and its compliance status regarding environmental regulations. Although the 2000 ESA was primarily aimed at conducting soil sampling to further assess the potential environmental issues identified at the Solvent Recovery Area (SWMU #6)⁴, the former Drum Storage Area and the Tank Farm (refer to *Attachment 2*), it also sampled sediments at a nearby sinkhole⁵ and groundwater from both Davis & Geck's process water production wells and process water distribution system. (Ref. 2)

Analytical results for both well water samples revealed detections of two chlorinated volatile organic chemicals (VOCs), 1,1-dichloroethane and 1,1-dichloroethylene, below EPA's Maximum Contaminant Levels (MCLs) for drinking water. The results for the distribution system samples showed detections for

² Cyanamid Agricultural de PR, Inc., a subsidiary of the American Cyanamid Company, started manufacturing operations at this site in March 3, 1976; veterinary products were manufactured at the Manatí plant until 1993.

³ The 2000 ESA was conducted as an internal due diligence environmental assessment (i.e., in support of the innocent landowner defense under CERCLA) in accordance with the Phase 2 due diligence requirements and following the recommendations of the New Jersey Technical Regulations remediation guidance of 2000 regarding target analytes in environmental samples for remediation projects. Although EPA did not review nor approve the assessment's work plan, the ESA methodology seems to be consistent with the RCRA Corrective Action scheme, and its results are deemed to be valid.

⁴ The 1990 RFA Report recommended additional sampling only for SWMU #6; however, AHPC's ESA Report was more comprehensive in scope and addressed additional areas and media.

⁵ Sinkhole sediments sampling was included in the 2000 ESA in relation with a large kerosene spill that occurred in November 17, 1997 at the D&G plant, which impacted the sinkhole through the facility's stormwater collection system. EPA's records indicate that D&G notified and addressed the spill, undertook a cleanup effort and submitted a written notification on the spill remediation efforts to EPA in January 15, 1998.

trichloroethylene (TCE) slightly above EPA's current MCL of 1 ppb, as well as concentrations of 1,1-dichloroethane and 1,1-dichloroethylene below their respective MCLs. (Ref. 2)

The 2000 ESA groundwater sampling results showed no VOCs detections above applicable regulatory standards. Therefore, groundwater at the facility is not known or reasonably suspected to be contaminated above appropriately protective "levels" (i.e., as per EPA's MCLs) from releases subject to RCRA Corrective Action.

References

1. RCRA Facility Assessment Report, Cyanamid Agricultural of PR, Inc., Barceloneta⁶, Puerto Rico, PRD-091065102, prepared by Harold Carrasquillo Alberty, PREQB Land Pollution Control Area (LPCA), Hazardous Waste Division, December 1990.
2. Environmental Site Assessment (ESA) Report, American Cyanamid Company, Manatí, Puerto Rico Facility, prepared by Malcolm Pirnie, March 2, 2000.
3. E-mail correspondence addressed to Angel Salgado of EPA Region 2/CEPD/RRB from Doris Garcia of BASF Agricultural Chemicals, dated July 7, July 21, and July 23, 2014, on the subject of BASF Manatí CA-725 Environmental Indicators determination status. BASF's correspondence provided responses to EPA's June 25, July 7, and July 22, 2014 information requests aimed at clarifying some remaining data gaps regarding the Manati Site's operational history.

MIGRATION STABILIZED

3. Has the migration of contaminated groundwater stabilized (such that contaminated groundwater is expected to remain within "existing area of contaminated groundwater"⁷ as defined by the monitoring locations designated at the time of this determination)?

If yes – continue, after presenting or referencing the physical evidence (e.g., groundwater sampling/measurement/migration barrier data) and rationale why contaminated groundwater is expected to remain within the (horizontal or vertical) dimensions of the "existing area of groundwater contamination"²).

If no (contaminated groundwater is observed or expected to migrate beyond the designated locations defining the "existing area of groundwater contamination"²) – skip to #8 and enter "NO" status code, after providing an explanation.

⁶ The original document erroneously indicated Barceloneta although the facility is actually located in Manatí.

⁷ "existing area of contaminated groundwater" is an area (with horizontal and vertical dimensions) that has been verifiably demonstrated to contain all relevant groundwater contamination for this determination, and is defined by designated (monitoring) locations proximate to the outer perimeter of "contamination" that can and will be sampled/tested in the future to physically verify that all "contaminated" groundwater remains within this area, and that the further migration of "contaminated" groundwater is not occurring. Reasonable allowances in the proximity of the monitoring locations are permissible to incorporate formal remedy decisions (i.e., including public participation) allowing a limited area for natural attenuation.

If unknown – skip to #8 and enter “IN” status code.

Rationale

N/A

DISCHARGE INTO SURFACE WATER BODIES

4. Does “contaminated” groundwater discharge into surface water bodies?

If yes – continue after identifying potentially affected surface water bodies.

If no – skip to #7 (and enter a “YE” status code in #8, if #7 = yes) after providing an explanation and/or referencing documentation supporting that groundwater “contamination” does not enter surface water bodies.

If unknown – skip to #8 and enter “IN” status code.

Rationale

N/A

DISCHARGE LIKELY INSIGNIFICANT

5. Is the discharge of “contaminated” groundwater into surface water likely to be “insignificant” (i.e., the maximum concentration⁸ of each contaminant discharging into surface water is less than 10 times their appropriate groundwater “level,” and there are no other conditions (e.g., the nature, and number, of discharging contaminants, or environmental setting), which significantly increase the potential for unacceptable impacts to surface water, sediments, or eco-systems at these concentrations)?

If yes – skip to #7 (and enter “YE” status code in #8 if #7 = yes), after documenting: 1) the maximum known or reasonably suspected concentration³ of key contaminants discharged above their groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) provide a statement of professional judgment/explanation (or reference documentation) supporting that the discharge of groundwater contaminants into the surface water is not anticipated to have unacceptable impacts on the receiving surface water, sediments, or eco-system.

If no – (the discharge of “contaminated” groundwater into surface water is potentially significant) - continue after documenting: 1) the maximum known or reasonably suspected concentration of each contaminant discharged above its groundwater “level,” the value of the appropriate “level(s),” and if there is evidence that the concentrations are increasing; and 2) for any contaminants discharging into surface water in concentrations greater than 100 times their appropriate groundwater “levels,” the estimated total amount (mass in kg/yr) of each of these contaminants that are being discharged (loaded) into the surface water body (at the time of the

⁸ As measured in groundwater prior to entry to the groundwater-surface water/sediment interaction (e.g., hyporheic) zone.

determination), and identify if there is evidence that the amount of discharging contaminants is increasing.

If unknown – enter “IN” status code in #8.

Rationale

N/A

DISCHARGE CURRENTLY ACCEPTABLE

6. Can the discharge of “contaminated” groundwater into surface water be shown to be “currently acceptable” (i.e., not cause impacts to surface water, sediments or eco-systems that should not be allowed to continue until a final remedy decision can be made and implemented⁹)?

If yes – continue after either:

1) identifying the Final Remedy decision incorporating these conditions, or other site-specific criteria (developed for the protection of the site’s surface water, sediments, and eco-systems), and referencing supporting documentation demonstrating that these criteria are not exceeded by the discharging groundwater;

OR

2) providing or referencing an interim-assessment¹⁰, appropriate to the potential for impact, that shows the discharge of groundwater contaminants into the surface water is (in the opinion of a trained specialists, including ecologist) adequately protective of receiving surface water, sediments, and eco-systems, until such time when a full assessment and final remedy decision can be made. Factors which should be considered in the interim-assessment (where appropriate to help identify the impact associated with discharging groundwater) include: surface water body size, flow, use/classification/habitats and contaminant loading limits, other sources of surface water/sediment contamination, surface water and sediment sample results and comparisons to available and appropriate surface water and sediment “levels,” as well as any other factors, such as effects on ecological receptors (e.g., via bio-assays/benthic surveys or site-specific ecological Risk Assessments), that the overseeing regulatory agency would deem appropriate for making the EI determination.

If no – (the discharge of “contaminated” groundwater cannot be shown to be “currently acceptable”) - skip to #8 and enter “NO” status code, after documenting the currently unacceptable impacts to the surface water body, sediments, and/or eco-systems.

⁹ Note, because areas of inflowing groundwater can be critical habitats (e.g., nurseries or thermal refugia) for many species, appropriate specialist (e.g., ecologist) should be included in management decisions that could eliminate these areas by significantly altering or reversing groundwater flow pathways near surface water bodies.

¹⁰ The understanding of the impacts of contaminated groundwater discharges into surface water bodies is a rapidly developing field and reviewers are encouraged to look to the latest guidance for the appropriate methods and scale of demonstration to be reasonably certain that discharges are not causing currently unacceptable impacts to the surface waters, sediments or eco-systems.

If unknown – skip to 8 and enter “IN” status code.

Rationale

N/A

FUTURE MONITORING

7. Will groundwater monitoring / measurement data (and surface water/sediment/ecological data, as necessary) be collected in the future to verify that contaminated groundwater has remained within the horizontal (or vertical, as necessary) dimensions of the “existing area of contaminated groundwater?”

If yes – continue after providing or citing documentation for planned activities or future sampling/measurement events. Specifically identify the well/measurement locations which will be tested in the future to verify the expectation (identified in #3) that groundwater contamination will not be migrating horizontally (or vertically, as necessary) beyond the “existing area of groundwater contamination.”

If no – enter “NO” status code in #8.

If unknown - enter “IN” status code in #8.

Rationale

N/A

DETERMINATION

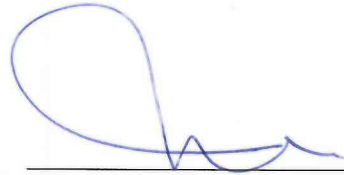
8. Check the appropriate RCRIS status codes for the Migration of Contaminated Groundwater Under Control EI (event code CA750), and obtain Supervisor (or appropriate Manager) signature and date on the EI determination below (attach appropriate supporting documentation as well as a map of the facility).

YE – Yes, “Migration of Contaminated Groundwater Under Control” has been verified. Based on a review of the information contained in this EI determination, it has been determined that the “Migration of Contaminated Groundwater” is “Under Control” at the facility, EPA ID # PRD091065102, located at P.R. State Road #2, Km. 47.3, Manatí, Puerto Rico. This determination will be re-evaluated when the Agency becomes aware of significant changes at the facility.

NO – Unacceptable migration of contaminated groundwater is observed or expected.

IN – More information is needed to make a determination.

Completed by (signature)

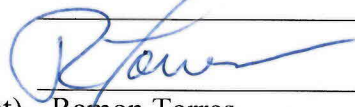


Date April 16, 2015

(print) Angel Salgado

(title) Environmental Scientist, Response & Remediation Branch

Supervisor (signature)



Date May 12, 2015

(print) Ramon Torres

(title) Branch Chief, Response & Remediation Branch

EPA region or state

Region 2 (CEPD)

Contact telephone and e-mail numbers:

Name: Angel Salgado
Telephone: 787-977-5854
Email: salgado.angel@epa.gov

ATTACHMENTS

The following attachments have been included in support to this EI determination.

Attachment 1 – Figure 1: Location Map (1982), BASF Agricultural Products de PR, Manatí (formerly Cyanamid Company), taken from the Environmental Site Assessment (ESA) Report, American Cyanamid Company, Manatí, Puerto Rico Facility, prepared by Malcolm Pirnie, dated March 2, 2000. (Second reference cited under Section 2, Page 4)

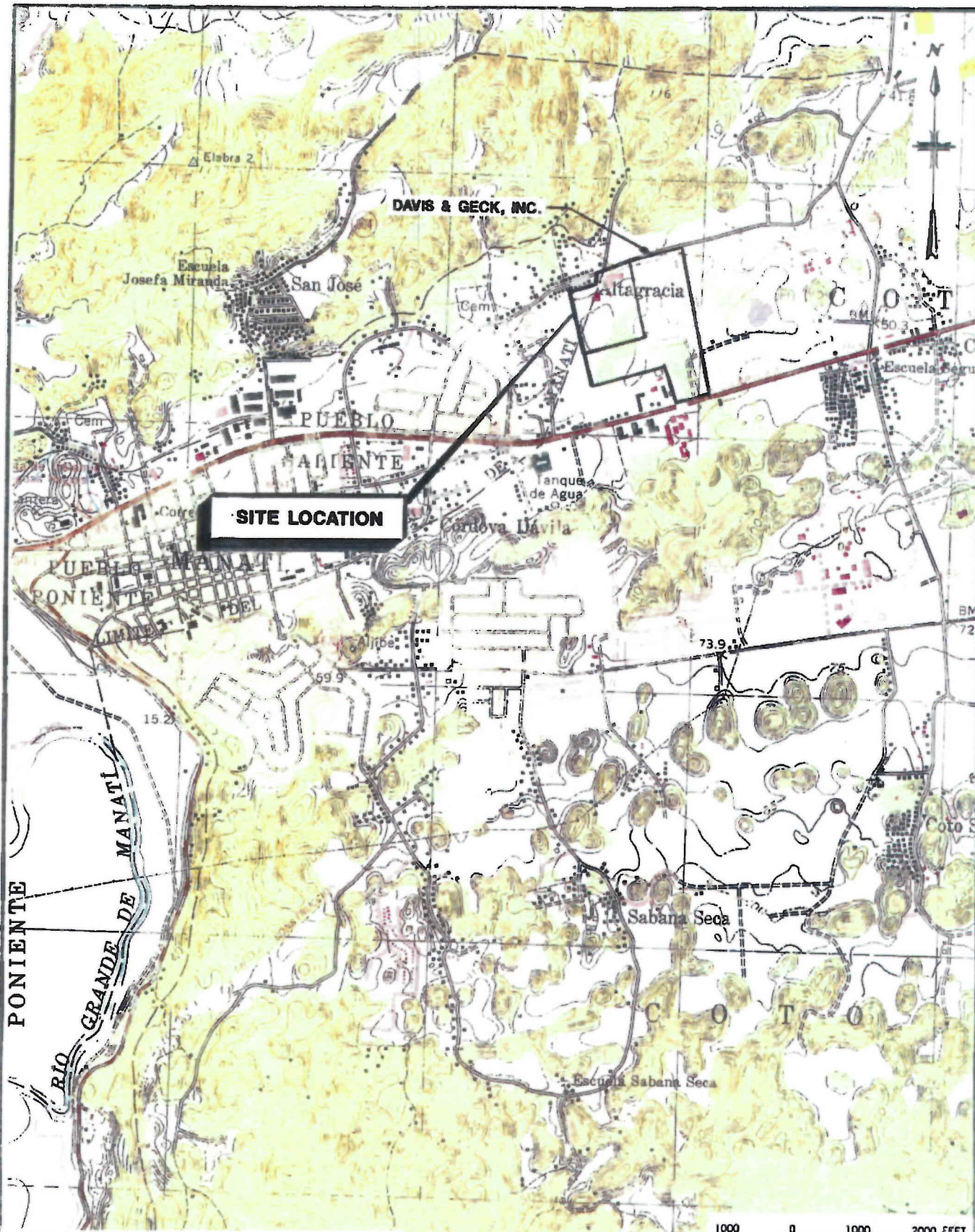
Attachment 2 – Figure 3: Plant Layout (1994), BASF Agricultural Products de PR, Manatí (formerly Cyanamid Company), taken from the Environmental Site Assessment (ESA) Report, American Cyanamid Company, Manatí, Puerto Rico Facility, prepared by Malcolm Pirnie, dated March 2, 2000. (Second reference cited under Section 2, Page 4)

Attachment 3 – BASF Northeast-Site Plan: BASF Process Water Extraction Wells Location Diagram¹¹, prepared by BASF Engineering Department, dated July 2014.

REFERENCES

1. U. S. Environmental Protection Agency. Environmental Indicators. [Online] September 4, 2012. <http://www.epa.gov/osw/hazard/correctiveaction/eis/index.htm>.

¹¹ Both groundwater wells are physically located in the adjoining D&G facility; D&G operates the wells while BASF provides maintenance.



SOURCE: MANATI, P.R. - USGS QUADRANGLE - 1969
PHOTOREVISED - 1982

1000 0 1000 2000 FEET
SCALE

**MALCOLM
PIRNIE**

CYANAMID AGRICULTURAL
De PUERTO RICO, INC.
LOCATION MAP

MALCOLM PIRNIE, INC.
2254-026
FIGURE 1

14-00000-0

SOURCE CAPRI PLANT INFORMATION, 1994

- 1 - ADMINISTRATION
- 2 - LABORATORY
- 3 - SOLID FORMULATION
- 4 - LIQUID FORMULATION
- 5 - CHEMICAL BLDG.
- 6 - UTILITIES
- 7 - MAINTENANCE SHOP
- 8 - TANK FARM
- 9 - SERVICE BUILDING
- 10 - WAREHOUSE
- 11 - DG FACILITY
- 12 - DRUM STORAGE AREA
- 13 - STORAGE SHED
- 14 - STORAGE SHED
- 15 - STORAGE AREA
- 16 - EMERGENCY VEHICLES GARAGE

- 17 - SOLVENT RECOVERY
- 18 - BONE YARD

Attachment 2

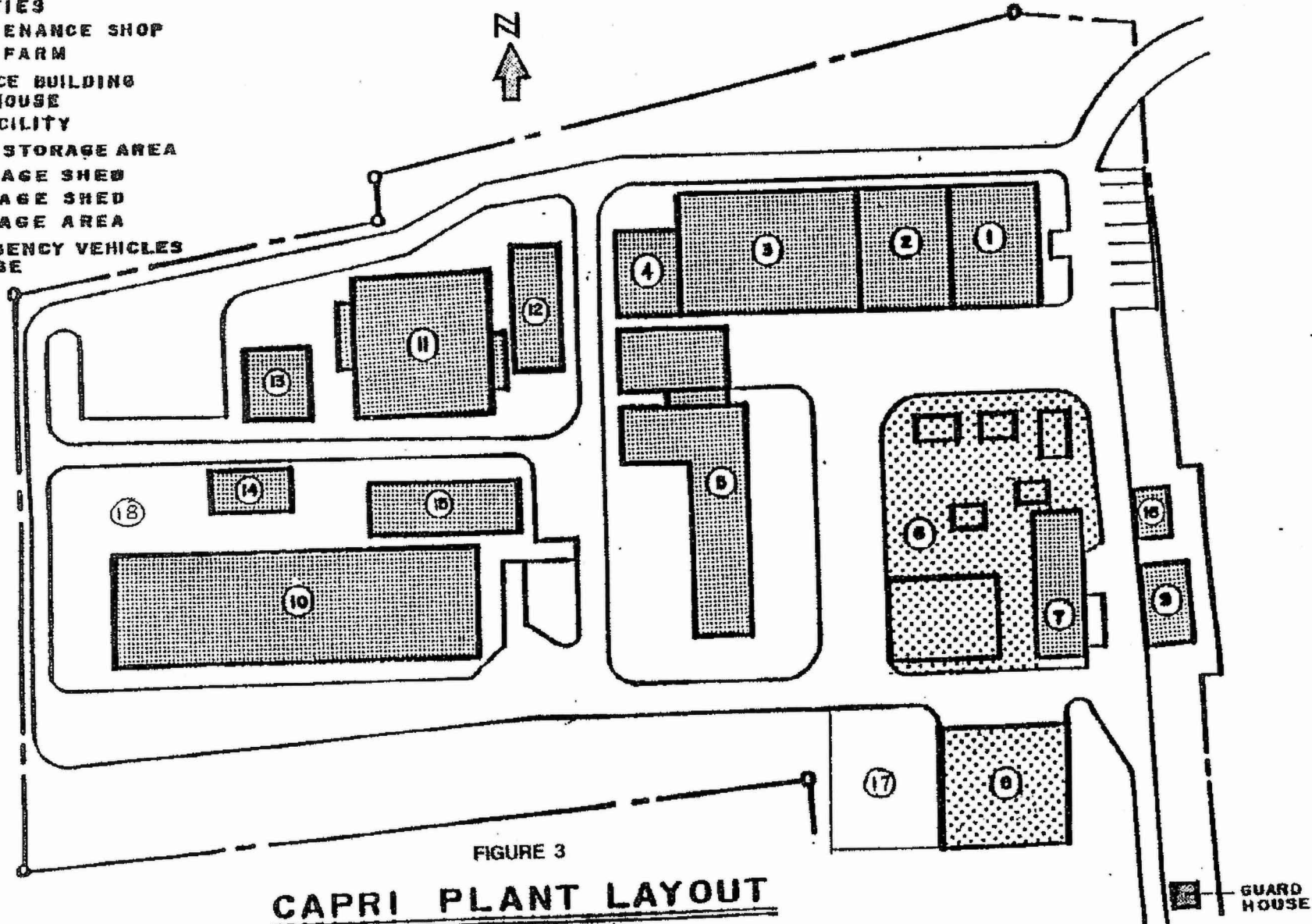
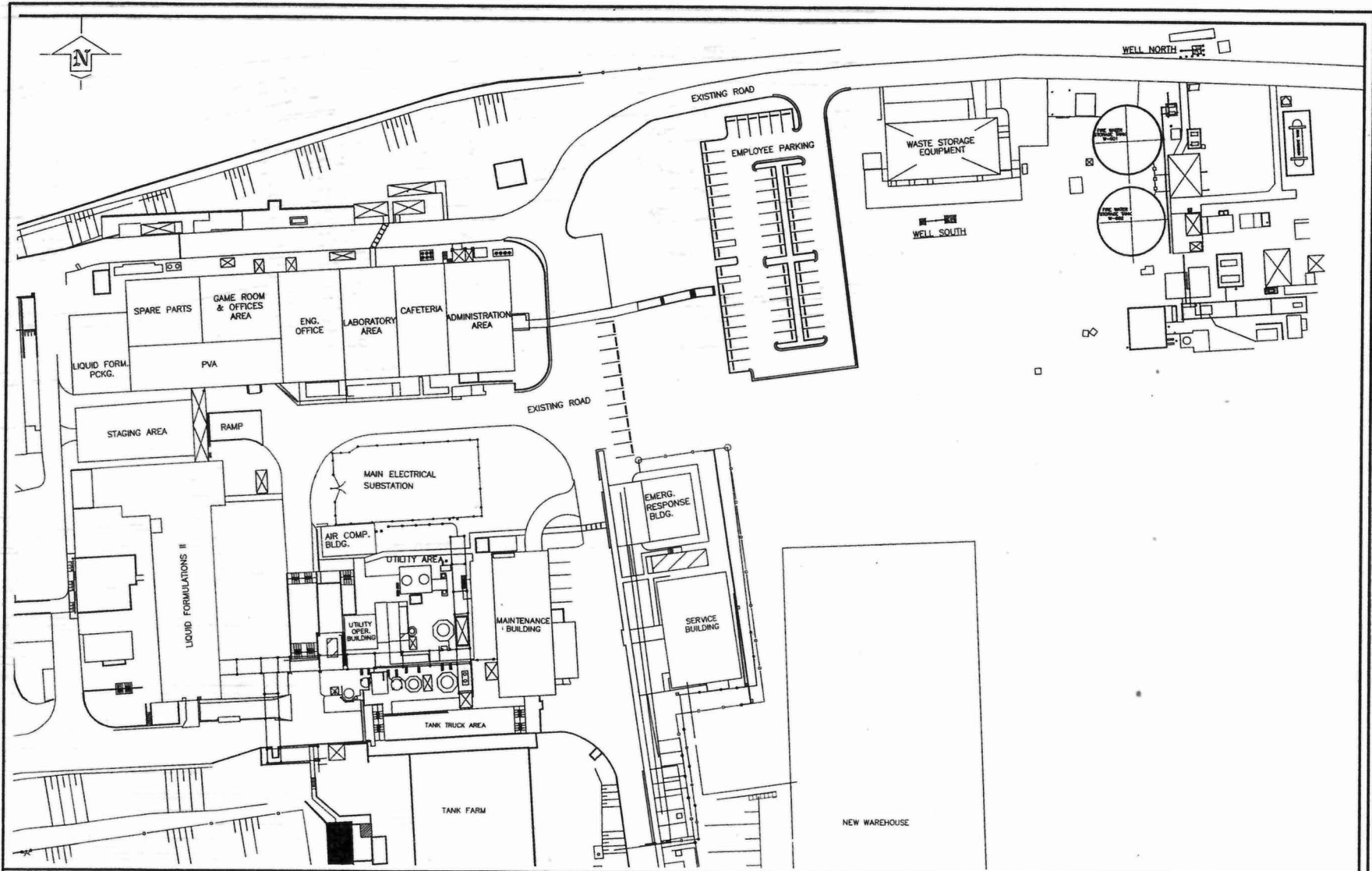


FIGURE 3

CAPRI PLANT LAYOUT



BASF Manatí Process Water Extraction Wells Location Diagram
 Prepared by BASF Engineering Department, July 2014.

<small>THIS DOCUMENT IS PROPERTY OF BASF AGRICULTURAL PRODUCTS DE PR. IT IS LOANED TO YOU BY THE ENGINEERING DEPARTMENT OF BASF AGRICULTURAL PRODUCTS DE PR. IT IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM, WITHOUT THE WRITTEN PERMISSION OF BASF AGRICULTURAL PRODUCTS DE PR.</small>		BASF Agricultural Products de PR State Road No.2, Km. 47.3 Manatí, PR 00674		
<small>PROJECT NAME</small> SITE PLAN		<small>DATE</small> 07/21/14		
<small>DESIGNED BY</small> C. DEL RIO		<small>DATE</small> 07/21/14		<small>PROJECT NO.</small> NORTH EAST SITE PLAN
<small>DATE</small> 07/21/14		<small>DATE</small> 07/21/14		
<small>APPROVED BY</small> [Signature]		<small>DATE</small> 07/21/14		<small>REV. NO.</small> SITE

