Section B: Community Solar Energy Project Description

Project Name: Oak Ridge Parkway Community Solar

*This name will be used to reference the project in correspondence with the Applicant.

I. Applicant Contact Information

Applicant Company/Entity Name: EDF Renewables Distributed Solutions, Inc.
First Name: Rod Last Name: Viens
Daytime Phone: 802.359.6520 Email: rod.viens@edf-re.com
Applicant Mailing Address: 5 Commerce Avenue
Municipality: West Lebanon, NH County: _____ Zip Code: 03784

Applicant is: ☑ Community Solar Project Owner ☑ Community Solar Developer/Facility Installer
☐ Property/Site Owner ☐ Subscriber Organization
☐ Agent (if agent, what role is represented) _____

II. Community Solar Project Owner

Project Owner Company/Entity Name *(complete if known)*: EDF Renewables Distributed Solutions, Inc.
First Name: Rod Last Name: Viens
Daytime Phone: 802.359.6520 Email: rod.viens@edf-re.com
Mailing Address: 5 Commerce Avenue
Municipality: West Lebanon, NH County: _____ Zip Code: 03784

III. Community Solar Developer

This section, "Community Solar Developer," is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a RFP, RFQ, or other bidding process. In all other cases, this section is required.

Developer Company Name *(optional, complete if applicable)*: EDF Renewables Distributed Solutions, Inc.
First Name: Rod Last Name: Viens
Daytime Phone: 802.359.6520 Email: rod.viens@edf-re.com
Mailing Address: 5 Commerce Avenue
Municipality: West Lebanon, NH County: _____ Zip Code: 03784

The proposed community solar project will be primarily built by:
☑ the Developer ☐ a contracted engineering, procurement and construction ("EPC") company

If the proposed community solar project will be primarily built by a contracted EPC company, complete the following *(optional, complete if known)*:
If the EPC company information is left blank and the proposed project is approved by the Board for participation in the Community Solar Energy Pilot Program, the Applicant must inform the Board of the information below once the EPC company becomes known.

EPC Company Name *(optional, complete if applicable)*: EDF Renewables Distributed Soluitons, Inc.
First Name: Rod Last Name: Viens
Daytime Phone: 802.359.6520 Email: rod.viens@edf-re.com
Mailing Address: 5 Commerce Avenue
Municipality: West Lebanon, NH County: Zip Code: 03784

IV. Property/Site Owner Information

Property Owner Company/Entity Name: BASF Corporation
First Name: Charles Last Name: Waltz
Daytime Phone: 973.245.6595 Email: charles.waltz@basf.com
Applicant Mailing Address: 100 Park Avenue
Municipality: Florham Park County: Morris Zip Code: 07932

V. Community Solar Subscriber Organization *(optional, complete if known)*

If this section, "Community Solar Subscriber Organization," is left blank and the proposed project is approved by the Board for participation in the Community Solar Energy Pilot Program, the Applicant must inform the Board of the information below once the Subscriber Organization becomes known.

Subscriber Organization Company/Entity Name *(optional, complete if applicable)*: Solstice Power Technologies, Inc.
First Name: Sandhya Last Name: Murali
Daytime Phone: 617.714.4554 Email: sandhya@solstice.us
Mailing Address: 186 Alewife Brook Parkway #1048
Municipality: Cambridge County: Suffolk Zip Code: 02138

VI. Proposed Community Solar Facility Characteristics

Community Solar Facility Size (as denominated on the PV panels): 4.989 MWdc
*Any application for a system larger than 5 MWdc will be automatically eliminated. If awarded, projects will be held to the MWdc size indicated in this Application.

Community Solar Facility Location (Address): 227 Oak Ridge Parkway
Municipality: Toms River County: Ocean Zip Code: 08755
Name of Property *(optional, complete if applicable)*: BASF Toms River

Property Block and Lot Number(s): Block 411, Lot 6.02

Community Solar Site Coordinates: 74.14.11.2 Longitude 39.59.15.5 Latitude

Total Acreage of Property Block and Lots: 420 acres

Total Acreage of Community Solar Facility: 17.94 acres

Attach a delineated map of the portion of the property on which the community solar facility will be located in PDF format. The map must be provided in color. Note: Applications may be required upon request to submit a copy of the delineated map as a design plan in drawing file format (.dwg) or as a shapefile (.shp), in order to facilitate integration with Geographic Information System (GIS) software.

SEE ATTACHMENT 1

EDC electric service territory in which the proposed community solar facility is located: *(select one)*

☐ Atlantic City Electric ☑ Jersey Central Power & Light

☐ Public Service Electric & Gas ☐ Rockland Electric Co.

Estimated time from Application selection to project completion* *(The Applicant should provide a good faith estimate of the date of project completion; however, this data is being collected for informational purposes only.)*: December (month) 2021 (year)

*Project completion is defined pursuant to the definition at N.J.A.C. 14:8-9.3 as being fully operational, up to and including having subscribers receive bill credits for their subscription to the project. Projects must be fully operational within 12 months of receiving conditional approval by the Board (subject to change according to the proposed rule amendment described in the Terms and Conditions).

The proposed community solar facility is an existing project* ..... ☐ Yes ☑ No

If "Yes," the Application will not be considered by the Board. See section B. XIII. for special provisions for projects having received a subsection (t) conditional certification from the Board prior to February 19, 2019.

*An existing project is defined in N.J.A.C. 14:8-9.2 as a solar project having begun operation and/or been approved by the Board for connection to the distribution system prior to February 19, 2019.

VII. Community Solar Facility Siting

1. The proposed community solar project has site control* ..... ☑ Yes ☐ No

   If "Yes," attach proof of site control. SEE ATTACHMENT 2

   If "No," the Application will be deemed incomplete.

   *Site control is defined as property ownership or option to purchase, signed lease or option to lease, or signed contract for use as a community solar site or option to contract for use as a community solar site. The site control must be specific to the project in this Application, and may not be contingent on the approval of another Application submitted in PY2.

2. The proposed community solar facility is located, in part or in whole, on preserved farmland* …… ☐ Yes ☑ No

   If "Yes," the Application will not be considered by the Board.

   *Preserved farmland is defined in N.J.A.C. 14:8-9.2 as land from which a permanent development easement was conveyed and a deed of easement was recorded with the county clerk's office pursuant to N.J.S.A. 4:1C-11 et seq.; land subject to a farmland preservation program agreement recorded with the county clerk's office pursuant to N.J.S.A. 4:1C-24; land from which development potential has been transferred pursuant to N.J.S.A. 40:55D-113 et seq. or N.J.S.A. 40:55D-137 et seq.; or land conveyed or dedicated by agricultural restriction pursuant to N.J.S.A. 40:55D-39.1.

3. The proposed community solar facility is located, in part or in whole, on Green Acres preserved open space* or on land owned by the New Jersey Department of Environmental Protection (NJDEP) …… ☐ Yes ☑ No

   If "Yes," the Applicant must attach special authorization from NJDEP for the site to host a community solar facility. The Board will not consider Applications for projects located, in part or in whole, on Green Acres preserved open space or on land owned by NJDEP, unless the Applicant has received special authorization from NJDEP and includes proof of such special authorization in the Application package.

   *Green Acres preserved open space is defined in N.J.A.C. 14:8-9.2 as land classified as either "funded parkland" or "unfunded parkland" under N.J.A.C. 7:36, or land purchased by the State with "Green Acres funding" (as defined at N.J.A.C. 7:36).

4. The proposed community solar facility is located, in part or in whole, on (*check all that apply)*:

   ☐ a landfill (see question 7 below)
   ☑ a brownfield (see question 8 below)
   ☐ an area of historic fill (see question 9 below)
   ☐ a rooftop (see question 10 below)
   ☐ a canopy over a parking lot or parking deck
   ☐ a canopy over another type of impervious surface (e.g. walkway)
   ☐ a water reservoir or other water body ("floating solar") (see question 11 below)
   ☐ a former sand or gravel pit or former mine
   ☐ farmland* (see definition below)
   ☐ other (see question 5 below): _____

   *Farmland is defined as land that has been actively devoted to agricultural or horticultural use and that is/has been valued, assessed, and taxed pursuant to the "Farmland Assessment Act of 1964," P.L. 1964, c.48 (C. 54:4-23.1 et seq.) at any time within the ten year period prior to the date of submission of the Application.

5. If you answered "other" to question 4 above, describe the proposed site and explain why it is appropriate for siting a community solar facility:

6. The proposed community solar facility is located, in part or in whole, on land located in:
   - ☐ the New Jersey Highlands Planning Area or Preservation Area
   - ☐ the New Jersey Pinelands

   If the project is a ground mounted project (i.e. not rooftop or canopy), and answered "Yes" to either of the options above, include a letter or other determination from the New Jersey Highlands Council or the New Jersey Pinelands Commission, as relevant, stating that the proposed project is consistent with land use priorities in the area.

7. If the proposed community solar facility is located, in part or in whole, on a landfill, provide the name of the landfill, as identified in NJDEP's database of New Jersey landfills, available at www.nj.gov/dep/dshw/lrm/landfill.htm: _____

8. If the proposed community solar facility is located, in part or in whole, on a brownfield, has a final remediation document been issued for the property? ..... ☑ Yes ☐ No
   If "Yes," attach a copy of the Response Action Outcome ("RAO") issued by a Licensed Site Remediation Professional ("LSRP") or the No Further Action ("NFA") letter issued by NJDEP.
   SEE ATTACHMENTS 3-5

9. If the proposed community solar facility is located, in part or in whole, on an area of historic fill, have the remedial investigation requirements pursuant to the Technical Requirements for Site Remediation, N.J.A.C. 7:26E-4.7 been implemented? ..... ☐ Yes ☐ No
   Has the remediation of the historic fill been completed pursuant to the Technical Requirements for Site Remediation, N.J.A.C. 7:26E-5.4? ..... ☐ Yes ☐ No
   If the remediation of the historic fill has been completed, attach a copy of the Response Action Outcome ("RAO") issued by a Licensed Site Remediation Professional ("LSRP") or the No Further Action ("NFA") letter issued by NJDEP.

10. If the proposed community solar facility is located, in part or in whole, on a rooftop, has the Applicant verified that the roof is structurally able to support a solar system? ..... ☐ Yes ☐ No
    If "Yes," attach substantiating evidence.
    If "No," the application will not be considered by the Board.

11. If the proposed community solar facility is located, in part or in whole, on a water reservoir or other water body ("floating solar"), is the facility located at a water treatment plant or sand and gravel pit that has little to no established floral and faunal resources? ..... ☐ Yes ☐ No

If "Yes," provide supporting details and attach substantiating evidence if needed.
*All proposed floating solar projects are required to meet with NJDEP's OPPN prior to submitting an Application. Applicants are responsible for contacting NJDEP with sufficient advance notice to ensure that a meeting will occur prior to the deadline to submit an Application. Please see section VIII Permits, Question 2 for more information.

12. The proposed community solar facility is located on the property of an affordable housing building or complex ..... ☐ Yes ☑ No

13. The proposed community solar facility is located on an area designated in need of redevelopment ..... ☑ Yes ☐ No
If "Yes," attach proof of the designation of the area as being in need of redevelopment from a municipal, county, or state entity. SEE ATTACHMENT 14

14. The proposed community solar facility is located in an Economic Opportunity Zone, as defined by the New Jersey Department of Community Affairs ("DCA") ..... ☐ Yes ☑ No
If "Yes," attach proof that the facility is located in an Economic Opportunity Zone.
*More information about Economic Opportunity Zones are available at the following link: https://www.state.nj.us/dca/divisions/lps/opp_zones.html.

15. The proposed community solar facility is located on land or a building that is preserved by a municipal, county, state, or federal entity ..... ☐ Yes ☑ No
If "Yes," attach proof of the designation of the site as "preserved" from a municipal, county, or state entity, and evidence that such designation would not conflict with the proposed solar facility.

16. The proposed community solar facility is located, in part or in whole, on land that includes trees ..... ☐ Yes ☑ No
Construction of the proposed community solar facility will require cutting down one or more trees ..... ☐ Yes ☑ No
If "Yes," estimated number of trees required to be cut for construction: _____
If "Yes," estimated number of acres of trees that required to be cut for construction: _____

17. Are there any use restrictions at the site? ..... ☑ Yes ☐ No
If "Yes," explain the use restriction below and provide documentation that the proposed community solar project is not prohibited.

The site is a remediated brownfield with use restrictions, however, solar is a permitted use.

Will the use restriction(s) be required to be modified by variance or other means? …… ☐ Yes ☑ No

If "Yes," explain the modification below.

18. The proposed community solar facility has been specifically designed or planned to preserve or enhance the site (e.g. landscaping, site and enhancements, pollination support, etc.) This represents site improvements beyond required basic site improvements …… ☑ Yes ☐ No

    If "Yes," explain below, and provide any substantiating documentation in an attachment. Explain how the proposed site enhancements will be made and maintained for the life of the project. If implementing pollination support, explain what type of pollination support, how this support is expected to help local ecosystems, and whether the proposed pollination support has received certifications or other verification.

    SEE ATTACHMENT 6

19. This question is for informational purposes only, and will not impact the Application's score. The Board is interested in learning more about ways in which "dual use" projects may be implemented in the Pilot Program:

    The proposed community solar facility is a "dual use" project: i.e. the project site will remain in active agricultural production throughout the life of the project (e.g. crop production under or between the panels, livestock grazing)…… ☐ Yes ☑ No

    *Wildflower planting or other pollination support is not considered dual use for purposes of this question (pollination support is question 18).

    If "Yes," explain what agricultural production will be maintained on the site and will be consistent with the presence of a solar system. Provide any substantiating documentation in an attachment.

VIII. Permits

1. The Applicant has completed the NJDEP Permit Readiness Checklist, and will submit it as an attachment to this Application..... ☑ Yes ☐ No If "No," the Application will be deemed incomplete. This requirement only applies to ground mounted and floating solar projects. Community solar projects located on a rooftop, parking lot, or parking structure are exempt from this requirement.
   *Applicants are not required to submit the Permit Readiness Checklist to NJDEP prior to submitting an Application to the Board, except in the case of floating solar projects.
   SEE ATTACHMENT 7
2. The Applicant has met with NJDEP's OPPN ..... ☑ Yes ☐ No
   If "Yes," attach meeting notes or relevant correspondence with NJDEP's OPPN.
   * If the Applicant met with OPPN or received comments from OPPN (formerly PCER) for this project as part of the Program Year 1 Application process, and if the details of the project and the site characteristics have remained the same, those comments remain valid. Please include those comments or meeting notes as an attachment to the Application. SEE ATTACHMENT 8
   * A meeting with NJDEP's OPPN is not required prior to submitting an Application. Exception: all floating solar projects are required to meet with NJDEP's OPPN prior to submitting an Application. Applicants with a floating solar project are responsible for contacting NJDEP with sufficient advance notice to ensure that a meeting will occur prior to the deadline to submit an Application.
3. The Applicant has received all non-ministerial permits* for this project *(optional)* ..... ☑ Yes ☐ No
   *Receiving all non-ministerial permits is not required prior to submitting an Application.
   *A non-ministerial permit is one in which one or more officials consider various factors and exercise some discretion in deciding whether to issue or deny a permit. This is in contrast to a ministerial permit, for which approval is contingent upon the project meeting pre-determined and established standards. Examples of non-ministerial permits include: local planning board authorization, use variances, Pinelands or Highlands Commission approvals, etc. Examples of ministerial permits include building permits and electrical permits.

4. Please list all permits, approvals, or other authorizations that will be needed for the construction and operation of the proposed community solar facility pursuant to local, state and federal laws and regulations. Include permits that have already been received, have been applied for, and that will need to be applied for. These include:
   a. Permits, approvals, or other authorizations from NJDEP (i.e. Land Use, Air Quality, New Jersey Pollutant Discharge Elimination System "NJPDES", etc.) for the property.
   b. Permits, approvals, or other authorizations from NJDEP (i.e. Land Use, Air Quality, NJPDES, etc.) directly related to the installation and operation of a solar facility on this property.

c. Permits, approvals, or other authorizations other than those from NJDEP for the development, construction, or operation of the community solar facility (including local zoning and other local and state permits)

An Application that does not list all permits, approvals, or other authorizations that will be needed for the construction and operation of the proposed community solar facility will be deemed incomplete.

If a permit has been received, attach a copy of the permit. SEE ATTACHMENT 9

4.A EXISTING

4.B/C FOR SOLAR

Permit Name & Description	Permitting Agency/Entity	Date Permit Applied for *(if applicable)* / Date Permit Received (*if applicable*)
Air Pollution Control Preconstruction Permit	NJDEP	Received 5/4/15
NJPDES	NJDEP	Received 8/5/16
Certificate to Operate Control Apparatus	NJDEP	Received 8/31/89, Renewed 5/17/16
Water Allocation Permit	NJDEP	Received 12/14/15
SDW Physical Connections Permit	NJDEP	Received 7/30/02, Renewed 4/1/19
Zoning Permit	Toms River Township Zoning Department	6/4/20
Building Permit	Toms River Township Construction Department	To be submitted
Preliminary and Final Major Site Plan Approval	Toms River Township Planning Board	2/22/20
Soil Conservation District Certification	Ocean County Soil Conservation District	2/12/20
Preliminary and Final Site Plan Approval	Ocean County Planning Board	1/9/20
CAFRA	NJDEP	12/13/19

5. The Applicant has consulted the hosting capacity map of the relevant EDC via the EDC's website (links are available on the NJCEP website) and determined that, based on the capacity hosting map as published at the date of submission of the Application, there is sufficient capacity available at the proposed location to build the proposed community solar facility ..... ☑ Yes ☐ No

If "Yes," include a screenshot of the capacity hosting map at the proposed location, showing the available capacity. SEE ATTACHMENT 10

If the hosting capacity map shows insufficient capacity, the Application will not be considered by the Board, unless the Applicant provides: 1) a letter from the relevant EDC indicating that the hosting capacity map is incorrect in that location, or 2) an assessment from the relevant EDC of the cost of the interconnection upgrade that would be required to enable the interconnection of the proposed system, and a commitment from the Applicant to pay those upgrade costs if the project were to be selected by the Board.

Exception: Projects located in PSE&G service territory for which the hosting capacity map shows insufficient capacity available at the planned location may be eligible for a waiver of this requirement. If this application is seeking to exercise this waiver, please check "Yes" below and attach the waiver requirements as described in the Board's Order: https://www.njcleanenergy.com/files/file/CommunitySolar/FY21/8E%20-%20ORDER%20PSEG%20Interconnection.pdf.

This project is exercising the PSE&G hosting capacity map waiver: ..... ☐ Yes ☐ No

6. The Applicant has conducted an interconnection study for the proposed system *(optional)* ..... ☑ Yes ☐ No
   If "Yes," include the interconnection study received from the EDC. SEE ATTACHMENT 10

IX. Community Solar Subscriptions and Subscribers

1. Estimated or Anticipated Number of Subscribers *(please provide a good faith estimate or range)*: 985

2. Estimated or Anticipated Breakdown of Subscribers *(please provide a good faith estimate or range of the kWh of project allocated to each category)*:
   Residential: 600 Commercial: 385
   Industrial: _____ Other: _____
   (define "other": _____)

3. The proposed community solar project is an LMI project* ..... ☑ Yes ☐ No
   *An LMI project is defined pursuant to N.J.A.C. 14:8-9 as a community solar project in which a minimum 51 percent of project capacity is subscribed by LMI subscribers.

4. The proposed community solar project has a clear plan for effective and respectful customer engagement process. ..... ☑ Yes ☐ No
   If "Yes," attach evidence of experience on projects serving LMI communities or partnerships with organizations that have experience serving LMI communities. SEE ATTACHMENT 11

5. The proposed community solar project will allocate at least 51% of project capacity to residential customers ..... ☑ Yes ☐ No

6. An affordable housing provider is seeking to qualify as an LMI subscriber for the purposes of the community solar project ..... ☐ Yes ☑ No
   If "Yes," estimated or anticipated percentage of the project capacity for the affordable housing provider's subscription *(provide an estimate or range)*: _____

   If "Yes," what specific, substantial, identifiable, and quantifiable long-term benefits from the community solar subscription are being passed through to their residents/tenants?

Additionally, the affordable housing provider must attach a signed affidavit that the specific, substantial, identifiable, and quantifiable long-term benefits from the community solar subscription will be passed through to their residents/tenants.

If "No," please be aware that, if, at any time during the operating life of the community solar project an affordable housing provider wishes to subscribe to the community solar project as an LMI subscriber, it must submit a signed affidavit that the specific, substantial, identifiable, and quantifiable benefits from the community solar subscription will be passed through to its residents/tenants.

7. This project uses an anchor subscriber *(optional)* ..... ☐ Yes ☑ No
   If "Yes," name of the anchor subscriber *(optional)*: _____
   Estimated or anticipated percentage or range of the project capacity for the anchor subscriber's subscription: _____

8. Is there any expectation that the account holder of a master meter will subscribe to the community solar project on behalf of its tenants? ..... ☐ Yes ☑ No
   If "Yes," what specific, identifiable, sufficient, and quantifiable benefits from the community solar subscription are being passed through to the tenants?

Additionally, the account holder of the master meter must attach a signed affidavit that the specific, identifiable, sufficient, and quantifiable benefits from the community solar subscription will be passed through to the tenants.

If "No," please be aware that, if, at any time during the operating life of the community solar project the account holder of a master meter wishes to subscribe to the community solar project on behalf of its tenants, it must submit to the Board a signed affidavit that the specific, identifiable, sufficient, and quantifiable benefits from the community solar subscription will be passed through to its tenants.

9. The geographic restriction for distance between project site and subscribers is: *(select one)*
   - ☐ No geographic restriction: whole EDC service territory
   - ☐ Same county OR same county and adjacent counties
   - ☑ Same municipality OR same municipality and adjacent municipalities

   Note: The geographic restriction selected here will apply for the lifetime of the project, barring special dispensation from the Board, pursuant to N.J.A.C. 14:8-9.5(a).

10. Product Offering for LMI subscribers: *(The Applicant must also complete and attach one or more product offering form(s) found in Appendix A. See Appendix A for exemptions.)*

    The subscription proposed offers guaranteed or fixed savings to subscribers …….. ☑ Yes ☐ No
    If "Yes," the guaranteed or fixed savings are offered as:

    ☐ A percentage saving on the customer's annual electric utility bill
    ☑ A percentage saving on the customer's community solar bill credit
    ☐ Other: _____

    If "Yes," the proposed savings represent:

    ☐ 0% - 5% of the customer's annual electric utility bill or bill credit
    ☐ 5% - 10% of the customer's annual electric utility bill or bill credit
    ☐ 10% - 20% of the customer's annual electric utility bill or bill credit
    ☑ over 20% of the customer's annual electric utility bill or bill credit

    The subscription proposed offers subscribers ownership or a pathway to ownership of a share of the community solar facility …… ☐ Yes ☑ No
    If "Yes," include proof of a pathway to ownership of a share of the community solar facility offered to the subscribers in Appendix A.

11. Product Offering for non-LMI subscribers: *(The Applicant must also complete and attach one or more product offering form(s) found in Appendix A. See Appendix A for exemptions.)*

    The subscription proposed offers guaranteed or fixed savings to subscribers …….. ☑ Yes ☐ No
    If "Yes," the guaranteed or fixed savings are offered as:

    ☐ A percentage saving on the customer's annual electric utility bill
    ☑ A percentage saving on the customer's community solar bill credit
    ☐ Other: _____

    If "Yes," the proposed savings represent:

    ☐ 0% - 5% of the customer's annual electric utility bill or bill credit
    ☐ 5% - 10% of the customer's annual electric utility bill or bill credit
    ☐ 10% - 20% of the customer's annual electric utility bill or bill credit
    ☑ over 20% of the customer's annual electric utility bill or bill credit

    The subscription proposed offers subscribers ownership or a pathway to ownership of a share of the community solar facility …… ☐ Yes ☑ No
    If "Yes," include proof of a pathway to ownership of a share of the community solar facility offered to the subscribers in Appendix A.

12. The list of approved community solar projects will be published on the Board's website. Additionally, subscriber organizations have the option of indicating, on this list, that the project is currently seeking subscribers.

    If this project is approved, the Board should indicate on its website that the project is currently seeking subscribers ..... ☑ Yes ☐ No

    If "Yes," the contact information indicated on the Board's website should read:

Company/Entity Name: Solstice Power Technologies, Inc. Contact Name: Sandhya Murali

Daytime Phone: 617.714.4554 Email: infot@solstice.us

*It is the responsibility of the project's subscriber organization to notify the Board if/when the project is no longer seeking subscribers, and request that the Board remove the above information on its website.

X. Community Engagement

1. The proposed community solar facility is located on land or a building owned or controlled by a government entity, including, but not limited to, a municipal, county, state, or federal entity ..... ☐ Yes ☑ No

2. The proposed community solar project is being developed by or in partnership or collaboration* with the municipality in which the project is located ..... ☐ Yes ☑ No

   If "Yes," explain how and attach evidence of the project being developed by or in partnership or collaboration with the municipality in which the project is located.

   *Partnership or collaboration with the municipality is defined as clear and ongoing municipal involvement in the approval of the design, development, or operation of the proposed community solar project (e.g. project is located on a municipal site, municipality facilitating subscriber acquisition, municipal involvement in defining the subscription terms, etc.). Examples of evidence may include a formal partnership, a municipal request for proposals or other public bidding process, letter describing the municipality's involvement in the project or meeting minutes. Documentation must be specific to the project described in this Application; "generic" documentation of support that applies to multiple projects submitted by the same Applicant will not be accepted.

3. The proposed community solar project is being developed by or in partnership or collaboration* with one or more local community organization(s) and/or affordable housing providers in the area in which the project is located ..... ☑ Yes ☐ No

If "Yes," explain how and attach evidence of the project being developed by or in partnership or collaboration with the local community organization(s) and/or affordable housing providers.
*Partnership or collaboration is defined as clear and ongoing involvement by the local community organization(s) and/or affordable housing providers in the approval of the design, development, or operation of the proposed community solar project (e.g. community organization owns the proposed site, community organization is facilitating subscriber acquisition or was involved in the design of the community solar product offering, etc.). Documentation must be specific to the project described in this Application; "generic" documentation of support that applies to multiple projects submitted by the same Applicant will not be accepted.

SEE ATTACHMENT 12 - Specifically, please see the letter from NJPACE included in Attachment 12. NJPACE is a community organization that is going to facilitate subscriber acquisition.

4. The proposed community solar project was developed, at least in part, with support and in consultation with the community in which the project is located* ..... ☑ Yes ☐ No
If "Yes," please describe the consultative process below.
*A community consultative process may include any of the following: letter of support from municipality and/or community organizations and/or local affordable housing provider demonstrating their awareness and support of the project; one or more opportunities for public intervention; and/or outreach to the municipality and/or local community organizations and/or affordable housing provider.

SEE ATTACHMENT 12

XI. Project Cost

This section, "Project Cost," is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a RFP, RFQ, or other bidding process. In all other cases, this section is required.

1. Provide the following cost estimates and attach substantiating evidence in the form of an unlocked Excel spreadsheet model: SEE ATTACHMENT 13

Applicants are expected to provide a good faith estimate of costs associated with the proposed community solar project, as they are known at the time the Application is filed with the Board. This information will not be used in the evaluation of the proposed community solar project.

Net Installed Cost (in $)	$10,426,801
Net Installed Cost (in $/Watt)	$2.09
Initial Customer Acquisition Cost (in $/Watt)	$0.20
Annual Customer Churn Rate (in %)	8%
Annual Operating Expenses (in c/kWh)	$0.0402
Levelized Cost of Energy ("LCOE") (in c/kWh)	$0.1125

2. Pursuant to N.J.A.C. 14:8-9.7(q), "community solar projects shall be eligible to apply, via a one-time election prior to the delivery of any energy from the facility, for SRECs or Class I RECs, as applicable, or to any subsequent compensations as determined by the Board pursuant to the Clean Energy Act." Consistent with the Clean Energy Act of 2018, the Board is no longer accepting applications for the SREC Registration Program ("SRP"). Projects granted conditional approval to participate in PY2 will be eligible to apply for the TI Program.

For indicative purposes only, please indicate all local, state and federal tax incentives which will be applied to if the proposed community solar project is approved for participation in the Community Solar Energy Pilot Program:

Federal Investment Tax Credit and New Jersey Incentive Program Credits

XII. Other Benefits

1. The proposed community solar facility will be paired with storage ..... ☐ Yes ☑ No
   If "Yes," please describe the proposed storage facility:
   a. Storage system size: _____ MW _____ MWh
   b. The storage offtaker is also a subscriber to the proposed community solar facility ..... ☐ Yes ☐ No

*Community solar credits will only be provided to community solar generation; credits will not be provided to energy discharged to the grid from a storage facility (i.e. no "double counting").

2. The proposed community solar facility will be paired with one or more EV charging stations ..... ☑ Yes ☐ No
   If "Yes," how many EV charging stations: 2
   Will these charging stations be public and/or private? Public
   Please provide additional details:

   Two (2) EV charging stations will be installed at a location to be determined within the Community of Toms River, NJ.

3. The proposed community solar facility will provide energy audits and/or energy efficiency improvements to subscribers…… ☐ Yes ☑ No
   If "Yes," please provide additional details:

4. The proposed community solar project will create temporary or permanent jobs in New Jersey …… ☑ Yes ☐ No
   If "Yes," estimated number of temporary jobs created in New Jersey: 45
   If "Yes," estimated number of permanent jobs created in New Jersey: 0
   If "Yes," explain what these jobs are:

   Solar facility site preparation, racking installation and electrical appurtenance installation.

5. The proposed community solar project will provide job training opportunities for local solar trainees …… ☐ Yes ☑ No
   If "Yes," will the job training be provided through a registered apprenticeship? …. ☐ Yes ☐ No
   If "Yes," identify the entity or entities through which job training is or will be organized (e.g. New Jersey GAINS program, partnership with local school):

XIII. Special Authorizations and Exemptions

1. Is the proposed community solar project co-located with another community solar facility (as defined at N.J.A.C. 14:8-9.2)? …… ☐ Yes ☑ No
   If "Yes," please explain why the co-location can be approved by the Board, consistent with the provisions at N.J.A.C. 14:8-9

2. Does this project seek an exemption from the 10-subscriber minimum? ..... ☐ Yes ☑ No
   If "Yes," please demonstrate below (and attach supporting documents as relevant):
   a. That the project is sited on the property of a multi-family building.
   b. That the project will provide specific, identifiable, and quantifiable benefits to the households residing in said multi-family building.

3. Specific sections throughout the Application Form are identified as optional only if: 1) the Applicant is a government entity (municipal, county, or state), and 2) the community solar developer will be selected by the Applicant via a RFP, RFQ, or other bidding process. Is the Applicant a government entity that plans to select the developer via such bidding process? ..... ☐ Yes ☑ No
   If "Yes," attach a letter describing the proposed bidding process and a copy of the request for bids (RFP, RFQ, or other bidding document) that is ready to be issued if the project is granted conditional approval by the Board. The Applicant must further commit to issuing said RFP, RFQ, or other bidding process within 90 days of the proposed project being approved by the Board for participation in the Community Solar Energy Pilot Program. The Applicant will be required to provide the information contained in those optional sections to the Board once it becomes known.

4. Has the proposed community solar project received, in part or in whole, a subsection (t) conditional certification from the Board prior to February 19, 2019? ..... ☐ Yes ☑ No
   If "Yes," the project may apply to participate in the Community Solar Energy Pilot Program if it commits to withdrawing the applicable subsection (t) conditional certification immediately if it is approved by the Board for participation in the Community Solar Energy Pilot Program. Attach a signed affidavit that the Applicant will immediately withdraw the applicable subsection (t) conditional certification if the proposed project is approved by the Board for participation in the Community Solar Energy Pilot Program.

5. The Board has proposed an amendment to the Pilot Program rules, which, if approved, would allow municipally-owned community solar projects to submit an application for a project that requests an exemption from the provisions at N.J.A.C. 14:8-9.10(b)(1) mandating subscriber enrollment via affirmative consent (i.e. an opt-out community solar project). Projects that intend

to utilize opt-out subscriber enrollment if the proposed rule amendment is approved by the Board must indicate such intent below. If the Application is selected but the proposed rule amendment is not approved by the Board, the project will be required to proceed using affirmative consent (i.e. "opt-in") subscriber enrollment rules, as currently provided for in the Pilot Program rules at N.J.A.C. 14:8-9.10(b)(1).

A. This Application is for an opt-out community solar project..... ☐ Yes ☑ No

B. The proposed opt-out project will be owned and operated by the municipality for the duration of the project life (excluding a possible period of temporary third-party, tax-credit investor ownership to maximize the financeability of the opt-out project, subject to appropriate contractual provisions that maintain the municipality's ultimate control of the proposed opt-out project)..... ☐ Yes ☑ No

If "Yes," the municipality name is: _____

If "No," the project will not be considered for eligibility as an opt-out community solar project.

C. The proposed opt-out project has been authorized by municipal ordinance or resolution ..... ☐ Yes ☑ No

If "Yes," attach a copy of the municipal ordinance or resolution allowing the development, ownership, and operation an opt-out community solar project, contingent on the proposed rules being approved by the Board.

If "No," the project will not be considered for eligibility as an opt-out community solar project.

D. The proposed opt-out project will allocate all project capacity to LMI subscribers ..... ☐ Yes ☑ No

If "No," the project will not be considered for eligibility as an opt-out community solar project.

E. Describe the process by which the municipality will identify the customers that will be automatically enrolled in the proposed opt-out project: _____

F. The municipal applicant has reviewed the proposed rule amendment allowing for opt-out projects, and agrees to adhere to the proposed rules and any subsequent modification if they are approved by the Board. The applicant understands that any approval for the project to operate as an opt-out community solar project is contingent on the proposed rule amendment being approved by the Board. The applicant understands that, if the proposed rule amendment is not approved by the Board, the project, if approved, will be required to

adhere to the existing "opt-in" rules for subscriber enrollment (N.J.A.C. 14:8-9.10(b)(1)). …… ☐ Yes☐ No N/A

Attach an affidavit that the municipal project owner will comply with all applicable rules and regulations, particularly those relating to consumer privacy and consumer protection.

Section C: Certifications

Instructions: Original signatures on all certifications are required. All certifications in this section must be notarized; instructions on how to submit certifications will be provided as part of the online application process. Certifications must be dated after October 3, 2020: PY1 certifications may not be reused in PY2.

Applicant Certification

The undersigned warrants, certifies, and represents that:

1) I, Rod Viens (name) am the SVP (title) of the Applicant EDF Renewables Distributed Solutions, Inc. (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) The community solar facility proposed in the Application will be constructed, installed, and operated as described in the Application and in accordance with all Board rules and applicable laws; and
4) The system proposed in the Application will be constructed, installed, and operated in accordance with all Board policies and procedures for the Transition Incentive Program, if applicable; and
5) My organization understands that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
6) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: _____ Date: 2/1/2021

Print Name: Rod Viens

Title: SVP Company: EDF Renewables Distributed Solutions, Inc.

Signed and sworn to before me on this 1st day of February, 2021

Rachael White
Signature

Rachael White
Name

RACHAEL L. WHITE
Notary Public-New Hampshire
My Commission Expires
May 16, 2023

Project Developer Certification

This Certification "Project Developer / Installer" is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a Request for Proposals (RFP), Request for Quotations (RFQ), or other bidding process. In all other cases, this Certification is required.

The undersigned warrants, certifies, and represents that:

1) I, Rod Viens (name) am the SVP (title) of the Project Developer EDF Renewables Distributed Solutions, Inc. (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) The community solar facility proposed in the Application will be constructed, installed, and operated as described in the Application and in accordance with all Board rules and applicable laws; and
4) The system proposed in the Application will be constructed, installed, and operated in accordance with all Board policies and procedures for the Transition Incentive Program, if applicable; and
5) My organization understands that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
6) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: _____ Date: 2/1/2021

Print Name: Rod Viens

Title: SVP Company: EDF Renewables Distributed Solutions, Inc.

Signed and sworn to before me on this 1st day of February, 2021

Rachael White
Signature

Name

RACHAEL L. WHITE
Notary Public-New Hampshire
My Commission Expires
May 16, 2023

Project Owner Certification

The undersigned warrants, certifies, and represents that:

1) I, Rod Viens (name) am the SVP (title) of the Project Owner EDF Renewables Distributed Solutions, Inc. (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) The community solar facility proposed in the Application will be constructed, installed, and operated as described in the Application and in accordance with all Board rules and applicable laws; and
4) The system proposed in the Application will be constructed, installed, and operated in accordance with all Board policies and procedures for the Transition Incentive Program, if applicable; and
5) My organization understands that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
6) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: _____ Date: 2/1/2021

Print Name: Rod Viens

Title: SVP Company: EDF Renewables Distributed Solutions, Inc.

Signed and sworn to before me on this 1st day of February, 2021

Rachael L White

Signature

RACHAEL L. WHITE
Notary Public-New Hampshire
My Commission Expires
May 16, 2023

Name

Property Owner Certification

The undersigned warrants, certifies, and represents that:

1) I, CHARLES WALTZ (name) am the SITES MANAGER (title) of the Property BASF CORPORATION (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package pertaining to siting and location of the proposed community solar project has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) My organization or I understand that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
4) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: C R W Date: January 19 2021

Print Name: CHARLES WALTZ

Title: SITES MANAGER Company: BASF CORPORATION

Signed and sworn to before me on this 19th day of January, 2021

C R W Mary Erin Brennan

Signature

C.R.W.A

Name

MARY ERIN BRENNAN
Commission # 2110651
Notary Public, State of New Jersey
My Commission Expires
April 15, 2023

Subscriber Organization Certification *(optional, complete if known)*

The undersigned warrants, certifies, and represents that:

1) I, Sandhya Murali (name) am the COO & Co-Founder (title) of the Subscriber Organization Solstice Power Technologies, Inc. (name) and have been authorized to file this Applicant Certification on behalf of my organization; and
2) The information provided in this Application package has been personally examined, is true, accurate, complete, and correct to the best of the undersigned's knowledge, based on personal knowledge or on inquiry of individuals with such knowledge; and
3) The community solar facility proposed in the Application will be constructed, installed, and operated as described in the Application and in accordance with all Board rules and applicable laws; and
4) My organization understands that information in this Application is subject to disclosure under the Open Public Records Act, N.J.S.A. 47-1A-1 et seq., and that any claimed sensitive and trade secret information should be submitted in accordance with the confidentiality procedures set forth in N.J.A.C. 14:1-12.3; and
5) I acknowledge that **submission of false information may be grounds for denial of this Application, and if any of the foregoing statements are willfully false, I am subject to punishment to the full extent of the law, including the possibility of fine and imprisonment.**

Signature: Sandhya Murali Date: 02/04/2021

Print Name: Sandhya Murali

Title: COO & Co-Founder Company: Solstice Power Technologies Inc.

Signed and sworn to before me on this 4 day of February, 2021

Doris B. Owens

Signature

DORIS B OWENS

Name

Section D: Appendix

Appendix A: Product Offering Questionnaire

Complete the following Product Offering Questionnaire. If there are multiple different product offerings for the proposed community solar project, please complete and attach one Product Offering Questionnaire per product offering. Variations in any product offering require a separate Product Offering Questionnaire. Applicants are expected to provide a good faith description of the product offerings developed for the proposed community solar project, as they are known at the time the Application is filed with the Board. If the proposed project is approved by the Board, the Applicant must notify the Board and receive approval from the Board for any modification or addition to a Product Offering Questionnaire.

Exception: This "Product Offering Questionnaire" is optional if: 1) the Applicant is a government entity (municipal, county, or state), AND 2) the community solar developer will be selected by the Applicant via a Request for Proposals (RFP), Request for Quotations (RFQ), or other bidding process.

This Questionnaire is Product Offering number 1 of 1 (total number of product offerings).

This Product Offering applies to:

- ☐ LMI subscribers
- ☐ non-LMI subscribers
- ☑ both LMI and non-LMI subscribers

1. Community Solar Subscription Type *(examples: kilowatt hours per year, kilowatt size, percentage of community solar facility's nameplate capacity, percentage of subscriber's historical usage, percentage of subscriber's actual usage)*: Percentage of community solar facility's nameplate capacity.

2. Community Solar Subscription Price: *(check all that apply)*
   - ☐ Fixed price per month
   - ☑ Variable price per month, variation based on: credit allocation and production of farm
   - ☐ The subscription price has an escalator of _____ % every _____ *(interval)*

3. Contract term (length): _____ months, or 1 _____ years OR ☐ month-to-month

4. Fees
   - ☐ Sign-up fee: NONE
   - ☐ Early Termination or Cancellation fees: NONE
   - ☐ Other fee(s) and frequency: NONE

5. Does the subscription guarantee or offer fixed savings or specific, quantifiable economic benefits to the subscriber? ..... ☑ Yes ☐ No

If "Yes," the savings are guaranteed or fixed:

- ☐ As a percentage of monthly utility bill
- ☐ As a fixed guaranteed savings compared to average historic bill
- ☑ As a fixed percentage of bill credits
- ☐ Other: _____

6. Special conditions or considerations:

Appendix B: Required Attachments Checklist

Note that this list is for indicative purposes only. Additional attachments may be required, and as identified throughout this Application Form. Please review the Application Form in its entirety, and attach attachments as required. The page numbers reference the pages from the Application Form as it was originally approved by the Board, not as they may appear in this fillable PDF.

Required Attachments Attachments marked with an asterisk (*) are only required if the project meets the specified criteria. All others are required for all Applications.	**Reference Page Number**	**Attached?**
Delineated map of the portion of the property on which the community solar facility will be located (in color). SEE ATTACHMENT 1	p. 10	☑Yes ☐ No
Proof of site control. SEE ATTACHMENT 2	p. 10	☒Yes ☐ No
(*) If the proposed project is located, in part or in whole on a rooftop: substantiating evidence that the roof is structurally able to support a solar system.	p. 12	☐Yes ☑ No
(*) If the proposed project is located on an area designated in need of redevelopment: proof of the designation of the area as being in need of redevelopment from a municipal, county, or state entity.	p. 13 SEE ATTACHMENT 14	☑Yes ☐ No
(*) If the proposed project is located in an Economic Opportunity Zone ("EOZ"), as defined by DCA: proof that the facility is located in an EOZ.	p. 13	☐Yes ☑ No
(*) If the proposed project is located on land or a building that is preserved by a municipal, county, or federal entity: proof of the designation of the site as "preserved" and that the designation would not conflict with the proposed solar facility.	p. 13	☐Yes ☑ No
Copy of the completed Permit Readiness Checklist. SEE ATTACHMENT 7	p. 14	☑Yes ☐ No
A screenshot of the EDC capacity hosting map at the proposed location, showing the available capacity (in color). SEE ATTACHMENT 10	p. 16	☑Yes ☐ No
Substantiating evidence of project cost in the form of charts and/or spreadsheet models. SEE ATTACHMENT 13	p. 20	☑Yes ☐ No
Product Offering Questionnaire(s) in Appendix A.	p. 30 – 31	☑Yes ☐ No
Certifications in Section C.	p. 25 – 29	☑Yes ☐ No

Optional Attachments Attachments marked with an asterisk (*) only apply if the project meets the specified criteria.	**Reference Page Number**	**Attached?**
(*) If the project is located, in part or in whole, on a brownfield: copy of the Response Action Outcome (issued by the LSRP) or the No Further Action letter (issued by DEP). SEE ATTACHMENTS 3, 4, 5	p. 12	☑Yes ☐ No
(*) If the project is located, in part or in whole, on an area of historic fill: copy of the Response Action Outcome (issued by the LSRP) or the No Further Action letter (issued by DEP).	p. 12	☐Yes ☑ No
Substantiating evidence that the proposed community solar facility has been specifically designed or planned to preserve or enhance the site (e.g. landscaping, site and enhancements, pollination support, etc.).	p. 14	☑Yes ☐ No

Proof of a meeting with NJDEP Office of Permitting and Project Navigation ("OPPN"), if applicable. SEE ATTACHMENT 7 and 8 (*) Proof of a meeting with OPPN is optional, except for projects that are in part or in whole a floating solar project. (*) If the Applicant met with OPPN (formerly PCER) during PY1, and there have been no changes to the project or site characteristics, include any comments received from OPPN on the PY1 Application.	p. 14	☑Yes ☐ No
Permits received for this site or project. SEE ATTACHMENT 9	p. 15	☑Yes ☐ No
Evidence of experience on projects serving LMI communities or partnerships with organizations that have experience serving LMI communities SEE ATTACHMENT 11	p.16	☑Yes ☐ No
(*) If an affordable housing provider is seeking to qualify as an LMI subscriber for purposes of the community solar project: signed affidavit from the affordable housing provider that the specific, substantial, identifiable, and quantifiable long-term benefits from the community solar subscription will be passed through to their residents/tenants.	p. 17	☐Yes ☑ No
(*) If the account holder of a master meter will subscribe on behalf of its tenants: signed affidavit from the account holder that the specific, identifiable, sufficient, and quantifiable benefits from the community solar subscription will be passed through to the tenants	p. 17	☐Yes ☑ No
Evidence that the proposed project is being developed by or in partnership and collaboration with the municipality in which the project is located.	p. 19	☐Yes ☑ No
Evidence that the proposed project is being developed in partnership or collaboration with one or more local community organization(s) and/or affordable housing providers in the area in which the project is located.	p. 19 – 20 SEE ATTACHMENT 12	☑Yes ☐ No
Evidence that the proposed project is being developed with support and in consultation with the community in which the project is located.	p. 20 SEE ATTACHMENT 12	☑Yes ☐ No
(*) If the project is seeking an exemption from the 10-subscriber minimum rule: supporting documents if needed.	p. 22	☐Yes ☑ No

Required Attachments for Exemptions	Reference Page Number	Attached?
If the Applicant is a government entity (municipal, county, or state), and the community solar developer will be selected by the Applicant via a Request for Proposals (RFP), Request for Quotations (RFQ), or other bidding process: ⇨ Attach a letter from the Applicant describing the bidding process and a copy of the request for bids (RFP, RFQ, or other bidding document) that is ready to be issued if project is granted conditional approval by the Board.	p. 22	☐Yes ☑ No
If the proposed community solar project is located, in part or in whole, on Green Acres preserved open space or on land owned by NJDEP. ⇨ Attach special authorization from NJDEP for the site to host a community solar facility.	p. 11	☐Yes ☑ No

If the proposed community solar project has received, in part or in whole, a subsection (t) conditional certification from the Board prior to February 19, 2019. ⇨ Attach a signed affidavit that the Applicant will immediately withdraw the applicable subsection (t) conditional certification if the proposed project is approved by the Board for participation in the Community Solar Energy Pilot Program.	p. 22	☐Yes ☑ No
If the proposed community solar project plans to operate as a municipal opt-out project, contingent on the Board's approval the relevant proposed rules. ⇨ Attach a copy of the municipal ordinance or resolution allowing the development, ownership, and operation an opt-out community solar project, contingent on the proposed rules being approved by the Board ⇨ Attach an affidavit that the municipal project owner will comply with all applicable rules and regulations, particularly those relating to consumer privacy and consumer protection.	p. 23 p. 24	☐Yes ☑ No ☐Yes ☑ No

Appendix C: Evaluation Criteria

The Evaluation Criteria chart below lists the various categories that the Board will consider in evaluating project Applications. Projects must score a minimum of 50 points total in order to be considered for participation in the Community Solar Energy Pilot Program. Projects that score above 50 points will be awarded program capacity in order, starting with the highest-scoring project and proceeding to the lowest-scoring project, until the capacity for each EDC territory is filled. The last project to be selected by the Board will be granted conditional approval for its full capacity.

Evaluation Criteria	Max. Points (total possible points: 100)
Low- and Moderate-Income and Environmental Justice Inclusion Higher preference: LMI project	25
Siting Higher preference, e.g.: landfills, brownfields, areas of historic fill, rooftops, parking lots, parking decks, canopies over impervious surfaces (e.g. walkway), former sand and gravel pits, floating solar on water bodies at sand and gravel pits that have little to no established floral and faunal resources (*) Medium preference, e.g.: floating solar on water bodies at water treatment plants that have little to no established floral and faunal resources (*) No Points, e.g.: preserved lands, wetlands, forested areas, farmland Bonus points for site enhancements, e.g. landscaping, land enhancement, pollination support (**) Bonus points if project is located in a redevelopment area or an economic opportunity zone (**) *Note: Applicants with a floating solar project must meet with DEP prior to submitting an Application, and take special notice of DEP's siting guidelines. *The siting criteria for floating solar located at sand and gravel pits that have little to no established floral and faunal resources has been moved from "medium preference" to "higher preference" per a Board Order dated January 7, 2021.* **Note: bonus points will only be available for projects in the "higher" or "medium" preference siting categories. Projects in the "No Points" siting categories are not eligible for bonus points.	20 Max. possible bonus points: 3 Max. possible bonus points: 2

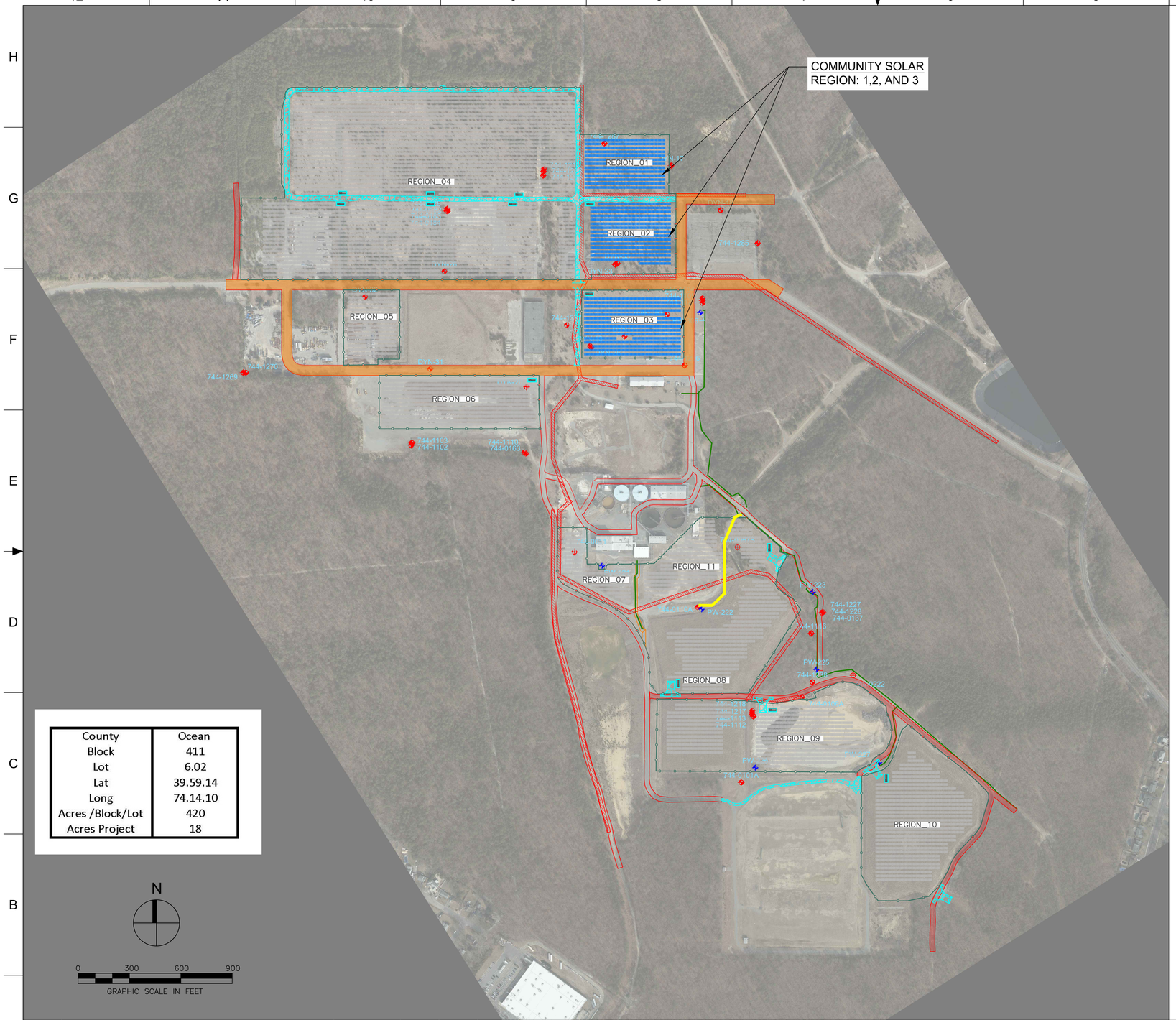
Community and Environmental Justice Engagement Higher preference: formal agreement, ongoing collaboration or effective partnership with municipality and/or local community organizations and/or affordable housing provider (per Section X, Questions 1, 2, and 3) Medium preference: consultation with municipality and/or local community organization(s) and/or or affordable housing provider (per Section X, Question 4) No Points: no collaboration or collaboration has not been proven	15
Product Offering Higher preference: guaranteed savings >20%, flexible terms* Medium preference: guaranteed savings >10%, flexible terms* Low preference: guaranteed savings >5% No Points: no guaranteed savings, no flexible terms* *Flexible terms may include: no cancellation fee, short-term contract	15
Other Benefits Higher preference: Provides jobs and/or job training and/or demonstrates co-benefits (e.g. paired with storage, EV charging station, energy audits, energy efficiency)	10
Geographic Limit within EDC service territory Higher preference: municipality/adjacent municipality Medium preference: county/adjacent county No Points: any geographic location within the EDC service territory	5
Project Maturity Higher preference: project has received all non-ministerial permits; project has completed an interconnection study	5

LIST OF ATTACHMENTS

1. **SOLAR FOOTPRINT MAP**
2. **PROOF OF SITE CONTROL**
3. **RECORD OF DECISION, OPERABLE UNIT 1 – GROUNDWATER**
4. **RECORD OF DECISION, OPERABLE UNIT 2 – SITE SOURCE AREAS**
5. **USEPA FOURTH FIVE YEAR REVIEW**
6. **DOCUMENTATION DESCRIBING SITE ENHANCEMENTS**
7. **COPY OF PERMIT READINESS CHECKLIST**
8. **PROOF OF MEETING WITH NJDEP PCER**
9. **COPIES OF PERMITS**
10. **SCREENSHOT OF CAPACITY HOSTING MAP & CONDITIONAL INTERCONNECTION APPROVAL**
11. **LMI EXPERIENCE**
12. **LETTERS OF SUPPORT**
13. **PROJECT COST TABLE**
14. **PROOF OF AREA IN NEED OF REDEVELOPMENT**

ATTACHMENT 1

SOLAR FOOTPRINT MAP



County	Ocean
Block	411
Lot	6.02
Lat	39.59.14
Long	74.14.10
Acres /Block/Lot	420
Acres Project	18

SYSTEM BASIS OF DESIGN	
ARRAY AZIMUTH	180°
ARRAY TILT	25°
PITCH	22.97 FT AVG
GLASS COVERAGE RATIO	51.80%
MODULE PER RACK	28
MODULE WATTAGE	390
NUMBER OF RACKS	457
TOTAL NUMBER OF MODULES	12792
MODULES PER STRING	26
NUMBER OF STRINGS	492
TOTAL RATED DC POWER (kWp)	4988.88
TOTAL RATED AC POWER (kWp)	3700
INVERTER LOADING RATIO (ILR)	1.35
FENCE ACREAGE	17.94

SYSTEM SUMMARY				
Project	**Regions**	**Racks**	**Modules**	**System size**
Type	**All**	**457**	**12792**	**4989**
Community Solar	1	129	3608	1407
	2	153	4284	1671
	3	175	4900	1911

LEGEND

SYMBOL	DESCRIPTION
	PROPOSED GRAVEL ACCESS DRIVEWAY FOR SOLAR ARRAY USE ONLY
	MONITORING / PIEZOMETER WELL: 5 FT RADIUS CLEARANCE REQUIRED FOR ACCESS
	GERS WELL: 20 FT RADIUS CLEARANCE REQUIRED
	30 FT WIDE ROADWAY CORRIDOR: BASF TO RETAIN FULL CONTROL
	60 FT WIDE ROADWAY CORRIDOR: BASF TO RETAIN FULL CONTROL
	ABOVE GROUND/UNDERGROUND CONVEYANCE PIPING: 20 FT CLEARANCE REQUIRED ON VEHICLE ACCESS SIDE 5 FT CLEARANCE REQUIRED ON OPPOSITE SIDE
	LIMIT OF SOLAR DEVELOPMENT AREA PERIMETER FENCELINE: FENCELINE PROHIBITED WITHIN CAPPED AREAS AND ASSOCIATED CAP DRAINAGE SWALES.
	20 FT WIDE OVERHEAD LINE AND POLES CORRIDOR
	COMMUNITY SOLAR ARRAY

CONCEPTUAL SITE PLAN
NOT FOR CONSTRUCTION

NOTES

1. SITE SPECIFIC FACTORS SUCH AS: TOPOGRAPHY, TREE SHADING, ACCESS DRIVES, DRAINAGE, EXISTING BUILDINGS, PROPOSED PV EQUIPMENT, PROPOSED PAD LOCATIONS, AND OR UTILITY INTERCONNECTION AREA COULD CHANGE THE FINAL ARRAY AREAS, SITE PLAN AND POWER OUTPUT.
2. CONSTRUCTION ACCESS, MAINTENANCE ACCESS AND OTHER SITE IMPROVEMENTS SHALL BE DESIGNED TO AVOID NEGATIVE IMPACTS TO CURRENT STORM WATER DRAINAGE CHARACTERISTICS AROUND LANDFILL AREAS

REV	DESCRIPTION	DATE	RE	CHECKER
G	ISSUED FOR SITE PLAN REVIEW	08/30/2019	ID	

REVISIONS

PROJECT: NJ TOMS RIVER (COMMUNITY SOLAR)

LOCATION: 227 OAK RIDGE PKWY
TOMS RIVER, NJ 08755

edf renewables
9175 GUILFORD ROAD, SUITE #202
COLUMBIA, MD 21046
800-374-4494
INFO@EDF-RE.COM

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SIZE: D | PROJECT NUMBER: TBD | DRAWING NUMBER: E-1 | REV: G

DATE: 08/30/2019

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ATTACHMENT 2

PROOF OF SITE CONTROL

OCEAN COUNTY CLERK'S OFFICE
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SCOTT M. COLABELLA
OCEAN COUNTY CLERK
P.O. BOX 2191
TOMS RIVER, NJ 08754-2191
(732) 929-2110
www.oceancountyclerk.com

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OR BK 17729 PG 930
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OCEAN COUNTY, NEW JERSEY

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FIRST PARTY NAME: *(Enter Last Name, First Name)* Basf corporation	SECOND PARTY NAME: (*Enter Last Name, First Name*) Toms River Merchant Solar, LLC
ALL ADDITIONAL PARTIES: *(Enter Last Name, First Name)*	RETURN NAME AND ADDRESS:

THE FOLLOWING SECTION IS REQUIRED FOR DEEDS ONLY

BLOCK:	LOT:

MUNICIPALITY: (*Select Municipality from Drop-Down Box*)

CONSIDERATION:

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Street Address | Town | State | Zip

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EDF Renewables Distributed Solutions, Inc.
5 Commerce Avenue
West Lebanon, NH 03784
Attn: General Counsel

[Parcel Ref./APN]: Block 411, Lots 6.02 and 6.03
Tax Map Toms River

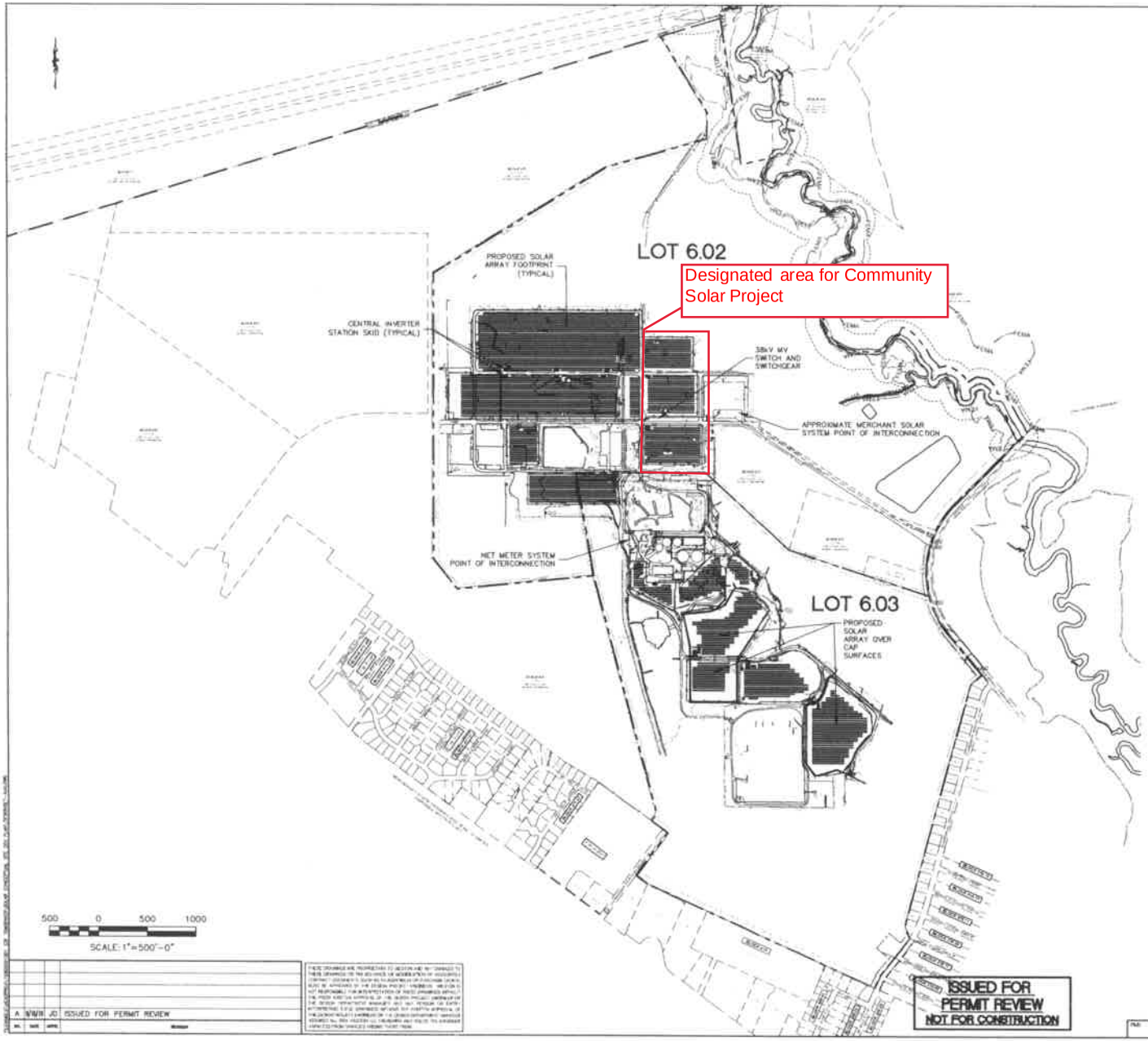
The above space for Recorder's Use Only

MEMORANDUM OF SOLAR LAND LEASE

THIS MEMORANDUM OF SOLAR LAND LEASE (this "**Memorandum**") is made and entered into as of November 22, 2019 (the "**Effective Date**"), by and between BASF Corporation, a Delaware corporation ("**Lessor**"), and Toms River Merchant Solar, LLC., a Delaware limited liability corporation ("**Lessee**").

1. The Lease. Lessor has granted and hereby grants to Lessee the following rights and purposes: the exclusive right for solar energy conversion, for the collection and transmission of electric power, and for related and incidental purposes and activities, including ingress and egress to the Leased Premises (defined below), interconnection, stormwater control and solar access (collectively, "**Operations**" or "**Solar Operations**." The term of the Lease (the "**Term**") began on September 18, 2019 and terminates upon the earlier of: (a) twenty-five (25) years after the Operations Date, which is generally when Solar Operations commence, or (b) the date this Lease is terminated as permitted in the Lease or by operation of law. Lessee may extend the term of this Lease by up to three (3) additional consecutive five (5) year terms commencing on the last day of the initial twenty-five (25) year term or the first extended term.

2. The Leased Premises. The Leased Premises is of approximately one hundred, fifteen (115) acres of the Property described in **Exhibit A** hereto. Upon agreement by the Lessor and Lessee of a survey showing the metes and bounds of the Leased Premises (the "Survey"), this Memorandum shall be amended to replace Exhibit A with the Survey.



NOTES:

1. FOR GENERAL NOTES AND LEGEND SEE DRAWING NO. G-002.
2. SOLAR ARRAY PANEL LOCATIONS ARE SUBJECT TO FINAL DESIGN. PANEL ARRAY COVERAGE SHALL NOT EXCEED 50 PERCENT AREA OF SOLAR ARRAY DEVELOPMENT FOOTPRINT.

BLOCK 411 OWNERS NAME

LOT 9	OCEAN COUNTY	(DB. 13948-PG. 1582)	
LOT 12.19	GURAL SANPREET	(DB. 15272-PG. 865)	(FILED MAP #H-2096)
LOT 12.20	KYLE, SAMUEL T. & TRACY D.	(DB. 11753-PG. 1184)	(FILED MAP #H-2096)
LOT 12.21	LU, SHENG & XIAO C. ZHANG	(DB. 15209-PG. 1879)	(FILED MAP #H-2096)
LOT 12.23	KYLE, SAMUEL T. & TRACY D.	(DB. 12680-PG. 1807)	(FILED MAP #H-3096)
LOT 26	TOWNSHIP OF TOMS RIVER		
LOT 81	COMCAST CABLEVISION OF NJ LLC	(DB. 10309-PG. 1993)	
LOT 114	CHURCH-PINELANDS REFORMED	(DB. 4112-PG. 102)	
LOT 117	BOARD OF EDUCATION OF T.R. SCHOOLS		
LOT 132	KALUS REALTY, LLC	(DB. 11529-PG. 348)	
LOT 133.03	WAL-MART STORES, INC. STORE #1944	(DB. 5700-PG. 585)	

BLOCK 411.38 OWNERS NAME

LOT 1	OSBORNE, OLIVER & HELENA	(DB. 4716-PG. 547)	(FILED MAP #C-297)
LOT 2	VITOLO, JOSEPH & BARBARA	(DB. 4847-PG. 435)	(FILED MAP #C-297)
LOT 3	ALBERTO, SHEILA	(DB. 15974-PG. 1424)	(FILED MAP #C-297)
LOT 4	BYRD, MILDRED G.	(DB. 5755-PG. 565)	(FILED MAP #C-297)
LOT 5	DICAPILLO, SALVATORE & LESLIE	(DB. 12733-PG. 586)	(FILED MAP #C-297)
LOT 6	LE, THUY-NGAN	(DB. 14580-PG. 1406)	(FILED MAP #C-297)
LOT 7	LOPICE, KIMBERLEY	(DB. 14736-PG. 1756)	(FILED MAP #C-297)
LOT 8	BOYLE, JEANMARIE	(DB. 13709-PG. 1370)	(FILED MAP #C-297)
LOT 9	HARDY, MARK W.	(DB. 14824-PG. 1808)	(FILED MAP #C-297)
LOT 10	HAGLEY, THOMAS & SARAH	(DB. 5704-PG. 365)	(FILED MAP #C-297)
LOT 11	DIRO IN PERTOSI LLC	(DB. 15814-PG. 308)	(FILED MAP #C-297)
LOT 12	FRANCESCHELLI, CHRISTOPHER	(DB. 11068-PG. 736)	(FILED MAP #C-297)
LOT 13	WEISINGER, ERIN & JOSEPH STARTZ	(DB. 14319-PG. 528)	(FILED MAP #C-297)
LOT 14	WANSENBERG, T. SCOTT & SHANNON	(DB. 12350-PG. 556)	(FILED MAP #C-297)
LOT 15	MCDERMOTT,CHRISTOPHER & WEBB,J	(DB. 17161-PG. 1186)	(FILED MAP #C-297)
LOT 16	GIANNOZZO, FRANK & SUSAN	(DB. 4888-PG. 342)	(FILED MAP #C-297)
LOT 17	KYLE, CHARLES M. JR. & MILDRED M.		(FILED MAP #C-297)
LOT 18	ROSSANO, Rose & STANCHOK, ELIZABETH (DB. 14907-PG. 1957)		(FILED MAP #C-297)
LOT 18	BAHTA, ROBERT & JOSEPHINE	(DB. 4178-PG. 840)	(FILED MAP #C-297)

BLOCK 411.46 OWNERS NAME

LOT 26	WELTMAN, JOHN & LINDA	(DB. 10409-PG. 1273)	(FILED MAP #A-427)
LOT 27	HAHN, JEFFREY & ELLEN	(DB. 4700-PG. 767)	(FILED MAP #A-427)
LOT 28	CRAIG, ROBERT & PATRICIA	(DB. 13048-PG. 322)	(FILED MAP #A-427)
LOT 29	US BANK NA	(DB. 17147-PG. 487)	(FILED MAP #A-427)
LOT 30	GALMI, FRANK & MARGARET M.		(FILED MAP #A-427)

BLOCK 508.04 OWNERS NAME

LOT 1	KAPUSNEY, DAVID & SHARON	(DB. 11981B-PG. 11372)	(FILED MAP #C-358)
LOT 2	OUTWIN, DENISE	(DB. 5141-PG. 383)	(FILED MAP #C-358)
LOT 3	JUHR, ROBERT JR	(DB. 5425-PG. 673)	(FILED MAP #C-358)
LOT 4	RILEY, FLOYD G. & HELEN M.		(FILED MAP #C-358)
LOT 6	CONOVER, R. L. J. W & B. C.	(DB. 15435-PG. 01)	(FILED MAP #C-358)

BLOCK 510.30 OWNERS NAME

LOT 1	LISA MARIANNO	(DB. 17389-PG. 1530)	(FILED MAP #B-438)
LOT 2	KYLE III & MARELLEN MORRIS	(DB. 18731-PG. 1074)	(FILED MAP #B-438)
LOT 3	GARY T. SOMMER	(DB. 15745-PG. 1979)	(FILED MAP #B-438)
LOT 4	JOHN J. & DOLORES PASSUTH	(DB. 10758-PG. 113)	(FILED MAP #B-438)
LOT 5	KATHRYN WEISCHALER		(FILED MAP #B-438)
LOT 6	LINDA M TONER	(DB. 15032-PG. 1390)	(FILED MAP #B-438)
LOT 7	GUERSHON CHERLIEN	(DB. 18883-PG. 281)	(FILED MAP #B-438)
LOT 8	CHRISTOPHER GALVEZ	(DB. 5578-PG. 854)	(FILED MAP #B-438)
LOT 9	KILZY, GORDX & YEHEZIANG, KAREN	(DB. 17208-PG. 706)	(FILED MAP #B-438)
LOT 10	BUSHEY, KELLY A. & HADER, JOSEPH F	(DB. 15215-PG. 1835)	
LOT 11	FRANK & FRANCESPANE	(DB. 10679-PG. 1715)	
LOT 12	DANIEL & MICHELE PASHICU	(DB. 17166-PG. 170)	(FILED MAP #D-251)
LOT 13	ROBERT & JULIE BURCZYK		(FILED MAP #D-251)
LOT 14	PHILIP & EVADNEY MANASH	(DB. 17188-PG. 1522)	(FILED MAP #D-251)
LOT 15	RAJINDER S. CHANDI, & KAUR, JASVIR	(DB. 16798-PG. 1803)	(FILED MAP #D-251)
LOT 16	ROBERT & ALBERTA PAUSINELLI	(DB. 15861-PG. 377)	(FILED MAP #D-251)
LOT 17	PHILIP C & TARA LOMENBURG	(DB. 13401-PG. 1084)	(FILED MAP #F-341)
LOT 18	KAMPMEYER, J. & KAMPMEYER, R. E.	(DB. 14594-PG. 238)	(FILED MAP #F-341)
LOT 19	TIMOTHY & LORI OCONNELL	(DB. 10623-PG. 1190)	(FILED MAP #F-341)
LOT 20	JOHN J. III & BRENDA PENN	(DB. 14717-PG. 223)	(FILED MAP #F-341)
LOT 21	JERRY J. & ELIZABETH A. DAUT	(DB. 14123-PG. 1087)	(FILED MAP #F-341)
LOT 22	MICHAEL DANTE JANUTOLA	(DB. 18060-PG. 1332)	(FILED MAP #F-341)
LOT 23	KAREN CRAWFORD		(FILED MAP #F-341)
LOT 24	RICHARD & MARGNOLL LORI TROVATO	(DB. 17087-PG. 358)	(FILED MAP #F-341)
LOT 25	ROCCO & CHERYL PALLITTO	(DB. 5304-PG. 838)	(FILED MAP #F-341)
LOT 26	SUZANNE NOORMAN	(DB. 14528-PG. 782)	(FILED MAP #F-341)
LOT 27	MARIO J. & MARIA F. ZAFRA	(DB. 18371-PG. 1897)	(FILED MAP #F-341) (FILED MAP #G-579)
LOT 28	UPPLER, GEORGE & CHANNING, STEPHEN	(DB. 18438-PG. 834)	(FILED MAP #F-341) (FILED MAP #G-579)

NO.	DATE	APP'D	REVISION
A	9/19/19	JD	ISSUED FOR PERMIT REVIEW

ISSUED FOR PERMIT REVIEW
NOT FOR CONSTRUCTION

DESIGNED BY: KP | DRAWN BY: DP | CHECKED BY: MM
APPROVED BY: JD | PROJECT MGR.: JD

Joseph R Dietrich
NJ PROFESSIONAL ENGINEER
24GE04713700

TOMS RIVER MERCHANT SOLAR, LLC
PROPOSED 35 MW DC SOLAR FACILITY
TOWNSHIP OF TOMS RIVER, OCEAN COUNTY, NEW JERSEY
BLOCK 411 TAX LOT 8.03 & 8.03

SITE DEVELOPMENT PLAN

WESTON SOLUTIONS
Weston Solutions, Inc.
205 Campus Drive
Edison, NJ 08837-3638

SCALE: AS SHOWN | DATE: AUGUST 2019 | DRAWING NO.: G-100 | SHEET NO.: 3 OF 34

3. Addresses for Notices:

Lessor:

BASF Corporation
100 Park Avenue
Florham Park, New Jersey 07932
Attn: Charlie Waltz, Sites Manager
Attn: Charles R. Waltz, Real Estate Department
Telephone: (973) 245-6595
Facsimile: (973) 245-6782
E-Mail: Charles.waltz@basf.com

Lessee:

EDF Renewables Distributed Solutions, Inc.
5 Commerce Avenue
West Lebanon, NH 03784
Attn: General Counsel
Telephone: (802) 295-4415
Fax: (802) 295-4417
E-Mail: counsel@edf-re.com

4 Counterparts. This Memorandum may be executed in counterparts, each of which shall be deemed an original but all of which together shall constitute one and the same instrument.

5 This Memorandum is executed and recorded for providing record notice of the execution, delivery and existence of the Lease, and satisfaction of requirement of the Toms River Planning Board granting final major site plan approval for Solar Operations on the Leased Premises. This Memorandum shall not supersede or in any way modify the terms or conditions of the Lease. In the event of any conflict between any term or provision of the Lease and this Memorandum, the applicable term or provision of the Lease shall control.

[SIGNATURE PAGES BELOW]

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum as of the date first set forth above.

LESSOR: BASF CORPORATION

By: _____
Print Name: C.R. Waltz
Title: Sites Lead Manager
Date: 12/13/19

APPROVED BY LEGAL DEPT. DA

STATE OF New Jersey)
) ss.
COUNTY OF Morris)

The foregoing instrument was acknowledged before me this 13th day of December, 2019 by Charles Waltz, the Sites Manager (title) of BASF Corporation, a Delaware corporation, on behalf of the corporation.

Jeanne Hahn
Notary Public

JEANNE HAHN
NOTARY PUBLIC
STATE OF NEW JERSEY
MY COMMISSION EXPIRES DEC. 6, 2022

IN WITNESS WHEREOF, the parties hereto have executed this Memorandum as of the date first set forth above.

LESSEE: TOMS RIVER MERCHANT SOLAR, LLC
By: EDF Renewables Distributed Solutions, Inc., Manager

By: _____
Print Name: Rod Viens
Title: SVP of Manager
Date: December 10, 2019

STATE OF New Hampshire)
) ss.
COUNTY OF Grafton)

The foregoing instrument was acknowledged before me this 10th day of December, 2019 by Rod Viens, the SVP of EDF Distributed Solutions, Inc., a Delaware corporation, as Manager of Toms River Merchant Solar, LLC, a Delaware limited liability company.

_____
Notary Public

CATHERINE E PELTON
Notary Public-New Hampshire
My Commission Expires
May 16, 2023

ATTACHMENT 3

RECORD OF DECISION, OPERABLE UNIT 1 - GROUNDWATER

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R02-89/076
April 1989

EPA

Superfund Record of Decision:

Ciba-Geigy, NJ

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R02-89/076	2.	3. Recipient's Accession No.

4. Title and Subtitle
SUPERFUND RECORD OF DECISION
Ciba-Geigy, NJ
First Remedial Action

5. Report Date
4/24/89

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Organization Name and Address

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered
800/000

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Ciba-Geigy Chemical Corporation site is located in Dover Township, Ocean County, New Jersey. The site covers 1,400 acres, 320 of which are developed; the remaining area is largely wooded. The site is bounded by industrial, commercial, residential, and recreational areas. The Toms River, which derives surface water primarily through ground water baseflow, runs through the northeast sector of the property. The aquifer system in the site area is tapped by municipal, industrial, and private wells. The manufacturing facility, presently owned by Ciba-Geigy Chemical Corporation, has been in operation since 1952 and is composed of numerous buildings, an industrial wastewater treatment plant, and a lined reservoir for emergency storage of treated and untreated wastewater. From 1952 to 1988, a variety of synthetic organic pigments, organic dyestuffs and intermediates, and epoxy resins were manufactured at the site. The company disposed of chemical wastes onsite in several locations, including a 5.2-acre drum disposal area (containing approximately 100,000 drums); a 3.9-acre lime sludge disposal area (used for disposal of inorganic wastes); a 12-acre filtercake disposal area (which received sludge from the wastewater treatment); five backfilled lagoons comprising 8.5 acres; and a calcium sulfate disposal area. The drum disposal area and lime sludge disposal area were closed and capped in 1978. About this time, the
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision - Ciba-Geigy, NJ
First Remedial Action
Contaminated Media: gw
Key Contaminants: VOCs (TCE, PCE, toluene, benzene), metals (arsenic, chromium)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 132
	20. Security Class (This Page) None	22. Price

DO NOT PRINT THESE INSTRUCTIONS AS A PAGE IN A REPORT

INSTRUCTIONS

Optional Form 272, Report Documentation Page is based on Guidelines for Format and Production of Scientific and Technical Reports, ANSI Z39.18–1974 available from American National Standards Institute, 1430 Broadway, New York, New York 10018. Each separately bound report—for example, each volume in a multivolume set—shall have its unique Report Documentation Page.

1. Report Number. Each individually bound report shall carry a unique alphanumeric designation assigned by the performing organization or provided by the sponsoring organization in accordance with American National Standard ANSI Z39.23–1974, Technical Report Number (STRN). For registration of report code, contact NTIS Report Number Clearinghouse, Springfield, VA 22161. Use uppercase letters, Arabic numerals, slashes, and hyphens only, as in the following examples: FASEB/NS–75/87 and FAA/RD–75/09.
2. Leave blank.
3. Recipient's Accession Number. Reserved for use by each report recipient.
4. Title and Subtitle. Title should indicate clearly and briefly the subject coverage of the report, subordinate subtitle to the main title. When a report is prepared in more than one volume, repeat the primary title, add volume number and include subtitle for the specific volume.
5. Report Date. Each report shall carry a date indicating at least month and year. Indicate the basis on which it was selected (e.g., date of issue, date of approval, date of preparation, date published).
6. Sponsoring Agency Code. Leave blank.
7. Author(s). Give name(s) in conventional order (e.g., John R. Doe, or J. Robert Doe). List author's affiliation if it differs from the performing organization.
8. Performing organization Report Number. Insert if performing organizaton wishes to assign this number.
9. Performing Organization Name and Mailing Address. Give name, street, city, state, and ZIP code. List no more than two levels of an organizational hierachy. Display the name of the organization exactly as it should appear in Government indexes such as Government Reports Announcements & Index (GRA & I).
10. Project/Task/Work Unit Number. Use the project, task and work unit numbers under which the report was prepared.
11. Contract/Grant Number. Insert contract or grant number under which report was prepared.
12. Sponsoring Agency Name and Mailing Address. Include ZIP code. Cite main sponsors.
13. Type of Report and Period Covered. State interim, final, etc., and, if applicable, inclusive dates.
14. Performing Organization Code. Leave blank.
15. Supplementary Notes. Enter information not included elsewhere but useful, such as: Prepared in cooperation with . . . Translation of . . . Presented at conference of . . . To be published in . . . When a report is revised, include a statement whether the new report supersedes or supplements the older report.
16. Abstract. Include a brief (200 words or less) factual summary of the most significant information contained in the report. If the report contains a significant bibliography or literature survey, mention it here.
17. Document Analysis. (a). Descriptors. Select from the Thesaurus of Engineering and Scientific Terms the proper authorized terms that identify the major concept of the research and are sufficiently specific and precise to be used as index entries for cataloging.

    (b). Identifiers and Open-Ended Terms. Use identifiers for project names, code names. equipment designators, etc. Use open-ended terms written in descriptor form for those subjects for which no descriptor exists.

    (c). COSATI Field/Group. Field and Group assignments are to be taken form the 1964 COSATI Subject Category List. Since the majority of documents are multidisciplinary in nature, the primary Field/Group assignment(s) will be the specific discipline, area of human endeavor, or type of physical object. The application(s) will be cross-referenced with secondary Field/Group assignments that will follow the primary posting(s).
18. Distribution Statement. Denote public releasability, for example "Release unlimited", or limitation for reasons other than security. Cite any availability to the public, with address, order number and price, if known.

19. & 20. Security Classification. Enter U.S. Security Classification in accordance with U. S. Security Regulations (i.e., UNCLASSIFIED).

21. Number of pages. Insert the total number of pages, including introductory pages, but excluding distribution list, if any.
22. Price. Enter price in paper copy (PC) and/or microfiche (MF) if known.

☆ GPO: 1983 0 - 381-526 (8393)

6. Abstract (Continued)

filtercake disposal area was also closed and covered with soil. Ground water contamination is migrating from these inactive disposal sites easterly towards the Toms River. Currently, the company generates both liquid and solid wastes. The liquid wastes are treated onsite in a wastewater treatment plant before discharge to the Atlantic Ocean. The solid wastes are disposed of offsite, and sludges from the wastewater treatment plant are disposed of in a permitted, double-lined, onsite landfill. EPA began investigating the site in 1980. Throughout its operation, the facility has routinely violated treatment and disposal permits, including accepting hazardous offsite waste beginning in 1981. The landfill reportedly was leaking as early as 1981, precipitating remedial measures by the State including issuance of a consent order forcing Ciba-Geigy to close part of the landfill and monitor ground water and leachate. In 1984, after discovering that Ciba-Geigy was illegally disposing of drums containing liquids and hazardous waste in the landfill, the State ordered Ciba-Geigy to remove 14,000 drums. In 1985, leaking equalization basins associated with the wastewater treatment plant led to Ciba-Geigy closing the basins and beginning remediation of the ontaminated plume from these basins. Currently, contaminants are present in leaking drums, waste sludges, soils, and ground water. This Record of Decision addresses the first operable unit focusing on the remediation of ground water contamination in the upper aquifer. Remediation of the onsite source areas and deeper aquifer (if needed) will be addressed in future operable units. The primary contaminants of concern affecting the ground water are VOCs including benzene, PCE, TCE, and toluene; and metals including arsenic and chromium.

The selected remedial action for this site includes sealing contaminated residential irrigation wells; on- and offsite ground water pumping with onsite treatment using filtration, reverse osmosis, and GAC in an upgraded version of the Ciba-Geigy wastewater treatment plant, followed by temporarily retaining the ground water in basins for monitoring and subsequent discharge to the Toms River; and implementation of a river and ground water monitoring program. The estimated present worth cost for this remedial action is $164,500,000, which includes annual O&M of $12,539,000.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

RECORD OF DECISION OPERABLE UNIT ONE



CIBA-GEIGY CHEMICAL CORPORATION SITE
TOMS RIVER, NJ

APRIL 24, 1989

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4 Proposed Discharge Criteria for the Toms River - To Be Considered (Mass Units)

4A Proposed Discharge Criteria for the Toms River - To Be Considered (Concentration Units)

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DECLARATION STATEMENT

RECORD OF DECISION

CIBA-GEIGY Chemical Corporation - Operable Unit I, Dover Township, Ocean County, New Jersey

STATEMENT OF PURPOSE

This decision document presents the selected remedial action for the CIBA-GEIGY Chemical Corporation site - Operable Unit I in Dover Township, New Jersey, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300.

STATEMENT OF BASIS

I am basing my decision primarily on the following documents, which are contained in the administrative record for this site:

- Remedial Investigation for the CIBA-GEIGY site, prepared by NUS Corporation, January 22, 1988;
- Final Draft Feasibility Study for the CIBA-GEIGY site, prepared by NUS Corporation, April 29, 1988;
- Final Report - CIBA-GEIGY Technical Enforcement Support Document, Groundwater Modeling Report, CIBA-GEIGY, Toms River, New Jersey, prepared by Camp, Dresser & McKee, April 1989;
- Final Report - CIBA-GEIGY Plant, Groundwater Treatment Alternatives, Toms River, New Jersey, prepared by Camp, Dresser & McKee, April 1989;
- Proposed Remedial Action Plan, CIBA-GEIGY site, June 1988;
- The attached Decision Summary for the CIBA-GEIGY site,
- The attached Responsiveness Summary for the site, which incorporates public comments received; and
- Staff summaries and recommendations.

The State of New Jersey has concurred on the selected remedy.

DESCRIPTION OF THE SELECTED REMEDY

This operable unit was developed to protect public health and the environment by remediating the contaminated groundwater in the upper aquifer. The groundwater will be extracted until the federal and state cleanup standards are met to the maximum extent practicable. The operable unit is fully consistent with all planned future site activities. Future site activities include further evaluation of potential areas of contamination and development of measures to remediate these areas and further evaluation of the deeper aquifer and development of remedial measures for this aquifer, if required.

The major components of the selected remedy for the CIBA-GEIGY site - Operable Unit I are as follows:

- Sealing of contaminated residential wells in the Cardinal Drive area to prevent human exposure to contaminated groundwater.

- Installation of an extraction well system on and off site to stop migration of contaminated groundwater at the property line and capture the contaminated groundwater in the off-site areas.

- After extraction, treatment of the contaminated groundwater separately from the process wastewater in an upgraded existing CIBA-GEIGY wastewater treatment plant. The contaminated groundwater will be treated to the discharge levels as specified by the NJDEP for discharge to the Toms River.

- After treatment, the groundwater will be retained in basins to allow monitoring of residual contaminant levels prior to discharge through a pipeline to the Toms River.

- Monitoring of the Toms River to determine current water quality upstream, downstream, and adjacent to the site. Monitoring will continue during the implementation of the remedial action to evaluate the effects of the extraction system and river discharge over time.

DECLARATION

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300, I have determined the selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate for this remedial action and is cost-effective.

This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining on-site above health-based levels, a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

April 24, 1989
Date

William J. Muszynski, P.E.
Acting Regional Administrator

DECISION SUMMARY

CIBA-GEIGY CHEMICAL CORPORATION SITE - OPERABLE UNIT I

DOVER TOWNSHIP, NEW JERSEY

SITE NAME, LOCATION AND DESCRIPTION

The CIBA-GEIGY Chemical Corporation site is located on Route 37 in Toms River, Ocean County, New Jersey, about one mile west of the Garden State Parkway (refer to Figure 1). The site, presently owned by the CIBA-GEIGY Chemical Corporation, covers 1400 acres, 320 of which are developed; the remaining area is largely wooded. The manufacturing facility, which has been in operation since 1952, is composed of twenty-two buildings, a wastewater treatment plant which currently has an average operating capacity of 4.0 million gallons per day (MGD), and a lined reservoir for emergency storage of treated and untreated wastewater.

Topographically, the CIBA-GEIGY site is flat but drops off sharply toward the Toms River in the northeastern sector of the property. Winding River Park, an outdoor recreational area situated on the floodplain of the Toms River, adjoins the site to the east. A residential area borders the site to the southeast. The site is bounded on the west by an industrial park, and on the north and south by residential and commercial properties. Major residential developments, including two retirement communities, are located 1 mile south of the site. The business district of the town of Toms River lies 3 miles southeast of the site (refer to Figure 2).

Geologically, the CIBA-GEIGY site is directly underlain by the Kirkwood Formation and Cohansey Sand. In general, the Kirkwood Formation is composed of quartz-bearing very fine- to medium-grained sand and contains dark-colored micaceous, diatomaceous clay, known to be regionally extensive at the base of the formation. The Cohansey Sand is composed of light-colored, medium- to coarse-grained quartz sand with pebbles, and locally, clay beds. The thickness of the Kirkwood-Cohansey aquifer system in the vicinity of the CIBA-GEIGY site is approximately 205 feet. Perched water tables and semi-confined aquifer conditions occur locally within the Kirkwood-Cohansey aquifer system.

The drainage course of the Toms River traverses Ocean County along a 16-mile pathway from the northwest to the southeast. The main channel of the Toms River, along with associated tributaries of the river system, provides drainage to a basin encompassing 190 square miles. Surface waters from all tributaries in the northern drainage basin of the Toms River contribute to the hydraulic flow and water quality at the CIBA-GEIGY site.

Average stream discharge of the Toms River for the past 57 years at the CIBA-GEIGY site is 215 cubic feet per second (cf/s). Stream flows in the New Jersey Coastal Plain, including the surface water discharge in the Toms River are derived primarily from groundwater baseflow.

Water quality data for the past 20 years show that the waters of the Toms River are acidic, with a pH range of 3.4 to 7.8 and a median of 5.0. Surface waters are normally oxygen saturated; however, conditions of oxygen stress occurred during the summer months of 1966 and 1970. Biological oxygen demand (BOD) of the surface waters has remained within the expected concentration range of river water and presently ranges from 0.2 mg/l to 1.5 mg/l. Total nitrogen content of the river shows a trend toward decreasing concentrations over time. Total phosphorous has remained fairly stable, with a range of 0.01 to 0.20 mg/l. The total dissolved solids (TDS) level is approximately 35 mg/l.

From 1952 to 1966, operators of the site discharged treated effluent into the Toms River. Since 1966, the treated effluent has been sent to the Atlantic Ocean. Improved water quality in the Toms River, notably a decrease in nitrogen and BOD concentrations, may be related to these changes at the CIBA-GEIGY plant.

Municipal and Private Wells

The Kirkwood-Cohansey aquifer system in the area surrounding the CIBA-GEIGY site is tapped by municipal, industrial and private wells. The nearest public water supply well, owned by the Toms River Water Company and designated "TRWC 20," is located approximately 2200 feet from the site boundary on the east side of the Toms River. Privately-owned drinking water wells near the site are concentrated along the southwestern site boundary and in the southern portion of the Cardinal

Drive area, located between the eastern site boundary and the Toms River (refer to Figure 2). Several residents in the Cardinal Drive area also have irrigation wells. Additional residential drinking water wells are located along Coulter Street between well TRWC 20 and the Toms River (refer to Figure 2).

The U.S. Environmental Protection Agency (EPA) sampled both residential drinking water and irrigation wells several times beginning in the Spring of 1985. Elevated levels of mercury (which are not believed to be site-related) above EPA's Maximum Contaminant Level (MCL) of 0.002 mg/l were found in three private residential drinking water wells on Coulter Street. These residences have since been put on municipal water supplies. In addition, elevated levels of lead contamination above EPA's MCL of 0.05 mg/l were found in three private residential drinking water wells along the southwestern site boundary. One home has been placed on municipal water supplies. The contamination found in these wells is not believed to be site-related.

Elevated levels of volatile organic compounds (VOCs) and metals were also found in water from private irrigation wells in the Cardinal Drive area. Some of these contaminated irrigation wells have been sealed. Presently, all residences in the Cardinal Drive area which are within the CIBA-GEIGY plume use municipal water as their potable water source.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

According to CIBA-GEIGY, the manufacturing facility commenced operation in 1952 as the Toms River Chemical Corporation (TRC), jointly owned by Society of Chemical Industry, Basle (Ciba), J.R. Geigy, S.A., Basle (Geigy) and Chemical Works, the predecessor of Sandoz Limited (Sandoz). In 1970, the U.S. subsidiaries of Ciba and Geigy merged to become CIBA-GEIGY Corporation. From 1970 through 1981, TRC was jointly owned by Sandoz and CIBA-GEIGY. In 1981 Sandoz transferred all interest to CIBA-GEIGY.

From 1952 to 1988, a variety of synthetic organic pigments, organic dyestuffs and intermediates, and epoxy resins were manufactured at the site. Principal markets for these products were the paper and textile industries and the electronics

industry. In 1988, CIBA-GEIGY phased out the dye manufacturing processes. According to CIBA-GEIGY, epoxy resin manufacturing processes are scheduled to end in late 1991. Dye standardization will continue indefinitely.

Currently, the company generates both liquid and solid wastes. The liquid wastes are treated on site in a wastewater treatment plant before discharging to the Atlantic Ocean. The solid wastes, consisting of residue from the manufacturing processes, are disposed off site, and sludges from the wastewater treatment plant are disposed in permitted double-lined, on-site landfills.

In 1987, the company applied to the New Jersey Department of Environmental Protection (NJDEP) for permits to convert the existing facility to a pharmaceutical manufacturing facility. On October 24, 1988, NJDEP denied these permits. On November 28, 1988, CIBA-GEIGY announced that it would not appeal the NJDEP permit denials and on December 6, the company announced that it would significantly reduce manufacturing operations at this location and close the current ocean outfall by December 31, 1991.

Wastewater Treatment Activities

Since 1952 until 1960, TRC operated an industrial wastewater treatment plant. According to CIBA-GEIGY, this plant consisted of an equalization basin, an oxidation lagoon, and a settling basin, with discharge to the Toms River. Of these units, only the equalization basin was lined. The liner, however, began to leak soon after the basin became operational. All liquid wastes were disposed through this treatment plant. Solid wastes were disposed in bulk on site.

In 1960, the existing treatment plant was closed except for the equalization basins, which were re-lined. A new treatment plant was built adjacent to the Toms River in the northeastern area of the site. A portion of the settling basin from the original wastewater treatment plant was converted to a solid waste disposal area for both drummed waste and other wastes such as iron sludge and biological sludge.

In 1966, the river discharge was closed and the treated effluent was sent to the Atlantic Ocean through a ten-mile pipeline.

The second wastewater treatment plant was closed in 1977 and a third, more modern treatment plant with lined basins was constructed. The sludge from the second treatment plant was sent to an on-site area known as the Filtercake Disposal Area, after which this area was closed and covered with soil.

On-Site Waste Disposal Activities

The company disposed of chemical wastes on site in several locations. These locations include:

- a 5.3-acre Drum Disposal Area (reported by CIBA-GEIGY to contain approximately 100,000 drums),
- a 3.9-acre Lime Sludge Disposal Area,
- a 12-acre Filtercake Disposal Area,
- five Backfilled Lagoons comprising approximately 8.5 acres, and
- a Calcium Sulfate Disposal Area.

Aerial photographs indicate that other areas designated as the Borrow Area, Casual Dumping Area and the suspected East Overflow Area may have also been used as waste disposal sites (refer to Figure 2).

The Drum Disposal Area was used from 1960 until 1977. Also during this time, the Filtercake Disposal Area was used for the disposal of sludge from the wastewater treatment plant. In addition, the Lime Sludge Disposal Area was used to dispose of inorganic wastes (including arsenic wastes) stabilized with calcium carbonate. Some of this waste was drummed, while some was disposed in bulk. The Drum Disposal Area and the Lime Sludge Disposal Area were closed in 1978. Investigations have shown that groundwater contamination is migrating from these inactive disposal sites in an easterly direction towards the Toms River. In addition to the closed disposal areas, an active landfill designed and permitted to accept wastewater treatment plant sludge is also located on site. After 1977, CIBA-GEIGY began disposing of waste in a double-lined permitted landfill and shipping waste off site for disposal.

Site Investigations

During the late 1970s and early 1980s, CIBA-GEIGY performed various closure activities and geohydrologic investigations at the site in response to NJDEP directives. These activities included closing the Drum Disposal Area and the Lime Sludge Disposal Area with 30-mil PVC caps in 1978, installing drainage swales and initiating geohydrologic studies to identify the sources of groundwater contamination and the direction and extent of contaminated plumes. Also, as early as 1979, there were reports of leakage of the double-lined Active Landfill and remedial measures were taken under the direction of the NJDEP Solid Waste Administration.

EPA completed an Identification and Preliminary Assessment report of the CIBA-GEIGY site under the Potential Hazardous Waste Site Program in 1980. The site was proposed for the National Priorities List in 1982 and was ranked at 166 nationally among 418 listed sites.

An Administrative Consent Order was entered into between the NJDEP and CIBA-GEIGY in 1981 to close Cell I of the Active Landfill, delineate conditions for the use of Cell II, sample and analyze leachate from Cells I and II, and monitor groundwater.

In 1981, CIBA-GEIGY began accepting waste for treatment and disposal from off site. In 1983, the Division of Water Resources (DWR) of NJDEP notified CIBA-GEIGY that further acceptance of hazardous/nonhazardous waste into the on-site wastewater treatment plant from off-site sources would be in violation of its New Jersey Pollution Discharge Elimination System Permit and would result in prosecution.

In 1984, the NJDEP discovered that CIBA-GEIGY was illegally disposing of drums containing liquids and hazardous waste in Cell II of its Active Landfill. This discovery led the New Jersey Division of Criminal Justice to conduct an investigation into the waste handling and disposal practices at the site. The criminal investigation resulted in indictments on two occasions, of several CIBA-GEIGY officials who were charged with the illegal disposal of chemical waste, filing false documents with the NJDEP, making false and misleading statements to the NJDEP, and illegal disposal of hazardous waste.

In 1985, CIBA-GEIGY notified EPA and NJDEP that the existing RCRA Equalization Basins may be leaking into the groundwater. Also in 1985, after discovering the disposal of hazardous wastes and liquids in the Active Landfill (permitted only for the disposal of nonhazardous solid wastes), NJDEP ordered CIBA-GEIGY to remove 14,000 drums from Cell II, pay a $1.65 million fine, and reorganize its Environmental Technology Department at the Toms River plant.

By 1986, CIBA-GEIGY had committed to close the leaking Equalization Basins and install purge wells to begin remediating the contaminated plume from these basins. A RCRA closure plan for the Equalization Basins was submitted to NJDEP in 1987.

Under the Comprehensive, Environmental, Response, Compensation and Liability Act of 1980 (CERCLA), EPA began the Remedial Investigation (RI) in January 1985 and released the RI report to the public in September 1986. The objectives of the RI were the following:

- to characterize the nature and extent of contamination associated with the site;
- identify site-related off-site contamination and its impact on the environment and on public health; and
- to determine the need for remedial measures to mitigate the impact of the site on public health and the environment.

After further review and analysis of the data, EPA released a revised RI in February 1988. This report presented a more conservative interpretation of the hydrogeology and extent of surficial soil contamination at the site than the earlier document. The principal revisions of the study included:

- a new hydrogeologic interpretation that the layers between the two aquifers are semi-confining, and therefore, a potential for contamination of the deeper aquifer zones exists,
- the identification of several additional areas of soil contamination requiring further evaluation, and

- discussions of additional potential source areas, such as the Borrow Area, the Suspected East Overflow Area and the Casual Dumping Area were expanded to provide more detail on the histories and locations of these areas.

After the RI, a Feasibility Study (FS) evaluating remedial alternatives was performed by EPA and was released to the public for comment in June 1988.

CERCLA Enforcement Activities

EPA issued general notice to CIBA-GEIGY in March 1984 to inform the company of its potentially responsible party (PRP) status and the Agency's intention of beginning the RI/FS process. In October 1984, because of the numerous violations and criminal actions related to the company's waste disposal activities, EPA denied CIBA-GEIGY the opportunity to perform the RI/FS under CERCLA. CIBA-GEIGY reimbursed EPA $1.085 million for RI/FS expenditures in June 1985.

In May 1988, EPA sent general notice to eighteen PRPs who contributed outside waste streams to the TRC/CIBA-GEIGY wastewater treatment facilities.

CIBA-GEIGY has formally requested to conduct additional studies needed to supplement the information obtained during the RI/FS process and to implement the remedial action for the first operable unit under EPA oversight. The company has publicly stated its willingness to conduct remedial activities at the site. In addition, in a November 4, 1988 letter from CIBA-GEIGY to EPA, the company submitted a statement of qualifications in support of its request. CIBA-GEIGY confirmed its commitment in a March 8, 1989 letter to EPA.

COMMUNITY RELATIONS

This project has included extensive community relations activities and has received a significant amount of community input. Several groups, including the Ocean County Citizens for Clean Water (OCCCW), the Save Our Ocean Committee (SOOC), and the CIBA-GEIGY Oversight and Advisory Committee formed in response to concerns related to the CIBA-GEIGY Superfund site and the ocean discharge pipeline.

Beginning in December 1984 and continuing throughout the RI/FS process, EPA met with citizens' groups and held several public meetings to update the public on EPA's progress during the RI/FS.

In April 1986 and again in 1987, OCCCW requested a Technical Assistance Grant (TAG) from EPA. Since the regulations for issuing TAGs had not been developed, EPA suggested that the OCCCW request funding directly from CIBA-GEIGY. The company agreed to provide a $50,000 grant to the citizens which enabled them to hire technical consultants to review EPA's and CIBA-GEIGY's work. Additional monies were later provided to OCCCW by CIBA-GEIGY to allow the citizens' group to continue to obtain the services of technical consultants.

At the request of OCCCW, EPA developed a process to increase community involvement during the Feasibility Study. A series of technical meetings with both CIBA-GEIGY and OCCCW and its consultants was held during 1987 and 1988 to discuss EPA's development of the FS. As part of this process, an early draft of the FS was released to this group for input.

Proposed Remedy; Public Review

On June 23, 1988, EPA announced that the preferred alternative for groundwater remediation was to pump and treat the contaminated groundwater and discharge it through the existing CIBA-GEIGY pipeline to the Atlantic Ocean. EPA also stated that discharge to the Toms River, although producing a somewhat higher public health risk, was also acceptable. This announcement began a 60-day public comment period during which time a public meeting was held on August 2, 1988.

Due to the extensive public opposition to EPA's preferred remedy, EPA proposed to meet weekly with a group of Federal, State and local public officials and citizens groups to discuss potential alternatives to the ocean discharge. This group included mayors from the nearby towns and coastal communities, and representatives of the local water companies, health department, and several citizens' environmental groups, NJDEP and CIBA-GEIGY. The weekly meetings began July 21 and continued until October 27, 1988. EPA extended the formal comment period to November 4, 1988 during which time the Agency evaluated additional alternatives proposed by the group. Through this process, EPA was able to review a range of remedies in an attempt to develop a remedy which was acceptable to the Agency, NJDEP and much of the community.

SCOPE OF THE OPERABLE UNIT WITHIN SITE STRATEGY

As is the case with many Superfund sites, the contamination at the CIBA-GEIGY site is complex and extensive; it consists of a wide range of chemicals emanating from many source areas. The contaminants are present in leaking drums, waste sludges, soils and the groundwater. The complexity of such a situation necessitates addressing the contamination in discrete phases, referred to as operable units.

This Record of Decision for the first operable unit focuses on the remediation of groundwater contamination in the upper aquifer. Groundwater contamination was selected as the first operable unit of a multi-phase remedy because its nature and extent are best understood, the remedy can be implemented quickly, and it will reduce the most significant risk to public health while alternatives for source remediation are being evaluated.

Although EPA has conducted investigations of the waste disposal areas, further investigatory work is necessary. As a result, EPA has deferred remedy selection for the source areas until the nature and extent of contamination are more fully understood and treatability studies can be conducted. Remediation of the on-site source areas and the deeper aquifer (if needed) will be addressed in future operable units. In this way, the most significant public health concerns will be addressed by preventing further off-site migration of groundwater contamination. It is possible that remediating the contaminant source areas could shorten the time required to remediate the contaminated groundwater.

SUMMARY OF SITE CHARACTERISTICS

EPA accomplished the following major tasks during the RI:

- Historical geological, geophysical, hydrological, and chemical information was reviewed and evaluated.
- Eight boreholes were drilled to identify waste disposal areas. The wastes were sampled, analyzed and characterized. Waste volumes were calculated and the impacts of the waste deposits on groundwater, surface water and biological systems were assessed.

- Fifty-nine monitoring wells were installed and the subsurface data generated during the drilling were employed to determine and define the geology of the site area. Groundwater was sampled and analyzed in August and October 1985 and February, June and September 1986.

- Ground penetrating radar and terrain conductivity surveys were conducted throughout the site.

- One hundred eighty-nine shallow soil samples were collected and analyzed for Hazardous Substance List (HSL) parameters, indicator parameters, and dioxin to characterize contamination of on-site soils.

- Surface water, stream-bottom sediment, and insect populations were sampled at each of five locations along the Toms River adjacent to the site to determine the impact of the site on these systems.

- A "No Action" public health evaluation was performed to determine the potential impact of human exposure to contaminants.

During EPA's performance of the RI, CIBA-GEIGY and its consultants conducted parallel studies and additional investigations at the site. The work included the installation and sampling of additional monitoring wells, additional soil borings in some of the source areas, and sampling in the marsh area. Information from these investigations including data from more than 200 existing CIBA-GEIGY wells was used by EPA to supplement the data gathered for this RI.

Remedial Investigation Conclusions

The major conclusions of the RI are as follows:

- The two aquifers investigated at the site are separated by a thirty foot thick semi-confining layer of silt and clay located at an approximate depth of 100' below mean sea level.

- Groundwater in the upper aquifer flows towards and discharges into the Toms River. Site-related groundwater contamination appears to be restricted to the upper aquifer. Although most of the groundwater in the shallow aquifer ultimately discharges into the Toms River, locally some contamination has migrated a short distant beyond the Toms River. Figure

3 depicts the extent of volatile organic contamination in the Upper Sand Aquifer. Figures 4 and 5 depict the total concentration of volatile organic chemicals and inorganic chemicals, respectively, found in monitoring wells during the RI.

° The semi-confining layer of silt and clay appears to have prevented groundwater contamination from migrating into the lower aquifer. Unlike the shallow aquifer, groundwater in the lower aquifer does not discharge into the Toms River.

° The Backfilled Lagoons and the Filtercake Disposal Area contain large volumes of sludge; buried drums also appear to be present. These waste disposal areas are unlined, and the sludges in them contain significant concentrations of hazardous substances which are contributing to contamination of the shallow groundwater.

° The inactive Drum Disposal Area is releasing hazardous substances into the groundwater. The contaminants detected in the groundwater downgradient of the Drum Disposal Area closely match the chemicals known to have been disposed in this area.

° The surface soil sampling results reveal several areas where inorganic chemical contamination exists. The inorganic chemicals tend to be localized within the source areas. There is evidence that inorganic contaminants are migrating from the contaminated areas via surface water runoff.

° The public health evaluation for human exposure to contaminants emanating from the CIBA-GEIGY site indicates that, although at present no exposure exists, if no action is taken the population will eventually be exposed to a potentially significant risk. This is due to the fact that private drinking water wells are located south and southeast of the site. There is the potential that groundwater contamination could migrate to these wells if no remediation were undertaken.

° Potential routes of exposure include ingestion and dermal exposure of contaminated groundwater from existing irrigation wells, and ingestion of, dermal exposure to and inhalation of contaminants in a marshland adjacent to the Toms River.

- Approximately 95 chemicals were detected in the groundwater and soils at the site. Of these 95 chemicals, 17 were above MCLs. Some of the chemicals and contaminants identified at the site include: benzene, chlorobenzene, tetrachloroethene, trichloroethene, toluene, arsenic, cadmium, chromium, copper and mercury. (NUS Remedial Investigation, 1988.)

Appendix A lists the average and maximum concentrations of contaminants found in each of the media on and off site.

SUMMARY OF SITE RISKS

A public health evaluation (PHE) was performed for the CIBA-GEIGY site to determine the impact of the site on public health and the environment under various exposure scenarios and different contaminant pathways. This evaluation is presented in the "Quantitative Public Health Evaluation for the No Action Alternative at the CIBA-GEIGY Site" (NUS, April 1988.) The PHE identified 11 indicator chemicals in accordance with the EPA Superfund Public Health Evaluation Manual. The indicator chemicals selected for the CIBA-GEIGY Site are compounds that are in the groundwater, have a history of use and disposal at the site and were found in private wells off site (refer to Appendix A). These compounds are listed below.

Carcinogens	Noncarcinogens
Arsenic	Barium
Benzene	Cadmium
Chloroform	Chlorobenzene
1,2-Dichloroethane	Nickel
Tetrachloroethene	1,2,4-Trichlorobenzene
Trichloroethene	

The PHE involves four steps. The first step is to identify indicator chemicals to address the potential public health and environmental concerns associated with the site. The next step is to use the toxicity of each chemical to determine whether the contaminants present at the site may be associated with adverse health and/or environmental effects. The third step identifies likely exposure scenarios and defines the individuals who may be at risk via these exposure scenarios,

as well as the most likely indicator compound concentrations associated with these scenarios. The PHE at CIBA-GEIGY used the maximum concentration of each indicator chemical detected in the groundwater or marshland sediment. The groundwater concentrations used were not directly in a source area.

Air concentrations for the residential exposure routes were calculated, while actual air concentrations found at the marshland were used for the recreational exposure scenarios. The final step in the process is the calculation of potential risks associated with exposure to indicator chemicals.

In the PHE, individual contaminants were separated into two categories of chemical toxicity depending on whether they cause carcinogenic or noncarcinogenic effects. In the case of chemicals exhibiting carcinogenic effects, exposures and associated risks are expressed in an exponential nomenclature, 1 x 10-4 (one in ten thousand), 1 x 10-7 (one in ten million), etc. EPA has used the range of 1 x 10-4 to 1 x 10-7 in evaluating risk. For chemicals exhibiting noncarcinogenic effects, exposures and associated risks are expressed as a ratio. This ratio, called a Hazard Index, is estimated by dividing the amount of a chemical that an individual might be exposed to by the amount of the chemical that will not cause any adverse health effects. A hazard index that is less than 1.0 indicates that no adverse health impacts would be expected. Summaries of the quantitations of carcinogenic risks and hazard indices are presented for residential and recreational exposure routes in Tables 1 and 2, respectively. The information in these tables is discussed in subsequent paragraphs.

Human Exposure Routes

The human exposure assessment for the CIBA-GEIGY site included the areas where the public could be exposed to contaminants migrating from the site. The data, which were obtained from the five media, namely groundwater, surface water, soil, sediments and air, indicated that human exposure to contaminated groundwater, marshland sediments and air and contaminated river water can occur.

The human exposure pathways were divided into two categories: exposure due to residential uses of contaminated groundwater and exposure due to recreational uses of a marshland adjacent to the river and the river itself, all of which are receiving contaminated groundwater. The residential exposure routes

included ingestion, dermal absorption and inhalation of contaminants from residential well water. The recreational exposure routes included ingestion, dermal absorption and inhalation of contaminants from contaminated marshland sediments and the river through activities such as fishing and swimming in the river and walking in the marshland. These pathways are particularly relevant to children who play in this area. It should be noted, however, that the public health evaluation used extremely conservative assumptions related to lifetime exposures to chemicals from drinking, bathing, cooking, etc. with contaminated water for seventy years.

Wells in the vicinity of the CIBA-GEIGY site are currently used for residential purposes such as drinking, bathing and other domestic activities, as well as agricultural purposes such as watering lawns and gardens and filling swimming pools.

If an individual were to use a contaminated residential well for domestic purposes, exposure could result from ingestion of contaminated groundwater, dermal absorption of contaminants through showering and other domestic activities, and inhalation of contaminants volatilizing from sprayed water during activities such as showering.

The RI indicates that the marshland adjacent to the Toms River contains contaminated sediments. If an individual were to walk in the marshland area, exposure to contaminants could result from incidental ingestion of sediments, dermal absorption of contaminants from direct contact with sediments, and inhalation of contaminants volatilizing from the marshland area surface water. Exposure could also occur through fishing and swimming in the river.

The potential for significant exposure through dermal contact with, and incidental ingestion of on-site soils or wastes by trespassers is considered low due to the fact that much of the site is fenced and the wastes are buried and covered. Access to the site by unauthorized persons is restricted and monitored by CIBA-GEIGY's site security personnel. Off-site migration of contaminated soils does not appear to be occurring.

Summaries of the potential risks posed by each pathway evaluated in the PHE are given in Tables 1 and 2. Under certain conditions in which persons could be exposed to the contaminants through residential uses, the risk of contracting cancer would increase to 1 x 10-2. While this risk is significant, it is almost entirely from the residential exposure routes. Carcinogenic risk from human exposure from recreational uses alone is estimated at 8 in a million population.

Since the Hazard Index, a measure of noncarcinogenic risks, is greater than 1, chronic health effects due to exposure to the noncarcinogenic contaminants at the site can occur. As with the carcinogenic risk numbers, the Hazard Index is almost entirely based on the residential exposure scenarios. If all wells were to be capped, the Hazard Index would drop to below 1 and there would not be a chronic health hazard due to recreational exposure routes alone.

The Agency for Toxic Substances and Disease Registry (ATSDR) performed a Public Health Evaluation for the site. The Agency agrees that the human exposure pathways of concern are from oral, dermal and inhalation exposure to contaminated residential well water and contaminated surface water, sediment and air in the marshland area. Ingestion of contaminated plants from gardens or lawns irrigated with contaminated well water is also possible.

Environmental Media Sampling

As has been stated previously, contaminated groundwater is migrating from the site into the Toms River. A limited number of water and sediment samples was taken in the river, some of which indicated that low levels of trichloroethene were found in the surface water and chlorobenzene and benzene were found in the sediments.

Aquatic insect populations were surveyed along the Toms River. No aquatic insects were found at the confluence of the river and the CIBA-GEIGY cooling water discharge channel. This may be attributable to either thermal effects from the cooling water discharge or the trace levels of organics found in the surface water.

DESCRIPTION OF ALTERNATIVES

The major objectives of this first operable unit ROD are mitigation of the effects of groundwater contamination on public health and the environment and restoration of the Upper Sand Aquifer to drinking water standards. These objectives will be met by extracting both the contaminated groundwater on site and the plume of contaminated groundwater which has migrated off site and treating this contaminated groundwater for discharge to either surface waters or the aquifer.

Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA, as amended by SARA, requires that remedial actions comply with all applicable or relevant and appropriate Federal and more stringent state requirements (ARARs) for the hazardous substances, pollutants, or contaminants that are present and attributable to a site.

Applicable requirements are defined as those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site.

Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal or State law that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

Other information that does not meet the definition of ARAR but may be useful in developing a CERCLA remedy is to be considered (TBC). Criteria, advisories, or guidance developed by EPA, other Federal agencies, or States fall within the TBC category.

There are three categories of requirements with which Superfund actions may have to comply, namely, location-specific (refer to Appendix B), action-specific (refer to Appendix B and Tables 3 and 4) and chemical-specific (refer to Tables 5 and 6).

Location-specific requirements are restrictions of activities placed upon the concentrations of hazardous substances or the conduct of activities depending on the site or its immediate environs. Location specific requirements with regard to the CIBA-GEIGY site pertain to the discharge of treated groundwater to the Toms River or Atlantic Ocean. ARARs for the remediation of the contaminated groundwater include the Endangered Species Act of 1973; Executive Order 11990, Protection of Wetlands; Executive Order 11988, Protection of Floodplains; New Jersey State Coastal Management Program; and the National Historic Preservation Act.

Action-specific requirements set controls or restrictions on particular kinds of activities related to management of hazardous substances, pollutants or contaminants. Action-specific requirements specify particular performance levels, actions or technologies, as well as specific levels (or a methodology for setting specific levels) for discharged or residual chemicals. ARARs for discharge of treated groundwater to the Atlantic Ocean include the Federal Register dated November 5, 1987 Part IV 40 CFR Parts 414 and 416, Organic Chemicals and Plastics and Synthetic Fibers Category Effluent Limitations Guidelines, Pretreatment Standards, and New Source Performance Standards: Final Rule (refer to Appendix B). The specific standards based on the above regulation are presented in Table 3 as the discharge criteria for the Atlantic Ocean. Table 3A presents the concentration equivalents of these criteria.

ARARs for discharge of treated groundwater to the Toms River include the New Jersey State Surface Water Quality Standards (NJSWQS) (refer to Appendix B). New Jersey has proposed more stringent and protective NJSWQS which are anticipated to be promulgated in the near future. Due to their proposed status, these standards would be classified as TBCs. After consultation with New Jersey and in anticipation of promulgation, EPA has chosen to use these proposed standards in developing the Toms River discharge criteria (refer to Table 4). Table 4A presents the concentration equivalents of these criteria.

Chemical-specific requirements are usually health or risk-based concentration limits or ranges in various environmental media for specific hazardous substances, pollutants or contaminants. These requirements indicate an acceptable level

of discharge (e.g., air emission or wastewater discharge taking into account water quality standards) for remedial activity. The New Jersey Safe Drinking Water Act (MCLs) are the required cleanup standards for the aquifer, a current source of drinking water, and for any treated groundwater which would be reinjected into the aquifer. Tables 5 and 6 present the chemical-specific ARARs for the site.

Components of Remedial Alternatives

The remedial alternatives for the first operable unit ROD are divided into three components:

Component 1 - Groundwater Extraction,
Component 2 - Treated Groundwater Discharge, and
Component 3 - Groundwater Treatment.

The remedial alternatives which were evaluated for these components are described below.

COMPONENT 1 - GROUNDWATER EXTRACTION ALTERNATIVES

The objective of Component 1 is to control the migration of contaminated groundwater at the CIBA-GEIGY site and in off-site areas and limit its migration into the Toms River. Five remedial alternatives were evaluated in the FS ranging from a No Further Action with Monitoring Alternative to the installation of extraction wells, reinjection wells and infiltration basins.

After the release of the FS and during the public comment period, EPA developed modifications of the original groundwater extraction/reinjection scenarios evaluated in the FS. These additional evaluations were performed in response to comments and questions from the public. This work effort is presented in the report entitled "Final Report - CIBA-GEIGY Technical Enforcement Support Document, Groundwater Modeling Report, CIBA-GEIGY, Toms River, New Jersey" (CDM, April 1989).

The extraction alternatives which were evaluated in this decision document are listed in Table 7. The extraction systems were designed to achieve three remedial objectives: 1) mitigate the groundwater contamination in the off-site residential areas, 2) limit the migration of groundwater contamination from the plant site and the property border, and 3) limit the downward vertical migration of contaminated groundwater and thus protect the semi-confined aquifer.

ALTERNATIVE GE-1 NO FURTHER ACTION WITH MONITORING

Implementation of this alternative would not eliminate or reduce carcinogenic or chronic health risks associated with exposure to contaminated groundwater. This alternative would require only regular sampling and analysis of selected groundwater wells, surface water and sediments to monitor the present contamination. Groundwater contamination would continue to move and disperse in an east-southeastward direction under residential areas and into the Toms River.

The continued leaching of contaminants from source areas could result in higher levels of contamination before natural attenuation occurs.

The health risk associated with the No Further Action Alternative is 1 x 10-2 due mainly to the ingestion of contaminated groundwater from potable wells.

ALTERNATIVE GE-2 GROUNDWATER EXTRACTION (GROUNDWATER MONITORING, SEALING OF RESIDENTIAL WELLS)

This alternative consists of sealing contaminated residential irrigation wells in the Cardinal Drive Area to prevent potential human exposure to contaminated groundwater through the use of these wells. At present, no drinking water wells in this area have been found to be contaminated from the site. There are no drinking water wells in the area of the plume and no contamination has been found in drinking water wells which exist south of the plume. However, there are contaminated irrigation wells located within the CIBA-GEIGY groundwater contamination plume.

It is estimated that twenty-eight extraction wells would be installed and operated on the CIBA-GEIGY property and along the Toms River (refer to Figure 6). Computer modeling efforts have indicated that about 2.7 to 4.0 million gallons per day

(MGD) of groundwater would need to be extracted to mitigate groundwater contamination under this scenario. For estimating purposes in this ROD, it was assumed that approximately 3.3 MGD of contaminated groundwater would be extracted. The extraction wells would be placed so that they would most effectively and efficiently capture the plume and produce or maintain an upward groundwater flow gradient.

Groundwater quality would be monitored quarterly. The monitoring wells would aid in verifying the effectiveness of the groundwater extraction well program.

One potential constraint in implementing this alternative is that extraction wells may create a relatively stagnant zone of groundwater movement in the Cardinal Drive Area. As a result, the cleanup time within this stagnant area is estimated to be longer than for cases which include injection of clean water or reinjection and/or infiltration of treated groundwater. To address this potential concern, the remedial design would be developed so as to minimize or eliminate the stagnation effect by increasing the number of extraction wells. Additional extraction wells would be added to assure an upward groundwater flow gradient in this area and other contaminated areas of the site. Creating an upward flow gradient would cause contaminants to be drawn upward and prevent them from migrating deeper into the aquifer system.

ALTERNATIVE GE-3 GROUNDWATER EXTRACTION WITH INJECTION OF CLEAN WATER (GROUNDWATER MONITORING, SEALING OF RESIDENTIAL WELLS)

This alternative is similar to Alternative GE-2 above with the addition of three injection wells installed along the southeastern property border of the site. Clean water (from either a deeper aquifer, a potable source or the Toms River) would be injected into the Upper Sand Aquifer to promote a flushing action in the Cardinal Drive area (refer to Figure 7). These injection wells would accelerate the cleanup of the contaminated groundwater and reduce the size of the stagnation zone which occurs in Alternative GE-2. However, there is concern that injection could cause some downward vertical migration of contaminated groundwater. It is estimated that approximately 3.9 MGD would be extracted, treated and discharged with approximatley 0.38 MGD of clean water injected through the three injection wells.

Additional constraints in implementing this alternative include concerns related to the high maintenance required for injection wells and the potential for clogging of both the wells and the aquifer from the precipitation of metals such as iron in the aquifer.

COMPONENT 2 - GROUNDWATER DISCHARGE ALTERNATIVES

After extraction, the groundwater must be treated and discharged. The type and level of treatment of the contaminated groundwater is dependent on the discharge location selected. Table 8 lists the alternatives for groundwater discharge. These alternatives are described in subsequent paragraphs.

Treated Groundwater Holding Basins

During the public comment period, representatives of several citizens' environmental groups requested EPA to evaluate the use of holding basins for the treated groundwater prior to discharge. The citizens' representatives stated that holding basins could afford certain safeguards to public health and the environment should unexpected problems arise with the groundwater treatment plant. As a result of this request, EPA evaluated the function and benefits of these basins.

The holding basins would serve five beneficial functions:

1) provide retention capacity should a major problem develop with the groundwater treatment plant;

2) provide equalization of the treated groundwater;

3) provide additional filtration of the treated groundwater;

4) provide a certain amount of retention time during which analyses could be performed to determine if the treated groundwater were within discharge permit limitations; and

5) provide public confidence of the groundwater treatment and discharge systems.

The construction and location of the holding basins would be the same for all groundwater discharge alternatives with the exception of Alternative GD-4, which would consist of treatment at the Ocean County Utilities Authority and would therefore not require retention basins. The basins would be located in the northeast quadrant of the site and would consist of aboveground tanks. It is envisioned that two tanks, each with a capacity of 4 million gallons, may be required. A thick layer of sand and gravel would cover the bottom of the basins and would serve to remove additional fines from the treated effluent. After the treated groundwater filters through the sand and gravel, it would be collected in an underdrain system and then piped to the discharge point. The sand and gravel layer would be periodically reconditioned in order to maintain a satisfactory rate of infiltration.

Since these basins would be constructed above ground with bottoms, they would not result in groundwater mounding that could adversely effect the direction of groundwater flow or groundwater contaminant migration. Should it be determined that treated groundwater contained in the basins did not meet discharge permit requirements, the basin contents would be piped back to the treatment plant to be retreated.

An alternative to constructing new holding basins would be to use the existing 75 million gallon emergency reservoir. This would result in an estimated savings of up to $4 million.

For the ocean discharge option, treated groundwater from the holding basins would be discharged directly into the existing CIBA-GEIGY ocean outfall pipeline.

For the Upper Sand Aquifer recharge option, treated groundwater would be directed from the holding basins to infiltration basins and/or the reinjection well network.

Two options are possible for river discharge: direct discharge and indirect discharge. For the direct river discharge option, treated groundwater would be fed directly from the holding basins

to the Toms River via a pipe. The indirect river discharge option would employ a network of gravel filled channels located along the banks of the Toms River which would allow treated groundwater from the holding basins to flow into the Toms River. Treated groundwater from the holding basins would be distributed throughout this seepage network by a system of pipes.

ALTERNATIVE GD-1 OCEAN DISCHARGE THROUGH THE EXISTING CIBA-GEIGY PIPELINE

CIBA-GEIGY is currently discharging treated process wastewater through its outfall to the Atlantic Ocean. Alternative GD-1 would continue this process by discharging the treated groundwater into the ocean.

The company has recently announced that it will end using its pipeline for ocean discharge of treated process wastewater by December 31, 1991. By this date, CIBA-GEIGY's process flows, laboratory wastewater and other miscellaneous flows would decrease to approximately 600,000 gallons per day. This volume would then either be sent to the OCUA for treatment or treated and discharged to the Toms River.

Alternatives for Discharge to the Toms River

As previously discussed, the treated groundwater from the holding tanks can be discharged to the Toms River either directly by a pipe or by a network of channels.

ALTERNATIVE GD-2A DISCHARGE TO THE TOMS RIVER BY PIPE

In this alternative, the treated groundwater would be discharged to the Toms River adjacent to the site by a pipeline from the holding tanks.

ALTERNATIVE GD-2B DISCHARGE TO THE TOMS RIVER BY SEEPAGE NETWORK

In this alternative, the treated effluent from the holding tanks would be piped to a seepage network which consists of perforated pipes placed in gravel-filled, concrete channels which discharge to the Toms River.

Alternatives for Discharge to the Upper Sand Aquifer

In these alternatives, some or all of the treated groundwater would be recharged into the Upper Sand Aquifer. This could be accomplished using reinjection wells and/or infiltration basins.

ALTERNATIVE GD-3A DISCHARGE TO UPPER SAND AQUIFER
30% REINJECTION OF TREATED GROUNDWATER

As previously mentioned, additional groundwater recharge scenarios were modeled and evaluated after the release of the FS in response to comments from the public. One of the primary objectives of these scenarios was to determine the maximum volume of treated groundwater which could be recharged on-site without causing negative impacts to the vertical or horizontal groundwater flow regime. A primary consideration of the groundwater remediation scenarios was maintaining the existing groundwater flow field below the CIBA-GEIGY site. The maximum amount of groundwater which could be returned to the aquifer was determined with the stipulations that there would be no reversal in the vertical groundwater gradient which would result in pushing contaminants further down into the aquifer and no change in the horizontal gradient which would affect the plume of the off-site contamination located north/northwest of the site. There is currently groundwater contamination in a residential area adjacent to the northern property border which groundwater modeling has shown could spread to uncontaminated areas as a result of the reinjection of large volumes of water on the site. For this reason, in most cases, the groundwater was recharged upgradient of the sources in the western portion of the site. Specifically, the present groundwater flow through the Semi-Confining Unit (separating the Upper Sand Aquifer from the Lower Sand Aquifer) and the horizontal flow patterns in the adjacent residential areas were used as a baseline with which to compare changes in the flow regime produced by each extraction/recharge scenario.

The following scenarios were evaluated as part of this analysis:

° 10%, 30%, 50% and 90% recharge of treated groundwater using infiltration basins;

° 90% recharge of treated groundwater using reinjection wells;

- 90% recharge of treated groundwater with 70% reinjected into a deep aquifer;
- 90% recharge of treated groundwater with 70% infiltrated in the northeast portion of the site along the Toms River;

In each case, 10% of the treated groundwater was also returned through reinjection wells in the Cardinal Drive Area.

These evaluations indicated that approximately 10 to 15% of the extracted groundwater could be returned to the Upper Sand Aquifer upgradient of the source areas without significantly impacting the horizontal or vertical flow regime.

Using these analyses, it was concluded that as much as 30% of the extracted groundwater could be reinjected or infiltrated into the Upper Sand Aquifer (10 to 15% in the Cardinal Drive Area and 10 to 15% upgradient of the source areas) without negatively impacting the present groundwater flow conditions. The remaining treated groundwater would need to be discharged to a surface water or the municipal treatment plant.

ALTERNATIVE GD-3B DISCHARGE TO UPPER SAND AQUIFER
100% REINJECTION OF TREATED GROUNDWATER

In this alternative, the extraction wells would be placed as in Alternative GE-3, however, all treated groundwater would be recharged into the Upper Sand Aquifer through three Cardinal Drive reinjection wells and 15 reinjection wells installed along the southwestern and northwestern property borders of the site (refer to Figure 8). The effluent would be treated to drinking water standards before reinjection. Approximately 4.0 MGD of contaminated groundwater would be extracted, treated and reinjected into the Upper Sand Aquifer.

A constraint associated with this alternative is the altering of the present groundwater flow direction and, consequently, potentially spreading contamination in adjacent areas. The groundwater contamination in the residential area to the north of the site would be expected to spread to uncontaminated areas.

There is also the consideration that the reinjected groundwater could force contaminants vertically downward through the area's semi-confining layer into the deeper aquifer. The maintenance problems related to reinjection wells (discussed in Alternative GD-3A) would again be a concern in this alternative, and to a greater degree, as there are many more reinjection wells and there is a much greater volume of water being reinjected.

Concerns associated with this alternative include the high maintenance required for the reinjection wells and the potential of clogging of both the wells and the aquifer from the precipitation of iron in the aquifer.

Finally, the increase in horizontal groundwater flow from the reinjection of 4.0 MGD would make it more difficult to capture all of the contamination before it reaches the river. As a result, an increase in extraction well pumpage rates would be required to capture the contaminated groundwater, although it is estimated that groundwater cleanup times would be shorter than those from previous alternatives.

Deep Aquifer Reinjection

Reinjection into the deeper aquifer was also simulated and evaluated to determine the impact of deep aquifer reinjection on the regional groundwater flow regime and the feasibility of reinjecting treated groundwater into the deeper semi-confined aquifer.

Evaluation of the deep aquifer reinjection scenarios revealed the following: 1) reinjection into the Lower Sand Aquifer may induce upward groundwater flow through the Semi-Confining Unit to the Upper Sand Aquifer; and 2) treated groundwater reinjected into the Lower Sand Aquifer could potentially migrate into the public drinking water supply wells.

Deep aquifer reinjection was not considered further because of the maintenance problems related to reinjection wells which have been previously discussed, the potential impact of the treated contaminated groundwater on residential and public supply wells, and the availability of other alternatives.

ALTERNATIVE GD-3C DISCHARGE TO UPPER SAND AQUIFER 100% RECHARGE OF TREATED GROUNDWATER USING REINJECTION WELLS AND INFILTRATION BASINS

In addition to the supplemental groundwater extraction/reinjection scenarios which were performed during the public comment period, the differences between recharging groundwater through reinjection wells versus infiltration basins were evaluated further. Two significant differences between these methods were identified. First, reinjection wells induce a greater horizontal flow component in the Upper Sand Aquifer than do infiltration basins. This is due to the fact that the reinjection wells are distributed over a larger area in the western portion of the site. Thus, the water tends to spread out more in a horizontal direction. However, infiltration basins induce a greater vertical flow component across the Semi-Confining Unit than do the reinjection wells. This is due to the concentrated application of treated groundwater in a smaller area. The horizontal component of flow decreases, but because the water is concentrated in a smaller area, a greater vertical flow component is produced.

Additional differences between reinjection wells and infiltration basins are that reinjection wells are more expensive to operate and maintain and are more susceptible to fouling than are infiltration basins.

Alternative GD-3C is similar to Alternative GD-3B with the exception that two infiltration basins would be designed to infiltrate 3.7 MGD of treated groundwater in the western portion of the site instead of the majority of reinjection wells to recharge the Upper Sand Aquifer (refer to Figure 9). The three Cardinal Drive wells would still be used to reinject 0.4 MGD to flush the residential area. The groundwater flow patterns in this alternative are similar to those in Alternative GD-3B, that is, significant changes in horizontal groundwater flow direction are predicted to occur in nearby off-site contaminated areas. Additionally, the downward vertical migration of contaminants is still a concern with this scenario. However, the maintenance concerns related to well clogging would be less than in Alternative GD-3B. Aquifer clogging problems from the introduction of water into the aquifer would still exist. Maintenance costs related to infiltration basins are substantially less than those related to injection wells.

Alternative Placement of Infiltration Basins

Placing the infiltration basins in other locations on site (other than upgradient) was also evaluated during the public comment period. However, in each case, either horizontal flow was impacted in off-site areas, or downward vertical gradients were created through the Semi-Confining Unit either beneath contaminant source areas or where upward gradients presently exist. Since one of the requirements of the groundwater modeling effort was to maintain the present groundwater flow conditions in the area, it was determined that the placement of basins in the western portion of the site was necessary.

ALTERNATIVE GD-4 DISCHARGE TO OCEAN COUNTY UTILITIES AUTHORITY

For this alternative, after extraction, the groundwater would be discharged to the OCUA treatment plant. The groundwater would be pretreated, if necessary, in a CIBA-GEIGY treatment system before being transported via pipeline to the OCUA plant. Either the existing municipal sewerage system would be used or, if the existing system is at hydraulic capacity, a new pipeline would have to be constructed to transport the groundwater. At the OCUA plant, the groundwater would receive secondary treatment prior to discharge to the Atlantic Ocean via the OCUA pipeline.

COMPONENT 3 - GROUNDWATER TREATMENT ALTERNATIVES

The four treatment options evaluated in the FS for the extracted groundwater are the following: the existing CIBA-GEIGY wastewater treatment plant, a newly constructed on-site treatment plant, the Ocean County Utilities Authority treatment facility and an in-situ bioreclamation system.

During the extended public comment period, as part of the supplemental FS effort, the groundwater treatment alternatives were evaluated in more detail. This information is described in a document entitled, "Final Report - CIBA-GEIGY Plant, Groundwater Treatment Alternatives, Toms River, New Jersey" (CDM, April 1989) and is discussed in the following evaluation of treatment alternatives.

The alternatives involving groundwater treatment are listed in Table 9. The information in this table indicates that the groundwater alternatives include treatment in the existing CIBA-GEIGY treatment facility, in a new on-site facility, at the OCUA plant and in situ.

The objective of Component 3 is to treat the extracted groundwater to the level required in a New Jersey Pollution Discharge Elimination System (NJPDES) permit for the appropriate discharge point, namely the ocean, river or aquifer. These options can be conducted through either an on-site treatment facility or in situ or off site through the OCUA facility. The criteria for on-site treatment for discharge to the ocean and river are listed in Tables 3 and 4, respectively. The criteria for on-site treatment for discharge to the aquifer are presented in Tables 5 and 6. For all treatment alternatives, it was assumed that the groundwater would be treated at a rate of 4 MGD.

Existing Wastewater Treatment Plant Operation

CIBA-GEIGY's wastewater treatment plant currently maintains tertiary treatment using biological activated sludge with powdered activated carbon. The plant treats approximately 1.1 MGD of process wastewater, 0.5 MGD of contaminated groundwater and 0.5 MGD of other miscellaneous flows such as laboratory wastes, sanitary wastes, landfill leachate and stormwater runoff.

A schematic of the existing treatment facilities is presented in Figure 10. Influent wastewater initially undergoes pH adjustment in two primary tanks before entering two equalization tanks. Chemical precipitation of metals and suspended solids is then accomplished by adding ferric chloride and lime prior to clarification. Subsequently, the flow enters the aeration basin where powdered activated carbon (PACT®) is added for biodegradation of organic contaminants. Finally, the wastewater undergoes secondary clarification and is discharged to the Atlantic Ocean through a ten-mile pipeline. Sludges from these processes are eventually disposed in the on-site Active Landfill.

CIBA-GEIGY Wastewater Treatment Plant Alternatives

As shown in Table 9, six alternatives were evaluated using CIBA-GEIGY's wastewater treatment plant. Two possible influents to the treatment plant were considered: groundwater combined with process wastewater, and groundwater only. For each case, the treatment plant was evaluated for treating the wastewater to meet ocean discharge criteria. It is noted that an alternative for treatment of contaminated groundwater combined with process wastewater to meet river or aquifer discharge criteria was not evaluated. The discharge of process wastewater is permitted by the State of New Jersey, Division of Water Resources, and is not regulated by CERCLA.

The treatment plant was also evaluated assuming the treatment of groundwater only with discharge to either the Toms River or the Upper Sand Aquifer (recharge). The choice of the receiving water for the plant effluent determines what modifications are required for the existing plant to meet the permit requirements of such a discharge.

ALTERNATIVE GT-1A CIBA-GEIGY WASTEWATER TREATMENT PLANT COMBINED TREATMENT OF PROCESS WASTE AND GROUNDWATER WITH DISCHARGE TO THE ATLANTIC OCEAN

The existing treatment plant was preliminarily evaluated in the FS. It is believed that the current treatment plant, with some modifications, could treat the combined waste streams. However, pilot studies would be required to confirm this. It should be noted that the volume and composition of process wastewater has been decreasing and changing during the past few years and will continue to exhibit this trend through 1991 as CIBA-GEIGY phases out additional processes.

ALTERNATIVE GT-1B CIBA-GEIGY WASTEWATER TREATMENT PLANT SEPARATE TREATMENT OF PROCESS WASTEWATER AND GROUNDWATER WITH DISCHARGE TO THE ATLANTIC OCEAN

The feasibility of utilizing the CIBA-GEIGY treatment plant and hydraulically separating the process wastewater and contaminated groundwater is dependent upon utilizing some existing duplicate process units and constructing some new process units in addition to new pumping and piping facilities. The determination that the existing treatment facility could handle the two separate waste streams was based on the assumption that the need for redundant or standby units could be

waived. An existing 75 million gallon emergency reservoir is available to provide temporary storage for process wastewater. In addition, the groundwater extraction system could be shut down for periods of time while system repairs are performed.

In order to divide the existing plant facilities for separate treatment of the process wastewater and contaminated groundwater, the following process modifications and additions would be required:

1) an existing equalization tank would be converted to a volatile organics stripping reactor;

2) an aeration basin would be modified to allow for the addition of PACT®. A second aeration basin may also be needed;

3) a secondary neutralization reactor would be refurbished for chemical addition and pH control;

4) a flocculation tank would be added for metals removal;

5) a new sludge thickening tank would be installed; and

6) a carbon regeneration system consisting of a 30,000-gallon holding tank and two wet air oxidation reactors would be built.

Figure 11 shows this process train using the available units with the proposed modifications and additions required to treat the groundwater flow.

ALTERNATIVE GT-1C CIBA-GEIGY WASTEWATER TREATMENT PLANT TREATMENT OF CONTAMINATED GROUNDWATER ONLY WITH DISCHARGE TO THE ATLANTIC OCEAN

To treat the contaminated groundwater in the CIBA-GEIGY treatment plant to meet ocean discharge criteria, the following modifications in existing units and new unit processes would be required:

1) both equalization tanks would be refurbished for volatile organic carbon removal;

2) new mixers would be installed in the secondary neutralization reactors;

3) an aeration basin would be upgraded;

4) a new flocculation tank may be needed;

5) a new carbon regeneration system would be added.

Figure 13 shows the flow diagram of a modified plant for treating groundwater only with discharge to the Atlantic Ocean.

It is envisioned that under this alternative, process wastewater would be handled in a separate treatment facility either on or off site. The handling of the process waste is not included as part of this Record of Decision.

ALTERNATIVE GT-1D CIBA-GEIGY WASTEWATER TREATMENT PLANT SEPARATE TREATMENT OF PROCESS WASTEWATER AND CONTAMINATED GROUNDWATER WITH DISCHARGE TO THE TOMS RIVER OR UPPER SAND AQUIFER

The discharge criteria for the Toms River or the Upper Sand Aquifer require additional removal of volatile organics, metals, and total dissolved solids. Significant plant modifications are deemed necessary in order to meet these discharge criteria. Also, additional metals precipitation, carbon adsorption, and solids removal with a reverse osmosis unit would be required. Of note, is the need for the reverse osmosis unit to reduce the total dissolved solids from an estimated concentration of 2,000 mg/l to 50 mg/l.

The modifications described for Alternative GT-1C represent the treatment operations which would treat the groundwater to ocean discharge criteria. However, a greater degree of treatment could be achieved by optimizing the chemical precipitation of metals and operating two aeration basins in series.

The following new treatment processes would be applied to the effluent from the secondary clarifiers:

1) a filtration unit to remove suspended solids, organics and metals;

2) a reverse osmosis unit to remove dissolved solids (the side stream generated from this process would be treated on site to reduce the volume and then disposed off site); and

3) 12 granular activated carbon units to remove residual organic compounds;

Figure 13 shows the process modifications needed for treatment of the groundwater through separation of the two waste streams in the existing treatment plant.

ALTERNATIVE GT-1E CIBA-GEIGY WASTEWATER TREATMENT PLANT TREATMENT OF CONTAMINATED GROUNDWATER ONLY WITH DISCHARGE TO THE TOMS RIVER OR UPPER SAND AQUIFER

The same treatment units described in Alternative GT-1D would be required for this alternative. Figure 14 shows the process modifications needed to treat groundwater only with use of the entire treatment plant.

ALTERNATIVE GT-1F CIBA-GEIGY WASTEWATER TREATMENT PLANT TREATMENT TO NONDETECTABLE LEVELS

During the extended public comment period, citizens' environmental groups requested that treatment of contaminated groundwater to undetectable levels also be evaluated to determine the treatment requirements for attaining nondetectable levels. In response to this request, process trains capable of treating the contaminated groundwater to "nondetectable" levels were also developed in the treatment report previously referenced (CDM, April 1989). Nondetection was defined as 0.5 micrograms per liter (ug/l) for volatile organic compounds. The treatment requirements would be similar to those of Alternatives GT-1D and GT-1E with the exception that a two-stage PACT® process would be added to maximize removal of organics. The filtration and reverse osmosis processes would remain the same. It is estimated that the number of carbon adsorbers would be increased from 12 to 24 units. Figures 15 and 16 depict the treatment modifications necessary to achieve these discharge limits.

However, as will be discussed in subsequent sections of this document, since there are other treatment alternatives that would produce a high quality treated groundwater which would be fully protective of public health and the environment, EPA does not believe that the additional treatment costs to attain nondetectable levels are justifiable. For this reason, treatment to nondetectable levels will not be included as part of the comparative analysis of alternatives according to the nine remedial criteria.

Alternatives for a Newly Constructed On-Site Wastewater Treatment Plant

As shown in Table 9, four alternatives involving the construction of a new on-site wastewater treatment plant were evaluated. Included were a physical/chemical treatment plant which was conceptually designed in the FS and a separate biological treatment plant which was designed in the treatment report previously referenced (CDM, April 1989).

ALTERNATIVE GT-2A NEW PHYSICAL/CHEMICAL TREATMENT PLANT WITH DISCHARGE TO THE ATLANTIC OCEAN

The major design elements for the physical/chemical treatment plant were metals and organics separation with flocculation/ sedimentation; volatile organics removal through air stripping, and additional organics and inorganics removal by carbon adsorption and filtration. In addition, it is envisioned that a fixed-film, biological reactor would also be required to attain the ocean discharge standards.

The process train required for such a plant would include the following:

1) a rapid mix tank for coagulation;

2) a flocculation tank to precipitate metals;

3) an air stripper to remove volatile organics;

4) a fixed-film biological reactor;

5) a clarifier to settle suspended solids;

6) a gravity filtration unit to remove particulates; and

7) a granular activated carbon system for additional carbon adsorption.

Figure 17 illustrates the treatment train which would be required for this alternative.

ALTERNATIVE GT-2B NEW BIOLOGICAL TREATMENT PLANT WITH DISCHARGE TO THE ATLANTIC OCEAN

The process train for this alternative consists of five stages of contaminant removal:

1) iron, aluminum and particulate removal by coagulation, sedimentation and filtration;

2) volatile organics removal through air stripping;

3) BOD and semi-volatile organics removal through an activated sludge/PACT® system;

4) suspended solids removal through sedimentation and filtration; and

5) nonbiodegradable semi-volatile organics removal through a PACT® system.

A schematic of the process train for this alternative is presented in Figure 18.

ALTERNATIVE GT-2C NEW BIOLOGICAL TREATMENT PLANT WITH DISCHARGE TO THE TOMS RIVER OR UPPER SAND AQUIFER

The treatment processes required to discharge the treated groundwater to the Toms River or Upper Sand Aquifer are basically the same. The plant would be similar to that discussed in Alternative GT-3B with the following modifications and additions:

1) a carbon adsorption unit would be required for final adsorption of organics;

2) a reverse osmosis unit would be added after the filtration step to remove total dissolved solids which must be reduced to less than 500 mg/l for discharge to the aquifer and to 50 mg/l for discharge to the Toms River;

3) the reject stream from the reverse osmosis unit would be treated by evaporation and then disposed off site.

Figure 19 shows the treatment processes for this alternative.

ALTERNATIVE GT-2D NEW BIOLOGICAL TREATMENT PLANT WITH TREATMENT TO NONDETECTABLE LEVELS

The treatment requirements for this alternative are the same as those described in Alternative GT-3C. However, for the additional removal of organic contaminants which would be required to reach nondetectable levels, the sizes and/or numbers of air strippers, vapor-phase carbon adsorption units and liquid-phase carbon adsorption units would be expanded. Figure 20 illustrates the treatment units which would be required for this alternative. For the reason stated under the discussion of Alternative GT-1F, treatment to nondetectable levels will not be included as part of the comparative analysis of alternatives according to the nine remedial criteria.

ALTERNATIVE GT-3 OCEAN COUNTY UTILITIES AUTHORITY WASTEWATER TREATMENT PLANT

The Ocean County Utilities Authority (OCUA) operates three wastewater treatment plants of which the central plant serves the areas surrounding the CIBA-GEIGY site. The central plant achieves secondary treatment before discharging into the Atlantic Ocean.

An OCUA facility would be a potential alternative for the treatment of contaminated groundwater at the CIBA-GEIGY site. However, there were several constraints and disadvantages associated with this alternative:

1. The central plant does not have the hydraulic capacity to handle the additional 4.0 MGD of contaminated groundwater.

2. The secondary treatment of the municipal plant does not meet the level of treatment currently attained by CIBA-GEIGY. Under this alternative, the contaminated groundwater would undergo a lower degree of treatment and be discharged into the Atlantic Ocean.

3. The northern and southern plants are located at excessive distances from the CIBA-GEIGY site. Major modifications, including constructing a pipeline from the CIBA-GEIGY plant to a tie-in point for the northern and southern OCUA plants, would be needed.

In consideration of the above, the OCUA was not considered further as a treatment and discharge alternative for the contaminated groundwater.

ALTERNATIVE GT-4 IN SITU BIORECLAMATION SYSTEM

The in-situ bioreclamation alternative requires the use of microorganisms in the ground to degrade the contaminants in the groundwater. Figure 21 is a generalized flow sheet of the system. Extraction wells located downgradient or within the plume would collect the contaminated groundwater. The groundwater would then be pumped to surface-mounted bioreactors in which microorganisms are acclimated to the specific chemicals in the groundwater and to the desired subsurface environment. The microbe-rich and nutrient-rich effluent from the bioreactors would be reinjected into the subsurface via reinjection wells. The biodegradation process would then continue in the subsurface system.

The implementation of an in-situ biodegradation aquifer restoration system is complicated at the CIBA-GEIGY site by the large area of the contaminant plumes, the numerous contaminant sources, the diversity of organic and inorganic contaminants and the depth of the contamination within the aquifer. Comprehensive tests are needed to indicate whether the groundwater can be acclimated to biological degradation, what species of microorganisms are best suited, and site-specific kinetic considerations. There is concern regarding the level of treatment achievable and the possibility of partially treated or untreated contaminated groundwater continuing to migrate from the site.

Operation and maintenance requirements of a bioreclamation system are similar to those of a groundwater extraction and treatment system. In addition, monitoring of physical and chemical parameters such as dissolved oxygen, pH, nutrients and organic constituents would be necessary.

Due to the uncertainties mentioned in the previous paragraphs, in-situ bioreclamation was not considered further for the treatment of the contaminated groundwater.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

EPA's selection of a remedial alternative must be in accordance with the requirements of CERCLA, 42 U.S.C. Secs. 9601 et seq., and the requirements of its governing regulations, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300.

In this section, the relative performance of the alternatives are summarized by highlighting the key differences between the alternatives in terms of nine criteria.

The nine remedial criteria summarize the requirements of CERCLA 121(b) and are as follows:

1. overall protection of human health and the environment,
2. compliance with applicable or relevant and appropriate requirements (ARARS),
3. long-term effectiveness and permanence,
4. reduction of toxicity, mobility or volume,
5. short-term effectiveness,
6. implementability,
7. cost,
8. state acceptance and
9. community acceptance.

1. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

This criterion addresses whether or not a remedy provides adequate protection of human health and the environment and describes how risks posed through each pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.

COMPONENT 1:

ALTERNATIVE GE-1 NO FURTHER ACTION WITH MONITORING

This alternative would not result in reducing the public health and environmental risk associated with exposure to contaminated groundwater. Specifically, contaminated groundwater would continue to migrate off-site, potentially into deeper aquifers, and into both public and private drinking water supplies. Additionally, contaminated groundwater would continue to migrate into the Toms River, potentially adversely impacting aquatic populations.

The long-term public health and environmental impacts of selecting this alternative would be significant, if no further action were taken and source control were not achieved.

COMPONENT 1:

ALTERNATIVE GE-2 GROUNDWATER EXTRACTION
ALTERNATIVE GE-3 GROUNDWATER EXTRACTION AND INJECTION OF CLEAN WATER

The objective of both of these extraction scenarios is to stop off-site migration of contaminated groundwater at the property line, remediate the contaminated groundwater in the off-site areas, and create upward vertical gradients beneath the contaminant source areas. The risks to public health and the environment from current- and future-use exposure scenarios would be mitigated, resulting in protection of public health and the environment.

Alternative GE-2, extraction of contaminated groundwater without any reinjection of treated groundwater or injection of clean water, would produce a stagnation zone where contaminated groundwater may not migrate in any direction. This remedy, by mitigating the contaminated groundwater and eliminating the human exposure route, would be protective of human health and the environment. Within the stagnation zone, there would be the potential that exposure to contaminated groundwater could persist longer than in the cases of the other alternatives, if residential wells were to be used in this area. This situation could be alleviated if the extraction system were designed so as to minimize or eliminate the stagnation zone.

Alternative GE-3 also consists of groundwater extraction. However, the injection of clean water in the Cardinal Drive residential area would create a flushing action which would eliminate the stagnation zone discussed above and accelerate the remediation of the off-site contamination. There would be a possibility that the injection of water into the aquifer could cause some horizontal or downward vertical migration of contaminants. If this were to occur, and exposure to contaminated groundwater were to result, protection of human health and the environment would not be attained.

COMPONENT 2:

ALTERNATIVE GD-1	DISCHARGE TO ATLANTIC OCEAN
ALTERNATIVES GD-2A and 2B	DISCHARGES TO TOMS RIVER
ALTERNATIVES GD-3A, 3B and 3C	DISCHARGES TO UPPER SAND AQUIFER

Risks that the public could be exposed to as a result of discharging the treated groundwater into the ocean, the river and back into the ground were calculated. They are as follows:

Discharge	Risk
Atlantic Ocean	2×10^{-7}
Toms River	2×10^{-8}
Upper Sand Aquifer	2×10^{-5}

The ocean and river discharge numbers were similar (approximately one order of magnitude difference) with river discharge producing a slightly lower risk. The risks ranged from two additional cancer deaths in one hundred thousand (10-5) people exposed over a seventy-year period (aquifer discharge) to two in one hundred million (10-8) people (river discharge). The calculations were based on human exposure via ingestion of contaminated water, ingestion of contaminated fish and dermal exposure. The calculations assumed the treatment process would meet the discharge limitations set by NJDEP.

The above risk numbers can be used to compare one discharge alternative to another. For the purpose of comparison, the risk due to exposure to the river discharge is 10 times less than the risk due to exposure to the ocean discharge, and 1000 times less than the risk due to exposure to the recharged water in the aquifer. This risk assessment for groundwater is based upon exposure to treated groundwater only. If an altered groundwater flow regime results in moving contaminated groundwater into adjacent areas or into the deeper aquifer, and thus, into private or municipal drinking water wells, the risks from exposure increase to unacceptable levels.

Among the various discharge alternatives for the Upper Sand Aquifer, it is expected that Alternative GD-3A, 30% Reinjection, would alter the flow regime less than Alternatives GD-3B or GD-3C, which include 100% recharge. This is due to the lesser

volume of water being reinjected into the aquifer. Thus, the potential among the aquifer recharge alternatives, to spread contamination to drinking water wells is lowest for GD-3A. Therefore, GD-3A would be more protective of human health and the environment than GD-3B or GD-3C.

In summary, while the risk to human health of any of the discharge alternatives is within acceptable levels, the river discharge is the least risky, the ocean discharge is slightly more risky, while reinjection into the ground is the most risky.

COMPONENT 3:

ALTERNATIVES GT-1A to 1E	UTILIZING EXISTING CIBA-GEIGY WASTEWATER TREATMENT PLANT
ALTERNATIVES GT-2A TO 2C	UTILIZING A NEW SEPARATE TREATMENT PLANT

All of the above treatment alternatives, if implemented to meet appropriate discharge levels, would be protective of human health and the environment. It should be noted, however, that treating the contaminated groundwater to the levels requi for discharge to the Toms River would be most protective, treatment to levels required for ocean discharge would be second, and treatment to levels required for discharge to the aquifer would be the least protective.

2. COMPLIANCE WITH ARARS

This criterion addresses whether or not a remedy will meet all of the applicable or relevant and appropriate requirements (ARARS) of other environmental statutes.

As discussed previously, Tables 5 and 6 list the ARARs for remediating the Upper Sand Aquifer and discharging treated groundwater back into the aquifer. Tables 3 lists the ARARs for the Atlantic Ocean discharge and Table 4 presents the TBC values for the Toms River discharge. Appendix B lists the additional location-specific and action-specific ARARs which may be required for various activities related to the extraction, treatment and discharge of the groundwater.

COMPONENT 1:

ALTERNATIVE GE-1 NO FURTHER ACTION WITH MONITORING

This alternative would not result in attaining the Federal and State ARARs. Since the contaminants would continue to be present in the groundwater, the aquifer would not be in compliance with the standards required for a drinking water aquifer.

COMPONENT 1:

ALTERNATIVE GE-2	GROUNDWATER EXTRACTION
ALTERNATIVE GE-3	GROUNDWATER EXTRACTION AND INJECTION OF CLEAN WATER

Both groundwater extraction scenarios would be implemented until ARARs (MCLs) are attained in the aquifer. If the groundwater extraction system designed under Alternative GE-2 results in a stagnation area, the ARARs would not be attained in this area. If Alternative GE-3 pushes contaminants downward into the lower aquifer, ARARs would not be attained in this area.

During the remedial design of the extraction system, a wetlands assessment will be performed in the marshland area to evaluate both the contamination present in this area and the potential impacts of the extraction system on the wetlands. This is required under Executive Order 11990, Protection of Wetlands. Also, the proposed remedial design will be reviewed to ensure that it is consistent with the New Jersey State Coastal Zone Management Program.

COMPONENT 2:

ALTERNATIVE GD-1	DISCHARGE TO ATLANTIC OCEAN
ALTERNATIVES GD-2A and 2B	DISCHARGES TO TOMS RIVER

During the remedial design for any of the discharge scenarios, a floodplains assessment will be performed to ensure that the location of the holding basins will not violate the requirements of Executive Order 11988, Protection of Floodplains.

For any of these Alternatives: GD-1, GD-2A and GD-2B, contaminated groundwater would be treated to the levels required by the Clean Water Act and would therefore be expected to meet ARARs and TBC values for the discharges to the Toms River. These discharge criteria are considered to be protective of most aquatic organisms including species protected under the Marine Mammal Protection Act and the Endangered Species Act of 1973. As with the holding basins discussed above, the seepage network in Alternative GD-2B would be located such that any floodplains protection requirements would be met.

COMPONENT 2:

ALTERNATIVES GD-3A, 3B and 3C DISCHARGES TO UPPER SAND AQUIFER

Any treated groundwater which would be recharged into the Upper Sand Aquifer (a public drinking water source) would be treated to drinking water standards and would therefore be expected to meet ARARs. Potentially for Alternative GD-3A and most likely for Alternatives GD-3B and GD-3C, if the reinjected groundwater moves contamination into areas where the contamination does not presently exist, or into the deeper aquifer through the semi-confining unit, groundwater ARARs would not be attained in these areas.

Additionally, any requirements under the Underground Injection Control Regulations for the injection of treated groundwater into a drinking water source would be met for these alternatives.

COMPONENT 3:

ALTERNATIVES GT-1A TO 1E	UTILIZING EXISTING CIBA-GEIGY WASTEWATER TREATMENT PLANT
ALTERNATIVES GT-2A TO 2C	UTILIZING A NEW SEPARATE TREATMENT PLANT

For each of the treatment scenarios discussed in Alternatives GT-1A to 1E and GT-2A to 2C, the treatment plant would be expected to meet the appropriate discharge criteria for each discharge alternative (Atlantic Ocean, Toms River or Upper Sand Aquifer.) To ensure that the treatment plant would function as required, pilot studies would be conducted to develop the operating and design criteria to meet the necessary degree of treatment. Since the ARARs for ocean discharge are less stringent, they are more likely to be met than the ARARs for the Toms River and Upper Sand Aquifer discharges.

3. LONG-TERM EFFECTIVENESS AND PERMANENCE

This criterion refers to the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup goals have been met.

COMPONENT 1:

ALTERNATIVE GE-1 NO FURTHER ACTION WITH MONITORING

Performance of only site monitoring activities without taking any action to control migration of groundwater contamination would not provide for long-term effectiveness in protecting human health and the environment. There would continue to be

groundwater contamination which poses a threat to public health. The magnitude of the public health and environmental risks would remain unchanged and potentially increase, if contaminant leaching from sources were to increase.

COMPONENT 1:

ALTERNATIVE GE-2	GROUNDWATER EXTRACTION
ALTERNATIVE GE-3	GROUNDWATER EXTRACTION AND INJECTION OF CLEAN W

For both of these alternatives, the groundwater contamination would be reduced to levels which are protective of public health. However, for both scenarios, there is some degree of uncertainty that all of the contamination will be remediated. If a stagnation zone is formed in the Cardinal Drive residential area in Alternative GE-2, some groundwater contamination would be left indefinitely and long-term effectiveness would not be attained. The stagnation zone in Alternative GE-2 would be eliminated in Alternative GE-3 by flushing with clean water. However, this flushing action may push contaminants downward into the lower aquifer again placing human health and the environment at risk.

Alternative GE-2 would be expected to be more effective in achieving long-term protection than Alternative GE-3, if the stagnation zone were eliminated. As stated previously, this could be accomplished by increasing the number of wells.

COMPONENT 2:

ALTERNATIVE GD-1	DISCHARGE TO ATLANTIC OCEAN
ALTERNATIVES GD-2A and 2B	DISCHARGES TO TOMS RIVER
ALTERNATIVES GD-3A, 3B and 3C	DISCHARGES TO UPPER SAND AQUIFER

Alternatives GD-1, GD-2A and 2B would provide long-term effectiveness. Alternatives GD-3A, 3B and 3C may not provide long-term effectiveness if the recharge of treated groundwater spreads contamination either vertically or horizontally to other areas.

There is a greater likelihood that contamination may be pushed horizontally and/or vertically into uncontaminated areas (off site or into a deeper zone of the aquifer) in Alternatives GD-3B and GD-3C than in Alternative GD-3A. Thus, Alternatives GD-3B and GD-3C are the least likely to attain long-term protection of human health.

COMPONENT 3:

ALTERNATIVE GT-1A TO 1E UTILIZING EXISTING CIBA-GEIGY WASTEWATER TREATMENT PLANT
ALTERNATIVE GT-2A TO 2C UTILIZING A NEW SEPARATE TREATMENT PLANT

Alternatives GT-1A, GT-1B, GT-1C, GT-2A and GT-2B (ocean discharge) are expected to provide the same degree of long-term effectiveness. The alternatives utilize existing technologies which have been used frequently for treatment of industrial and hazardous wastes. All of these treatment alternatives are reliable and present no major operational problems provided proper maintenance is performed.

It is less certain whether Alternatives GT-1D, GT-1E and GT-2C (river or aquifer discharge) can provide the same degree of long-term effectiveness as the other treatment alternatives discussed above. Pilot studies will be required to develop the design criteria for meeting the discharge limitations for the river and aquifer.

4. REDUCTION OF TOXICITY, MOBILITY OR VOLUME

This criterion refers to the anticipated performance of the treatment technologies, with respect to these parameters, that a remedy may employ.

COMPONENT 1:

ALTERNATIVE GE-1 NO FURTHER ACTION WITH MONITORING

By allowing the contaminated groundwater to continue to migrate off site and into the Toms River, this alternative would not reduce the toxicity, mobility or volume of contamination either on or off site. The sources would continue to contribute to the groundwater contamination and therefore, the volume of contaminants in the groundwater may actually increase.

COMPONENT 1:

ALTERNATIVE GE-2 GROUNDWATER EXTRACTION
ALTERNATIVE GE-3 GROUNDWATER EXTRACTION AND INJECTION OF CLEAN WAT

These alternatives do not reduce toxicity. However, both of these alternatives significantly reduce the volume of contaminated groundwater by extracting it from the ground and eliminating further migration of contaminants. Alternative GE-2 attains the greatest reduction of contaminants except

for the stagnation zone because no reinjection of treated water occurs. Assuming that the stagnation zone associated with Alternative GE-2 is eliminated or minimized, Alternatives GT-2 and GT-3 would be effective in reducing contaminants. However, since reinjection may produce a downward migration of contaminants, this alternative may be potentially less effective.

COMPONENT 2:

ALTERNATIVE GD-1	DISCHARGE TO ATLANTIC OCEAN
ALTERNATIVES GD-2A AND 2B	DISCHARGES TO TOMS RIVER
ALTERNATIVES GD-3A, 3B AND 3C	DISCHARGES TO UPPER SAND AQUIFER

This criterion is generally not applicable to Alternatives GD-1, GD-2A and GD-2B, as these discharge options do not reduce toxicity, mobility or volume of contaminants. Alternatives GD-3A, GD-3B and GD-3C include returning the treated groundwater to the Upper Sand Aquifer and in these cases, some low residual levels of contaminants would be returned to the aquifer system and the quantity or volume of contaminants in the aquifer would be greater than that for the alternatives which do not include recharge. Alternatives GD-3B and GD-3C place the greatest amount of contaminants back into the aquifer because 100% of the treated groundwater is recharged.

COMPONENT 3:

ALTERNATIVES GT-1A TO 1E	UTILIZING EXISTING CIBA-GEIGY WASTEWATER TREATMENT PLANT
ALTERNATIVES GT-2A TO 2C	UTILIZING A NEW SEPARATE TREATMENT PLANT

All of the above treatment plant alternatives would reduce the toxicity, mobility and volume of waste by removing contaminants from the groundwater and treating them.

If the groundwater were treated to nondetectable levels, the toxicity, mobility and volume of waste in the groundwater would be reduced to the greatest extent. Discharge to the Toms River requires the second most stringent levels; the aquifer discharge scenario has the third most stringent requirements, with the ocean discharge criteria being the least stringent.

5. SHORT-TERM EFFECTIVENESS

This criterion addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

COMPONENT 1:

ALTERNATIVE GE-1 NO FURTHER ACTION WITH MONITORING

This alternative would take no time to implement as the monitoring wells which would be used currently exist. This alternative presents no short-term risks to on-site workers or the community, however, it provides little or no protection to human health and the environment.

COMPONENT 1:

ALTERNATIVE GE-2 GROUNDWATER EXTRACTION
ALTERNATIVE GE-3 GROUNDWATER EXTRACTION AND INJECTION OF CLEAN WATER

Both of these alternatives reduce the threat to public health in generally the same length of time, although Alternative GE-2 would take longer than Alternative GE-3 by not including some form of groundwater recharge. Also, each alternative takes approximately the same amount of time to implement.

Short-term risks to workers are associated with installation of the collection system and through direct contact pathways with contaminated water resulting from pipeline leaks and normal construction hazards during remedial action. These risks can be mitigated through the use of appropriate controls and adherence to proper health and safety protocols during construction activities.

COMPONENT 2:

ALTERNATIVE GD-1	DISCHARGE TO ATLANTIC OCEAN
ALTERNATIVES GD-2A AND 2B	DISCHARGES TO TOMS RIVER
ALTERNATIVES GD-3A, 3B AND 3C	DISCHARGES TO UPPER SAND AQUIFER

Alternative GD-1 would require the least time to implement since the ocean discharge pipeline is already in existence.

Alternatives GD-2A and 2B would require a small amount of time to construct the pipeline or seepage network to the Toms River.

Alternatives GD-3A, 3B and 3C would require the installation of reinjection wells or infiltration basins. Piping systems to transport the treated groundwater to the reinjection wells or infiltration basins would also have to be designed and constructed. These discharge alternatives would require significantly more time to implement than either Alternatives GD-1, GD-2A or GD-2B.

It should be noted that the length of time required to implement a remedy for this operable unit is dependent upon the length of time needed to perform pilot studies and design and construct the treatment plant (as discussed in Component 3.) Any of the discharge alternatives can be implemented concurrently with the treatment alternatives.

The short-term risks to workers for Alternatives GD-2A, GD-2B, GD-3A, GD-3B and GD-3C include those presented by normal construction hazards during the construction and operation activities. The risks can be mitigated through adherence to proper health and safety protocols.

COMPONENT 3:

ALTERNATIVES GT-1A TO 1E	UTILIZING THE EXISTING CIBA-GEIGY TREATMENT PLANT
ALTERNATIVES GT-2A TO 2C	UTILIZING A NEW SEPARATE TREATMENT PLANT

The following lists the estimated times required to implement each of the treatment and discharge options for Alternatives GT-1 and GT-2.

Ocean-Existing Plant	(GT-1A, 1B, 1C)	34-36 months
Ocean-New Plant	(GT-2B)	38-44 months
Toms River-Existing Plant	(GT-1D, 1E)	38-44 months
Toms River-New Plant	(GT-2C)	48-54 months

It is noted that the alternatives generally will require between 3 and 4.5 years to implement. Alternatives GT-1A, 1B and 1C require the least amount of time to implement. Although the plant is currently built and operating, pilot studies for an ocean discharge would be required before plant modifications could be designed and constructed.

Pilot studies would also be required for Alternatives GT-2A and 2B for discharge to the Atlantic Ocean. A new plant would then have to be designed and constructed before any groundwater remediation would occur.

The discharge criteria for the Toms River and Upper Sand Aquifer are more stringent than for the ocean discharge criteria. Due to the additional treatment processes required to meet river/aquifer discharge criteria, the pilot studies required for the river discharge Alternatives GT-1D, 1E and 2C would be more extensive than for the ocean discharge Alternatives GT-1A, 1B, 1C and 2B and therefore the river discharge alternative would require a longer time to implement.

For all treatment plant alternatives, short-term risks to workers include those presented by normal construction hazards during the construction and operation and maintenance of the plant. The risks can be mitigated through adherence to proper health and safety protocols.

6. IMPLEMENTABILITY

This criterion addresses the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

COMPONENT 1:

ALTERNATIVE GE-1 NO FURTHER ACTION WITH MONITORING

This alternative, requiring only groundwater monitoring, is the simplest to implement. It has no construction or land requirements. The monitoring wells which would be utilized in this alternative are currently in existence and would require no construction activities.

COMPONENT 1:

ALTERNATIVE GE-2 GROUNDWATER EXTRACTION
ALTERNATIVE GE-3 GROUNDWATER EXTRACTION AND INJECTION OF CLEAN WATER

Alternatives GE-2 and GE-3 can be implemented without construction difficulties and in a relatively short period of time. There is some concern related to potential operation and maintenance problems associated with the injection of clean water into the aquifer under Alternative GE-3. Therefore, Alternative GE-2 is believed to be the more implementable of the two alternatives, since no reinjection is included in this scenario.

COMPONENT 2:

ALTERNATIVE GD-1	DISCHARGE TO ATLANTIC OCEAN
ALTERNATIVES GD-2A AND 2B	DISCHARGES TO TOMS RIVER

It is expected that the discharge alternatives for the ocean and river are implementable. The ocean discharge pipeline currently exists and is in use, and the construction materials for the discharge to the Toms River are available, as well as the land required for construction. However, if at some future time, the use of the ocean discharge pipeline is banned by law, the ocean discharge alternative would not be implementable.

COMPONENT 2:

ALTERNATIVES GD-3A, 3B AND 3C	RECHARGE TO UPPER SAND AQUIFER

The construction materials and land required for the injection and reinjection wells and infiltration basins used in these alternatives are available. There is some concern that recharging the large volume of water into the aquifer in Alternatives GE-3B and GE-3C will create operation and maintenance problems. The concern is due to the possibilty of clogging from metals precipitation and bacterial growth in the wells and basins and in the aquifer. Therefore, since Alternative GD-3A includes only 30% reinjection, this alternative is believed to be more implementable than Alternatives GD-3B or GD-3C.

COMPONENT 3:

ALTERNATIVES GT-1A TO 1E	UTILIZING THE EXISTING CIBA-GEIGY WASTEWATER TREATMENT PLANT
ALTERNATIVES GT-2A TO 2C	UTILIZING THE NEW SEPARATE TREATMENT PLANT

Alternatives GT-1A, GT-1B, GT-1C, GT-2A and GT-2B, (ocean discharge) can be readily implemented. The proposed treatment technologies and equipment required for construction of any treatment plant modifications or additions are available.

There is less certainty regarding the implementability of Alternatives GT-1D, GT-1E and GT-2C (treatment with discharge to the Toms River or Upper Sand Aquifer). Pilot studies will be required prior to implementation of the groundwater treatment system to develop the design criteria to ensure attainment of

the discharge criteria. The requirements for discharge to the Upper Sand Aquifer are less stringent than the requirements for discharge to the Toms River, and thus, slightly more implementable.

7. COST

This criterion includes estimated capital, operation and maintenance costs and net present worth costs. The costs estimates are summarized in Tables 10A, 10B and 10C, respectively, for Component 1, the Extraction Alternatives, Component 2, the Discharge Alternatives and Component 3, the Treatment Alternatives. Detailed information regarding the assumptions which were made in developing these costs is presented in the groundwater-modeling and treatment documents previously referenced (CDM, April 1989).

For Component 1, the No Further Action with Monitoring Alternative is the least costly alternative with a present worth value of approximately $5.2 million. Alternative GE-2, Groundwater Extraction only, would cost approximately $10.0 million. However, if the stagnation zone were to be eliminated in this alternative, the cost would increase to approximately $13.5 million. Alternative GE-3, with some reinjection would cost approximately $13.2 million.

For the Component 2 alternatives, the cost of discharging to the Atlantic Ocean via the existing pipeline is estimated at $3.7 million. The costs of discharging to the Toms River are estimated at $864,000 for discharge through a pipe, versus $1.7 million for discharge via a seepage network.

For the alternatives related to discharge to the Upper Sand Aquifer, the cost for Alternative GD-3A (with 30% reinjection) is estimated to be $22.1 million. Alternative GD-3B (100% recharge using reinjection) is estimated to be $24.2 million and Alternative GD-3C (with 100% recharge using reinjection wells and infiltration basins) is estimated to be $20.0 million.

For the Component 3 alternatives, the present worth values to treat the groundwater are as follows:

Existing CIBA-GEIGY Wastewater Treatment Plant		New On-Site Treatment Plant	
GT-1A (ocean)	$ 58,921,000	GT-2A (ocean)	$ 66,[redacted],
GT-1B (ocean)	$ 63,909,000	GT-2B (ocean)	$ 71,632,
GT-1C (ocean)	$ 58,921,000	GT-2C (river/aquifer)	$167,344,
GT-1D (river/aquifer)	$155,099,000	GT-2D (nondetect)	$182,315,
GT-1E (river/aquifer)	$150,115,000		
GT-1F (nondetect)	$158,136,000		

This information indicates that the costs to treat the groundwater for discharge to the ocean range from approximately $59 million to $72 million. The costs for Toms River or Upper Sand Aquifer discharge range from approximately $150 million to $167 million. The main difference in costs between the Atlantic Ocean and Toms River/Upper Sand Aquifer scenarios is due to the reverse osmosis and activated carbon units which are required to remove additional total dissolved solids and residual organic compounds from the groundwater.

The reverse osmosis unit would result in high operation and maintenance costs due to the production of a large sidestream flow which is concentrated in total dissolved solids. The sidestream would be first treated on site to reduce the volume and the remaining concentrated stream will be disposed off site.

It is noted that if the existing facility were modified to provide treatment to nondetectable levels, the cost for modifying the existing plant is estimated to increase from approximately $150 million (Alternative GT-1E) to $158 million. Similarly, the cost for building a new plant to achieve nondetectable levels is estimated to increase from approximately $167 million (Alternative GT-2C) to $182 million.

8. STATE ACCEPTANCE

This criterion addresses the concern and degree of support that the state government has expressed regarding the remedial alternatives being evaluated.

COMPONENT 1:

ALTERNATIVE GE-1 NO FURTHER ACTION WITH MONITORING

This alternative would not adequately reduce the public health and environmental risks posed by the contaminated groundwater. In addition, neither Federal or State ARARs would be met. Therefore, the State would not support this alternative.

COMPONENT 1:

ALTERNATIVE GE-2 GROUNDWATER EXTRACTION
ALTERNATIVE GE-3 GROUNDWATER EXTRACTION AND INJECTION OF CLEAN WATER

NJDEP concurs that the contaminated groundwater should be extracted and treated. The State has indicated that it would not want reinjected water to force contaminants into the lower aquifer.

COMPONENT 2:

ALTERNATIVE GD-1	DISCHARGE TO ATLANTIC OCEAN
ALTERNATIVES GD-2A and 2B	DISCHARGES TO TOMS RIVER

The state would accept any of these discharge alternatives provided all discharge criteria are met.

COMPONENT 2:

ALTERNATIVES GD-3A, 3B and 3C	RECHARGE TO UPPER SAND AQUIFER

The NJDEP would accept these alternatives, only if none of the reinjected groundwater would migrate off site or into deeper subsurface zones. All reinjected water would have to be recaptured downgradient by the extraction wells.

COMPONENT 3:

ALTERNATIVES GT-1A TO 1E	UTILIZING THE EXISTING CIBA-GEIGY WASTEWATER TREATMENT PLANT
ALTERNATIVES GT-2A to 2C	UTILIZING THE NEW SEPARATE TREATMENT PLANT

The NJDEP would accept any of these treatment alternatives. The NJDEP agrees with EPA that pilot studies will be required to develop the design criteria for treating the contaminated groundwater to the stringent levels required for ocean, Toms River, or aquifer discharge.

9. COMMUNITY ACCEPTANCE

This section summarizes the public's general response to the alternatives described in the Proposed Remedial Action Plan, the RI/FS reports and the weekly meetings held through the extended public comment period. Specific responses to public comments are addressed in the Responsiveness Summary which is an attachment to this document.

COMPONENT 1:

ALTERNATIVE GE-1	NO FURTHER ACTION WITH MONITORING

This alternative would not be acceptable to the public, as the threat to public health and the environment will not be reduced. Contamination would continue to spread and could contaminate additional wells.

COMPONENT 1:

ALTERNATIVE GE-2 GROUNDWATER EXTRACTION
ALTERNATIVE GE-3 GROUNDWATER EXTRACTION AND INJECTION OF CLEAN WATER

The public is in general agreement that the contaminated groundwater should be extracted and treated.

COMPONENT 2:

ALTERNATIVE GD-1 DISCHARGE TO ATLANTIC OCEAN

The public, particularly those who live along the shore, is adamantly opposed to discharging the treated groundwater to the ocean.

COMPONENT 2:

ALTERNATIVES GD-2A AND GD-2B DISCHARGES TO TOMS RIVER

Some of the public is against discharging the treated groundwater to the Toms River, however, for the majority of the public, this is preferable to the ocean discharge.

As described in a previous section of this document, the majority of the public favors a seepage network for discharging the treated groundwater into the Toms River rather than a single pipeline.

COMPONENT 2:

ALTERNATIVES GD-3A, 3B AND 3C RECHARGE INTO UPPER SAND AQUIFER

Many people prefer this alternative and would like the water reinjected back into the aquifer. However, some members of the public who live adjacent to the site share EPA's concerns regarding the possibility of spreading contamination in other areas such as Pine Lake Park and into deeper subzones of the aquifer. Additionally, the water companies in the area are concerned that reinjection may spread contamination to their wells.

COMPONENT 3:

ALTERNATIVES GT-1A TO 1E UTILIZING EXISTING CIBA-GEIGY TREATMENT PLANT
ALTERNATIVES GT-2A TO 2C UTILIZING THE NEW SEPARATE TREATMENT PL

The public expressed major concerns related to the level of treatment achieved, the point of discharge, and whether the groundwater would be treated separately or combined with the

CIBA-GEIGY process waste. The public wants the groundwater to be treated to the most stringent standards possible and want the groundwater treated separately from the process waste. In addition, as discussed in an earlier section of this document, the public indicated a strong preference for using holding basins for the treated groundwater prior to discharge.

SELECTED REMEDY

The EPA has been explicitly directed by Congress in Section 121(b) of CERCLA, as amended, to select remedial actions which utilize permanent solutions and alternative treatment technologies or resource recovery options to the maximum extent practicable. In addition, the Agency is to prefer remedial actions that permanently and significantly reduce the mobility, toxicity or volume of site wastes.

A) Description of the Selected Remedy

After careful review and evaluation of the alternatives presented in the Feasibility Study as achieving the best balance of all evaluation criteria, on June 23, 1988, EPA presented that extraction and treatment of the contaminated groundwater and discharge of the cleansed water to the Atlantic Ocean was the best alternative. Since the risks to public health and the environment from both an ocean or river discharge were low, EPA indicated that a river discharge would also be an acceptable alternative.

Due to the strong concerns expressed by the public regarding the ocean discharge and the public's request to explore other alternatives and the existing alternatives in greater detail, EPA extended the public comment period to November 4, 1988 and conducted additional studies and evaluations, the results of which were presented to members of the public, CIBA-GEIGY and State and local governments. The input which EPA received during the public comment period is presented in the Responsiveness Summary, which accompanies this report.

Based on the results of supplemental studies and evaluations and the information contained in the original Feasibility Study, and input received during the public comment period, EPA has chosen the following alternatives for the remedy for the first operable unit at the CIBA-GEIGY site:

- Component 1 GE-2 Groundwater Extraction,
- Component 2 GD-2A Discharge to the Toms River by Pipeline

and

- Component 3 GT-1E CIBA-GEIGY Wastewater Treatment Plant-Treatment of Contaminated Groundwater Only

As indicated above, EPA's selected remedy is essentially the same as the proposed remedy with the exception that the treated groundwater will be discharged to the Toms River rather than the Atlantic Ocean. EPA believes that there are several considerations and factors that make the selected remedy, which includes a river discharge, a unique determination for the site. Currently, the CIBA-GEIGY ocean outfall is the only direct industrial discharge from a chemical manufacturing facility in the State of New Jersey. EPA is aware that there is pending state legislation to prohibit such discharges. Furthermore, in late 1988, EPA under former Administrator Lee Thomas, issued the Agency's National Coastal and Marine Policy recognizing the serious degradation of the nation's coastal and marine waters. One of the goals of this policy is to minimize the use of coastal and marine waters for waste disposal. Also, the federal Ocean Dumping Ban Act prohibits new permits for ocean dumping for industrial and acid wastes by 1991. In addition, within the last two years, two major industries, namely, Allied Chemical and E.I. du Pont de Nemours & Company have voluntarily discontinued their practices of ocean dumping industrial wastes. As indicated in an earlier section of this document, CIBA-GEIGY also intends to terminate the use of its existing ocean outfall for process wastes by December 31, 1991.

It is due to primarily these circumstances and events as well as the opposition and concerns voiced by the general public that EPA has decided not to include ocean discharge as part of the selected remedy for the first operable unit of the CIBA-GEIGY site.

The major components of the Remedial Action are as follows:

- Sealing contaminated residential irrigation wells in the Cardinal Drive area to prevent human exposure to contaminated groundwater.
- Installation of an extraction well system both on and off site to capture the contaminated groundwater in the

off-site areas and stop migration of contaminated groundwater at the property line. The system will be designed such that the stagnation zone produced in Alternative GE-2 will be eliminated or minimized to the maximum extent practicable. In addition, the system will be designed to limit the downward vertical migration of contaminants and protect the semiconfined aquifer by creating an upflow gradient. The exact design of the extraction system will be determined during the design phase of the project. The quality of the deeper aquifer will also be evaluated during the design phase.

- Extraction of contaminated groundwater at a rate estimated between 2.7 and 4 MGD until the federal and state cleanup standards listed in Tables 5 and 6 are met to the maximum extent that is technically practicable.

- After extraction, treatment of the contaminated groundwater separately from process wastewater in the existing CIBA-GEIGY wastewater treatment plant. This will be accomplished by modifying the wastewater treatment plant to accommodate only the groundwater flow. Any process wastewater would be treated in a separate facility. However, during the pilot and design phases an evaluation for modifying the existing CIBA-GEIGY wastewater treatment plant to accommodate the (hydraulically) separate treatment of both the groundwater and process wastewater will be made to determine if any cost savings can be realized. The contaminated groundwater will be treated to the discharge levels required by the NJDEP, and determined to be practicable based on pilot studies; the levels will be developed based on the Effluent Limitations Guidelines for the Organic Chemicals and Plastics and Synthetic Fibers Category (40 CFR Parts 414 and 416) and the 1988 proposed New Jersey State Surface Water Quality Standards for discharge to the Toms River (refer to Table 4).

- Conduct of pilot studies to confirm the practicability of achieving the discharge levels and to develop the design and operating criteria for the treatment processes and design modifications to the existing CIBA-GEIGY treatment plant which will be required to meet the Toms River discharge criteria. If based on the results of pilot studies, EPA determines that the above-mentioned effluent standards are technically impracticable or cannot be achieved, then an evaluation will be made to determine the standards that can be achieved.

- After treatment, the groundwater will be retained in basins to allow monitoring of residual levels prior to discharge through a pipeline to the Toms River. The use of a diffuser for the discharge will be evaluated during the remedial design phase.

Additional activities which will be performed as part of this ROD are the following:

- Monitoring of the Toms River will be performed during the design phase of this project. The monitoring will provide a baseline for current water quality in the river upstream, downstream and adjacent to the site. The data generated from the monitoring effort will be used to supplement existing information in assessing the current impact of the contaminated groundwater on the Toms River. Monitoring will continue during the implementation of the remedial action to evaluate the effects of the extraction system and discharge over time.

- Groundwater monitoring will be performed while the extraction system and treatment plant modifications are being designed and will continue during the implementation of the remedial action.

The purpose of the river and groundwater monitoring program as indicated above is twofold:

1. The river monitoring will provide a baseline to which the effects of all future activities can be compared. By obtaining data on present river water quality conditions, the effects of the extraction system, when operational, and river discharge can be measured and evaluated.

2. The groundwater and river monitoring program will generate information to ensure that, while the pilot studies and treatment plant design are being performed, the groundwater contamination problem is not migrating further and the quality of the Toms River is not deteriorating. If it appears that the contamination may be spreading either laterally or vertically, the option may exist to pump and treat the contaminated groundwater and discharge it to the ocean.

The costs (expressed as present worth values) associated with the selected alternatives are the following:

Alternative GE-2 Groundwater Extraction (modified to eliminate stagnation zones and enhance upflow gradients)	$ 13,500,000
Alternative GD-2A Discharge to Toms River by pipe	$ 900,000
Alternative GT-1E (CIBA-GEIGY Wastewater Treatment Plant for Discharge to Toms River)	$150,100,000
Total Estimated Cost of Remedy	$164,500,000

It is noted that the above values do not include the costs for river monitoring. It is further noted that the cost may be reduced by up to $4 million by using the 75 million gallon emergency reservoir in place of the two holding tanks.

Pre-design work including, but not limited to pilot studies and preliminary engineering are estimated to take approximately 8 months to complete. Design of the selected remedy is estimated to take an additional 12 months. The time required to construct the remedy is estimated to be approximately 18 to 24 months. Therefore, the estimated timeframe to implement the selected remedy is 38 to 44 months.

B) Future Work

A Supplemental Remedial Investigation will be required to characterize adequately the nature and extent of the contaminant sources, both known and suspected, and to study the Lower Sand Aquifer further. Upon completion of the Supplemental Remedial Investigation, a Feasibility Study will be conducted to develop and evaluate remedial alternatives. A subsequent ROD(s), which will document the selection of a remedy for the control of the sources of contamination and will address the remediation of the Lower Sand Aquifer (if necessary), will be prepared.

THE STATUTORY DETERMINATIONS

Protection of Human Health and the Environment

The selected remedy is protective of human health and the environment in that the contaminated groundwater will be controlled and treated on site and remediated in off-site areas. In addition, the remedy will significantly reduce the toxicity and volume of contaminants in the groundwater and prevent further degradation of groundwater quality in the Upper Sand Aquifer. It will mitigate the risk to public health by eliminating the principal threat posed by the site, i.e., ingestion of contaminated groundwater from public and residential wells.

The contaminated groundwater will be treated to the required limits before discharging to the Toms River, thereby reducing the toxicity and volume of contaminants. The extraction and treatment of the contaminated groundwater will produce no short-term risk to public health and the environment.

Attainment of Applicable or Relevant and Appropriate Requirements

During development of the Feasibility Study, applicable or relevant and appropriate requirements, (ARARs) and to be considereds (TBCs) were established for groundwater remediation based on current EPA guidance.

Location-Specific

The remedy will comply with all location-specific ARARs. The floodplain will be evaluated during the designs of the extraction system and the holding basins. As required by Executive Order 11988, Protection of Floodplains, the remedial design will include efforts to minimize potential harm and avoid adverse effects to the floodplain area.

The wetlands will also be evaluated during the design of the groundwater extraction system. Executive Order 11990, Protection of Wetlands, requires that actions be taken to minimize the destruction, loss or degradation of wetlands.

The discharge of the treated groundwater will comply with all requirements of the Endangered Species Act of 1973 and the Marine Mammal Protection Act. EPA has consulted with the Department of Commerce (National Oceanic and Atmospheric Administration) (NOAA) on the proposed remedies and NOAA has concurred that the remedy is protective of endangered or threatened species.

During the remedial design, the requirements of the New Jersey State Coastal Management Program will be evaluated to ensure that remedial activities are consistent with the Coastal Management Program.

Also during the remedial design, the site and the remedial action will be reviewed to determine the potential impacts to cultural resources which could result from the remedial activities as required under National Historic Preservation Act.

Action-specific

The remedy will comply with all Clean Water Act requirements for discharge of treated groundwater to the Toms River. The groundwater will be treated to the levels listed in Table 4. These values were derived from the proposed New Jersey State Water Quality Standards and are TBCs. In anticipation of promulgation of the proposed standards, EPA has chosen to use them in developing the Toms River discharge criteria.

Chemical-specific

The aquifer will be remediated to the New Jersey MCLs listed in Tables 5 and 6. These standards are applicable requirements for a drinking water aquifer.

Cost Effectiveness

EPA believes that the Selected Remedy affords the highest overall effectiveness proportionate to its cost. The Selected Remedy will be designed to maximize the removal of contaminant mass from the aquifer. The groundwater will then be treated to the levels required for discharge to the Toms River. The costs of treatment for a river discharge are greater than for ocean discharge because the river discharge criteria are more stringent than ocean discharge criteria. Thus, a greater proportion of pollutants are removed. EPA believes that the benefits in terms of the total volume of contaminants removed justify the added costs involved.

Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

This remedy represents the best balance of the nine criteria and is determined to be the most appropriate remedy for the site at this time. It utilizes permanent solutions by extracting and treating the contaminated groundwater and uses alternative treatment technologies to th maximum extent practicable.

The groundwater treatment will reduce the contaminants of concern to health protective levels. After treatment of the off-site groundwater is complete, the aquifer will no longer present potential future risk to the public health; neither monitoring nor management will be required.

The groundwater at the site will continue to become contaminated as long as the sources of contamination remain. Therefore, the extraction wells pumping the on-site groundwater contamination will continue until the contamination sources and the groundwater are remediated. The sources will be investigated and remediated in the second operable unit.

Preference for Treatment as a Principal Element

The Selected Remedy satisfies the statutory preference for remedies employing treatment that permanently and significantly reduces the toxicity, mobility or volume of hazardous substances.

The Selected Remedy includes the installation and operation of extraction wells for contaminant recovery. Contaminated groundwater pumped from the extraction wells will be treated in the existing CIBA-GEIGY treatment plant before being discharged to the Toms River. This pumping and treatment is expected to reduce permanently and significantly the toxicity, mobility, and volume of the hazardous substances in the groundwater at the site and in the off-site areas.

TABLE 1

TOTAL "NO ACTION" CARCINOGENIC RISKS AND CHRONIC HAZARD EVALUATION FOR RESIDENTIAL EXPOSURE ROUTES

Exposure Route	Carcinogenic Risk	Total Chronic Hazard[a]
Ingestion of Water From a Residential Well	1×10^{-2}	4×10
Dermal Absorption of Water From a Residential Well	1×10^{-5}	1×10^{-2}
Inhalation Exposure From Residential Well Water	5×10^{-5}	8×10^{-1}

The total carcinogenic risk per million people exposed is: 1×10^{-2}.

The total chronic hazard is: 4×10.

[a] The chronic hazard is the ratio of the amount of a chemical to which an individual might be exposed to the amount of the chemical that will not cause any adverse effect. A hazard index that is less than 1.0 indicates that no adverse health impacts would be expected.

TABLE 2

TOTAL "NO ACTION" CARCINOGENIC RISKS AND CHRONIC HAZARD EVALUATION FOR RECREATIONAL EXPOSURE ROUTES

Exposure Route	Carcinogenic Risk	Total Chronic Hazard[a]
Ingestion of Surface Water From the Toms River	4×10^{-9}	7×10^{-6}
Ingestion of Marshland Sediment	1×10^{-6}	6×10^{-6}
Ingestion of Fish Which Inhabit the Toms River	2×10^{-6}	4×10^{-2}
Dermal Absorption of Surface Water From the Toms River	2×10^{-8}	7×10^{-5}
Dermal Absorption of Contaminants From Marshland Sediment	6×10^{-8}	3×10^{-5}
Inhalation of Contaminated Air From the Toms River	2×10^{-10}	4×10^{-6}
Inhalation of Contaminated Air in the Marshland	5×10^{-6}	8×10^{-3}

The total carcinogenic risk per million people exposed is: 8×10^{-6}.

The total chronic hazard is: 5×10^{-2}.

[a] The chronic hazard is the ratio of the amount of a chemical to which an individual might be exposed to the amount of the chemical that will not cause any adverse effect. A hazard index that is less than 1.0 indicated that no adverse health impacts would be expected.

TABLE 3

ACTION-SPECIFIC ARARs

DISCHARGE CRITERIA FOR THE ATLANTIC OCEAN (MASS UNITS)+

POLLUTANT	4 MGD DISCHARGE TO THE ATLANTIC OCEAN (kg/day) average/maximum
Benzene	0.561/ 2.060
Chlorobenzene	0.227/ 0.425
Chloroform	0.318/ 0.698
Chlorinated Benzenes	*231
1,2-Dichloroethane	1.030/ 3.200
Carbon Tetrachloride	0.273/ 0.576
Ethylbenzene	0.485/ 1.640
Toluene	0.394/ 1.219
Dichloroethenes	*3400
1,1-Dichloroethene	0.243/ 0.379
Trans-1,2-Dichloroethene	0.318/ 0.819
Tetrachloroethene	0.334/ 0.849
Trichloroethene	0.318/ 0.819
1,1,1-Trichloroethene	0.318/ 0.819
Methylene Chloride	0.607/ 1.350
1,2-Dichlorobenzene	1.170/ 2.470
1,3-Dichlorobenzene	0.470/ 0.667
1,4-Dichlorobenzene	0.227/ 0.425
Total Dichlorobenzenes	*29.9
Bis(2-Ethylhexyl)Phthalate	1.560/ 4.230
Naphthalene	0.334/ 0.895
Nitrobenzene	0.409/ 1.030
Phenol	0.227/ 0.394
1,2,4-Trichlorobenzene	1.030/ 2.120
Vinyl Chloride	1.580/ 4.060
Cadmium	1.516/ 3.033
Chromium Trivalent	*156
Chromium Hexavalent	*89.5
Total	3.030/ 6.060
Copper	*5.19
Lead	2.270/ 4.550
Nickel	11.40 /22.70
Zinc	7.580/15.20
Arsenic	3.030/ 6.060
Pentavalent	*23.3
Trivalent	*64.4
Mercury	0.045/ 0.091
Selenium	*96.6
Iron	22.7 /45.5
TSS	-
TDS	-
Petroleum Hydrocarbons (mg/l)	10 /15
Acute toxicity (LC50)-%eff	*50
Chronic Toxicity (NOEC)-%eff	*8.5
pH Standard Units	6 minimum - 9 maximum

A minimum 85% TOC removal is required when influent TOC >100 mg/l. When influent TOC is <100 mg/l, a maximum TOC effluent limitation of 15.0 mg/l is required.

+Technology based discharge criteria except where noted.
*Federal Water Quality Criteria

TABLE 3A

ACTION-SPECIFIC ARARs

DISCHARGE CRITERIA FOR THE ATLANTIC OCEAN (CONCENTRATION UNITS)

(Revised December 9, 1988)

POLLUTANT	DISCHARGE TO THE ATLANTIC OCEAN (ug/l)
*Benzene	37.0
*Chlorobenzene	15.0
*Chloroform	21.0
+Chlorinated Benzenes	129.0
*1,2-Dichloroethane	68.0
*Carbon Tetrachloride	18.0
*Ethylbenzene	32.0
*Toluene	26.0
+Dichloroethenes	224,000.0
*1,1-Dichloroethene	16.0
*Trans-1,2-Dichloroethane	21.0
*Tetrachloroethene	22.0
*Trichloroethene	21.0
*1,1,1-Trichloroethane	21.0
*Methylene Chloride	40.0
*1,2-Dichlorobenzene	77.0
*1,3-Dichlorobenzene	31.0
*1,4-Dichlorobenzene	15.0
*Total Dichlorobenzenes	1,970.0
*Bis(2-Ethylhexyl)Phthalate	103.0
*Naphthalene	22.0
*Nitrobenzene	27.0
*Phenol	15.0
*1,2,4-Trichlorobenzene	68.0
*Vinyl Chloride	104.0
*Cadmium	100.0
Chromium	
+Trivalent	10,300.0
+Hexavalent	50.0
*Total	500.0
+Copper	2.9
+Lead	5.6
+Nickel	8.3
+Zinc	86.0
Arsenic	
+Pentavalent	13.0
+Trivalent	36.0
+Mercury	0.025
+Selenium	54.0
*Iron	1,500.0
TSS (mg/l)	-
TDS (mg/l)	-
Petroleum Hydrocarbons (mg/l)	10.0
Acute Toxicity (LC50)-%eff	>50.0
Chronic Toxicity (NOEC)-%eff	>8.5
pH Standard Units	6.0 - 9.0

*Technology based discharge criteria.
+Federal Water Quality Criteria.

TABLE 4

PROPOSED DISCHARGE CRITERIA FOR THE TOMS RIVER (MASS UNITS)**
TO BE CONSIDERED

POLLUTANT	4 MGD DISCHARGE TO THE TOMS RIVER (kg/day)	
WATER QUALITY BASED -	DIFFUSER	NO DIFFUSER
Benzene	0.1704	0.0151
Chlorobenzene	0.6816	0.0606
Chloroform	0.0324	0.0029
1,2-Dichloroethane	0.3408	0.0303
Carbon Tetrachloride	0.3408	0.0303
1,1-Dichloroethene	0.3408	0.0303
Trans-1,2-Dichloroethene	1.0704	0.1515
Tetrachloroethene	0.1704	0.0151
Trichloroethene	none detected	
Methylene Chloride	0.3408	0.0303
1,2,4-Trichlorobenzene	1.364	0.1212
Vinyl Chloride	3.408	0.303
Cadmium	1.70	0.1511
Chromium Trivalent	5.28	0.4693
Chromium Hexavalent	1.88	0.1671
Total	8.52	0.7573
Copper	0.28	0.0245
Lead	8.52	0.7573
Nickel	3.75	0.3333
Zinc	2.56	0.2276
Arsenic	8.52	0.7573
Mercury	0.34	0.0302
Selenium	1.70	0.1511
Iron	92.9	15.2
TSS	5270	607
TDS	2934	758
Acute Toxicity (LC50)-%eff	50	50
Chronic Toxicity (NOEC)-%eff	89	100
pH Standard Units	4 minimum - 7 maximum	
TECHNOLOGY BASED	average/maximum	
Ethylbenzene	0.485/1.64	
Toluene	0.394/1.219	
1,1,1-Trichloroethane	0.318/0.819	
1,2-Dichlorobenzene	1.170/2.470	
1,3-Dichlorobenzene	0.470/0.667	
1,4-Dichlorobenzene	0.227/0.425	
bis(2-Ethylhexyl)Phthalate	1.560/4.230	
Naphthalene	0.334/0.895	
Nitrobenzene	0.409/1.030	
Phenol	0.227/0.394	
Petroleum Hydrocarbons-mg/l	10 /15	

A minimum of 95% TOC removal is required when influent TOC >100 mg/l. When influent TOC <100 mg/l, a maximum TOC effluent limitation of 5.0 mg/l is required.

**Toms River discharge is the more stringent of the water quality based discharge criteria or the average technology based discharge.

TABLE 4A

PROPOSED DISCHARGE CRITERIA FOR TOMS RIVER (CONCENTRATION UNITS)**

TO BE CONSIDERED

(Revised December 9, 1988)

POLLUTANT	DISCHARGE TO THE TOMS RIVER (ug/l) (no diffuser)
Benzene	1
Chlorobenzene	4
Chloroform	0.19
1,2-Dichloroethane	2
Carbon Tetrachloride	2
*Ethylbenzene	32
*Toluene	26
1,1-Dichloroethene	2
Trans-1,2-Dichloroethene	10
Tetrachloroethene	1
Trichloroethene	1
*1,1,1-Trichloroethane	21
Methylene Chloride	2
*1,2-Dichlorobenzene	77
*1,3-Dichlorobenzene	31
*1,4-Dichlorobenzene	15
*bis(2-Ethylhexyl)Phthalate	103
*Naphthalene	22
*Nitrobenzene	27
*Phenol	15
1,2,4-Trichlorobenzene	8
Vinyl Chloride	2
Cadmium	10
Chromium	
Trivalent	31
Hexavalent	11
Total	50
Copper	1.65
Lead	50
Nickel	22
Zinc	15
Arsenic	50
Mercury	2
Selenium	10
Iron	1000
TSS mg/l	40
TDS mg/l	45@
Acute Toxicity (LC50) - % eff	≥50
Chronic Toxicity (NOEC) - % eff	≥100
pH Standard Units	4 - 7

* Pollutant criteria that are technology based.
**Toms River discharge is the more stringent of the water quality based discharge criteria without diffuser or the average technology based discharge.
@ or 1.33 times background where the discharger demonstrates the increase will not adversely affect the aquatic biota.

TABLE 5

CHEMICAL-SPECIFIC ARARs FOR GROUNDWATER PROTECTION

NEW JERSEY DRINKING WATER STANDARDS: JANUARY, 1989

CONTAMINANTS (mg/L unless otherwise noted)	TREATED WATER
Physical:	
Turbidity	1 TU (Nepthalometric Turbidity Unit)
Color	10 CU (Color Units)
Odor	3 TON (Threshold Odor Number)
Total Dissolved Solids	500
Microbiological:	
Total Coliform	1 per 100 ml
Inorganic Chemicals:	
Arsenic	0.05
Barium	1
Cadmium	0.01
Chloride	250
Chromium	0.05
Copper	1
Corrosivity	Within 1 of Optimum pH as determined by Langlier Index
Fluoride	2
Foaming Agents	0.5
Hardness (as $CaCO_3$)	250
Iron	0.3
Lead	0.05
Manganese	0.05
Mercury	0.002
Nitrate	10
pH Units	6.5 - 8.5
Selenium	0.01
Silver	0.05
Sodium	50
Sulfate	250
Zinc	5

TABLE 5 (continued)

CHEMICAL-SPECIFIC ARARs FOR GROUNDWATER PROTECTION

NEW JERSEY DRINKING WATER STANDARDS: JANUARY, 1989

CONTAMINANTS (mg/L unless otherwise noted)	TREATED WATER
Organic Chemicals:	
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.005
2,4-D	.1
2,4,5-TP (Silvex)	0.01
Trihalomethane (THM)	0.10
Radioactivity:	
Gross Alpha	15 pCi/L
Combined Radium (226 & 228)	5 pCi/L
Manmade: Beta	4 millirem/yr.
NJA-280 Compounds (ug/l):	
Benzene	1
Carbon Tetrachloride	2
Chlordane	0.5
Chlorobenzene	4
m-Dichlorobenzene	600
o-Dichlorobenzene	600
p-Dichlorobenzene	75*
1,2-Dichloroethane	2
1,1-Dichloroethylene	2
cis-Dichloroethylene	10
trans-1,2-Dichloroethylene	10
Methylene Chloride	2
PCBs	0.5
Tetrachloroethylene	1
Trichlorobenzenes	8
1,1,1-Trichloroethylene	26
Trichloroethylene	1

*The EPA established MCL will apply because NJDEP will not be reproposing an MCL for this contaminant in the near future.

TABLE 6

CHEMICAL-SPECIFIC ARARs FOR GROUNDWATER PROTECTION

GENERAL GUIDELINES FOR UNREGULATED VOCs

EPA Carcinogenicity Classification*	Recommended Guideline/Level
a,b	5 ppb (Single contaminant level not to exceed)
c,d,e	50 ppb (Single contaminant level not to exceed)
Total for all unregulated VOCs	50 ppb (Total for all VOCs not to exceed)

*Based on U.S. EPA 1986 as shown below

U.S. EPA CATEGORIZATION OF WEIGHT OF EVIDENCE FOR HUMAN CARCINOGENICITY

GROUP A: **HUMAN CARCINOGEN** -
Sufficient evidence from human epidemiological studies.

GROUP B: **PROBABLE HUMAN CARCINOGEN** -
Group B1: Limited evidence from human epidemiological studies.
Group B2: Sufficient evidence from animal studies and inadequate or no data from human epidemiological studies.

GROUP C: **POSSIBLE HUMAN CARCINOGEN** -
Limited evidence of carcinogenicity from animal studies in the absence of human data.

GROUP D: **NOT CLASSIFIABLE AS TO HUMAN CARCINOGENICITY** -
Inadequate human and animal evidence for carcinogenicity or no data available.

GROUP E: **EVIDENCE OF NONCARCINOGENICITY FOR HUMANS** -
No evidence for carcinogenicity in at least two adequate human epidemiological and animal studies.

TABLE 7

COMPONENT 1 - GROUNDWATER EXTRACTION ALTERNATIVES

Alternative GE-1	No further action with monitoring
Alternative GE-2	Groundwater extraction (groundwater monitoring, sealing of residential wells)
Alternative GE-3	Groundwater extraction with injection of clean water (groundwater monitoring, sealing of residential wells)

TABLE 8

COMPONENT 2 - GROUNDWATER DISCHARGE ALTERNATIVES

Alternative GD-1	Ocean discharge through the existing CIBA-GEIGY pipeline
Alternative GD-2A	Discharge to the Toms River by pipe
Alternative GD-2B	Discharge to the Toms River by seepage network
Alternative GD-3A	Discharge to Upper Sand Aquifer, 30% reinjection of treated groundwater
Alternative GD-3B	Discharge to Upper Sand Aquifer, 100% reinjection of treated groundwater
Alternative GD-3C	Discharge to Upper Sand Aquifer, 100% recharge of treated groundwater using reinjection wells and infiltration basins
Alternative GD-4	Discharge to Ocean County Utilities Authority

TABLE 9

COMPONENT 3 - GROUNDWATER TREATMENT ALTERNATIVES

Existing Wastewater Treatment Plant Operation:

Alternative GT-1A	CIBA-GEIGY wastewater treatment plant combined treatment of process wastewater and groundwater with discharge to the Atlantic Ocean
Alternative GT-1B	CIBA-GEIGY wastewater treatment plant separate treatment of process wastewater and groundwater with discharge to the Atlantic Ocean
Alternative GT-1C	CIBA-GEIGY wastewater treatment plant treatment of contaminated groundwater only with discharge to the Atlantic Ocean
Alternative GT-1D	CIBA-GEIGY wastewater treatment plant separate treatment of process wastewater and contaminated groundwater with discharge to the Toms River or upper sand aquifer
Alternative GT-1E	CIBA-GEIGY wastewater treatment plant treatment of contaminated groundwater only with discharge to the Toms River or upper sand aquifer
Alternative GT-1F	CIBA-GEIGY wastewater treatment plant treatment to nondetectable levels

Newly Constructed On-Site Wastewater Treatment Plant:

Alternative GT-2A	New physical/chemical treatment plant with discharge to the Atlantic Ocean
Alternative GT-2B	New biological treatment plant with discharge to the Atlantic Ocean
Alternative GT-2C	New biological treatment plant with discharge to the Toms River or upper sand aquifer
Alternative GT-2D	New biological treatment plant with treatment to nondetectable levels

Ocean County Utilities Authority (OCUA) Treatment Facility:

Alternative GT-3	OCUA wastewater treatment plant

In-Situ Bioreclamation System:

Alternative GT-4	In-situ bioreclamation system

TABLE 10A

COMPARISON OF PRESENT WORTH FOR COMPONENT ONE (GROUNDWATER EXTRACTION) REMEDIAL ALTERNATIVES[a]

ALTERNATIVE	DESCRIPTION	CAPITAL COST ($)	O & M COSTS ($/yr)	PRESENT WORTH VALUE ($)
GE-1	NO FURTHER ACTION WITH MONITORING	293,000	517,000	5,163,000
GE-2	GROUNDWATER EXTRACTION (GROUNDWATER MONITORING, SEALING OF RESIDENTIAL WELLS)	4,432,000 (7,950,000)b	592,000 (592,000)b	10,009,000 (13,526,000)b
GE-3	GROUNDWATER EXTRACTION WITH INJECTION OF CLEAN WATER, (GROUNDWATER MONITORING, SEALING OF RESIDENTIAL WELLS)	6,907,000	614,000	13,156,000

a Costs taken from "Final Report-CIBA-GEIGY Technical Enforcement Support Document, Groundwater Modelling Report," (CDM, April 1989).

b The cost to implement this alternative with additional wells to eliminate the stagnation zone.

TABLE 10B

COMPARISON OF PRESENT WORTH FOR COMPONENT TWO (TREATED GROUNDWATER DISCHARGE) REMEDIAL ALTERNATIVES[a]

ALTERNATIVE	DESCRIPTION	CAPITAL COST ($)	O & M COSTS ($/yr)	PRESENT WORTH VALUE ($)
GD-1[b]	OCEAN DISCHARGE THROUGH THE EXISTING CIBA-GEIGY PIPELINE	-	380,000	3,582,000
GD-2A	DISCHARGE TO TOMS RIVER BY PIPE	675,000	20,000	864,000
GD-2B	DISCHARGE TO TOMS RIVER BY SEEPAGE NETWORK	4,452,000	80,000	5,206,000
GD-3A	DISCHARGE TO UPPER SAND AQUIFER/30% REINJECTION OF TREATED GROUNDWATER	13,599,000	717,000	22,138,000
GD-3B	DISCHARGE TO UPPER SAND AQUIFER/100% REINJECTION OF TREATED GROUNDWATER	15,549,000	729,000	24,204,000
GD-3C	DISCHARGE TO UPPER SAND AQUIFER/100% RECHARGE OF TREATED GROUNDWATER USING REINJECTION WELLS AND INFILTRATION BASINS	12,692,000	729,000	20,024,000

a Costs taken from "Final Report-CIBA-GEIGY Plant, Groundwater Treatment Alternatives," (CDM, April 1989).

b Costs provided by CIBA-GEIGY

TABLE 10C

COMPARISON OF PRESENT WORTH FOR COMPONENT THREE (GROUNDWATER TREATMENT) REMEDIAL ALTERNATIVES[a]

ALTERNATIVE	DESCRIPTION	CAPITAL COST ($)	O & M COSTS ($/yr)	PRESENT WORTH VALUE ($)
GT-1A[b]	CIBA-GEIGY WASTEWATER TREATMENT PLANT (CGWWTP) COMBINED TREATMENT OF PROCESS WASTEWATER & GROUNDWATER WITH DISCHARGE TO OCEAN	20,534,000	4,072,000	58,921,000
GT-1B	CGWWTP SEPARATE TREATMENT OF PROCESS WASTEWATER AND GROUNDWATER WITH DISCHARGE TO OCEAN	25,522,000	4,072,000	63,909,000
GT-1C	CGWWTP TREATMENT OF CONTAMINATED GROUNDWATER ONLY WITH DISCHARGE TO OCEAN	20,534,000	4,072,000	58,921,000
GT-1D	CGWWTP SEPARATE TREATMENT OF PROCESS WASTEWATER & CONTAMINATED GROUNDWATER WITH DISCHARGE TO TOMS RIVER OR UPPER SAND AQUIFER	42,663,000	11,927,000	155,099,000

a Costs taken from "Final Report-CIBA-GEIGY Plant, Groundwater Treatment Alternatives, Toms River, New Jersey," (CDM, April 1989).

b Costs estimated from "CIBA-GEIGY Feasibility Study," (NUS, April 1989) and "Final Report-CIBA-GEIGY Plant, Groundwater Treatment Alternatives, Toms River, New Jersey," (CDM, April 1989).

TABLE 10C (continued)[a]

ALTERNATIVE	DESCRIPTION	CAPITAL COST ($)	O & M COSTS ($/yr)	PRESENT WORTH VALUE ($)
GT-1E	OGWWTP TREATMENT OF CONTAMINATED GROUNDWATER ONLY WITH DISCHARGE TO TOMS RIVER OR UPPER SAND AQUIFER	37,679,000	11,927,000	150,115,000
GT-1F	OGWWTP TREATMENT TO NONDETECTABLE LEVELS	42,269,000	12,291,000	158,136,000
GT-2A	NEW PHYSICAL/CHEMICAL TREATMENT PLANT WITH DISCHARGE TO OCEAN	32,994,000	3,544,000	66,403,000
GT-2B	NEW BIOLOGICAL TREATMENT PLANT WITH DISCHARGE TO OCEAN	36,281,000	3,750,000	71,632,000
GT-2C	NEW BIOLOGICAL TREATMENT PLANT WITH DISCHARGE TO TOMS RIVER OR UPPER SAND AQUIFER	56,869,000	11,719,000	167,344,000
GT-2D	NEW BIOLOGICAL TREATMENT PLANT WITH TREATMENT TO NONDETECTABLE LEVELS	64,760,000	12,470,000	182,315,000

a Costs taken from "Final Report-CIBA-GEIGY Plant, Groundwater Treatment Alternatives, Toms River, New Jersey," (CDM, April 1989).

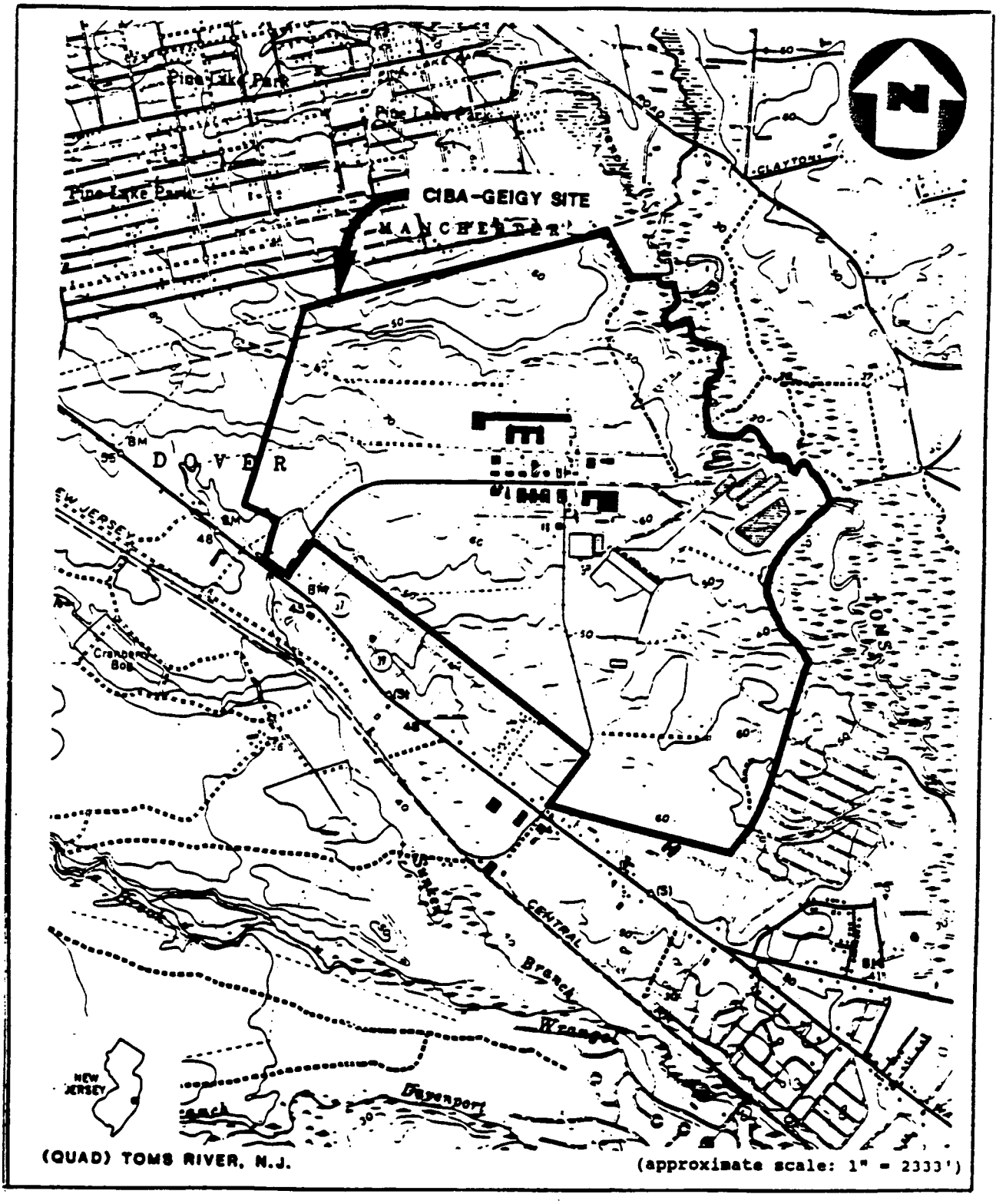


FIGURE 1

SITE LOCATION MAP

CIBA-GEIGY SITE, DOVER TOWNSHIP, NEW JERSEY

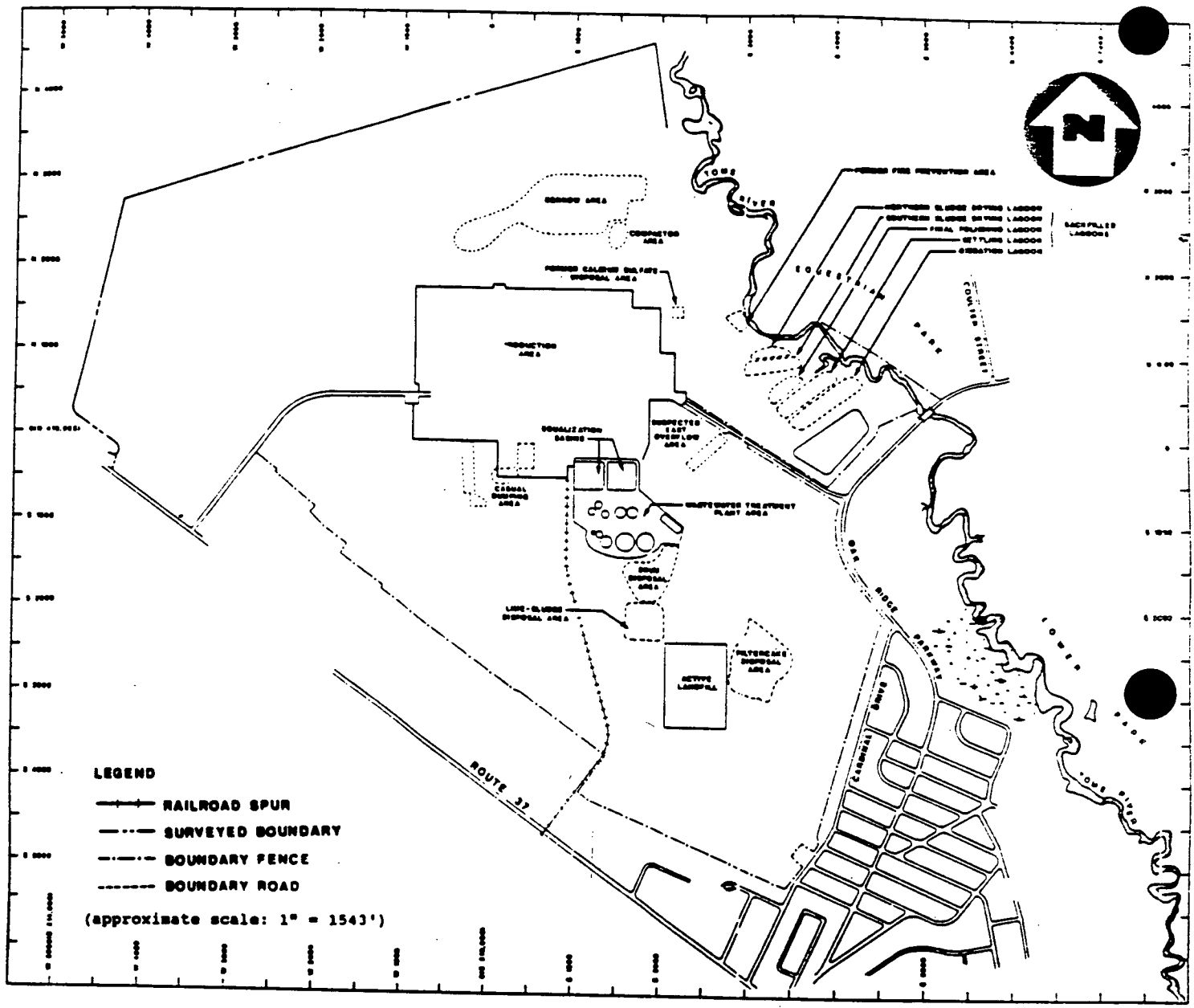


FIGURE 2

CIBA-GEIGY SITE PLAN

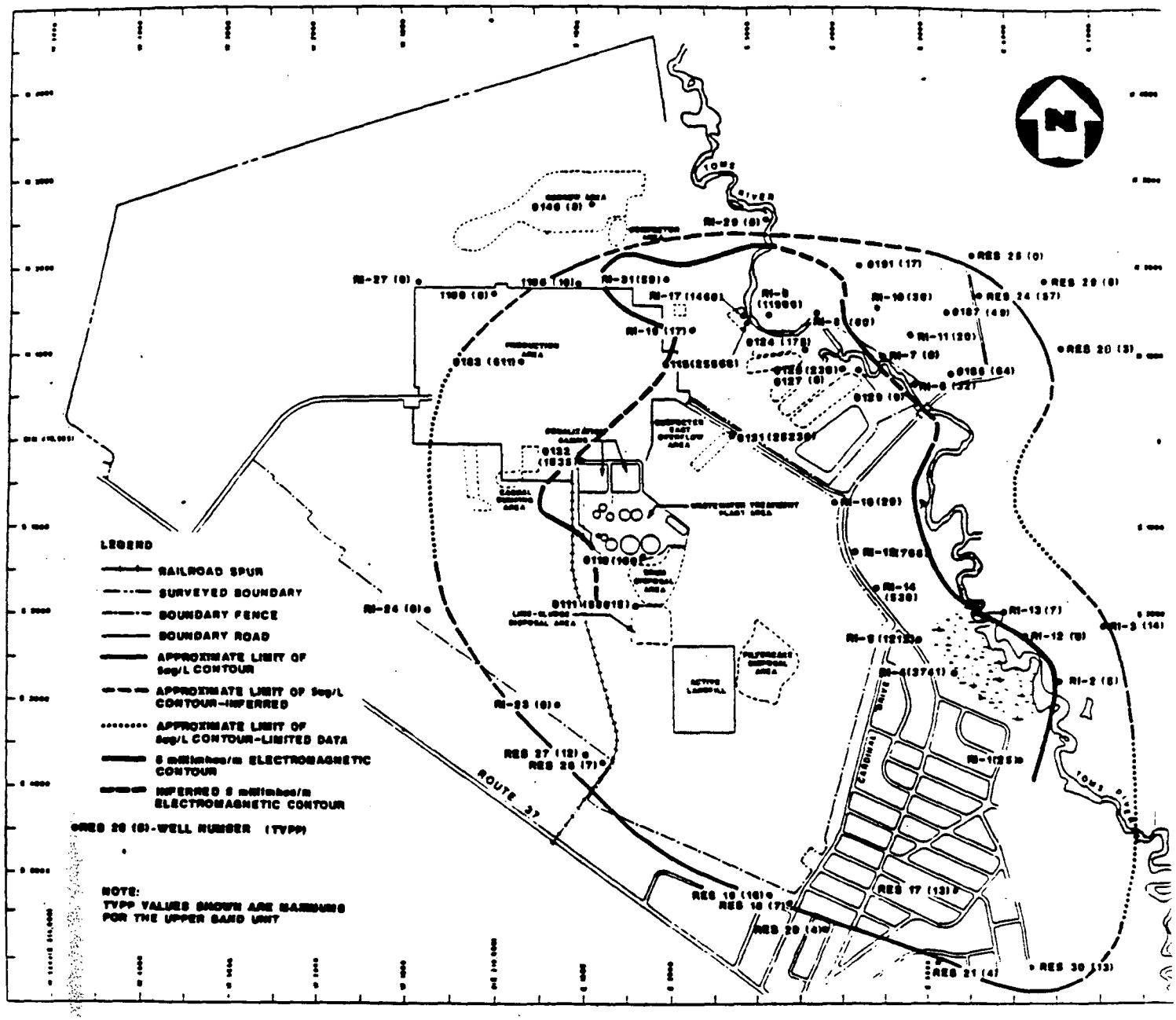


FIGURE 3

APPROXIMATE LATERAL EXTENT TOTAL VOLATILE PRIORITY POLLUTANTS CONTAMINATION >5 ug/L AND ELECTROMAGNETIC CONDUCTIVITY CONTOURS >5 MILLIMHOS/M

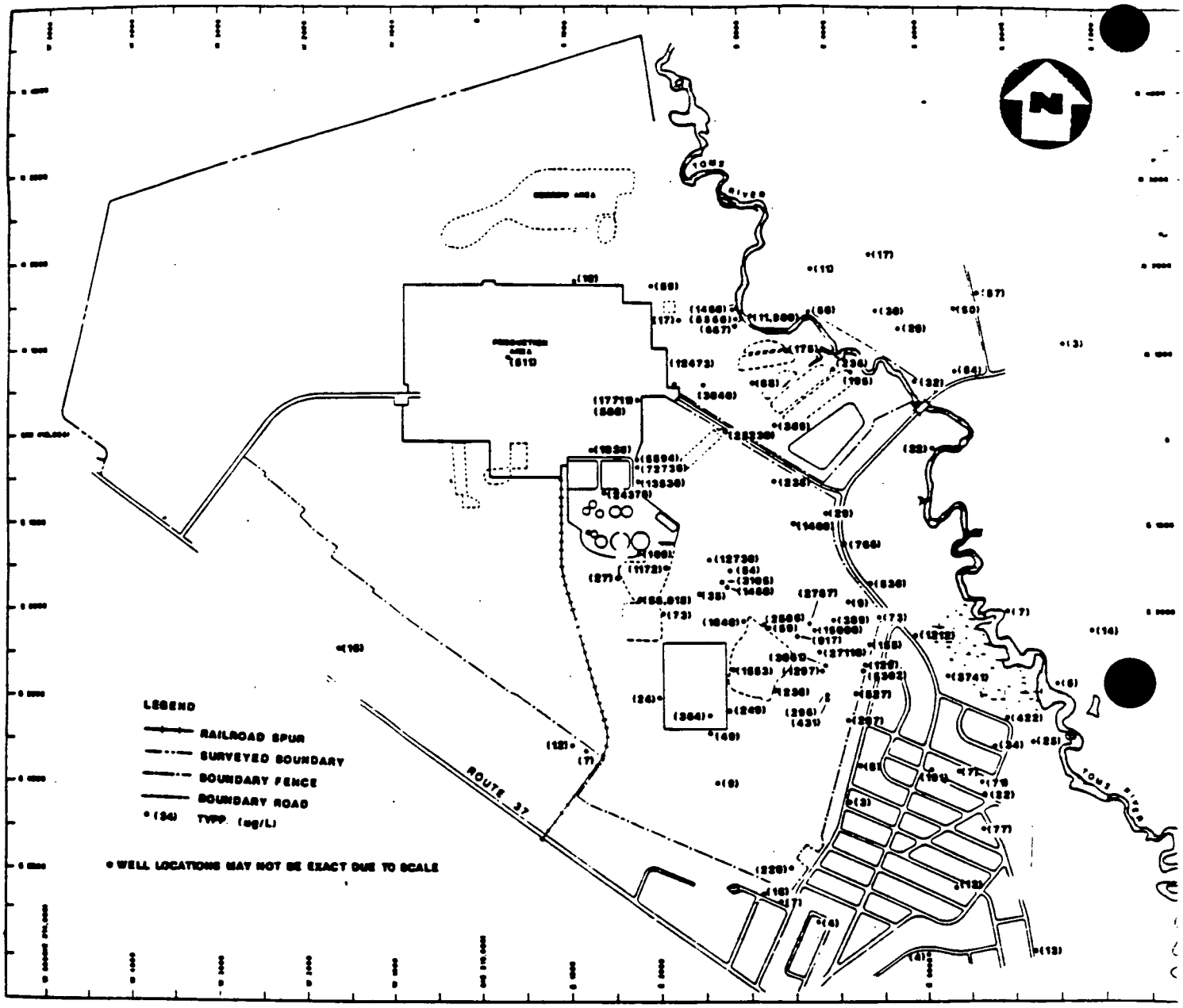


FIGURE 4

MAXIMUM DETECTED TOTAL VOLATILE PRIORITY POLLUTANTS (TVPP)

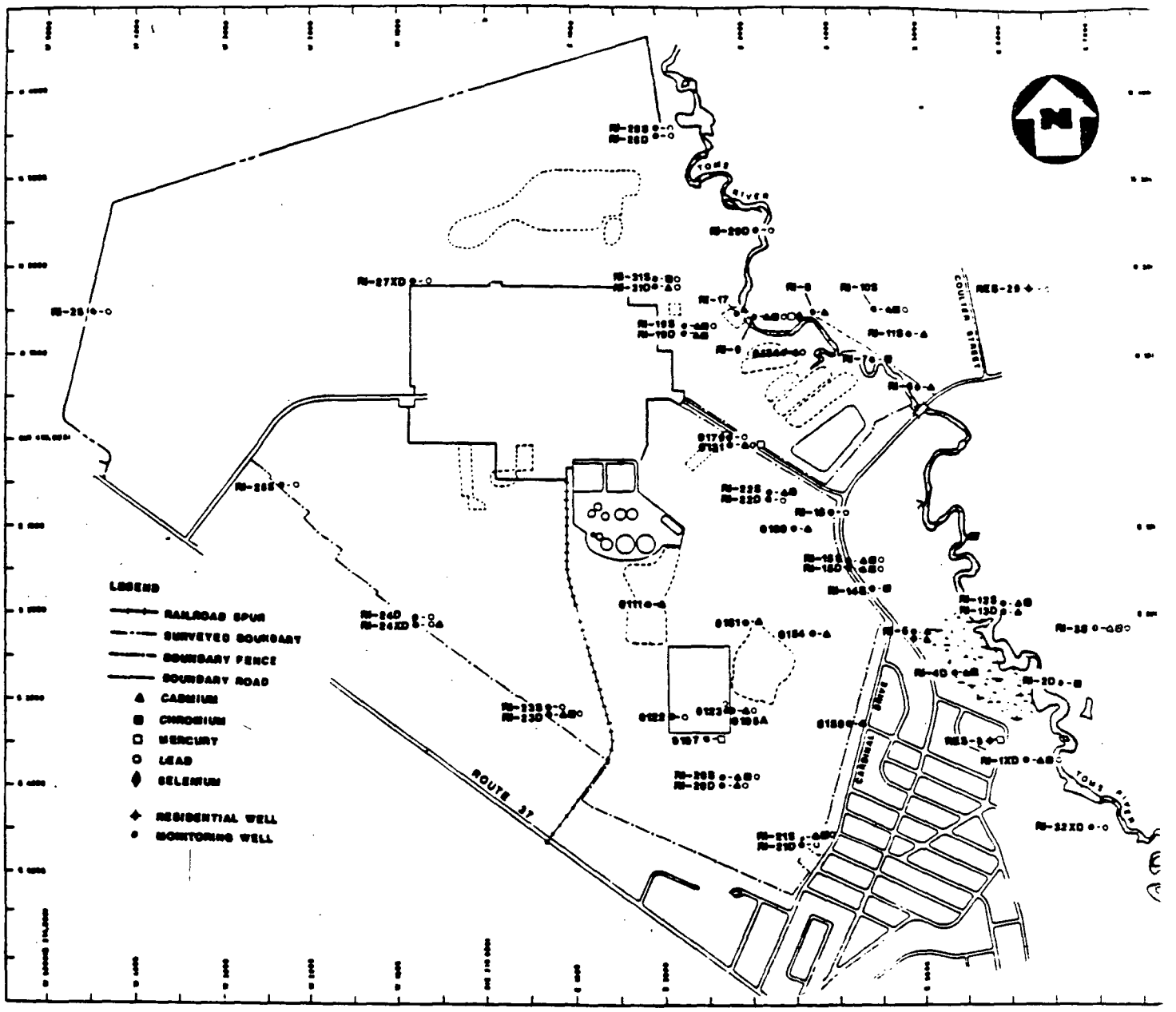


FIGURE 5

WELLS WITH INORGANIC CONTAMINANT CONCENTRATIONS

ABOVE MAXIMUM CONTAMINATION LIMITS (MCL)

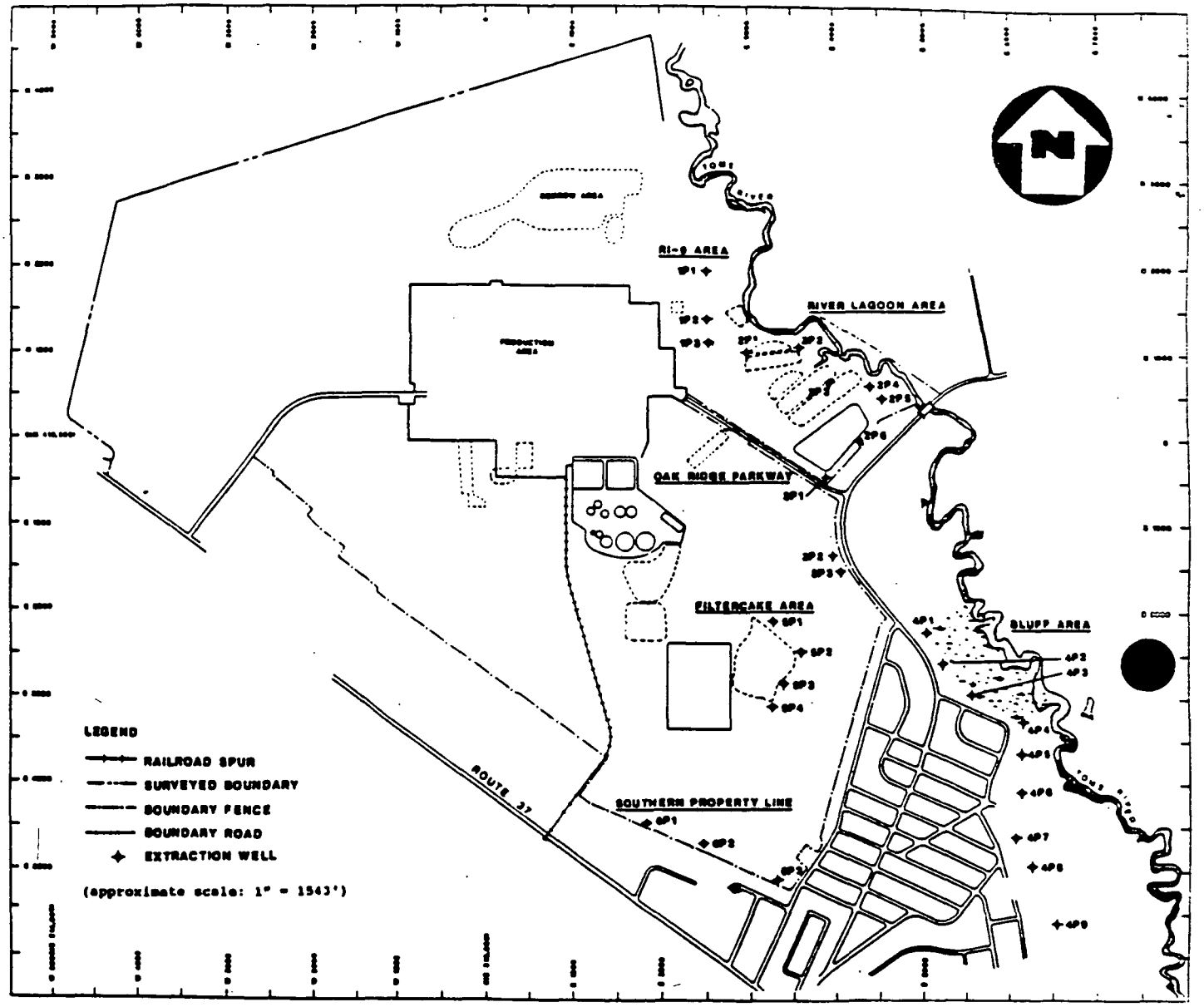


FIGURE 6

COMPONENT 1 - REMEDIAL ALTERNATIVE GE-2

INSTALLATION OF GROUNDWATER EXTRACTION WELLS

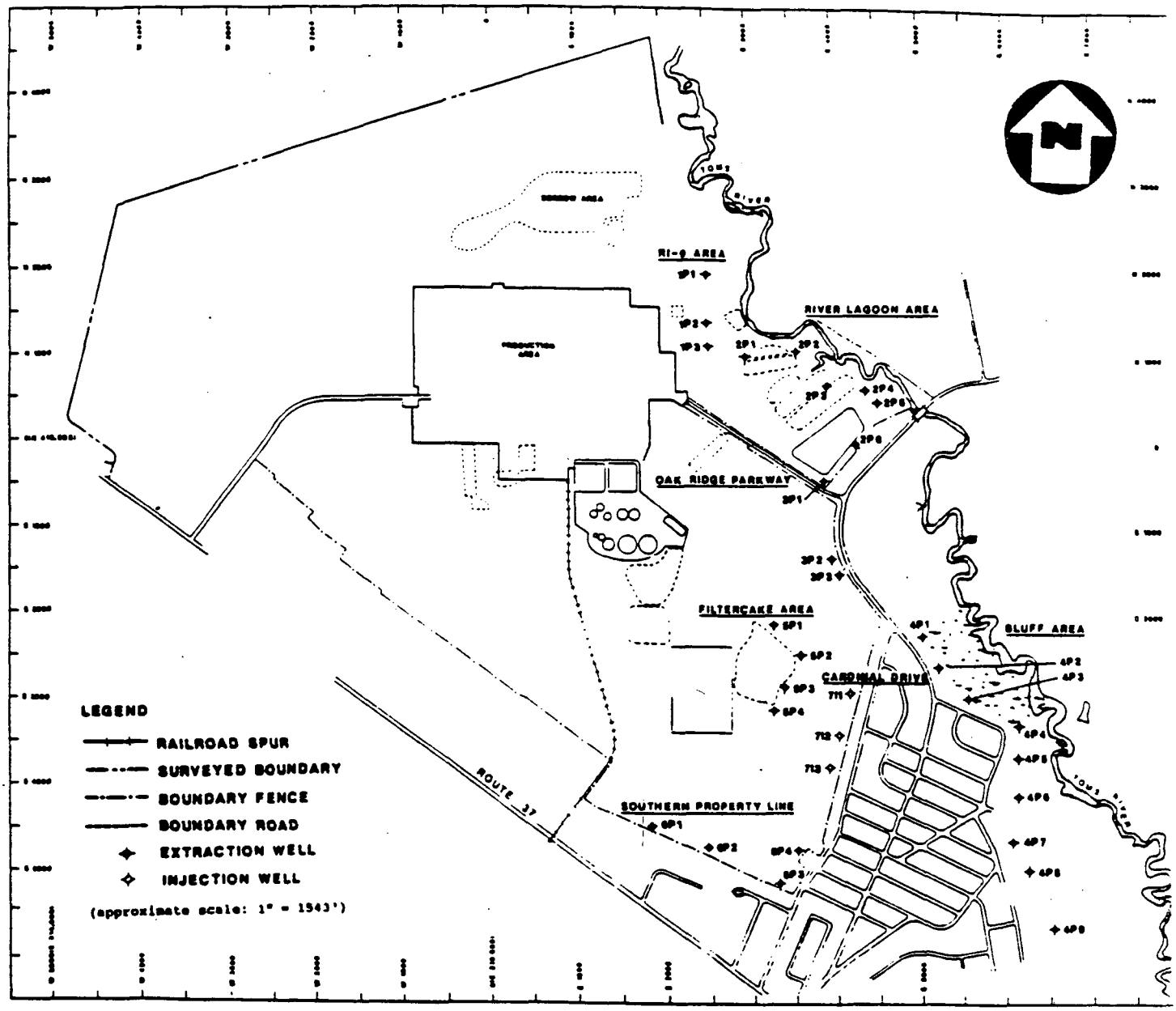


FIGURE 7

COMPONENT 1 - REMEDIAL ALTERNATIVE GE-3

INSTALLATION OF A GROUNDWATER EXTRACTION SYSTEM
AND PARTIAL INJECTION OF CLEAN WATER

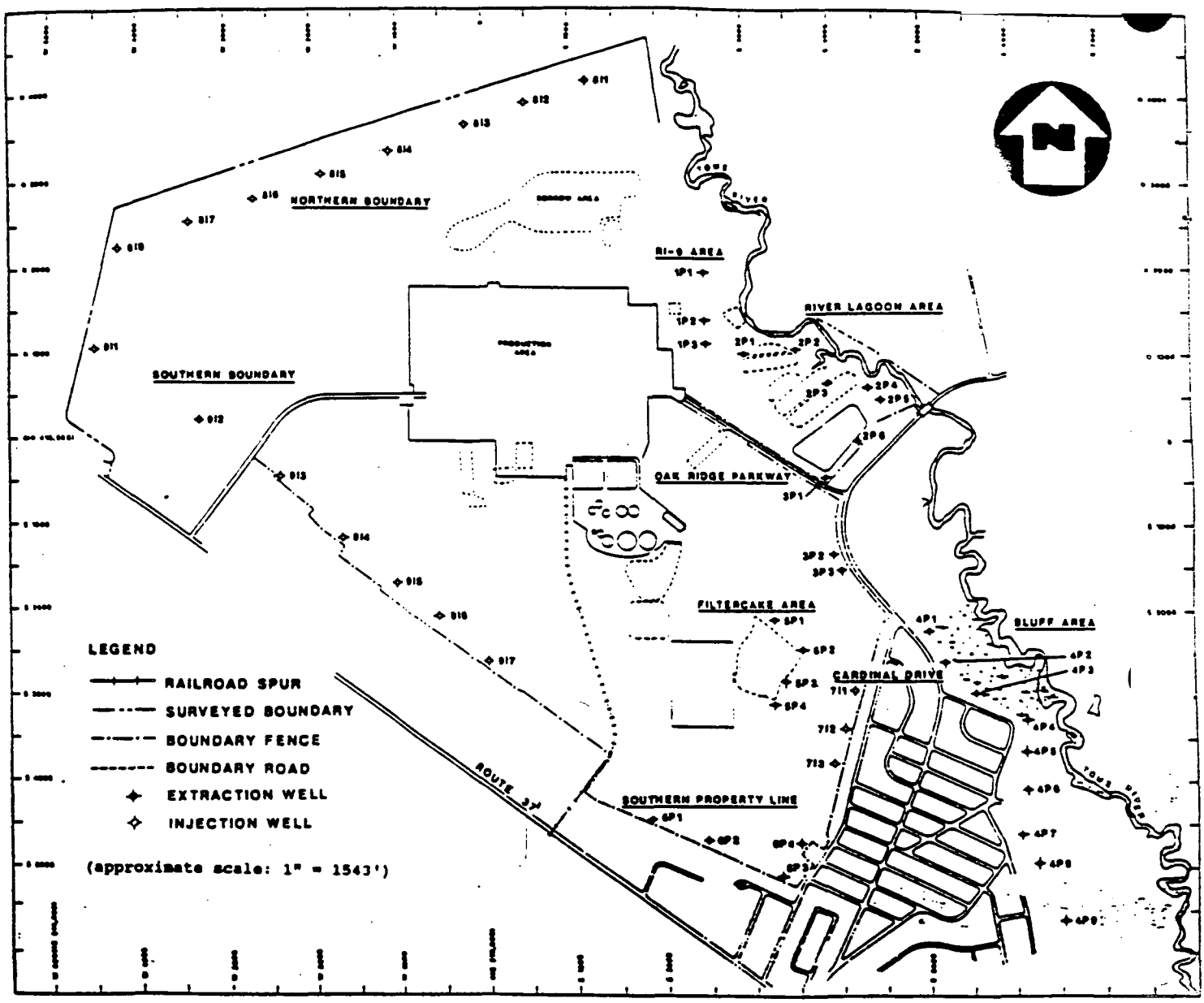


FIGURE 8

COMPONENT 2 - REMEDIAL ALTERNATIVE GD-3B

DISCHARGE TO UPPER SAND AQUIFER

100% REINJECTION OF TREATED GROUNDWATER

THROUGH REINJECTION WELLS

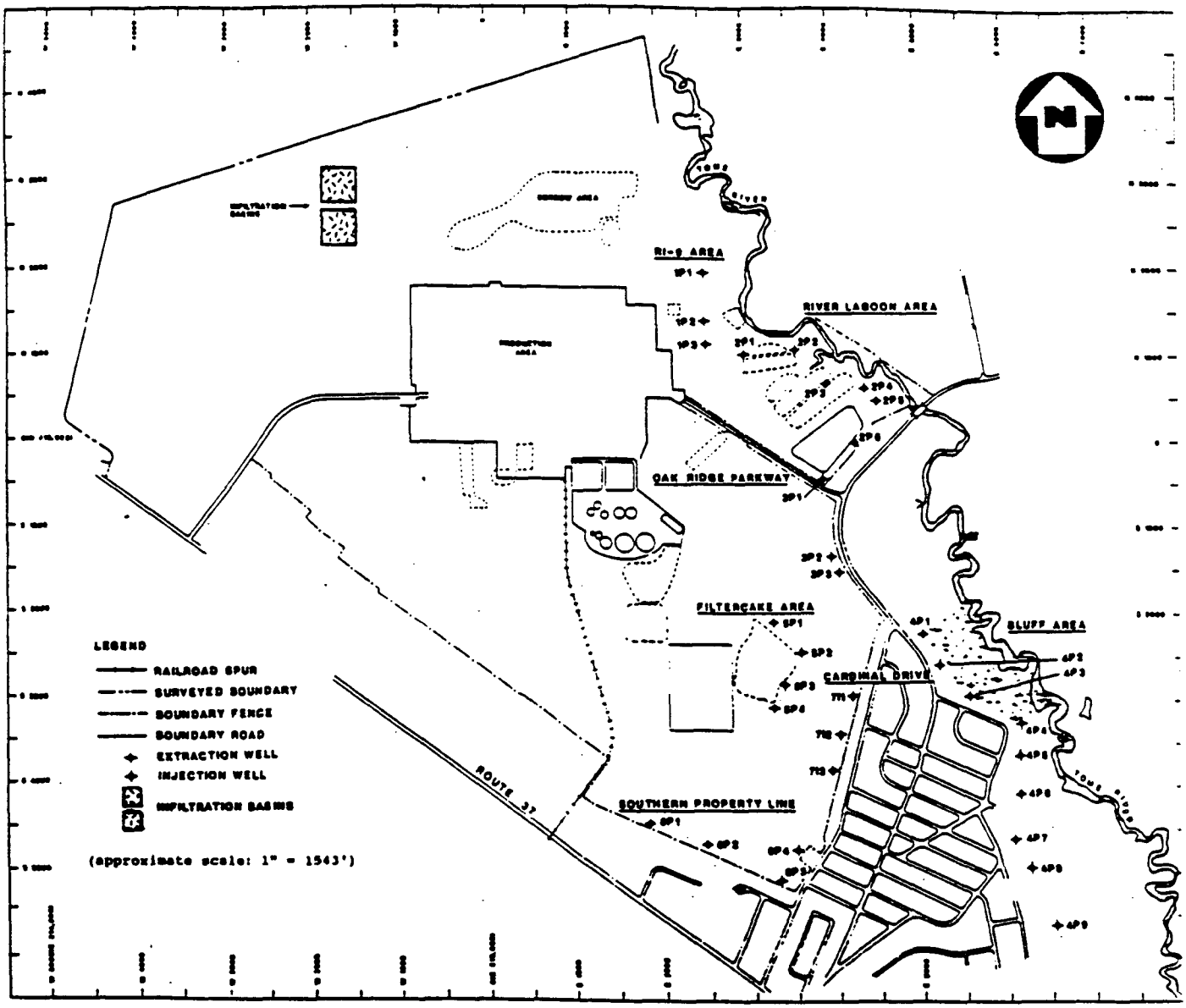


FIGURE 9

COMPONENT 2 - REMEDIAL ALTERNATIVE GD-3C

DISCHARGE TO UPPER SAND AQUIFER

100% RECHARGE OF TREATED GROUNDWATER

THROUGH REINJECTION WELLS AND INFILTRATION BASINS

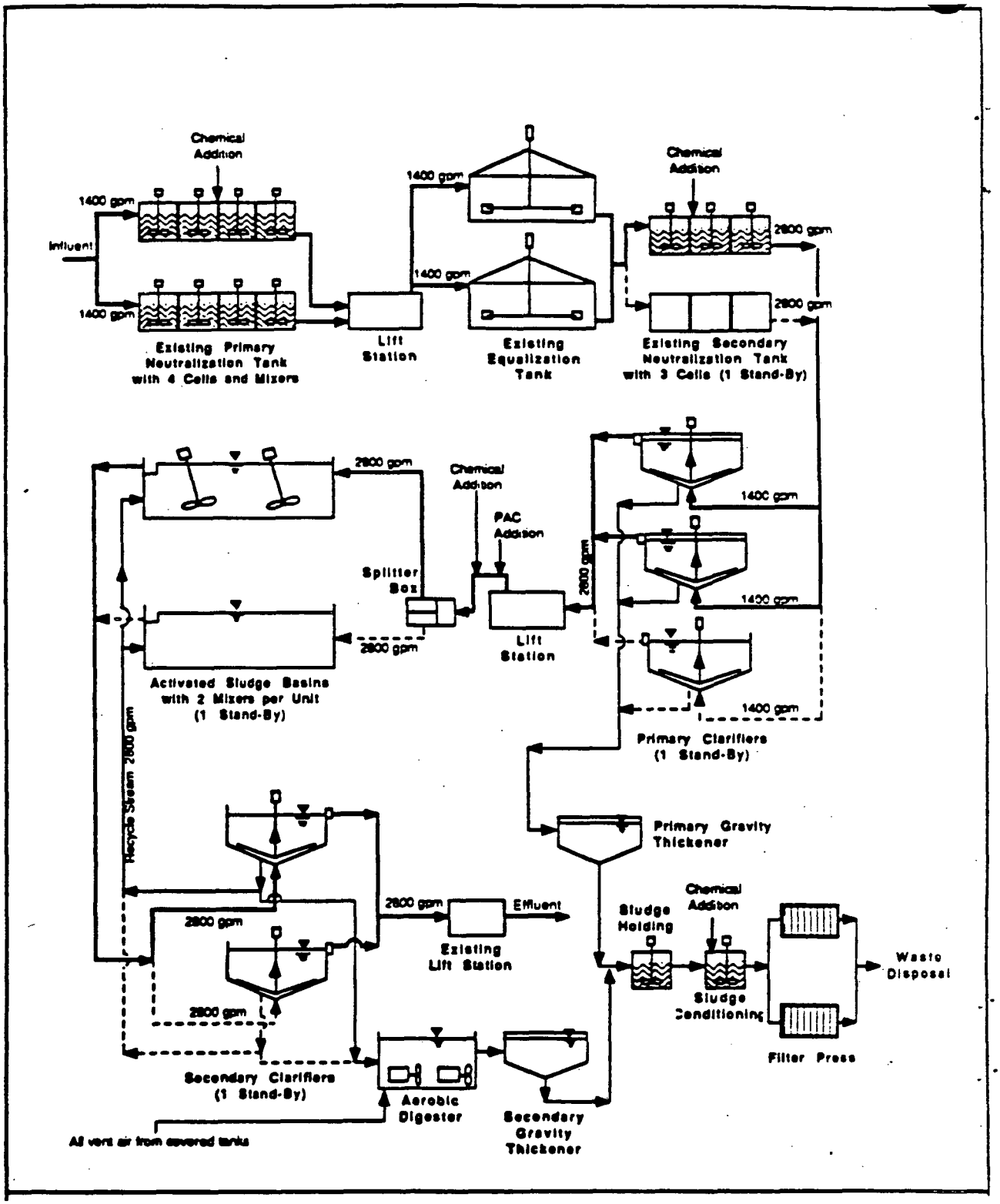


FIGURE 10

SCHEMATIC OF EXISTING CIBA-GEIGY WASTEWATER TREATMENT PLANT

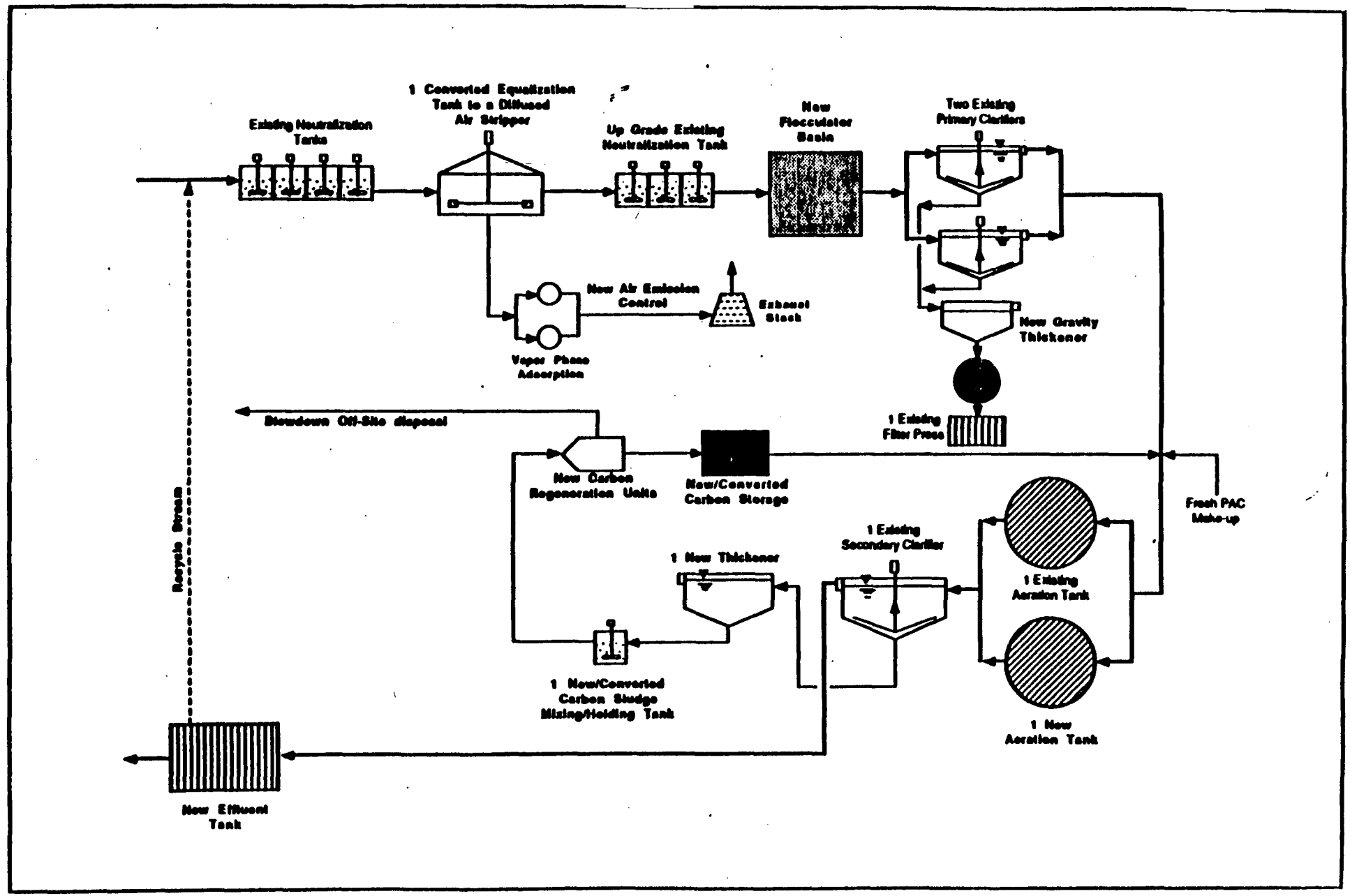


FIGURE 11

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-1B

CIBA-GEIGY WASTEWATER TREATMENT PLANT SEPARATE TREATMENT OF PROCESS WASTEWATER AND GROUNDWATER WITH DISCHARGE TO THE ATLANTIC OCEAN

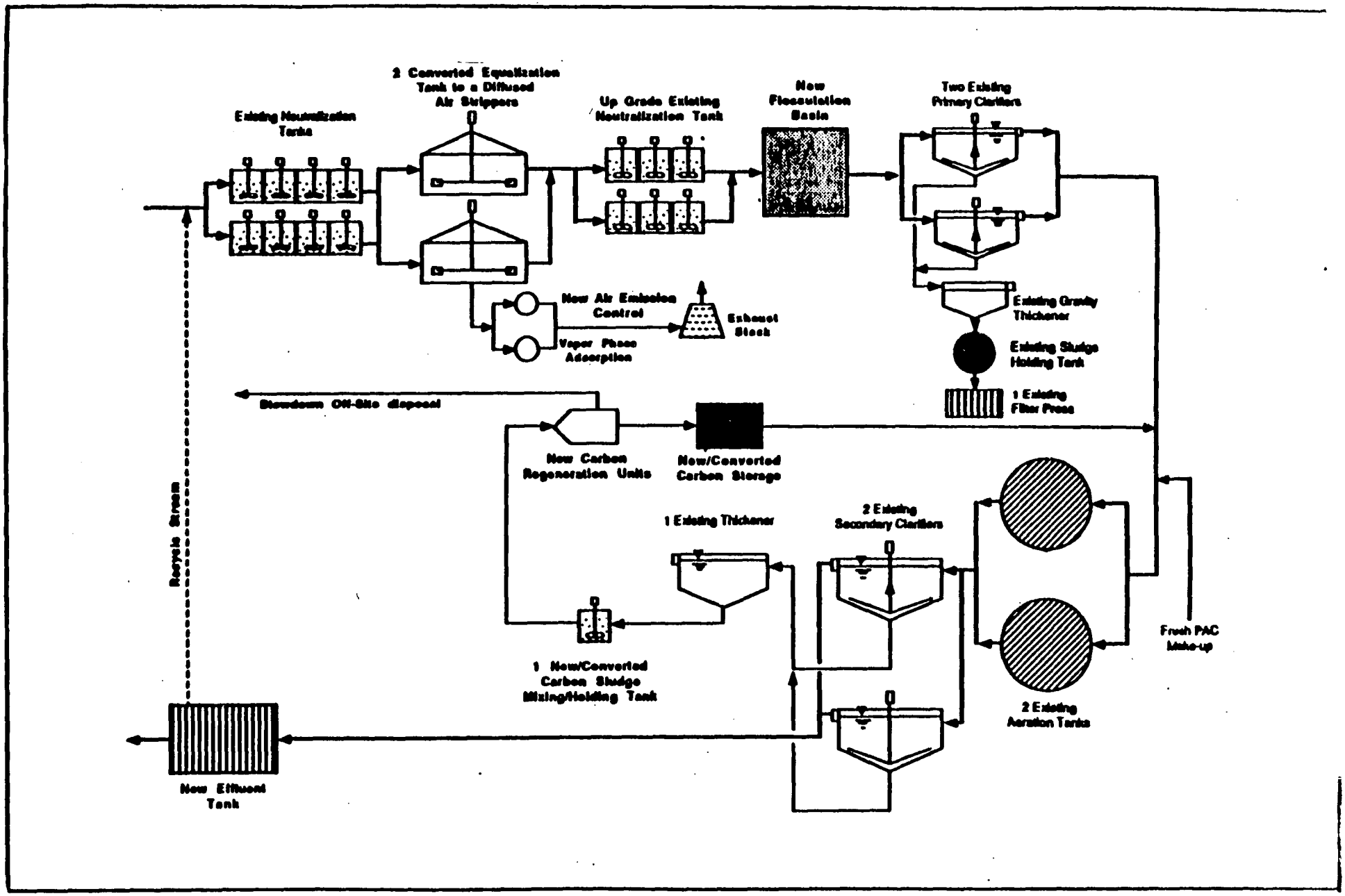


FIGURE 12

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-1C

CIBA-GEIGY WASTEWATER TREATMENT PLANT TREATMENT OF CONTAMINATED GROUNDWATER ONLY WITH DISCHARGE TO THE ATLANTIC OCEAN

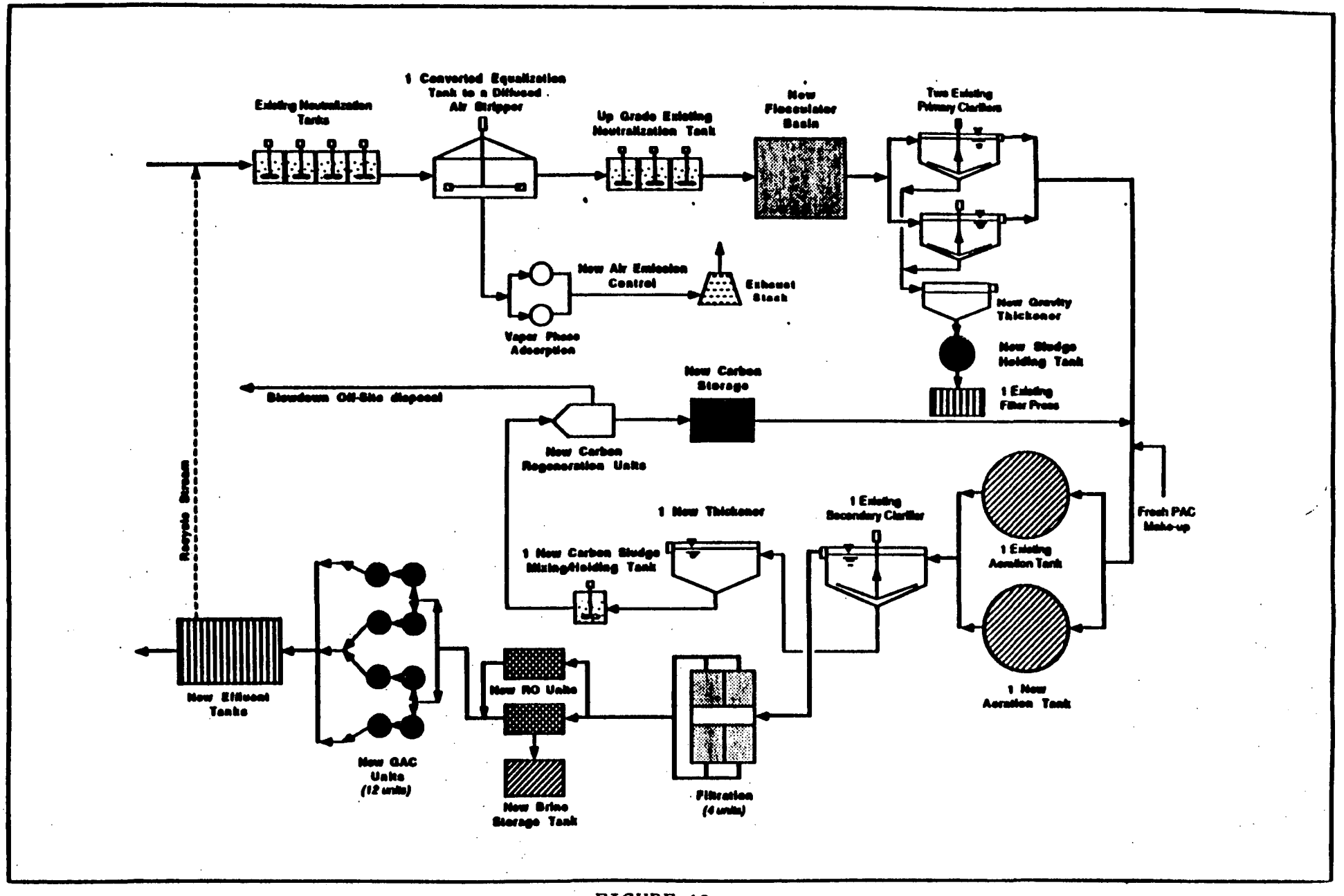


FIGURE 13

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-1D

CIBA-GEIGY WASTEWATER TREATMENT PLANT SEPARATE TREATMENT OF PROCESS WASTEWATER AND CONTAMINATED GROUNDWATER WITH DISCHARGE TO THE TOMS RIVER OR UPPER SAND AQUIFER

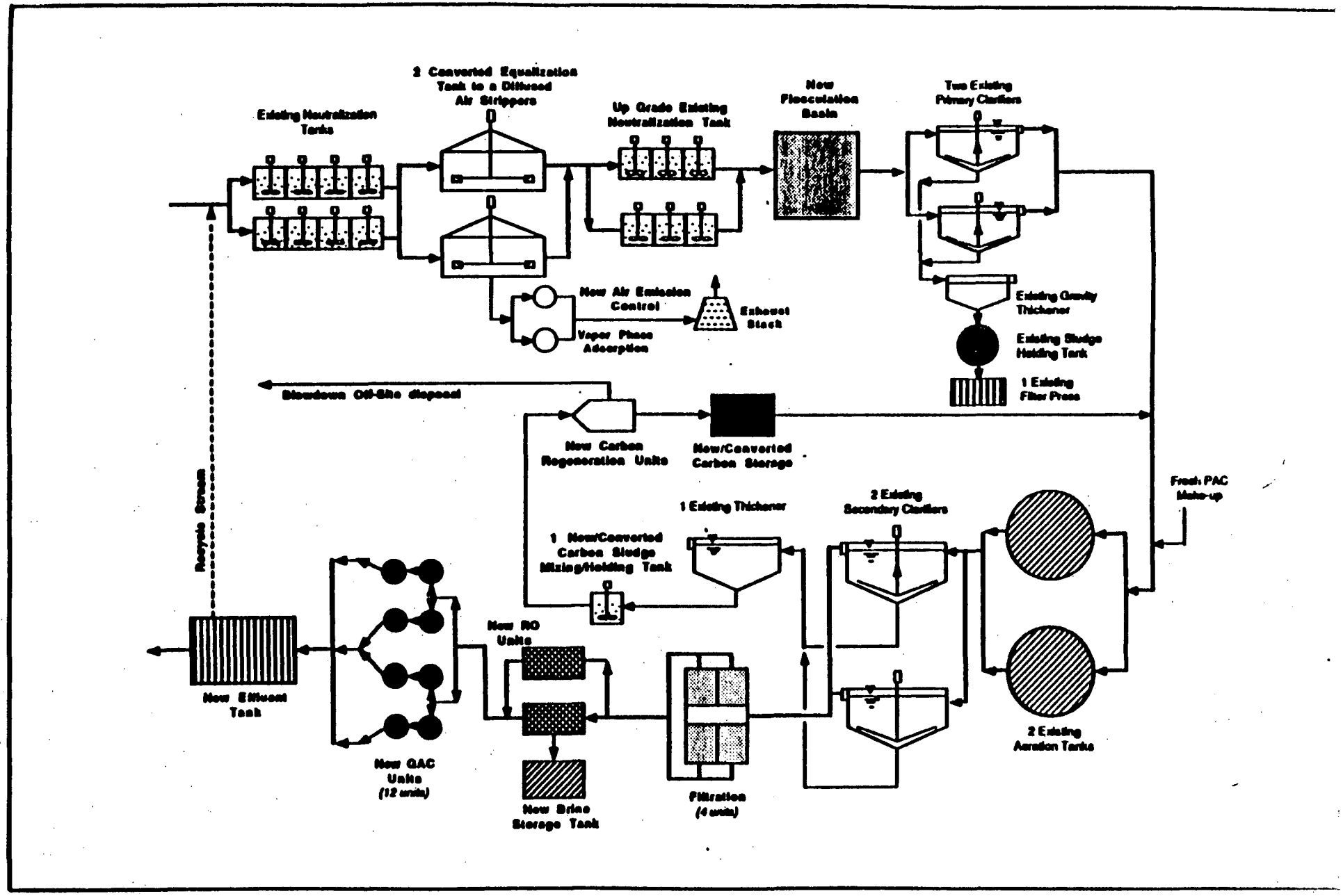


FIGURE 14

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-1E

CIBA-GEIGY WASTEWATER TREATMENT PLANT TREATMENT OF CONTAMINATED GROUNDWATER ONLY
WITH DISCHARGE TO THE T[redacted] RIVER OR UPPER SAND AQUIFER

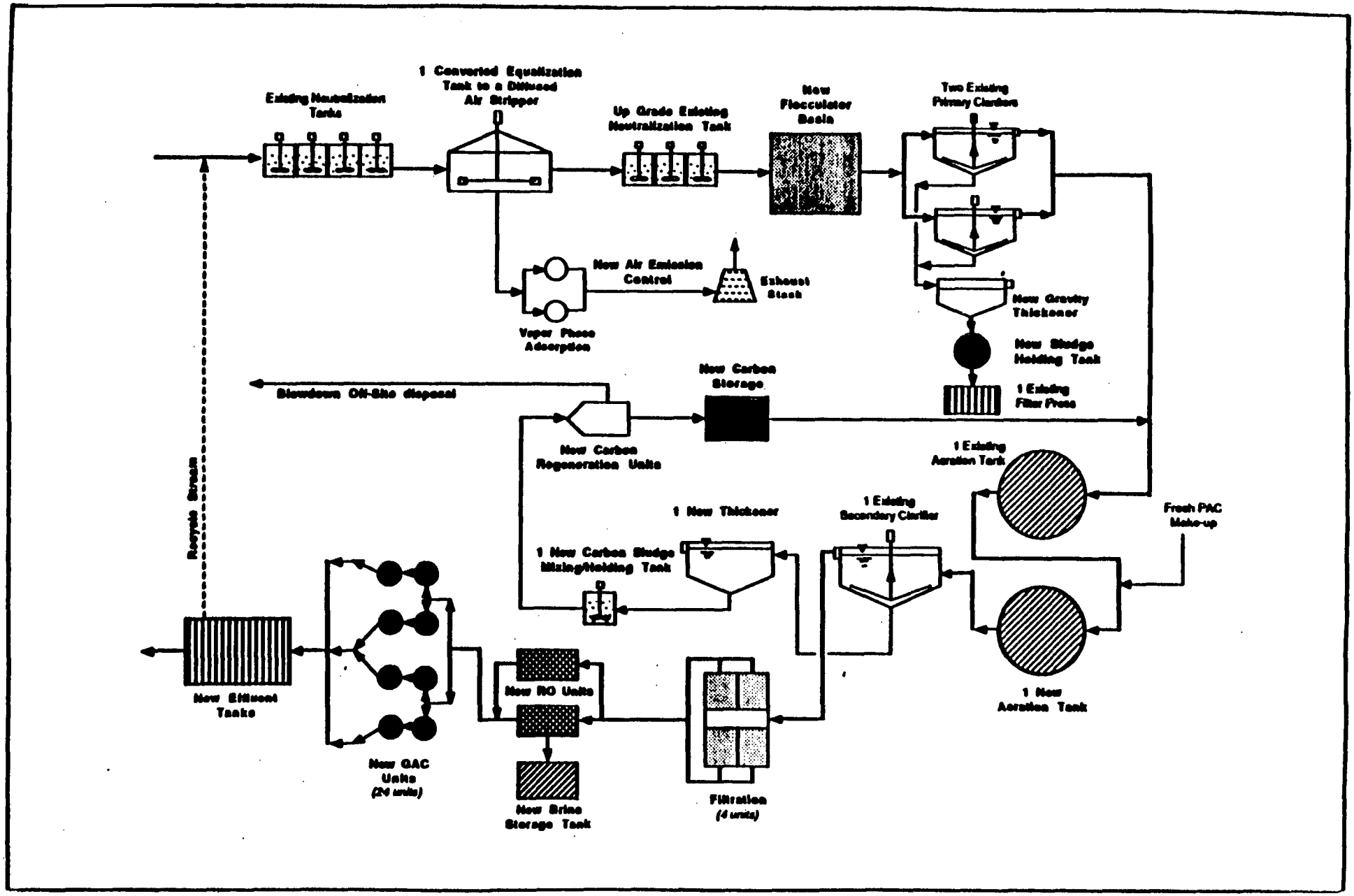


FIGURE 15

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-1F

CIBA-GEIGY WASTEWATER TREATMENT PLANT SEPARATE TREATMENT TO NON-DETECTABLE LEVELS

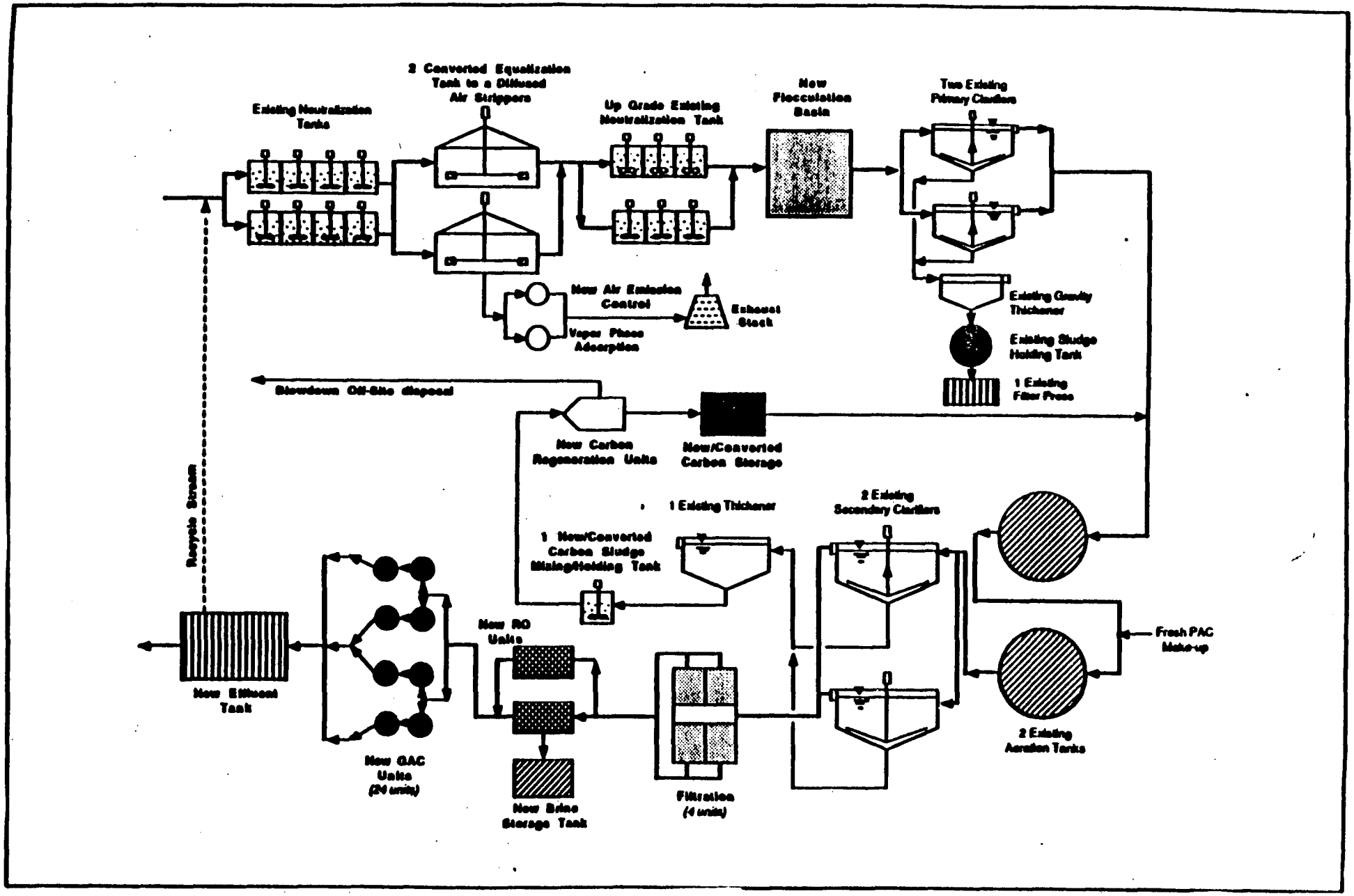


FIGURE 16

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-1F

CIBA-GEIGY WASTEWATER TREATMENT PLANT TREATMENT OF CONTAMINATED GROUNDWATER ONLY TO NON-DETECTABLE LEVELS

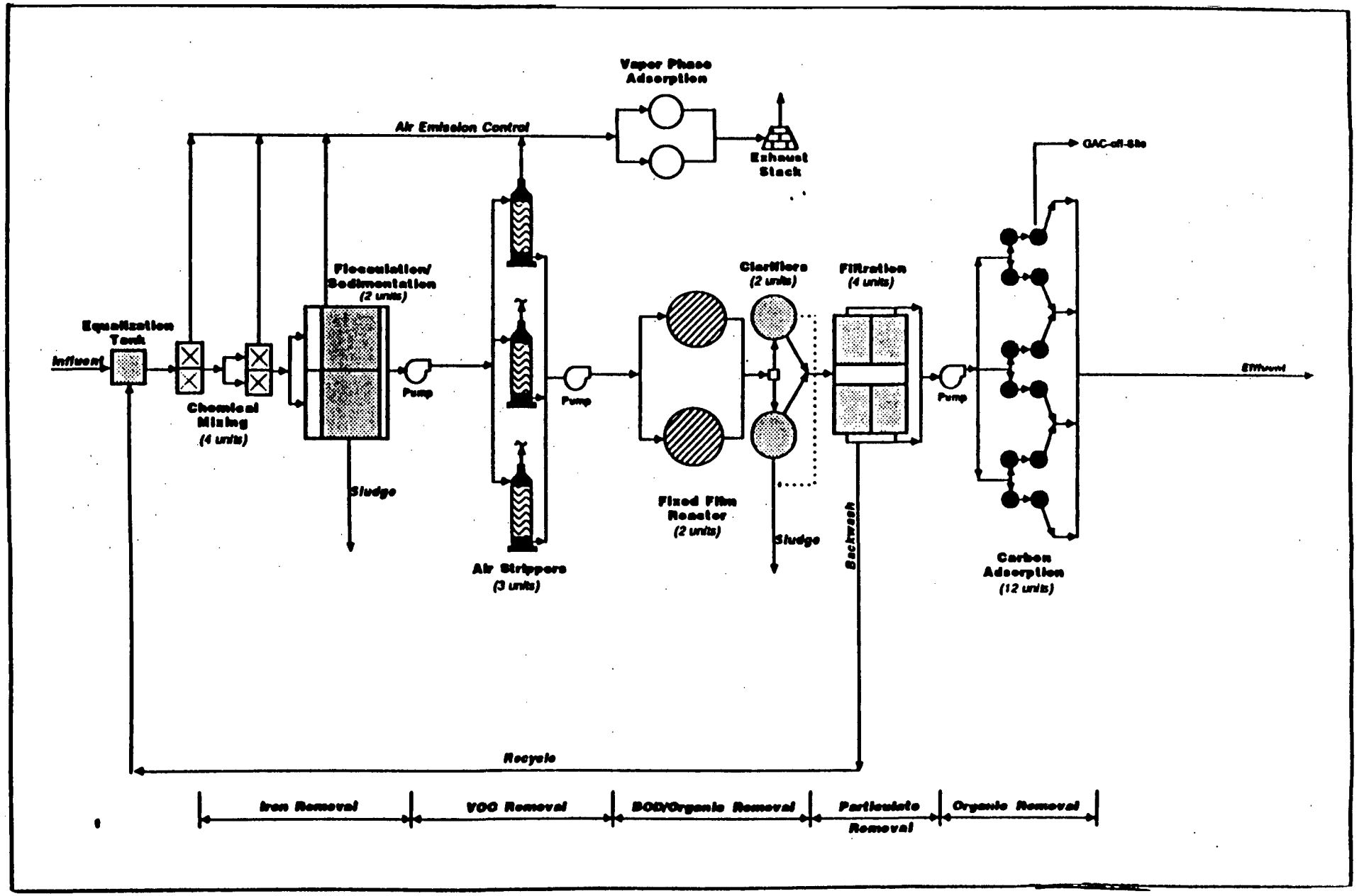


FIGURE 17

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-3A

NEW PHYSICAL/CHEMICAL TREATMENT PLANT WITH DISCHARGE TO THE ATLANTIC OCEAN

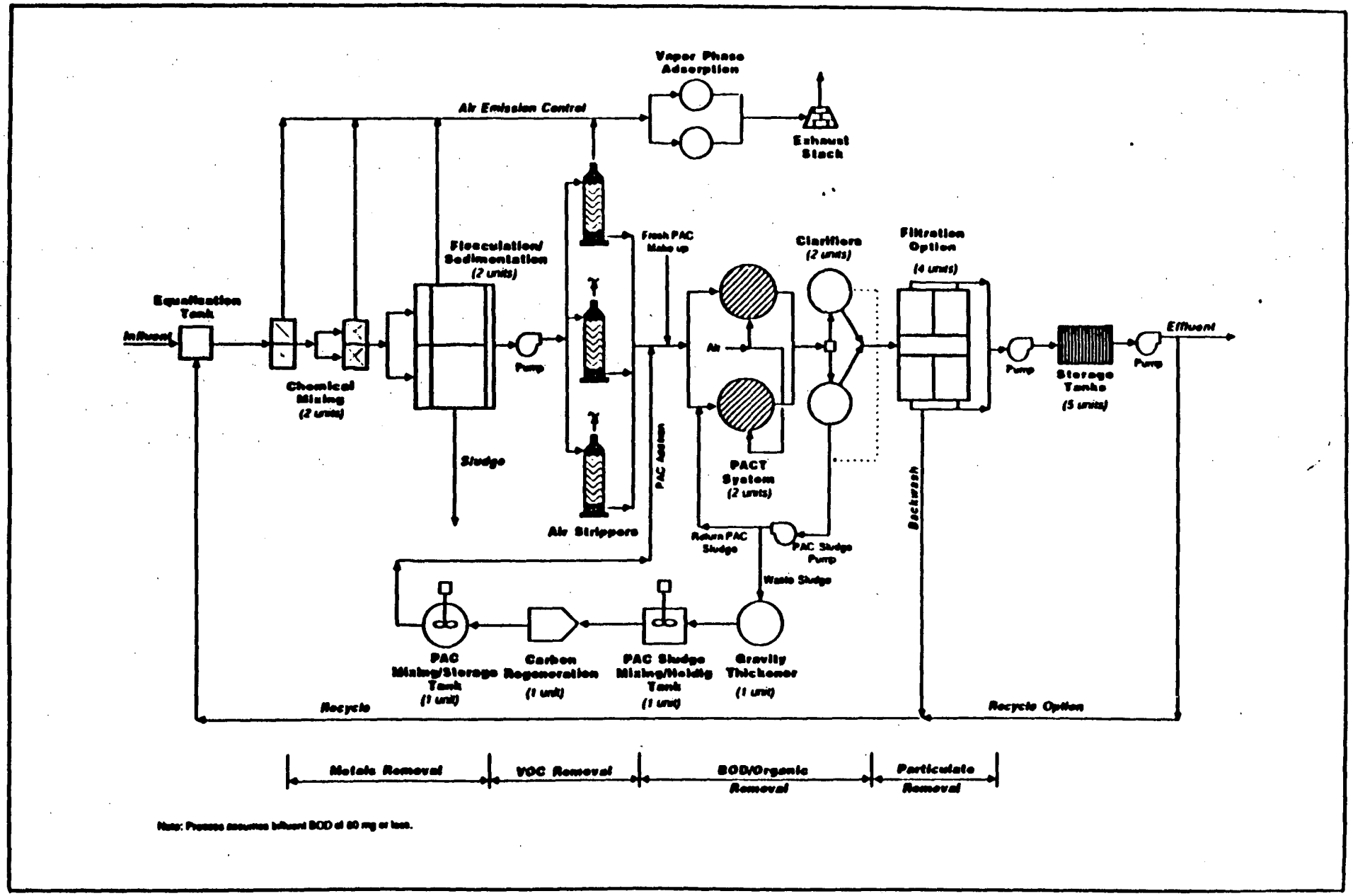


FIGURE 18

COMPONENT 3 - REMEDIAL ALTERNATIVE GT- 2B

NEW BIOLOGICAL TREATMENT PLANT WITH DISCHARGE TO THE ATLANTIC OCEAN

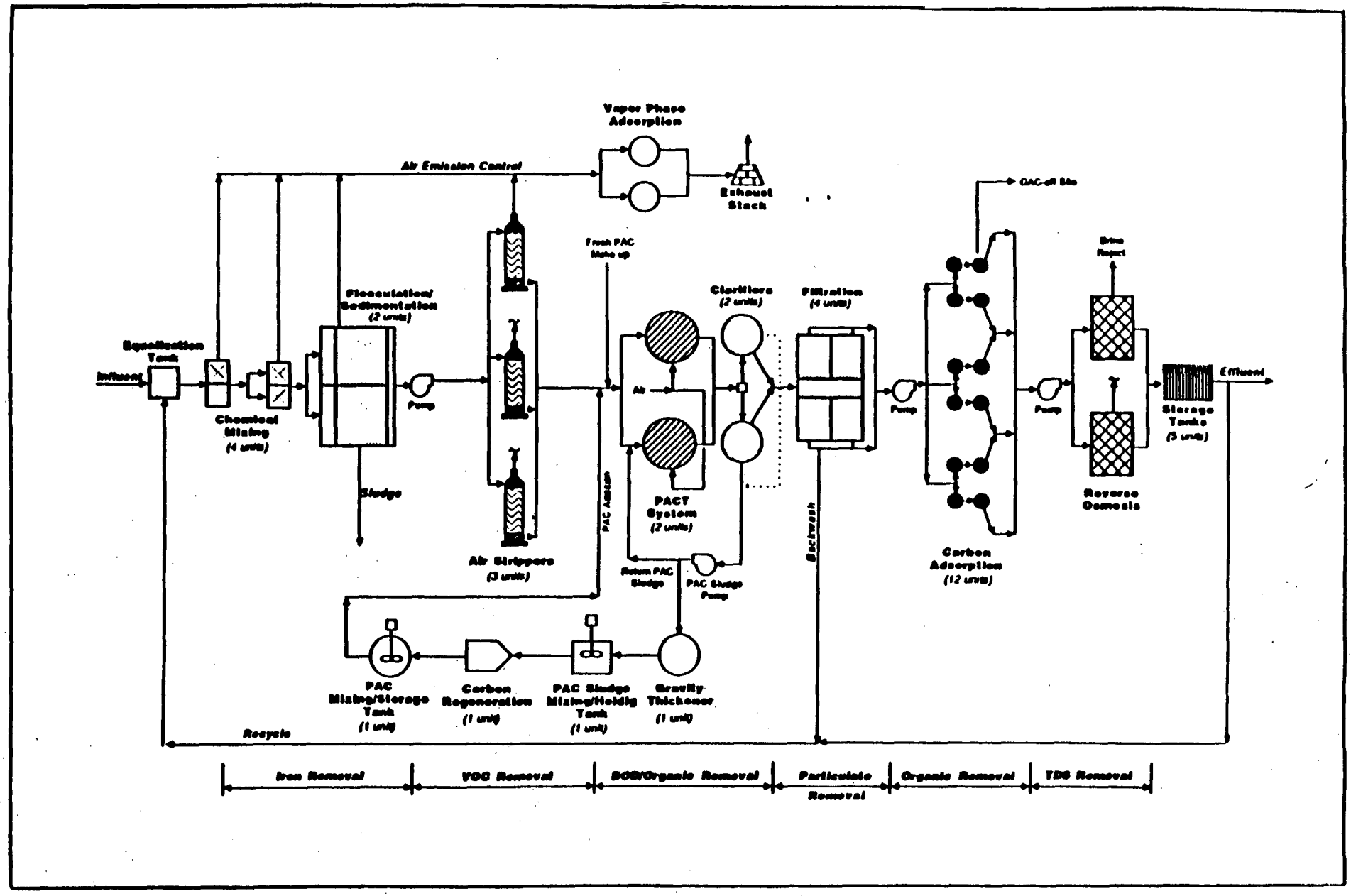


FIGURE 19

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-3C

NEW BIOLOGICAL TREATMENT PLANT WITH DISCHARGE TO THE TOMS RIVER OR UPPER SAND AQUIFER

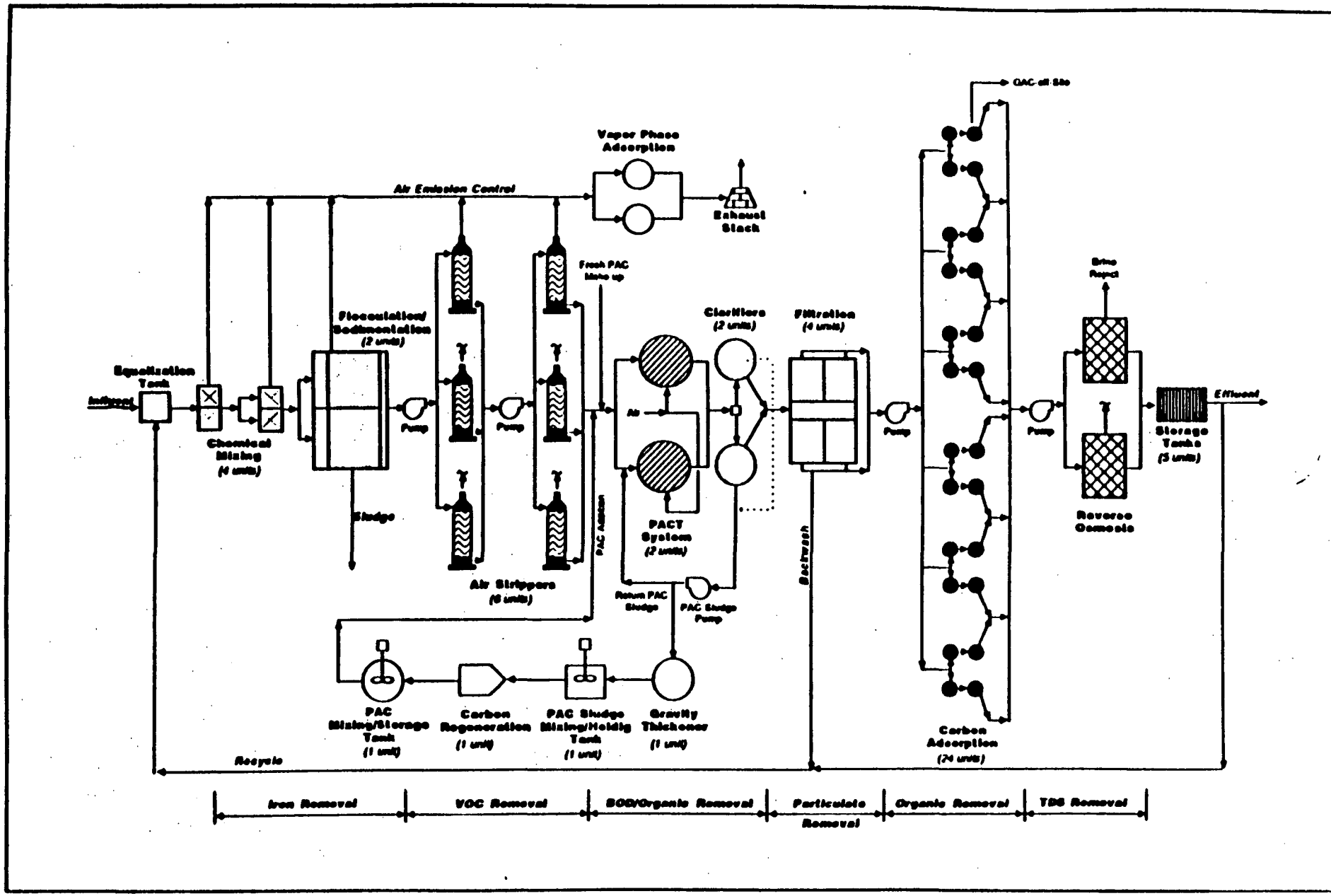


FIGURE 20

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-3D

NEW BIOLOGICAL TREATMENT PLANT WITH TREATMENT TO NON-DETECTABLE LEVELS

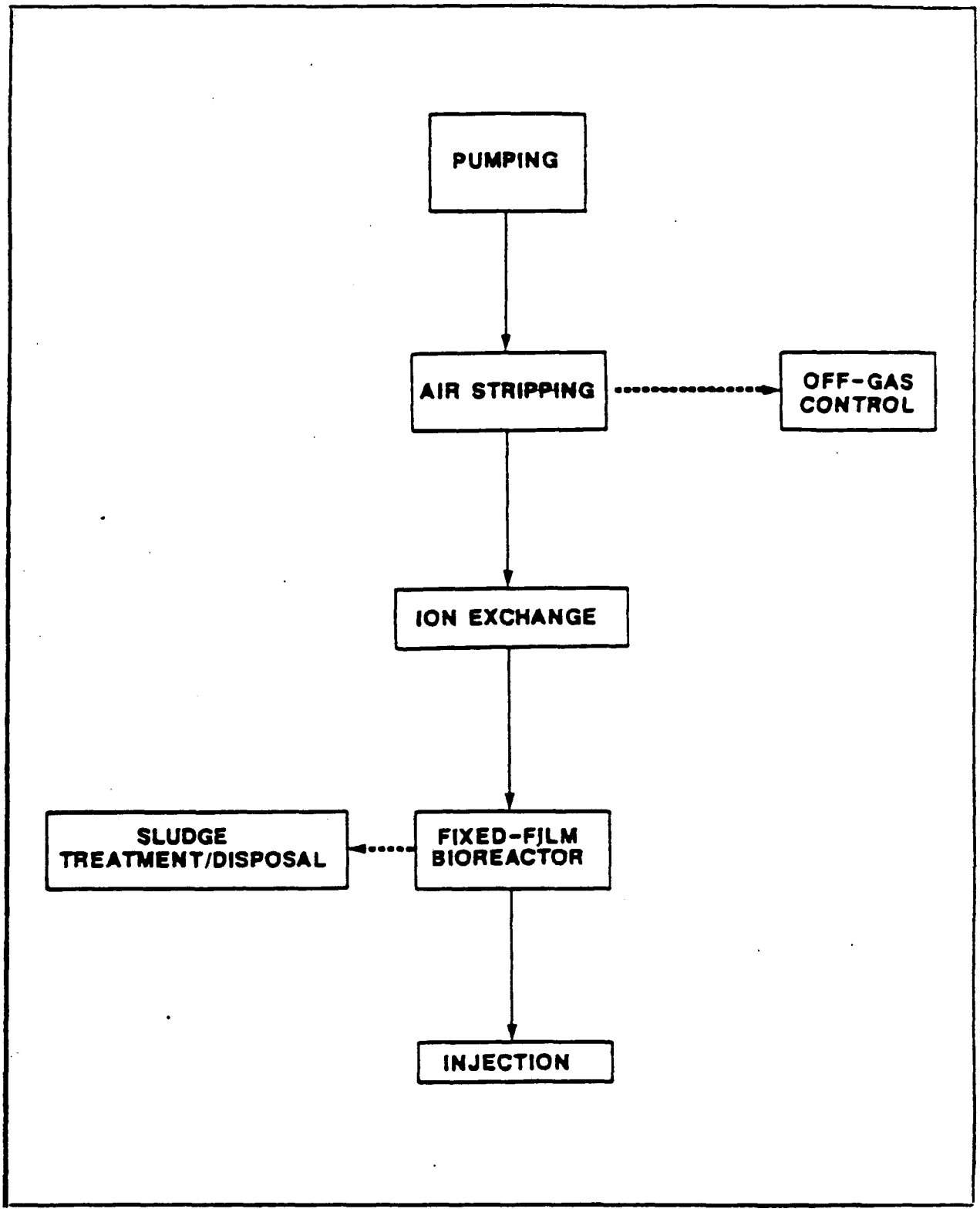


FIGURE 21

COMPONENT 3 - REMEDIAL ALTERNATIVE GT-4

IN SITU BIORECLAMATION SYSTEM

APPENDIX A

AVERAGE AND MAXIMUM CONCENTRATIONS OF PRIORITY POLLUTANTS IN VARIOUS ENVIRONMENTAL MEDIA

			Groundwater (ug/L)				Surface Water (ug/L)				Surface Soil (ug/kg)				Subsurface Soil (ug/kg)				Sediment (ug/kg)				Air (ug/m3)			
Chemical	CAS No.	Max Value ug/g	Min(1)	Max(2)	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq
VOLATILES																										
Benzene	71-43-2	83	0.81	3930	882.75	94/621	2.5	60	86.43	10/25									86.0	8250.9	787.63	6/12	1.5	3.19	2.26	12/26
Chlorobenzene	108-90-7	330	0.94	25000	1289.56	190/629	35	330	82.31	8/25	7	790	398.48	2/125	4.3	32000	3161.62	15/94	20.5	4837.15	2152.25	6/12	2.2	16.5	7.28	13/26
Chloroform	67-66-3	31	0.64	6400	272.32	3/150	6.4	150	66.35										77.9	3625.44	1277.47	5/12	6.3	15.1	9.68	7/26
1,2-Dichloroethane	107-06-2	14	6	700	134.10	5/612																				
1,1-Dichloroethane	75-35-4	63	4.5	21	11.00	6/612																				
1,2-Dichloropropane	78-87-5	51	9	30	15.92	6/344										8.9	8.90	1/89								
Ethylbenzene	100-41-4	1100	1.5	3115	586.63	24/612									5.7	19000	4765.00	13/89								
Toluene	108-88-3	300	1	14000	2493.47	81/639					11	4300	1139.46	4/125	5.7	100000	14260.38	25/94		12.96	12.96	1/12				
Trans-1,2-Dichloroethene	540-59-0	59	1	1300	91.89	127/612	6	41	86.33	6/25									13.5	384.36	147.99	4/12				
1,1,1-Trichloroethane	71-55-6	152	3	66	88.62	5/612						7.8	7.80	1/185						382.5	382.50	1/12				
1,1,2,2-Tetrachloroethane	79-34-5	118	5	49	27.62	12/629										50	50.00	1/94		6.75	6.75	1/12				
Tetrachloroethene	127-18-4	364	0.57	12000	813.25	142/612	15	150	58.89	9/25	6	590	185.24	5/125	9	39000	11673.98	7/94	33.74	4702.8	2483.36	6/12				
Trichloroethene	79-01-6	126	0.5	25000	1385.30	183/612	18	320	143.60	11/25									53.99	5706.75	1935.43	8/12	2.4	58	21.20	14/26
Vinyl Chloride	75-01-4	57	4	89	15.57	7/513																				
Total Xylenes	1330-20-7	240	0	44	17.30	6/352						170	170.00	1/125	24	67000	14141.13	16/89	107.5	293.49	213.76	3/12				
Acetone	67-64-1	2.2	5	74000	8270.01	189/339													190.39	413.06	301.74	2/12				
2-Butanone	78-93-3	4.5		336	336.00	1/330					15	98	34.89	7/125	18	730	184.50	12/35								
Carbon Disulfide	75-15-0	34	5	120	19.96	33/330																				
Chloroethane	74-87-3	35	13	220	102.96	3/234																				
2-Hexanone	591-78-6		6	14	8.70	4/330									40	3100	976.00	5/30								
Methylene Chloride	75-09-2	8.8	3.3	880	47.57	28/574									10	6300	970.00	17/44	86.51	652.2	230.01	4/12				
4-Methyl-2-Pentanone	108-10-1		5	13	7.17	5/330									4.9	2800	1233.73	4/30								
Styrene	100-42-5											45	45.00	1/125												
SEMIVOLATILES																										
Aniline	62-53-3		8	8020	1283.00	10/138					1700	1800	1750.00	2/125												
Acetophenone	103-33-3			10	10.00	1/37																				
Benzoic Acid	65-85-0		4	1000	602.00	2/307																				
Benzyl Alcohol	100-51-6		12	3000	1335.00	3/330																				
Bis-n-Butylphthalate	84-74-2	170000		1.0	1.00	1/228					1800	4300	2936.36	11/35	410	4600	2377.5	4/39								
Bis(2-Chloroethyl)Ether	111-44-4	13.9		13	13.00	1/228																				
4-Chloroaniline	106-47-8		10	17	13.37	2/228																				
2-Chloronaphthalene	91-58-7		13	19	16.04	2/228									670	5000	1887.5	4/39								
2-Chlorophenol	95-57-8		12	100	48.00	4/314																				
4-Chloro-3-Methylphenol	59-50-7			12	12.00	1/308																				
1,2-Dichlorobenzene	95-50-1	1700	1.3	10000	691.85	104/629	14	45	24.21	5/25	2500	5100	3799.55	3/125	1.8	120000	20180.80	13/44								
1,3-Dichlorobenzene	541-73-1	1700	3	130	31.65	12/320																				
1,4-Dichlorobenzene	106-46-7	1700	2.4	140	31.40	18/320									2000	23000	10366.70	3/44								
Bis(2-Ethylhexyl)Phthalate	117-81-7		18	530	83.91	16/330					430	8700	2378.38	6/125	630	18000	3843.80	8/39								
Hexachloroethane	67-72-1	20000		14	14.00	1/484																				
Naphthalene	91-20-3		2.9	920	123.75	46/616					2600	4200	3400.10	2/125	3000	120000	20491.70	12/39								
4-Methylphenol	106-44-5	300(3)	35	85	60.30	2/313																				
4-Nitroaniline	100-01-6			34	34.00	1/370																				
Nitrosodimethylamine	62-75-9	0.1		30	30.00	1/430																				
Nitrobenzene	98-95-3	35	5	35000	5298.23	38/616		10	10.00	1/18		390	390.00	2/125	1300	1800	1550.00	2/44								
Bis-n-Octyl Phthalate	117-84-0		16	24	20.00	2/303																				

APPENDIX A (continued)

AVERAGE AND MAXIMUM CONCENTRATIONS OF PRIORITY POLLUTANTS IN VARIOUS ENVIRONMENTAL MEDIA

			Groundwater (ug/L)				Surface Water (ug/L)				Surface Soil (ug/kg)				Subsurface Soil (ug/kg)				Sediment (ug/kg)				Air (ug/m3)			
Chemical	CAS No.	Rec Value ug/g	Min(1)	Max(2)	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq
Phenol	108-95-2	14.2	12	495	215.78	4/313																				
1,2,4-Trichlorobenzene	120-82-1	9200	10	4100	312.67	47/367	10	10.00	1/10		420	6500	3110.01	7/125	420	130000	34631.46	14/89								
2,4,5-Trichlorophenol	95-95-4	89													21.5	3800	966.13	4/28								
2-Methylphenol	95-48-7	380(3)	14	632	323.00	2/313																				
Anthracene	120-12-7	14000									350	12000000	2001835.79	12/125	700	5500	3087.50	8/39								
Butyl Benzyl Phthalate	85-68-7										1300	6300	3766.60	6/55		940	940	1/39								
Fluoranthene	206-44-0	38000									300	77000	17949.98	6/125	980	2800	1590.00	2/39								
Pyrene	129-00-0	38000		80	80.00	1/37					500	59000	21000.00	4/125		2000	2000.00	1/39								
Phenanthrene	85-01-8	14000									370	43000	8663.28	6/125	520	79000	23845.63	16/89								
Chrysene	218-01-9	200000									700	35000	12233.37	3/125		800	800.00	1/39								
Benzo(b)Fluoranthene	205-99-2	550000									500	58000	15915.53	4/125		570	570.00	1/39								
Benzo(k)Fluoranthene	207-08-9	550000									500	60000	21093.13	3/125		600	600.00	1/39								
Benzo(a)Pyrene	50-32-8	2200000									830	29000	14914.50	2/70												
Indeno(1,2,3cd)Pyrene	193-39-5	1600000										520	520.00	1/70												
Benzo(ghi)Perylene	191-24-2	1600000										360	360.00	1/70												
PESTICIDES																										
4,4-DDT	50-29-3	243000									6.1	300	34.82	29/125												
4,4-DDE	72-55-9	4400000									1	10	6.28	9/125												
Heptachlor Epoxide	1024-57-3	820									22	340	173.78	4/125												
Endosulfan II	33213-65-9										110	9000	3442.04	5/55												
Dieldrin	60-57-1	1700										6	6.00	1/55												
Chlordane	57-74-9	140000										80	80.00	1/55												
Aroclor 1016	12674-11-2	530000(4)										50	50.00	1/55												
Aroclor 1221	11104-28-2	530000(4)										80	80.00	1/55												
Aroclor 1232	11141-16-5	530000(4)										80	80.00	1/55												
Aroclor 1242	53469-21-9	530000(4)										50	50.00	1/55												
Aroclor 1248	12672-29-6	530000(4)										50	50.00	1/55												
Aroclor 1254	11097-69-1	530000(4)										80	80.00	1/55												
Aroclor 1260	11096-82-5	530000(4)										80	80.00	1/55												
INORGANICS																										
Aluminum	7429-90-5		890	38000	3402.85	147/253	200	500.00	1/13		2.2E+03	5.0E+07	4.7E+05	125/125	5.0E+05	5.8E+07	1.0E+07	50/50	200000	6.1E+05	3.8E+05	4/6				
Antimony	7440-36-0		34	63	48.69	3/253					3.9E+04	5.7E+04	4.7E+04	5/125	6.7E+03	4.0E+04	1.8E+04	3/53								
Arsenic	7440-38-2		11.3	16	13.33	4/488					6.1E+03	6.3E+04	1.5E+04	17/125	6.2E+03	1.6E+05	5.4E+04	12/135								
Barium	7440-39-3		25	395	91.99	31/610						1.8E+05	1.8E+05	1/125												
Beryllium	7440-41-7		5	18	12.52	4/171																				
Cadmium	7440-43-9		5	345	19.90	72/610					3.1E+03	2.0E+04	8.9E+03	3/125	1.1E+01	7.5E+05	7.8E+04	10/85								
Calcium	7440-70-2		6.8	139500	29308.55	141/610	14000	14000.00	2/13		2.2E+06	2.0E+07	9.7E+06	10/125	3.2E+06	1.9E+07	8.2E+06	23/50								
Chromium	7440-47-3		3	318	37.82	190/488					5.4E+03	4.8E+06	2.5E+05	86/125	3.8E+01	1.8E+06	3.9E+05	73/135								
Cobalt	7440-48-4		6	59	38.77	12/253																				
Copper	7440-50-8		21	560	92.18	162/472					1.5E+04	4.4E+06	6.8E+05	36/125	3.1E+01	1.8E+06	6.1E+05	69/103		5.0E+04	5.0E+04	1/6				
Iron	7439-89-6		340	1600000	49720.38	260/488	400	1160	783.00	9/13	5.1E+03	1.1E+08	7.0E+06	125/125	2.3E+03	5.0E+07	9.7E+06	50/50	580000	3.6E+06	1.8E+06	6/6				
Lead	7439-92-1		1	338	46.23	233/488					2.9E+03	6.3E+04	1.3E+04	88/125	1.2E+02	3.2E+05	9.5E+04	63/135	6100	1.5E+05	5.8E+04	3/6				

APPENDIX (continued)

AVERAGE AND MAXIMUM CONCENTRATIONS OF PRIORITY POLLUTANTS IN VARIOUS ENVIRONMENTAL MEDIA

Chemical	CAS No.	Koc Value mL/g	Groundwater (ug/L)				Surface Water (ug/L)				Surface Soil (ug/kg)				Subsurface Soil (ug/kg)				Sediment (ug/kg)				Air (ug/m3)			
			Min(1)	Max(2)	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq	Min.	Max.	Mean	Freq
Lithium	7439-93-2		10	85	24.68	17/115																				
Magnesium	7439-95-4		1050	148000	27229.85	73/413					3.44E+06	3.50E+07	1.39E+07	11/125	5.80E+06	3.04E+07	1.44E+07	17/50								
Manganese	7439-96-5		10	4650	441.35	195/410	20	20.00	1/13		6.30E+03	2.91E+05	4.19E+04	77/125	7.60E+03	4.79E+05	1.03E+05	46/50								
Mercury	7439-97-6		0.2	12	1.10	47/408					1.10E+02	3.00E+03	3.59E+04	61/125	1.20E+02	2.40E+03	2.35E+04	66/135								
Nickel	7440-02-0		21	612	76.09	73/410					2.20E+04	4.60E+04	3.06E+04	12/125	4.00E+01	2.00E+05	1.94E+04	19/103								
Potassium	7440-09-7		4100	137000	2000.85	61/410																				
Selenium	7782-49-2		6	31	14.30	3/265					7.10E+03	7.90E+03	7.35E+03	2/125	1.00E+03	5.80E+03	3.07E+03	7/85								
Silver	7440-22-4														5.40E+03	3.70E+04	1.65E+04	3/135								
Sodium	7440-23-5		4000	251000	29792.85	127/410	6000	16000	8444.17	6/13																
Tin	7440-31-5		50	80	71.46	3/216					2.80E+04	1.10E+05	6.48E+04	8/125												
Vanadium	7440-62-2		29	233	74.71	7/273					2.70E+04	1.41E+05	5.96E+04	21/125	3.50E+04	2.10E+05	7.59E+04	17/50								
Zinc	7440-66-6		20	3560	352.80	240/408					1.00E+04	1.77E+06	2.14E+05	47/125	3.80E+01	6.46E+05	1.12E+05	48/103	2.50E+05	2.50E+05	1/6					

NOTES:

(1) Minimum value of detected concentrations
(2) Maximum concentrations
(3) Koc value for Cresol, CAS No. 1319-77-33, used.
(4) Koc for Polychlorinated Biphenyls, CAS No. 1336-36-3, used.

ACTION-SPECIFIC ARARs

Action b/	Requirements	Prerequisites	Citation
Direct discharge of treatment system effluent (cont.)	The BMP program must:		40 CFR 125.104
	° Establish specific procedures for the control of toxic and hazardous pollutant spills.		
	° Include a prediction of direction, rate of flow, and total quantity of toxic pollutants where experience indicates a reasonable potential for equipment failure.		
	° Assure proper management of solid and hazardous waste in accordance with regulations promulgated under RCRA.		
	Discharge must be monitored to assure compliance. Discharge will monitor:		
	° The mass of each pollutant		40 CFR 122.44(i)
	° The volume of effluent		
	° Frequency of discharge and other measurements as appropriate.		
	Approved test methods for waste constituents to be monitored must be followed. Detailed requirements for analytical procedures and quality controls are provided.		
	Sample preservation procedures, container materials, and maximum allowable holding times are prescribed.		40 CFR 136.1-136.4

APPENDIX B (continued)
ACTION-SPECIFIC ARARs

Actions b/	Requirements	Prerequistes	Citation
Direct discharge of treatment system effluent (cont.)	Permit application information must be submitted including a description of activities, listing of environmental permits, etc.	On-site discharges to surface waters are exempt from procedural NPDES permit requirements. c/ Off-site discharges would be required to apply for and obtain an NPDES permit.	40 CFR 122.21
	Monitor and report results as required by permit (minimum of at least annually).		40 CFR 122.44(i)
	Comply with additional permit conditions such as:		40 CFR 122.41(i)
	° Duty to mitigate any adverse effects of any discharge; and		
	° Proper operation and maintenance of treatment systems.		
Direct discharge to ocean	Discharges causing "unreasonable degradation of the marine environment" are not permitted.		40 CFR 125.123(b)
	Determination of whether a discharge will cause reasonable degradation of the marine environment is based on consideration of:		40 CFR 125.122
	° Quantity, composition, or persistence of pollutants to be discharged.		
	° Potential transport of pollutants by biological, chemical or physical processes.		
	° Composition and vulnerability of exposed communities.		

c/ Section 121 of SARA exempts on-site CERCLA activities from obtaining permits. However, substantive requirements of a permit must be m

APPENDIX B (continued)
ACTION-SPECIFIC ARARs

Actions b/	Requirements	Prerequisites	Citation
Direct discharge to ocean (cont.)	° Importance of the receiving water to spawning, migratory paths, and surrounding biological community. ° Existence of specific aquatic sites. ° Impact on human health and commercial fishing.		
	Comply with the limiting permissible concentrations (LPGs) at the mixing zone boundary that are established in the permit.		40 CFR 125.123(d)(1)
	Permit applicants may be required to submit the following: analyses of chemical constituent of the discharge and the affected biological community, appropriate bioassays necessary to determine LPCs, a description of the facility and treatment process, and evaluations of alternative disposal options.		40 CFR 125.124
	Permit applicants shall be required to comply with a monitoring program specified in the permit. This program must assess the impact of the discharge on water, sediment, and biological quality.		40 CFR 125.123
›ischarge to POTW d/	Pollutants that pass-through the POTW without treatment, interfere with POTW operation, or contaminate POTW sludge are prohibited. Specific prohibitions preclude the discharge of pollutants to POTWs that: ° Create a fire or explosion hazard in the POTW; ° Are corrosive (pH<5.0);		40 CFR 403.5

/ Same regulations apply regardless of whether remedial action discharges

APPENDIX B (continued)

ACTION-SPECIFIC ARARs

Action b/	Requirements	Prerequisites	Citation
Discharge to POTW (cont.)	• Obstruct flow resulting in interference; • Are discharged at a flow rate and/or concentration that will result in interference; and • Increase the temperature of wastewater entering the treatment plant that would result in interference, but in no case raise the POTW influent temperature above 104°F (40°C).		
	• Discharge must comply with local POTW pretreatment program, including POTW-specific pollutants, spill prevention program requirements, and reporting and monitoring requirements.		40 CFR 403.5 and local POTW regulations
	• RCRA permit-by-rule requirements must be compiled with for discharges of RCRA hazardous wastes to POTWs by truck, rail, or dedicted pipe.		40 CFR 264.71 and 264.72

ATTACHMENT 4

RECORD OF DECISION, OPERABLE UNIT 2 – SITE SOURCE AREAS

SDMS Document
58825

RECORD OF DECISION

Operable Unit 2 - Site Source Areas

Ciba-Geigy Chemical Corporation Superfund Site

Dover Township, Ocean County, New Jersey

United States Environmental Protection Agency
Region II
New York, New York

DECLARATION STATEMENT

RECORD OF DECISION

SITE NAME AND LOCATION

Ciba-Geigy Chemical Corporation (EPA ID# NJD001502717)
Dover Township, Ocean County, New Jersey
Operable Unit 2

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Selected Remedy for contaminated source areas located at the Ciba-Geigy Chemical Corporation Site, located in Dover Township, New Jersey. The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act, as amended, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan. This decision is based on the Administrative Record file for this site.

ASSESSMENT OF THE SITE

The response action selected in this Record of Decision is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances from this site which may present an imminent and substantial endangerment to public health or welfare.

DESCRIPTION OF THE SELECTED REMEDY

The Selected Remedy described in this document represents the second of two planned response actions or operable units at tha Ciba-Geigy Site. It addresses the contaminated source areas. A previous Record of Decision and Explanation of Significant Differences address contaminated groundwater underlying the site.

The major components of the selected response action include:

- On-site bioremediation of approximately 145,000 cubic yards of contaminated soil.
- Off-site treatment and/or disposal of approximately 5,000 cubic yards of contaminated soil containing material which is not suited to bioremediation. This volume represents an estimate and is subject to change based on field sampling.

- Off-site treatment and disposal of approximately 19,500 drums of filtercakes and lab wastes containing high levels of organic contaminants. The number of drums that will require treatment prior to disposal is an estimate subject to change based on field sampling.

- Off-site disposal of approximately 12,350 drums of solid waste and other material containing low levels of organic contaminants.

- Installation of caps and barrier walls in areas of the site where the Cohansey Yellow Clay is present. This perched water management system will prevent the movement of contaminants from the clay into the underlying Primary Cohansey Aquifer. The cap in the Filtercake Disposal Area will also address the potential direct contact risks associated with the surface soils in this area.

- Implementation of an in-situ bioremediation system in the Equalization Basins to address contamination below the groundwater table.

- Stabilization of portions of the Lime Sludge Disposal Area that do not meet leaching standards.

- Establishment of deed restrictions to regulate the use of certain areas of the site and prevent intrusive activities in areas that are capped.

- Optimization of the Groundwater Extraction and Recharge System implemented as part of the first operable unit response action.

- Appropriate environmental monitoring to ensure the effectiveness of the Selected Remedy.

DECLARATION OF STATUTORY DETERMINATIONS

Part 1: Statutory Requirements

The Selected Remedy is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

Part 2: Statutory Preference for Treatment

The Selected Remedy satisfies the statutory preference for treatment as a principal element of the remedy. The bioremediation portion of the remedy is by far the largest component and it involves the treatment of approximately 145,000 cubic yards of contaminated soil.

Part 3: Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on the site above levels that will not allow for unlimited exposure and unrestricted use, a statutory review will be conducted within five years of the initiation of the remedial action.

ROD DATA CERTIFICATION CHECKLIST

The following information is included in the Decision Summary section of this Record of Decision. Additional information can be found in the Administrative Record file for the site.

1. Chemicals of concern and their respective concentrations may be found in the "Site Characteristics" section.

2. Baseline risk represented by the chemicals of concern may be found in the "Summary of Site Risks" section.

3. A discussion of cleanup levels for chemicals of concern may be found in the "Remedial Action Objectives" section.

4. A discussion of source materials constituting principal threats may be found in the "Principal Threat Waste" and "Remedial Action Objectives" sections.

5. Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater are discussed in the "Current and Potential Future Land and Resource Uses" section.

6. A discussion of potential land and groundwater use that will be available at the site as a result of the Selected Remedy is discussed in the "Current and Potential Future Land and Resource Uses" section.

7. Estimated capital, annual operation and maintenance, and total present worth costs are discussed in the "Description of Alternatives" section.

8. Key factor(s) that led to selecting the remedy (*i.e.*, how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision) may be found in the "Comparative Analysis of Alternatives" and "Statutory Determinations" sections.

William J. Muszynski

Jeanne M. Fox, Regional Administrator
U.S. Environmental Protection Agency
Region II

9/29/00
Date

UNITED STATES
ENVIRONMENTAL PROTECTION
AGENCY

REGION II

RECORD OF DECISION
OPERABLE UNIT TWO

CIBA-GEIGY CHEMICAL CORPORATION SITE
TOMS RIVER, NEW JERSEY

SEPTEMBER 29, 2000

500006

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DECISION SUMMARY

SITE NAME, LOCATION AND BRIEF DESCRIPTION

The Ciba-Geigy Chemical Corporation Site (EPA ID# NJD001502717) is located in Toms River, Dover Township, New Jersey. The Site is situated on approximately 1,350 acres of land and is bordered on the east by the Toms River (see Figure 1). Approximately 320 of the 1,350 acres are developed and were used for manufacturing operations, waste treatment, disposal activities, and administrative and laboratory facilities. Residential neighborhoods, recreational areas, small commercial establishments, and light industrial complexes are present near the Site. The commercial areas are situated primarily southwest of the Site. The area to the west is zoned for industrial use, light manufacturing, and warehousing operations. A large recreational area, which includes several parks, is east of the Site. Residential areas exist along the northern (Pine Lake Park) and southeastern (Oak Ridge Parkway Area) portions of the Site (see Figure 2). The U.S. Environmental Protection Agency (EPA) is the lead agency for addressing the cleanup of the contamination at the Site with support from the New Jersey Department of Environmental Protection (NJDEP). Under an agreement with EPA, Ciba Specialty Chemicals (Ciba), the responsible party for the Site, conducted a Feasibility Study (FS) to develop alternatives for addressing contamination at the Site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

Production operations at the Site began in late 1952. At the time, the Site was owned by the Toms River Chemical Company, which was later merged into the Ciba-Geigy Corporation. The Site was transferred to Ciba, the current owner and responsible party, when Ciba-Geigy reorganized its operations to merge with Sandoz Corporation. Manufacturing operations at the Site related to the production of a variety of dyestuffs, pigments, epoxy resins and additives. By the early 1980s, production operations were being scaled back. In 1996, manufacturing operations ended. Current activities are limited to those related to the cleanup of the Site.

The activities associated with the historical operations at the Site have resulted in contamination of groundwater and surface and subsurface soils. The contaminated groundwater in and around the Site is currently pumped, treated and recharged on site under the first cleanup phase, referred to as Operable Unit 1 (OU1). Contaminated soils and waste are present in several areas on site. These areas have been designated as source areas because they represent potential sources of contamination for the groundwater (see Figure 3). These source areas are being addressed under Operable Unit 2 (OU2). Most of the source areas can be categorized based on the site activity that resulted in their contamination. The three major site activities were:

- **Production-Related Activities**
- **Wastewater Treatment Operations**
- **Solid Waste Disposal**

Production-Related Source Areas

The Production Area is a 120-acre tract of land used for manufacturing activities from 1952 to 1996. The major source areas associated with the Production Area are the South Dye Area and the Building 108/Underground Storage Tank Area. The South Dye Area was the location of the initial manufacturing operations at the Site and operated from 1952 to 1984. Anthraquinone-based dyestuffs and pigments and azo-based dyestuff were manufactured in the South Dye Area. From 1960 to 1990, Building 108 was used for the manufacture of resins, additives, specialty chemicals and insoluble pigments. Many solvents used in this process were stored in underground storage tanks (USTs) west of Building 108. These tanks were removed in 1992.

Wastewater Treatment-Related Source Areas

During the entire period of site operations, a wastewater treatment plant existed for the treatment and disposal of process wastewater. Wastewater treatment residues generated in the treatment plant were periodically removed and disposed of in solid waste impoundments on the Site. The major source areas associated with the wastewater treatment operations are the East and West Equalization Basins and the Backfilled Lagoon Area.

The Equalization Basins were each approximately three acres with a depth of fourteen feet and an overall capacity of approximately 6.7 million gallons at their full operating capacity. The basins were an integral component of the wastewater treatment process until 1987, when they were replaced by aboveground closed equalization tanks. During their operation, the basins were used to balance and neutralize wastewater prior to the solids settling and aeration treatment steps. In 1991 and 1992, the West and East Equalization Basins, respectively, were closed according to Resource Conservation and Recovery Act (RCRA) protocol. Pumpable liquid, accumulated sludge, the liners and underlying soils that were visually contaminated were removed. The liquid and slurried sludge was processed through the wastewater treatment plant. Non-pumpable sludge and contaminated soils were disposed of offsite.

The Backfilled Lagoon Area consists of five unlined lagoons adjacent to the Toms River that operated from about 1959 to 1977. The entire area covered approximately seven acres and consisted of three wastewater treatment lagoons (Oxidation Lagoon, Settling Lagoon and Final Polishing Pond) and two sludge drying lagoons (Northern and Southern). The Backfilled Lagoon Area was closed in 1978. When the lagoons were closed, water from the three treatment lagoons was hydraulically removed, filtered, and the resulting sludges were placed in the on-site Active Landfill, which is regulated by NJDEP. The treatment lagoons were then backfilled. Residual dried sludge in the Northern and Southern Sludge Drying Lagoons remained in place and these two lagoons were then backfilled.

The other potential source areas related to wastewater treatment that EPA investigated are the Old Wastewater Treatment Plant, Old Oxidation Lagoon, Ocean Outfall Basin, Overflow Basin

and East Overflow Area. The Old Wastewater Treatment Plant and Old Oxidation Lagoon refer to treatment areas from the first generation wastewater treatment process. The Old Wastewater Treatment Plant refers to portions of the Old Settling Basin, which was a 14-acre unlined lagoon used for sludge settling in the first generation wastewater treatment plant. The Old Oxidation Lagoon was a 3-acre unlined impoundment where effluent from the Old Settling Basin was mechanically aerated. Usage of the Old Oxidation Lagoon and Old Settling Basin began about 1954 and continued until about 1960. Historical records indicate that sludge was periodically removed from these basins and sent to the on-site Filtercake Disposal Area. In 1976, the Old Settling Basin was cleaned out to make way for the wastewater treatment plant expansion and the sludge was disposed of in the Filtercake Disposal Area.

The Ocean Outfall Basin was constructed over the eastern end of the Final Polishing Pond in the Backfilled Lagoon Area. It was about 0.4 acre in size and approximately eight feet deep. From 1977 to 1985, the basin was used to contain overflow of treated wastewater from the ocean discharge pipeline that was used to take treated wastewater to the ocean for discharge. In 1991, the entire basin was excavated, including the sludge and the original synthetic liner, as part of the decommissioning of the ocean discharge pipeline.

The Overflow Basin was built over the southeastern end of the Old Oxidation Lagoon in the early 1980s as a catch basin for surface runoff from the adjacent wastewater treatment plant. It was approximately one acre with a depth of fourteen feet. The Overflow Basin was decommissioned in 1991 by draining the basin and removing its plastic liner.

The East Overflow Area is located to the east and parallel to the pipeline that transported wastewater from the Equalization Basins to the Backfilled Lagoon Area. This area was identified as a "possible impoundment" based on its dark gray color in 1976 and 1983 photographs. However, this area is actually a parking lot and was historically covered with dark gray paving gravel, which may account for its appearance in the photographs. Other than the aerial photographic interpretation, there is no evidence that an actual impoundment ever existed in the area.

Waste Disposal-Related Source Areas

Several solid waste disposal areas are known to have operated at different times during operations at the Site. The major areas associated with waste disposal are the Filtercake Disposal Area, Lime Sludge Disposal Area, Drum Disposal Area, Standpipe Burner Area and the Borrow/Compactor Area.

The Filtercake Disposal Area is approximately ten acres. The Filtercake Disposal Area was used from 1952 to 1977 for the disposal of wastewater sludges removed from wastewater treatment plant impoundments during routine clean-outs and final closures. The Trench Disposal Area, which is within the Filtercake Disposal Area, was used from 1952 to 1960 for the disposal of

debris and trash, crushed drummed waste materials and miscellaneous bulk sludges. The Filtercake Disposal Area was closed around 1977 by covering the sludge with a layer of soil and grass seeding. No synthetic cap was installed during closure of this area.

The Lime Sludge Disposal Area is approximately four acres and included three unlined pits. From 1952 to 1972, these pits were used for disposal of arsenic-containing wastes that had been stabilized to prevent leaching. In 1977, the three pits were capped with sand, a 30-millimeter PVC (polyvinyl chloride) membrane, and two feet of topsoil. The main contaminant in the Lime Sludge Disposal Area is arsenic.

The Drum Disposal Area is approximately five acres and was used for the disposal of solid waste from plant manufacturing activities from about 1961 to 1977. Three distinct subareas have been identified within the Drum Disposal Area. These subareas are the Non-Intact Drum Area, the Stacked Drum Area and the Iron Filings Area. The Non-Intact Drum Area was used for the disposal of crushed drummed wastes and debris from approximately 1961 to 1972. The Stacked Drum Area operated from 1972 to 1977 and was used for the disposal of intact drums containing various wastes. Based on a test pit survey conducted by EPA in 1992, approximately 35,000 drums are believed to be buried in the Stacked Drum Area. The Iron Filings Area was used from 1961 to 1977 for the disposal of bulk iron oxide sludges. In 1977-78, all waste disposal activities in the Drum Disposal Area ceased and the area was closed. Closure included placing soil/sand over the waste surface; capping the area with a 30-milliliter PVC liner and a 2-foot layer of soil and installing passive vent pipes for exhaust of any gases generated beneath the cap.

The Standpipe Burner Area is approximately 0.5 acre and partially overlaps the southern boundary of the Drum Disposal Area. Historical plant records indicate that up to 250 gallons per week of laboratory solvents and solvent contaminated laboratory wastes were disposed of down the concrete pipes of the Standpipe Burner Area between 1959 and 1970.

The Borrow/Compactor Area encompasses approximately 25 acres. This area was historically used as a source of fill material and a repository for construction debris beginning in 1952. From the late 1970s to 1981, the Borrow Area was used as a staging area for drummed waste shipped off site for disposal. Historical plant records show that nonhazardous plant refuse, including construction debris, was compacted at this location, although it is possible that some material containing residual waste was disposed of here as well.

The other potential source areas related to waste disposal that EPA investigated are the Casual Dumping Area and Calcium Sulfate Disposal Area. The Calcium Sulfate Disposal Area was used from 1960 until the early 1980s as a repository for neutralized sulfuric acid residue from the production of metanilic acid. Historical plant records indicate that periodically this pit was dug out and the dried sludge was transferred to the Iron Filings Area within the Drum Disposal Area.

The Casual Dumping Area was approximately three acres. Limited historical plant information indicates that the Casual Dumping Area, referred to as the "trash landfill," was used for debris and

trash disposal in the early 1970s until the trash compactor was constructed in the Borrow Compactor Area. No evidence has been found that the Casual Dumping Area was ever used for waste disposal.

Two other potential source areas that cannot be categorized as related to production, wastewater treatment, or disposal activities at the Site, were also investigated. These potential source areas are identified as the Fire Prevention Training Area and the Marshland Area. Fire fighting training activities were conducted within the Fire Prevention Training Area. These activities included the controlled ignition of solvents and other chemicals in order to simulate potential fire situations in the production facilities. Activities in this area began in 1965 and had ceased by 1983.

The Marshland Area consists of two separate areas, both of which are located outside of the site property. There is no indication that the Marshland Area was ever used for waste disposal. It was investigated because it is a natural discharge point for contaminated groundwater leaving the Site.

In addition to the source areas being addressed under the Superfund program, there are two landfills on the Ciba property regulated by the State of New Jersey. The New Jersey Department of Environmental protection will continue to be responsible for monitoring and regulating these landfills.

Regulatory History

The Site was placed on the Superfund National Priorities List (NPL) in 1983. In 1985, EPA began a Remedial Investigation (RI) of the Site. The results of the investigation were finalized in the initial RI report for the Site in 1988. The RI report concluded that contaminated source areas on site resulted in groundwater contamination. Based on this investigation, EPA defined the following operable units:

- Operable Unit 1 (OU1) - pertaining to groundwater; and
- Operable Unit 2 (OU2) - pertaining to known or suspected source areas.

EPA focused on identifying a remedy for groundwater contamination (OU1) first as part of a multi-phase remedy for the Site. This decision was made because the nature and extent of contamination were better understood in the groundwater than in the source areas and the groundwater remedy would more quickly address potential public health concerns by preventing the further off-site migration of groundwater contaminants.

On April 24, 1989, EPA issued a Record of Decision (ROD) for OU1 describing the selected groundwater remedy. The major components of this remedy were the sealing of contaminated irrigation wells; installation of a groundwater extraction and treatment system; and discharge of treated groundwater to the Toms River. In accordance with the ROD, irrigation wells near the

Site were decommissioned and well restrictions (based on Ocean County Board of Health regulations) were imposed that restrict installation of domestic wells in area.

After EPA issued the 1989 ROD, public concerns related to the proposed discharge to the Toms River resulted in continued investigation and public involvement to develop an alternate discharge point for treated groundwater. On September 30, 1993, after technical review of a groundwater recharge proposal submitted by Ciba, EPA issued an Explanation of Significant Differences (ESD) which changed the discharge from the Toms River to on-site recharge of treated groundwater. In 1993, a consent decree was lodged between EPA and Ciba, which allowed Ciba to design, construct and operate the groundwater extraction, treatment and recharge systems.

The groundwater extraction system includes 43 extraction wells that are designed to extract a maximum flow of 4.0 million gallons per day (MGD) of contaminated groundwater. Currently, the total nominal flow of the system is about 2.5 MGD. The basic technologies used in the groundwater treatment process, in order, are: 1) Powdered Activated Carbon Treatment (PACT®); 2) clarification and separation of the sludge/carbon from the PACT® effluent; and 3) Granular Activated Carbon (GAC) adsorption. The systems became fully operational in March 1996.

Based on the data generated during the OU1 RI, 13 potential source areas were identified that could be contributing to groundwater contamination at the Site. However, the OU1 RI data did not provide sufficient detail on the nature and extent of contamination within the source areas to determine a cleanup remedy. The OU1 ROD required that further investigations be conducted to evaluate the potential sources of contamination. EPA deferred remedy selection for the source areas until the nature and extent of contamination could be more fully understood. In 1990, EPA began the OU2 RI to characterize the nature and extent of contamination in the source areas. Sampling of groundwater, surface water, sediments, surface and subsurface materials and air was conducted under this investigation. In 1992, supplemental field investigations were conducted in three of the potential source areas (the Filtercake Disposal Area, the Drum Disposal Area and the Borrow Compactor Area) to characterize contamination and waste deposits in these areas further.

In 1995, an administrative order was executed which directed Ciba to perform, under EPA oversight, a Feasibility Study (FS) of cleanup alternatives for the 21 potential source areas referenced in the OU2 RI report. The draft OU2 FS report was submitted to EPA by Ciba and released to the public on August 31, 1999. The draft OU2 FS report included seven alternatives for addressing contamination in the major source areas.

As previously indicated, the Ciba Site also contains two landfills which will continue to be regulated by the State of New Jersey.

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COMMUNITY PARTICIPATION

The OU2 FS report and Proposed Remedial Action Plan (PRAP) for the Ciba-Geigy Chemical Corporation Site were made available to the public on June 15, 2000. These documents, and others related to the cleanup of the source areas at the Site, can be found in the Administrative Record file and the information repository maintained at the EPA Docket Room in Region 2 and at the Ocean County Public Library in Toms River, New Jersey. The notice of the availability of the documents in the Administrative Record file was published in the Asbury Park Press and the Ocean County Observer on June 16, 2000. A public comment period was held from June 15, 2000 to August 15, 2000. An extension to the public comment period was not requested.

Prior to the release of the final OU2 FS report and PRAP, EPA and NJDEP provided information regarding the cleanup of the Site to the public through public meetings, public availability sessions, and announcements published in the Asbury Park Press and the Ocean County Observer. EPA held public meetings on October 15, 1998; February 10, March 23 and 25, April 29, June 17, August 5 and 26, 1999; and January 19, 2000. Public availability sessions were held on November 10, 1999 and January 26, 2000. EPA and Ciba also held site tours on December 3, 1998; April 17 and 21, 1999; and January 22, 2000.

A public meeting was held on June 15, 2000 to present the PRAP to the community. At this meeting, representatives from EPA answered questions about the process used to evaluate the remedial alternatives presented in the draft and final OU2 FS reports. EPA held a public availability session on June 22, 2000 and a second public meeting on July 12, 2000 to further review the components of the preferred remedy and answer questions and address comments related to the remedy. EPA's response to the comments received during the public comment period is included in the Responsiveness Summary, which is part of this ROD.

SCOPE AND ROLE OF OPERABLE UNIT

As stated previously, EPA selected the remedy for the first phase of the site cleanup (OU1), in the 1989 ROD and 1993 ESD. The purpose of the groundwater remedy is to remove contaminants from the groundwater and draw the contaminant plume back toward the Site. The groundwater extraction, treatment and recharge systems, specified in these documents, became operational in March 1996. Sampling has confirmed that contaminated groundwater from the Site is not affecting the public drinking water supply. Under the current land use, no on-site groundwater receptors exist. As part of the OU1 groundwater remedy, residential wells in the Cardinal Drive area were sealed. In addition, as part of the groundwater remedy, institutional controls are in place to restrict the future installation of off-site drinking water wells within the groundwater plume. The groundwater extraction, treatment and recharge system, which Ciba is responsible for operating, will continue to operate until groundwater restoration standards that were established in the 1989 ROD and 1993 ESD are met.

This ROD identifies EPA's cleanup strategy for the second cleanup phase, OU2, which addresses the cleanup of the source areas at the Site. These source areas will continue to significantly contribute contamination to the groundwater at the Site if they are not addressed. This release of contaminants into the groundwater will extend the time it takes for the groundwater remedy to work. Therefore, one remedial action objective for the cleanup of the source areas is to accelerate the groundwater remedy by addressing contamination in the source areas. A second objective for the source area cleanup is to address potential risks associated with contacting contaminated surface soils under different future land-use scenarios for the Site. The source area cleanup represents the final response action planned for the Ciba-Geigy Site.

The ongoing OU1 remedy and the this OU2 remedy are integrated into an overall Site remedy to address the cleanup of contaminated surface soils, subsurface soils and groundwater at the Site.

SITE CHARACTERISTICS

To understand the impact of the source areas on the groundwater underlying the Site, information is needed on the geology and hydrology at the Site and the nature and extent of contamination in the groundwater and the source areas. It is also necessary to define the level of contamination in the source area surface soils in order to evaluate the risks associated with contacting this material. The following section presents information that has been collected during EPA's and Ciba's investigations at the Site on the geology and hydrology, the contaminant plumes in the groundwater, and the contamination in the source areas.

Site Geology and Hydrology

The five uppermost geologic members underlying the Site, in descending order, are the Upper Cohansey Member, Cohansey Yellow Clay, Primary Cohansey Member, Cohansey/Kirkwood Transitional Member, and the Lower Cohansey Member. Figure 4 presents a cross-section of these units. Contaminants have leached from the source areas into portions of these units, which are discussed below.

Upper Cohansey Member

The Upper Cohansey Member overlies the Cohansey Yellow Clay. At some locations, a perched water system is present in the Upper Cohansey, which is referred to as the Upper Cohansey Aquifer. The perched water system can provide a pathway for movement of contaminants to lower geologic units.

Cohansey Yellow Clay

The Primary Cohansey Aquifer is overlain by a clay layer known as the Cohansey Yellow Clay.

The clay is discontinuous throughout the area of the Site, but where present, may limit the movement of contaminants from the source areas to the Primary Cohansey Aquifer. However, investigations at the Site have shown that the Cohansey Yellow Clay does not completely prevent this movement of contaminants.

Primary Cohansey Member

The Primary Cohansey Member is a water-bearing unit and is a source of drinking water in the area beyond the plume. This unit is referred to as the Primary Cohansey Aquifer and contains a substantial mass of contaminants.

Cohansey/Kirkwood Transitional Member

The Cohansey/Kirkwood Transitional Member can limit the movement of contaminants from the source areas to the Lower Cohansey Aquifer. Toward the north, the thickness of the unit begins to decrease until it eventually disappears entirely in the extreme northern portion of the Site. As stated previously, contaminants have penetrated into this unit and reached the Lower Cohansey Aquifer.

Lower Cohansey Member

The Lower Cohansey Member is one of the water-bearing units beneath the Site. This unit is referred to as the Lower Cohansey Aquifer. In the northern portion of the Site, the overlying Cohansey/Kirkwood Transitional Member thins and eventually disappears entirely in the extreme northern portion of the Site. Where this occurs, the Lower Cohansey and Primary Cohansey Aquifers are undifferentiated. In the southern portion of the Site, the Lower Cohansey Aquifer thins and eventually disappears. Contaminants from the source areas have migrated into this unit.

Nature and Extent of Contamination in the Groundwater and Source Areas

Contaminants of Concern

A list of twelve Contaminants of Concern (COCs) was developed to aid in characterizing the nature and extent of contamination in the source areas and to define which areas of the Site present the greatest potential impact to groundwater quality. The process used to define the COC list focused on the presence, concentration, toxicity and mobility of contaminants detected in the groundwater and source areas. The twelve COCs include the following nine site-wide organic chemicals, --1,2,3-trichloropropane, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, 2-chlorotoluene, chlorobenzene, naphthalene, nitrobenzene, tetrachloroethene, and trichloroethene, and three source-area-specific inorganic chemicals, -- arsenic (Lime Sludge Disposal Area), lead (Backfilled Lagoon Area), and mercury (Filtercake Disposal Area).

The contaminants selected for inclusion as COCs meet one or more of the following criteria: they pose the greatest potential risk to human health and the environment; they are found in the highest concentrations in the source areas and groundwater at the Site; and/or they are most likely to move from the source areas to the groundwater. In addition, the list of COCs represent all of the significant contaminant zones within the source areas that have the potential to impact groundwater.

A two-step process was used to develop the COC list. The first step was to rank chemicals in groundwater and the source areas based on the following criteria:

- Frequency of chemical detection
- Chemical concentration
- Toxicity

Chemicals were first evaluated based on their frequency of detection in the two distinct groundwater plumes at the Site (the north and south plumes) and in the source areas. Those detected in more than 5% of the samples taken were then evaluated using a concentration-toxicity screen, consistent with EPA risk assessment guidance. A risk factor was assigned to each chemical, where the risk factor is the multiple of the mean concentration or maximum concentration of each chemical and its published oral toxicity value. The risk factors for the individual chemicals were then summed to obtain the total risk score, and a percent score was then assigned to each chemical. Chemicals with risk factors greater than ten percent of the total risk score were retained for secondary screening. Chemicals that did not have published toxicity values were also retained for the secondary screening.

The secondary screening criteria for organic constituents were based on the following:

- Groundwater quality compared with OU1 groundwater restoration standards
- Mobility
- Representativeness of broad classes of site-related compounds
- Whether the constituents were identified as indicator chemicals in the OU1 RI.

The secondary screening criteria for inorganic constituents focused on evaluation of their significance in the individual source areas and their impact on groundwater quality adjacent to the source areas.

Tables 1, 2 and 3 provide the primary and secondary screening data and results for the organic COCs.

TABLE 1

COC Primary and Secondary Screening - Data and Results

Constituent	Oral RfD (mg/kg-day)	Oral Slope (mg/kg-day)-1	Log P_{oct}	Mean Conc. in G.W./ OU1 Performance Standard
1,2,3-Trichloropropane	6.00E-01	7.00E+00	N/A	10
1,2,4-Trichlorobenzene	1.00E-01		4.18	6
1,2-Dichlorobenzene	9.00E-01		3.38	<1
2-Chlorotoluene	2.00E-01		3.42	No standard
Chlorobenzene	2.00E-01		2.84	6
Napthalene	4.00E-01		N/A	<1
Nitrobenzene	5.00E-04		2.28	12
Tetrachloroethene	1.00E-01	5.20E-01	2.67	27
Trichloroethene	6.00E-01	1.10E-01	2.42	162

TABLE 2

COC Primary and Secondary Screening - Data and Results

Constituent	North Plume						South Plume					
			Carcinogens		Noncarcinogens				Carcinogens		Noncarcinogens	
	Frequency of detection	Mean Conc. (µg/L)	Risk Factor (1/day)	Percent Score	Risk Factor (1/day)	Percent Score	Frequency of detection	Mean Conc. (µg/L)	Risk Factor (1/day)	Percent Score	Risk Factor (1/day)	Percent Score
1,2,3-Trichloropropane	55.6%	47.00	3.29E+02	77.93%	7.83E+01	1.53%	66.7%	6.15	4.31E+01	90.13%	1.03E+03	15.00%
1,2,4-Trichlorobenzene	51.9%	68.60			6.86E+02	13.36%	66.7%	7.08			7.08E+02	10.35%
1,2-Dichlorobenzene	48.1%	338.00			3.76E+02	7.31%	66.7%	16.11			1.79E+02	2.62%
2-Chlorotoluene	40.7%	401.00			2.01E+03	39.04%	33.3%	0.60			3.00E+01	0.44%
Chlorobenzene	59.3%	158.5			7.93E+02	15.43%	74.1%	23.03			1.15E+03	16.85%
Napthalene	48.1%	25.0			6.25E+01	1.22%	33.3%	3.08			5.19E+01	0.76%
Nitrobenzene	----											
Tetrachloroethene	37.0%	10.55	5.49E+00	1.30%	1.06E+02	2.05%	81.5%	6.82	3.55E-01	0.74%	6.82E+02	9.98%
Trichloroethene	63.0%	19.00	2.09E+00	0.50%	3.17E+01	0.62%	81.5%	9.02	9.92E-02	0.21%	1.50E+03	22.00%

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TABLE 3

COC Primary and Secondary Screening - Data and Results

Constituent	North Plume Source Areas						South Plume Source Areas					
			Carcinogens		Noncarcinogens				Carcinogens		Noncarcinogens	
	Frequency of detection	Mean Conc. (mg/kg)	Risk Factor (1/day)	Percent Score	Risk Factor (1/day)	Percent Score	Frequency of detection	Mean Conc. (µg/L)	Risk Factor (1/day)	Percent Score	Risk Factor (1/day)	Percent Score
1,2,3-Trichloropropane	6.70%	1.88	1.32E+01	82.81%	3.14E+02	0.26	22.25%	6.02	4.21E+01	73.92%	1.00E+03	0.03%
1,2,4-Trichlorobenzene	39.74%	182.22			1.82E+04	15.07%	49.31%	215.06			2.15E+04	0.65%
1,2-Dichlorobenzene	33.59%	184.3 6			2.05E+03	1.69%	45.24%	1533.16			1.70E+04	0.51%
2-Chlorotoluene	52.79%	175.39			8.77E+03	7.25%	13.55%	61.40			3.07E+03	0.09%
Chlorobenzene	21.18%	19.21			9.60E+02	0.79%	49.47%	1753.40			8.77E+04	2.63%
Napthalene	20.49%	27.64			6.91E+02	0.57%	49.09%	1372.91			3.43E+04	1.03%
Nitrobenzene	15.57%	32.34			6.47E+04	53.49%	27.79%	1559.54			3.12E+06	93.57%
Tetrachloroethene	6.85%	16.16	8.40E-01	5.28%	1.62E+03	1.34%	29.73%	74.00	3.85E+00	6.75%	7.40E+03	0.22%
Trichloroethene	6.59%	9.50	1.04E-01	0.66%	1.58E+03	1.31%	18.25%	22.57	2.48E-01	0.44%	3.76E+03	0.11%

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Aquifer Characterization

A large amount of data has been collected and interpreted since the late 1980s to understand the contaminant distribution in the groundwater both on and off the Site. The definition of the current plume uses data collected in 1997 and 1998. In general, the contaminated groundwater at the Site is present in two plumes, referred to as the north and south plumes. The north plume includes groundwater contamination to the north and east of the Equalization Basins. The south plume refers to contaminated groundwater east and south of the Drum Disposal Area. The orientation of the plumes is consistent with the directions of groundwater flow in each part of the Site, however, historical groundwater pumping conditions at the Site have affected the distribution of contaminants in the groundwater. The north and south plumes are evident in Figure 5 which show the contaminant concentration contours for the Primary Cohansey Aquifer. These contours represent the ratios of the COC concentrations in the groundwater as compared with the groundwater restoration standards.

In the Lower Cohansey Member, the plume is confined to the north, as shown in Figure 6. This determination is based on groundwater samples and site geology. Contaminant levels detected in the southern portion of the Lower Cohansey Member were below aquifer restoration standards. In addition, in the southern portion of the Site, the Lower Cohansey Member thins and eventually disappears.

North Plume - Primary Cohansey Aquifer

Figure 5 identifies those COCs in the Primary Cohansey Aquifer, close to the north plume source areas, that are likely to control the source areas cleanup because they represent contaminants that are currently moving from the source areas to the groundwater. Examples of organic COCs associated with specific north plume source areas include:

Equalization Basins: 2-chlorotoluene, 1,2,4-trichlorobenzene and tetrachloroethene
Underground Storage Tank (UST)/Building 108 Area: 1,2,4-trichlorobenzene, 2-chlorotoluene, chlorobenzene and trichloroethene
Former South Dye Area: 2-chlorotoluene, trichloroethene, chlorobenzene and 1,2,4-trichlorobenzene.
Backfilled Lagoon Area: chlorobenzene, trichloroethene and 1,2,4-trichlorobenzene
Borrow Compactor Area: trichloroethene

There are relatively few inorganic COC exceedances in the Primary Cohansey Aquifer. There were five exceedances for lead out of 102 locations. One exceedance was within the range of background concentrations and two were in the vicinity of the Backfilled Lagoon Area. There was also one exceedance for mercury (2.9 parts per billion (ppb) versus a criterion of 2.0 ppb.)

North Plume - Lower Cohansey Aquifer

Chlorobenzene, trichloroethene, tetrachloroethene and 1,2,3-trichloropropane are widely distributed in the Lower Cohansey Aquifer. Due to the depth of the Lower Cohansey Aquifer, it is frequently difficult to directly relate concentrations of COCs to individual source areas. However, as shown on Figure 6, two compounds in the Lower Cohansey can tentatively be related to source areas. Chlorobenzene is associated with the Equalization Basins. Trichloroethene underlies the Building 108/UST Area, although groundwater flow patterns facilitated by past well pumping could account for this occurrence originating from the Equalization Basins.

In addition to chlorobenzene, other COCs found in the Lower Cohansey that are associated with the Equalization Basins are 2-chlorotoluene, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, tetrachloroethene, nitrobenzene, and naphthalene. In addition to trichloroethene, other COCs that underlie the Former Building 108/Underground Storage Tank Area and are found in the Lower Cohansey are 1,2,3-trichloropropane, and nitrobenzene.

There were no exceedances observed for arsenic and mercury in the Lower Cohansey Aquifer. Only two exceedances for lead, out of a total of 37 locations, were observed in the Lower Cohansey. One was within the range of background values and is not believed to be site-related. The second location has a concentration at the upper end of the background concentration range. The upper end of the range is 25 ppb, versus the measured value of 26 ppb.

South Plume - Primary Cohansey Aquifer

Figure 5 identifies those COCs in the Primary Cohansey Aquifer, close to the south plume source areas, that are likely to control the source areas cleanup because they represent contaminants that are currently moving from the source areas to the groundwater. Organic COCs associated with the Filtercake Disposal Area are 2-chlorotoluene, chlorobenzene and tetrachloroethene. For the Drum Disposal Area and Standpipe Burner Area, the corresponding compounds are 2-chlorotoluene, chlorobenzene, trichloroethene and tetrachloroethene.

There are no observed confirmed exceedances of inorganic COCs in the south plume Primary Cohansey Member.

South Plume - Lower Cohansey Member

The organic COC distribution in the Lower Cohansey Member is shown in Figure 6. As illustrated in Figure 6, and discussed previously, the contaminant plume is confined to the north in the Lower Cohansey Member.

Overall Conclusions of Groundwater Contaminant Distribution

The locations of highest concentrations of many of the organic COCs in the groundwater are close to the major source areas, especially in the top layer of the Primary Cohansey Aquifer. These major source areas include the Equalization Basins, the Former South Dye Area and the Former Building 108/Underground Storage Tank Area in the north plume and the Drum Disposal Area, Standpipe Burner Area and Filtercake Disposal Area in the south plume. Among inorganic COCs in groundwater, lead appears to be associated with the Backfilled Lagoon Area.

Source Area Characterization

The source area characterization includes a source area conceptual model and a statistical summary of the compiled data for each source area. The conceptual model depicts the local geology, local hydrogeology and the distribution of contaminants in the subsurface. The statistical analysis of the data includes the number of samples taken in each area and the average concentration of each COC detected. The source area characterization is based on the extensive data collected in the source areas, including more than 3,000 samples collected and analyzed during the OU1 and OU2 RIs. In addition, several subsequent investigations were conducted by Ciba under EPA oversight. The scope of each of these investigations is summarized below.

The Non-Aqueous Phase Liquid (NAPL) Action Plan was implemented to determine the extent and location of NAPL at the Site. NAPLs are contaminants that are relatively insoluble in water and are often found in a separate phase in groundwater. Those NAPLs that are denser than water can sink to the bottom of the aquifer unit, making them difficult to remove. During this investigation, 4,509 samples were collected and screened for the presence of NAPL. In general, those samples exhibiting the highest total organic vapor level (311 samples) were sent for complete analysis. This investigation did not find any separate phase NAPL in the groundwater, however, residual NAPL, which resides in the spaces between soil particles, was identified in several locations.

The Supplemental Source Area Investigation was conducted to fill data gaps from the OU2 RI, to further delineate the source areas at the Site, and to incorporate a randomized sampling scheme into data collection at the Site. Since the OU2 RI focused on determining the nature and extent of contamination in the source areas, only a small number of uncontaminated, or marginally contaminated samples were analyzed. Additional data was needed to develop the statistical conceptual model for the major source areas. During this investigation, 650 samples were submitted to the laboratory for chemical analysis of COCs. Approximately 200 samples were screened for the presence of NAPL.

Former South Dye Area

Figure 7 presents the sample results for the Former South Dye Area. The Cohansey Yellow Clay is present below most of the Former South Dye Area. A large portion of the clay is contaminated. The clay surface generally dips toward the southeast which causes perched water on top of the clay (Upper Cohansey Aquifer) and water within the clay to flow in a southeasterly direction, toward the edge of the clay or bottom of the clay, where it discharges into the Primary Cohansey Aquifer. The surface of the Upper Cohansey Aquifer is approximately 20 to 25 feet below land surface. The Primary Cohansey Aquifer occurs at depths ranging from 31 feet to 34 feet in the eastern portion of the area.

There have been more than 100 subsurface borings conducted in the Former South Dye Area. This source area has been characterized based on more than 1,000 samples, which include nearly 300 chemical samples and more than 700 NAPL field screening samples. Figure 7 shows that most contamination above the water table is on the west end of the Former South Dye Area. The main contaminants present above and below the water table consist of 1,2-dichlorobenzene which had a maximum detected concentration of 38,000 parts per million (ppm), 1,2,4-trichlorobenzene at 2,549 ppm and 2-chlorotoluene at 7,700 ppm. A statistical summary of the sample data is presented in Table 4.

500022

TABLE 4

Statistical Summary for the Former South Dye Area

Chemical of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	949	0.310	0.01(nd)	0.210	1. 50
1,2,4-Trichlorobenzene	1060	27.157	0.01(nd)	0.190	120.000
1,2- Dichlorobenzene	1079	65.744	0.01(nd)	0.102	52.10
2-Chlorotoluene	982	23.439	0.01(nd)	0.054(nd)	54.00
Chlorobenzene	1070	2.001	0.01(nd)	0.081(nd)	2.90
Naphthalene	1034	1.045	0.01(nd)	0.075(nd)	2.70
Nitrobenzene	868	2.190	0.01(nd)	0.046(nd)	0.50
Tetrachloroethene	1057	0.198	0.01(nd)	0.049(nd)	0.85
Trichloroethene	1060	0.208	0.01(nd)	0.063	0.85

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

Former Building 108/Underground Storage Tank Area

Figure 8 presents the sample results for the Former Building108/Underground Storage Tank (UST) Area. Except for a small lense in the extreme eastern portion of the area, the Cohansey Yellow Clay is absent beneath this source area and no perched groundwater exists. The Primary Cohansey Aquifer occurs at depths ranging from 35 to 39 feet. Most contamination is found near the top of the Primary Cohansey. COCs in the unsaturated zone are mostly found within 5 to 10 feet above the water table. COCs in the saturated zone of the Primary Cohansey are mostly found within 5 to 10 feet below the surface of the water table.

There have been more than 50 subsurface borings conducted in the area. Nearly 1,200 samples have been collected to characterize this area. These include more than 100 chemical samples and more than 1,000 NAPL field screening samples. The main contaminant present in this source area is 1,2,4 trichlorobenzene which was detected at a maximum concentration of 3,200 ppm . A statistical summary of the sample data is presented in Table 5.

TABLE 5

Statistical Summary for the Building 108/UST Area

Chemicals of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	1163	0.052	0.01(nd)	0.01(nd)	0.01(nd)
1,2,4-Trichlorobenzene	1171	3.015	0.01(nd)	0.01(nd)	0.01(nd)
1,2- Dichlorobenzene	1171	0.292	0.01(nd)	0.01(nd)	0.01(nd)
2-Chlorotoluene	1163	0.011	0.01(nd)	0.01(nd)	0.01(nd)
Chlorobenzene	1171	0.076	0.01(nd)	0.01(nd)	0.01(nd)
Naphthalene	1171	0.010	0.01(nd)	0.01(nd)	0.01(nd)
Nitrobenzene	1171	0.046	0.01(nd)	0.01(nd)	0.01(nd)
Tetrachloroethene	1171	0.015	0.01(nd)	0.01(nd)	0.01(nd)
Trichloroethene	1171	0.013	0.01(nd)	0.01(nd)	0.01(nd)

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

Equalization Basins

Figure 9 presents the sample results for the Equalization Basins. The Cohansey Yellow Clay is absent beneath the Equalization Basins, so no perched groundwater exists and the unsaturated zone extends from land surface down to the groundwater surface of the Primary Cohansey. The surface of the Primary Cohansey occurs at depths ranging from 25 to 29 feet.

The Equalization Basins have been subjected to extensive characterization. There have been more than 140 subsurface borings in the basins. More than 1,400 samples have been analyzed to characterize the basins, which includes 300 chemical samples and 1,100 NAPL field screening samples. Chemically, the unsaturated zones of the east and west basins are similar with the maximum concentration of 1,2,4-trichlorobenzene at 4,500 ppm and 1,2-dichlorobenzene at 2,200 ppm serving as major COCs representative of each basin. The unsaturated zones differ in their 2-chlorotoluene content; the west basin contains substantial quantities of 2-chlorotoluene with an average of 246 ppm while the eastern basin contains little 2-chlorotoluene with an average of 28 ppm. A statistical summary of the sample data for the Equalization Basins is presented below in Table 6.

TABLE 6

Statistical Summary for the Equalization Basins

Chemical of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	1023	0.125	0.01(nd)	0.01(nd)	0.33
1,2,4-Trichlorobenzene	1224	53.77	0.01(nd)	0.039	44.25
1,2- Dichlorobenzene	1223	21.28	0.01(nd)	0.017	21.9
2-Chlorotoluene	1047	44.11	0.01(nd)	0.01(nd)	0.61
Chlorobenzene	1216	2.79	0.01(nd)	0.01(nd)	3.09
Naphthalene	1207	1.28	0.01(nd)	0.013	1.60
Nitrobenzene	1205	3.85	0.01(nd)	0.032	3.91
Tetrachloroethene	1207	1.37	0.01(nd)	0.01(nd)	0.65
Trichloroethene	1205	0.17	0.01(nd)	0.01(nd)	0.65

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

500027

Backfilled Lagoon Area

Figures 10 and 11 present the sample results for the Backfilled Lagoon Area. Figure 10 shows the conceptual model with wastewater treatment residue present. In Figure 11, the residue has been stripped away to facilitate viewing all samples. As discussed previously, the Backfilled Lagoon Area includes five treatment lagoons (the Oxidation Lagoon, Settling Lagoon, Final Polishing Pond, Northern Sludge Drying Lagoon and Southern Sludge Drying Lagoon) and the Ocean Outfall Basin, which was constructed over the eastern end of the Final Polishing Pond.

The Cohansey Yellow Clay is absent beneath this source area, so no perched groundwater exists and the unsaturated zone extends to the top of the Primary Cohansey aquifer. The top of the Primary Cohansey occurs at depths ranging from 15 to 21 feet. Two of the Backfilled Lagoon Area subareas (the Northern and Southern Sludge Drying Lagoons) have a nearly continuous layer of sludge material approximately 2 to 4 feet below ground surface, ranging in thickness from 3 to 9 feet. Both are pictured on Figure 10. Three of the Backfilled Lagoon Area subareas (the Oxidation Lagoon, Settling Lagoon and Final Polishing Pond) have occasional lenses of sludge material mixed with low-level soil contamination and are therefore, not pictured on the figure. All residue material resides in the unsaturated zone.

There have been more than 100 subsurface borings conducted in the Backfilled Lagoon Area. More than 200 samples have been collected, which include 100 chemical samples and 100 NAPL field screening samples. Most of the higher level contamination in the area is within the residue material of the two northern lagoons (Northern Sludge Drying Lagoon and Southern Sludge Drying Lagoon). The main organic COCs are 1,2,4-trichlorobenzene which was found at a maximum concentration of 1,100 ppm, 2-chlorotoluene at 400 ppm and naphthalene at 140 ppm. Lead is an area-specific inorganic COC for the Backfilled Lagoon Area and is found at concentrations up to 1,040 ppm in the unsaturated zone. Only low-level COC concentrations are found below the water table. A statistical summary of the sample data is presented in Table 7.

500028

TABLE 7

Statistical Summary for the Backfilled Lagoon Area

Chemical of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	175	0.378	0.01(nd)	0.219	2.745
1,2,4-Trichlorobenzene	237	16.065	0.024	0.195	60.862
1,2- Dichlorobenzene	233	2.374	0.014	0.190	13.4
2-Chlorotoluene	176	9.391	0.01(nd)	0.051	56.892
Chlorobenzene	241	0.698	0.01(nd)	0.086	2.900
Naphthalene	234	4.060	0.022	0.186	25.177
Nitrobenzene	225	0.308	0.016	0.165	1.421
Tetrachloroethene	238	0.108	0.01(nd)	0.051	0.591
Trichloroethene	238	0.126	0.01(nd)	0.066	0.764
Lead	51	127.149	4.7	88.00	533.00

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

500029

Old Wastewater Treatment Plant Area (Old Wastewater Treatment Plant Area/Old Oxidation Lagoon and the Overflow Basin)

Figure 12 presents the sample results for the Old Wastewater Treatment Plant Area. As discussed previously, the source area designation "Old Wastewater Treatment Plant Area" refers to the Old Wastewater Treatment Plant Area/Old Oxidation Lagoon and the Overflow Basin. The Cohansey Yellow Clay is present beneath only the southern portion of this area. Where present, the clay ranges up to 7 feet thick and supports several feet of perched groundwater. The Primary Cohansey occurs at depths ranging from 26 to 30 feet below the surface.

There have been 19 subsurface borings conducted in the Old Wastewater Treatment Plant Area. Approximately 150 samples (50 chemical samples and 100 NAPL field screening samples) have been collected and analyzed to characterize this source area. There are no elevated levels of COCs present in the Old Wastewater Treatment Plant Area. A statistical summary of the sample data is presented in Table 8.

TABLE 8

Statistical Summary for the Old Wastewater Treatment Plant Area

Chemical of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	122	0.021	0.01(nd)	0.01(nd)	0.01(nd)
1,2,4-Trichlorobenzene	151	0.049	0.01(nd)	0.01(nd)	0.178(nd)
1,2- Dichlorobenzene	151	0.045	0.01(nd)	0.01(nd)	0.175(nd)
2-Chlorotoluene	122	0.012	0.01(nd)	0.01(nd)	0.01(nd)
Chlorobenzene	151	0.012	0.01(nd)	0.01(nd)	0.01(nd)
Naphthalene	151	0.042	0.01(nd)	0.01(nd)	0.175(nd)
Nitrobenzene	151	0.042	0.01(nd)	0.01(nd)	0.175(nd)
Tetrachloroethene	151	0.011	0.01(nd)	0.01(nd)	0.01(nd)
Trichloroethene	151	0.011	0.01(nd)	0.01(nd)	0.01(nd)

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

East Overflow Area

Figure 13 presents the sample results for the East Overflow Area. The Cohansey Yellow Clay is present beneath only a small portion of the East Overflow Area. The Primary Cohansey Aquifer occurs at a depth of about 30 feet.

A total of four subsurface borings were conducted in the East Overflow Area and seven samples were chemically analyzed to characterize this source area. There are no elevated levels of COCs present in this area. A statistical summary of the sample data is presented in Table 9.

TABLE 9

Statistical Summary for the East Overflow Area

Chemicals of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	0				
1,2,4-Trichlorobenzene	7	*0.181*	*0.175(nd)*	*0.183(nd)*	*0.195(nd)*
1,2- Dichlorobenzene	7	0.181	0.175(nd)	0.183(nd)	0.195(nd)
2-Chlorotoluene	0				
Chlorobenzene	7	0.003	0.002(nd)	0.003(nd)	0.003(nd)
Naphthalene	7	0.183	0.175(nd)	0.183(nd)	0.195(nd)
Nitrobenzene	7	0.181	0.175(nd)	0.183(nd)	0.195(nd)
Tetrachloroethene	7	0.003	0.003(nd)	0.003(nd)	0.003(nd)
Trichloroethene	7	0.003	0.003(nd)	0.003(nd)	0.003(nd)

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

Filtercake Disposal Area

Figures 14 and 15 present the sample results for the Filtercake Disposal Area. The Cohansey Yellow Clay is present beneath the entire Filtercake Disposal Area. The top of the clay ranges in depth from 30 to 40 feet. Depending on seasonal fluctuations, it is approximately 16 to 18 feet from land surface to the Upper Cohansey Aquifer. As shown on Figure 14, the upper portion of the unsaturated zone is primarily filtercake residual derived from wastewater treatment activities. The lower portion of the Filtercake Disposal Area includes unsaturated Upper Cohansey sand and the Trench Disposal Area within the Filtercake Disposal Area.

It is likely that the bottom of the Trench Disposal Area is in contact with groundwater during times of high water table in the Upper Cohansey Aquifer. During times of low water levels, the groundwater surface is below the bottom of the Trench Disposal Area. Immediately eastward of the Filtercake Disposal Area, the surface of the Cohansey Yellow Clay dips below the elevation of the surface of the Primary Cohansey Aquifer and the perched water resting on the clay intercepts the Primary Cohansey Aquifer. The surface of the Primary Cohansey occurs at a depth of approximately 38 feet.

There have been more than 50 subsurface borings and 500 samples (200 chemical samples and 300 NAPL field screening samples) in the Filtercake Disposal Area. The main organic COC present in the unsaturated zones of the Filtercake Disposal Area is chlorobenzene with a maximum concentration of 99,000 ppm. The Trench Disposal Area has high concentrations of COCs. These include high levels of chlorobenzene (99,000 ppm), naphthalene (67,000 ppm). nitrobenzene (14,000 ppm) and 1,2,4-trichlorobenzene (10,000 ppm). Mercury is an area-specific inorganic COC for the Filtercake Disposal Area. Most mercury present in the area resides in the unsaturated zone in the filtercake residue. Saturated Upper Cohansey Sands located beneath the Trench Disposal Area have high COC concentrations for nitrobenzene (5,955 ppm), naphthalene (1,848 ppm), chlorobenzene (2,400 ppm) and 1,2-dichlorobenzene (23 ppm) Saturated sands in the Filtercake Disposal Area, away from the Trench Disposal Area, have only low levels (less than 1 ppm) of COCs present. Chemical analyses of soils data from the clay indicates the clay is relatively free of COCs. This is true even beneath the Trench Disposal Area. A statistical summary of the sample data is presented in Table 10.

500034

TABLE 10

Statistical Summary for the Filtercake Disposal Area

Chemical Of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	526	0.412	0.01(nd)	0.01(nd)	0.56
1,2,4-Trichlorobenzene	549	31.667	0.01(nd)	0.06	11.97
1,2- Dichlorobenzene	549	2.449	0.01(nd)	0.08	4.77
2-Chlorotoluene	522	0.386	0.01(nd)	0.01(nd)	0.34
Chlorobenzene	551	126.253	0.01(nd)	0.03	1.51
Naphthalene	548	130.017	0.01(nd)	0.05	4.19
Nitrobenzene	548	38.029	0.01(nd)	0.07	2.15
Tetrachloroethene	551	0.627	0.01(nd)	0.01(nd)	1.26
Trichloroethene	550	0.764	0.01(nd)	0.01(nd)	0.18
Mercury (subsurface)	45	375.74	98.0	206	563.20

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

Lime Sludge Disposal Area

Figures 16 and 17 present the sample results for the Lime Sludge Disposal Area. Figure 16 shows the conceptual model with treated residue present. The treated residue is sludge material containing high levels of arsenic that has been stabilized. In Figure 17, the residue has been stripped away to facilitate viewing all samples. The Cohansey Yellow Clay is present beneath the entire Lime Sludge Disposal Area. Depending on seasonal fluctuations, it is approximately 16 to 18 feet from land surface to perched groundwater of the Upper Cohansey Aquifer. The top of the Primary Cohansey Aquifer occurs at a depth of approximately 39 feet.

The main COC in the unsaturated zone is arsenic. The presence of arsenic is limited to the treated residue material shown on Figure 16. Analyses for arsenic in soils from beneath the residue indicate that arsenic is not migrating from the residue material. This is because the area is capped to prevent appreciable quantities of leachate from forming and the treated residue has been stabilized. Based on the soil results beneath the residue, it seems that the stabilization process and the cap have been successful in preventing the migration of arsenic.

There have been 22 subsurface borings conducted at the Lime Sludge Disposal Area. Nearly 200 chemical samples and NAPL screening samples were analyzed to characterize this source area. A statistical summary for the sample data is presented in Table 11. As shown on the table, arsenic is by far the major COC present in the Lime Sludge Disposal Area.

TABLE 11

Statistical Summary for the Lime Sludge Disposal Area

Chemical of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	161	0.039	0.01(nd)	0.01(nd)	0.23
1,2,4-Trichlorobenzene	171	0.070	0.01(nd)	0.01(nd)	0.33
1,2- Dichlorobenzene	171	0.071	0.01(nd)	0.01(nd)	0.33
2-Chlorotoluene	162	0.018	0.01(nd)	0.01(nd)	0.05
Chlorobenzene	171	0.020	0.01(nd)	0.01(nd)	0.09
Naphthalene	171	0.068	0.01(nd)	0.01(nd)	0.30
Nitrobenzene	171	0.068	0.01(nd)	0.01(nd)	0.31
Tetrachloroethene	171	0.017	0.01(nd)	0.01(nd)	0.05
Trichloroethene	171	0.019	0.01(nd)	0.01(nd)	0.07
Arsenic	23	48,768	6800	57,540	198,900

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

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Drum Disposal Area/Standpipe Burner Area

Figure 18 presents the sample results for the Drum Disposal Area/Standpipe Burner Area. The Cohansey Yellow Clay is present beneath most of this source area. The clay disappears or becomes insignificant along the northeastern portion of the area. The clay is thickest in the eastern portion of the Standpipe Burner Area (up to 14 feet). In general, it thins toward the northeast until it disappears. Depending on seasonal fluctuations, it is approximately 16 to 18 feet from land surface to perched groundwater of the Upper Cohansey. The surface of the Primary Cohansey occurs at depths ranging from 33 to 36 feet.

The Drum Disposal Area/Standpipe Burner Area is well characterized. There have been nearly 150 subsurface borings conducted in the Drum Disposal Area/Standpipe Burner Area. The area is quite heterogeneous with respect to contaminant distribution and required more than 1,800 samples to characterize the chemical distribution and composition of the source area fully. These samples include 500 chemical samples and 1,300 NAPL field screening samples. Nearly all high COC concentration samples in the Drum Disposal Area are found in the unsaturated and saturated (including perched water and Yellow Clay) zones of the Standpipe Burner Area and the Stacked Drum and Non-Intact Drum subareas of the Drum Disposal Area.

The main contaminants in the unsaturated zone in the Drum Disposal Area include chlorobenzene at a maximum concentration of 20,099 ppm, 1,2-dichlorobenzene (22,768) ppm , 1,2,4-trichlorobenzene (3,400 ppm) and naphthalene (19,053 ppm). Although present at lower concentrations than in the unsaturated and perched water zones, chlorobenzene, 1,2-dichlorobenzene, 1,2,4-trichlorobenzene and naphthalene are found throughout much of the Cohansey Yellow Clay beneath the Drum Disposal Area. These same contaminants also dominate the perched groundwater zone of the Upper Cohansey Aquifer. A statistical summary of the sample data is presented in Table 12.

Drum Characterization

In 1992, a total of 315 drums were removed from six test pits in the Stacked Drum Area. The test pits contained from one to four layers of stacked drums. Only intact drums were encountered. Most of the drums exposed and removed were in good condition. In general, the categories of waste materials found in the drums agreed with historical records.

500038

TABLE 12

Statistical Summary for Drum Disposal Area/Standpipe Burner Area (Soil)

Chemical of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	1753	0.566	0.01(nd)	0.01(nd)	0.360
1,2,4-Trichlorobenzene	1814	25.664	0.01(nd)	0.01(nd)	5.000
1,2- Dichlorobenzene	1815	346.149	0.01(nd)	0.01(nd)	4.576
2-Chlorotoluene	1752	0.432	0.01(nd)	0.01(nd)	0.137
Chlorobenzene	1819	49.180	0.01(nd)	0.01(nd)	2.711
Naphthalene	1811	59.202	0.01(nd)	0.01(nd)	2.446
Nitrobenzene	1796	2.871	0.01(nd)	0.01(nd)	0.600
Tetrachloroethene	1811	5.744	0.01(nd)	0.01(nd)	0.600
Trichloroethene	1798	1.236	0.01(nd)	0.01(nd)	0.322

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

Borrow Compactor Area

Figure 19 presents the sample results for the Borrow Compactor Area. The Cohansey Yellow Clay Member is absent beneath the Borrow Compactor Area, so no perched groundwater exists. The top of the Upper Cohansey Aquifer occurs at depths ranging from 20 to 24 feet.

There have been 79 subsurface borings conducted in the Borrow Compactor Area. More than 300 samples were analyzed to characterize the source area chemically, which include nearly 200 chemical samples and more than 100 NAPL field screening samples. The presence of COCs on the area is limited to the unsaturated zone. The main COCs present are 1,2,4-trichlorobenzene at a maximum concentration of 2,400 ppm and naphthalene at 1,800 ppm . A statistical summary of the sample data is presented in Table 13.

TABLE 13

Statistical Summary for the Borrow Compactor Area

Chemicals of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	172	0.73	0.01(nd)	0.01(nd)	0.239
1,2,4-Trichlorobenzene	220	11.082	0.01(nd)	0.170	0.550
1,2- Dichlorobenzene	220	4.708	0.01(nd)	0.170	1.050
2-Chlorotoluene	172	0.065	0.01(nd)	0.01(nd)	0.046
Chlorobenzene	221	2.321	0.01(nd)	0.01(nd)	0.295
Naphthalene	222	11.368	0.01(nd)	0.170	0.550
Nitrobenzene	219	0.341	0.01(nd)	0.170	0.550
Tetrachloroethene	219	0.318	0.01(nd)	0.01(nd)	0.296
Trichloroethene	219	3.505	0.01(nd)	0.01(nd)	0.296

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

Casual Dumping Area

Figure 20 presents the sample results for the Casual Dumping Area. The Cohansey Yellow Clay occurs beneath a small portion of the Casual Dumping Area. The top of the Primary Cohansey Aquifer occurs at depths ranging from 30 to 35 feet.

There have been 19 subsurface borings conducted in the Casual Dumping Area. A total of 30 chemical samples were analyzed to characterize the source area. There are very low levels of 1,2,3-trichloropropane with a maximum concentration of .23 ppm, 1,2,4-trichlorobenzene at .39 ppm, 1,2-dichlorobenzene at .39 ppm, and nitrobenzene at.39 ppm present in this area. A statistical summary of the sample data is presented in Table 14.

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TABLE 14

Statistical Summary for the Casual Dumping Area

Chemical of Concern	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	10	0.210	0.205(nd)	0.215(nd)	0.231
1,2,4-Trichlorobenzene	33	0.155	0.170(nd)	0.182(nd)	0.365(nd)
1,2- Dichlorobenzene	33	0.161	0.170(nd)	0.182(nd)	0.365(nd)
2-Chlorotoluene	10	0.102	0.048(nd)	0.050(nd)	0.349
Chlorobenzene	33	0.025	0.005(nd)	0.026(nd)	0.079(nd)
Naphthalene	33	0.156	0.170(nd)	0.182(nd)	0.365(nd)
Nitrobenzene	33	0.155	0.170(nd)	0.182(nd)	0.365(nd)
Tetrachloroethene	33	0.017	0.005(nd)	0.023(nd)	0.049(nd)
Trichloroethene	33	0.021	0.005(nd)	0.028(nd)	0.063(nd)

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

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Calcium Sulfate Disposal Area

Figure 21 presents the sample results for the Calcium Sulfate Disposal Area. The Cohansey Yellow Clay is absent beneath the Calcium Sulfate Disposal Area, so no perched groundwater exists. The top of the Primary Cohansey Aquifer occurs at a depth of approximately 38 feet.

There have been three subsurface borings conducted in the Calcium Sulfate Disposal Area. Thirteen chemical samples were analyzed to characterize this source area. Only low levels of COCs have been detected in the area. A statistical summary of the sample data is presented in Table 15.

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TABLE 15

Statistical Summary for the Calcium Sulfate Disposal Area

Chemicals of Concern	N	Mean (ppm)	50th Median (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	0				
1,2,4-Trichlorobenzene	10	0.201	0.178(nd)	0.232(nd)	0.285(nd)
1,2- Dichlorobenzene	10	0.181	0.175(nd)	0.194(nd)	0.253(nd)
2-Chlorotoluene	0				
Chlorobenzene	7	0.004	0.004(nd)	0.004(nd)	0.005(nd)
Naphthalene	10	0.182	0.175(nd)	0.194(nd)	0.253(nd)
Nitrobenzene	10	1.011	0.307(nd)	0.759(nd)	3.830
Tetrachloroethene	7	0.004	0.004(nd)	0.004(nd)	0.005(nd)
Trichloroethene	7	0.004	0.004(nd)	0.004(nd)	0.005(nd)

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

Fire Prevention Training Area

Figure 22 presents the sample results for the Fire Prevention Training Area. The Cohansey Yellow Clay is absent beneath the Fire Training Prevention Area, so no perched groundwater exists. The source area is located immediately adjacent to the Toms River and a large meander occurs in the river channel in this vicinity. The top of the Primary Cohansey Aquifer occurs at an approximate depth of 23 feet.

There have been 13 subsurface borings conducted in the Fire Prevention Training Area. A total of 31 chemical samples were analyzed to characterize this source area. COCs are present in the unsaturated zone in very low concentrations. A statistical summary of the sample data is presented in Table 16.

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TABLE 16

Statistical Summary for the Fire Prevention Training Area

Chemical	N	Mean (ppm)	50th (ppm)	70th (ppm)	95th (ppm)
1,2,3-Trichloropropane	11	0.225	0.225(nd)	0.228(nd)	0.246(nd)
1,2,4-Trichlorobenzene	29	0.293	0.170(nd)	0.175(nd)	0.380(nd)
1,2- Dichlorobenzene	29	0.221	0.170(nd)	0.175(nd)	0.210
2-Chlorotoluene	11	0.050	0.052(nd)	0.053(nd)	0.057(nd)
Chlorobenzene	29	0.033	0.003(nd)	0.076(nd)	0.085(nd)
Naphthalene	29	0.218	0.170(nd)	0.175(nd)	0.210(nd)
Nitrobenzene	29	0.222	0.170(nd)	0.175(nd)	0.210(nd)
Tetrachloroethene	29	0.022	0.004(nd)	0.046(nd)	0.052(nd)
Trichloroethene	29	0.027	0.003(nd)	0.060(nd)	0.067(nd)

Notes:

N = Number of samples

nd = non detect

Mean = Arithmetic average concentration

50th = For the data set, 50% of values were below and 50% of the values were above this concentration

70th = For the data set, 70% of values were below and 30% of the values were above this concentration

95th = For the data set, 95% of values were below and 5% of the values were above this concentration

Marshland Area

Since there is no indication that the Marshland Area was ever used for waste disposal, the area was not characterized in the same manner as the other source areas. However, it was investigated to determine the impact of direct contact with surface water, sediments and air in this area. The results of this evaluation is discussed under Summary of Site Risks.

CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

As discussed previously, the Site covers approximately 1,350 acres. Of this total, 72 acres are in Manchester Township and are zoned Residential; 39 acres are in Dover Township, east of Oak Ridge Parkway (physically separate from the main plant) and are zoned Conservation-Residential; and the remaining 1,240 acres represent Dover Township's largest single tract of industrially-zoned land. One other property owned by Ciba in Dover Township, which consists of approximately one acre of industrial land adjacent to the main Site, is currently subject to a 99-year lease with the Dover Township Volunteer Fire Department for use as a fire station. Over the years, approximately 320 acres of the 1,240 acres of industrial land were developed for manufacturing operations, waste treatment and disposal activities. The other acreage remains undeveloped.

As shown on Figure 23, the Site is bordered on the north by the Pine Lake Park residential neighborhood of Manchester Township, a densely populated lakeside community of single-family homes. Other than this northern boundary, all other borders are in Dover Township. On the northeast, the Site is bordered by the Toms River and by undeveloped land, zoned Conservation-Residential. While this area is zoned for residential use, it is unlikely that any future construction will occur due to the land's proximity to the banks and floodplain of the Toms River. On the east, Winding River Park borders the Site, which is also in the Conservation-Residential zone. The 480-acre Winding River Park is Dover Township's largest town-owned and operated recreational facility.

Adjacent to the southern border of the Site are two different zones, Residential and Rural Highway Business (RHB), a commercial zone, along Route 37. The RHB zone allows a variety of retail and wholesale shops, service establishments and office space. On the southeast, the Site is bordered by the Oak Ridge residential subdivision, which contains approximately 500 single-family homes. Finally, the Site is bordered on the west and southwest by the Toms River Industrial Park, a 150-acre parcel established by Dover Township for industrial development. The town's industrial zone allows a variety of manufacturing, fabrication and other industrially-related operations. Several industrial operations are active in this park.

As discussed previously, institutional controls are in place to prevent installation of off-site private drinking water wells within the groundwater plume. Drinking water in the area of the Site is provided by supply wells that are owned by the United Water Company. Sampling has confirmed

that contaminated groundwater from the Site is not impacting the public drinking water supply. The purpose of the groundwater remedy is to prevent future off-site migration of contaminated groundwater and draw the contaminant plume back toward the Site. Under the current land use, no on-site groundwater receptors exist. The groundwater extraction, treatment and recharge system will continue to operate until the groundwater cleanup standards for aquifer restoration are met. The system consists of a number of extraction wells, a state-of-the-water treatment facility, and recharge areas for the treated groundwater.

Potential Future Land Use

Figure 24 depicts a potential future land use plan for the Site based on evaluation of the current site conditions and surrounding neighborhood:

- The undeveloped portion of the Site is considered available for unrestricted use. As stated previously, this area is currently industrially-zoned.

- The developed portion of the Site that does not require remediation, or for which no operation and maintenance is necessary, will be a commercial/industrial/recreational use area.

- The active waste management area, which includes the wastewater treatment plant to the active landfill, is considered a restricted waste management area with no future development planned.

The local government has the primary responsibility for the ultimate land use at the Site. EPA will ensure that any future development efforts do not impact the selected remedial activities.

SUMMARY OF SITE RISKS

As stated previously, the risks posed by the groundwater plume are being addressed by the OU1 groundwater remedy. Therefore, this section addresses those risks associated with direct contact with surface soils in the source areas and exposure to surface water, sediments and air in the Marshland Area. In August 1998, a baseline human health risk assessment for the surface soil in the source areas was completed. This assessment provided quantitative estimates, in accordance with currently-accepted guidance, of the carcinogenic risks and noncarcinogenic health hazards associated with potential exposure to chemical contaminants in surface soils (defined as the 0 to 2-foot soil interval) without any further remediation of the Site.

The following four-step process was utilized to assess site-related human health risks associated with surface soils in the source areas.

Hazard Identification: In this step, the contaminants of concern (COCs) in the source area surface soils were identified based on such factors as toxicity, frequency of occurrence, and fate and

transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation. This list of COCs is different from the one presented earlier in this document, in the section entitled Site Characteristics. It was used to evaluate the risks associated with directly contacting surface soils in the source areas; the list presented earlier was used in assessing the impact of contamination in the source areas on the groundwater, however, the lists include many of the same contaminants. The COCs used in the risk assessment were designated by source area and are presented in Table 17.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step were evaluated. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a "reasonable maximum exposure" scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, was calculated.

Ten of the potential source areas were quantitatively evaluated for potential health threats to human receptors via the exposure routes of ingestion, dermal contact, and inhalation of surface soil. The remaining areas were not included in the assessment primarily because they were inaccessible (no exposure pathway existed) or only low levels of contamination were found. For the areas considered, potential receptors that were evaluated included trespassers, residents, site workers and construction workers. Since the Site is currently inactive, each of these scenarios, excluding trespassers, represents a potential future use of the Site.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) were determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects. Toxicity Data for the risk assessment were provided by the IRIS database, HEAST, and EPA's National Center for Environmental Assessment.

Risk Characterization: This step summarized and combined outputs of the exposure and toxicity assessments to provide a quantitative assessment of risks posed by the Site. Exposures were evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. For carcinogens, risks were expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

Table 17

CIBA-GEIGY CORPORATION SITE
SUMMARY OF CHEMICALS OF POTENTIAL CONCERN BY SOURCE AREA

CALCIUM SULFATE DISPOSAL AREA	LIME SLUDGE DISPOSAL AREA	FIRE PREVENTION TRAINING AREA	FILTERCAKE DISPOSAL AREA	BORROW/COMPACTOR AREA
Nitrobenzene	Arsenic	Antimony	Heptachlor Epoxide	Aroclor 1254
Heptachlor Epoxide	Chromium VI	Arsenic	Dieldrin	Antimony
Arsenic	Mercury	Barium	Antimony	Arsenic
Barium	Vanadium	Vanadium	Arsenic	Barium
Beryllium		Zinc	Chromium VI	Beryllium
Chromium VI			Mercury	Chromium VI
Mercury			Vanadium	Mercury
Nickel				Nickel
Vanadium				Vanadium
				Zinc

CASUAL DUMPING AREA	BACKFILLED LAGOON AREA	DRUM DISPOSAL AREA	WEST EQUALIZATION BASIN AREA	PRODUCTION AREA
Benzo(a)anthracene	Nitrobenzene	Arsenic	Benzyl Chloride (TIC)	Dibenzo(a,h)anthracene
Benzo(b)fluoranthene	Heptachlor Epoxide	Chromium VI	1,4-Dichlorobenzene	Benzo(a)anthracene
Benzo(k)fluoranthene	Arsenic	Mercury	1,2-Dichlorobenzene	Benzo(b)fluoranthene
Benzo(a)pyrene	Chromium VI	Vanadium	(TIC and TCL)	Benzo(k)fluoranthene
Indeno(1,2,3-cd)pyrene	Mercury		Nitrobenzene	Benzo(a)pyrene
4,4'-DDT	Vanadium		1,2,4-Trichlorobenzene	Heptachlor
Alpha-Chlordane			(TIC and TCL)	Heptachlor Epoxide
Gamma-Chlordane			Heptachlor Epoxide	Endosulfan
Aroclor 1248			Antimony	4,4'-DDT
Antimony			Arsenic	Alpha-Chlordane
Arsenic			Mercury	Gamma-Chlordane
Beryllium				Aroclor 1254
Chromium VI				Aroclor 1260
Mercury				Antimony
Nickel				Arsenic
Thallium				Barium
Vanadium				Beryllium
Zinc				Chromium VI
				Mercury
				Nickel
				Vanadium
				Zinc

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Risk = CDI x SF

where: **Risk** = a unitless probability (*e.g.*, 2 x 10^{-5}) of an individual's developing cancer.
CDI = chronic daily intake averaged over 70 years (mg/kg-day), this is based on the reasonable maximum exposure calculated for the Site.
SF = slope factor (a measure of toxicity/unit volume for a particular exposure type), expressed as (mg/kg-day)-1.

These risks are probabilities that usually are expressed in scientific notation (*e.g.*, 1x10^{-6}). An excess lifetime cancer risk of 1x10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to the sun. EPA's generally acceptable risk range for site-related exposures is 10^{-4} to 10^{-6}. NJDEP statue requires site-related exposures not to exceed a 1x10^{-6} excess lifetime cancer risk..

The potential for noncarcinogenic effects was evaluated by comparing an exposure level over a specified time period (*e.g.*, life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any negative effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ less than 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic noncarcinogenic effects from that chemical are unlikely. The hazard index (HI) is generated by adding the HQs for all chemical(s) of concern that affect the same target organ (*e.g.*, liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An HI less than 1 indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic noncarcinogenic effects from all contaminants are unlikely. An HI greater than 1 indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

Non-cancer **HQ = CDI/RfD**

where:

CDI = Chronic daily intake
RfD = reference dose.

CDI and RfD are expressed in the same units and represent the same exposure period (*i.e.*, chronic, subchronic, or short-term).

Although all source areas pose some risk, particularly to the groundwater, only the Filtercake Disposal Area exceeds EPA's acceptable threshold values for carcinogens and noncarcinogens for

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the inhalation and ingestion routes of exposure in surface soils, based on potential future residential, site worker and construction worker land use scenarios. The details of the exceedances are presented in Table 18. For several of these scenarios, part of the exceedance is related to the pesticide heptachlor epoxide. This chemical was not manufactured at the Site or used in the manufacturing process and its presence appears to be related to typical pesticide applications.

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TABLE 18

Summary of Unacceptable Risks

Source Area	Scenario	Pathway	Contaminant	Carcinogenic Risk	Non-Carcinogenic Risk (HQ)
Filtercake Disposal Area	**Site Worker**	**Ingestion**	Heptachlor Epoxide		2.6E-02
			Dieldrin		2.5E-03
			Antimony		3.0E-02
			Arsenic		2.6E-01
			Chromium VI*		3.7E-02
			Mercury		8.7E-01
			Vanadium		1.3E-02
Total Risk Related to Scenario/Pathway:					**1.2E+00**
Filtercake Disposal Area	**Site Worker**	**Inhalation**	Heptachlor Epoxide	3.6E-08	
			Diedrin	2.4E-08	
			Arsenic	1.4E-05	
			Chromium VI*	9.3E-05	
Total Risk Related to Scenario/Pathway:				**1.1E-04**	

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TABLE 18

Summary of Unacceptable Risks

Source Area	Scenario	Pathway	Contaminant	Carcinogenic Risk	Non-Carcinogenic Risk (HQ)
Filtercake Disposal Area	**Residential - Adults**	**Ingestion**	Heptachlor Epoxide	2.9E-06	7.2E+00
			Dieldrin	2.0E-06	7.1E-03
			Antimony		8.4E-02
			Arsenic	1.3E-04	7.2E-01
			Chromuium VI*		1.0E-01
			Mercury		2.4E+00
			Vanadium		3.7E-02
Total Risk Related to Scenario/Pathway:				**1.3E-04**	**1.1E+01**
Filtercake Disposal Area	**Residential - Children**	**Ingestion**	Heptachlor Epoxide	6.4E-06	6.3E+01
			Dieldrin	4.3E-06	6.2E-02
			Antimony		7.4E-01
			Arsenic	2.8E-04	6.3E+00
			Chromium VI*		2.3E-01
			Mercury		2.1E+01
			Vanadium		3.2E-01
Total Risk Associated with Scenario/Pathway:				**2.9E-04**	**9.2E+01**

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TABLE 18

Summary of Unacceptable Risks

Source Area	Scenario	Pathway	Contaminant	Carcinogenic Risk	Non-Carcinogenic Risk (HQ)
Filtercake Disposal Area	**Construction Worker**	**Ingestion**	Heptachlor Epoxide	1.9E-01	
			Dieldrin	1.9E-02	
			Antimony	2.3E-01	
			Arsenic	1.9E+00	
			Chromium VI*	6.9E-02	
			Mercury	6.5E+00	
			Vanadium	9.8E-02	
Total Risk Associated with Scenario/Pathway:				**9.1E+00**	

Note:

* Chromium VI concentrations were calculated from the total Chromium concentration. Later measurements of Chromium VI in this area were well below the estimated values.

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Based on public concerns, and the knowledge that many chemicals used in dye manufacturing are not on the Target Compound List (those compounds typically included in standard analytical testing procedures), and generally do not have adequate toxicological human health data to perform a toxicity assessment, a qualitative analysis of the Tentatively Identified Compounds (TICs) identified in surface soil samples was also performed for the Site. A total of 147 TICs were identified in the surface soil data. A screening protocol was established to develop a list of TICs for further evaluation.

Application of the screening protocol identified 14 surface soil TICs and toxicity profiles were developed for these chemicals. Toxicity data obtained for the 14 TICs were inadequate to develop quantitative benchmarks of toxicity in the form of cancer slope factors or reference doses. Therefore, these compounds were qualitatively evaluated. The results of this evaluation did not alter the outcome of the quantitative risk analysis, since TICs were generally detected at lower concentrations and less frequently than the COCs evaluated, and no available data indicated that any were significantly more toxic than the COCs. It should be noted, however, that TICs were carried through the FS process and were considered quantitatively in treatability studies of technologies under consideration for the Site, and qualitatively in the evaluation of remedial alternatives. This involved an analysis of the ability of the technology or alternative to address the TICs identified in the source areas and the classes of dye-related chemicals likely to be presented in the source areas.

Discussion of Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- environmental chemistry sampling and analysis
- environmental parameter measurement
- fate and transport modeling
- exposure parameter estimation
- toxicological data

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there is uncertainty as to the actual levels present. Environmental chemistry analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled. However, the large number of samples collected in the source areas at the Ciba Site reduces this uncertainty by a considerable degree.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with the COCs, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the COCs at the point of

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exposure.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk characterization provides upper bound estimates of the risks to exposed individuals, and is highly unlikely to underestimate actual risks related to the Site.

Marshland Area and Ecological Risk Assessment

There is no indication that the Marshland Area was ever used for waste disposal, however, previous investigations have determined that groundwater leaving the Site discharges to the Marshland Area. In the past, these discharges resulted in elevated concentrations of site-related organic and inorganic contaminants in this area. The quantitative baseline public health evaluation that was conducted in 1988 as part of the OU1 RI/FS concluded that marshland sediment and marshland air may result in completed exposure pathways through the ingestion, dermal contact and/or inhalation exposure routes.

Following the 1988 study, EPA conducted additional sampling in the Marshland Area. The sampling was performed to better characterize the area wetlands and Toms River. The testing results indicated that contaminant levels were lower that the previous study.

In 1994, EPA completed a Wetlands Characterization and Ecological Assessment to evaluate potential risks to the environment associated with site contaminants. The wetlands along the Toms River, including the Marshland Area, and the river itself, represent the most like pathway for ecological impacts related to the Site. Based on this assessment, it was determined that aquatic flora and fauna are the most likely ecological receptors to be exposed to chemicals in the surface water and sediment of the marshland and river. Exposure could occur through respiration, direct contact, or incidental ingestion while foraging. Bioaccumulation is not an important issue given that most of the chemicals detected in the marshland do not significantly accumulate in aquatic life and that no accumulation of site-associated chemicals was detected during an *in situ* exposure study (i.e., fish bioaccumulation study) conducted by EPA in 1992.

Exposure to receptors in the Marshland Area would likely be greatest at the point where groundwater discharges to the surface. Receptors in the Toms River could be exposed if chemicals are transported from the Marshland Area to the river. Since the OU1 groundwater extraction system prevents future discharge of contaminated groundwater to the Marshland Area, data from previous studies will overestimate current and potential future exposures. Nevertheless, this baseline data can be used to provide a "worst-case" estimate of conditions in the Marshland Area and adjacent Toms River under current and potential future conditions.

During the OU2 RI, volatile organic chemicals (VOCs) and semi-volatile organic chemicals (SVOCs) were detected in Marshland Area sediments, surface waters and air. In general, concentrations were greatest in sediments; concentrations in water and air were up to several orders of magnitude less than concentrations in sediments. For example, concentrations of total VOCs ranged from 0.069 to 32 parts per million in sediments, but were 0.036 to 0.369 ppm in surface waters and were 0.002 to 0.381 ppm by volume in air. (It should be noted that all the air results were reported as estimated values. The highest air result is inconsistent with all previous sampling events and appears to be a sample anomaly.) Concentrations of total SVOCs ranged from 0.093 to 6.0 ppm in sediments, and were 0.005 to 0.024 ppm in surface waters; air was not sampled for SVOCs due to their low volatility. In general, metals were found to be within the range of concentrations typical for local or regional background conditions. Current and future concentrations are likely to be lower, as noted above, due to implementation of the OU1 groundwater extraction and treatment system.

Based on the baseline data, the Marshland Area does not appear to act as a secondary source of contaminants to receptors in the Toms River. Samples collected during the baseline study indicated that substantially fewer chemicals were present in the river water and sediments than in the Marshland Area water and sediments. Chemicals that were found in the river were detected at lower frequencies and concentrations than in the Marshland Area. In fact, the quality of river water in the study area was comparable to that of the upstream reference stations.

During the wetlands characterization and ecological assessment, solid-phase sediment toxicity tests (10-day exposures) were conducted using the amphipod *Hyalella azteca* to investigate the possibility that chemicals detected in the Marshland Area could exert a toxic effect on sensitive marshland receptors. Results indicate that sediments taken from the marshland locations exerted adverse effects on test organism survival in the laboratory, but that these effects were not necessarily due to chemicals in marshland sediments. Instead, the adverse effects were determined to be due to pH differences (unrelated to the Site) in the Marshland Area samples.

No identifiable effects on biota were observed in the waters of Toms River. A series of site-specific ecological investigations, including macroinvertebrate surveys, fish bioaccumulation studies, and sediment bioassays, were included in the wetland characterization and ecological assessment. No impairment of the macroinvertebrate communities could be attributed to chemicals from the Site. In addition, the presence of specific macroinvertebrate taxa that are highly sensitive to pollution (e.g., *Ephemeroptera*, *Plecoptera*, and *Trichoptera*) provides evidence of the generally good water quality of the Toms River. Furthermore, tissue analysis of caged brown bullhead and brook trout exposed to Toms River waters for 14 days indicated no bioaccumulation of site-related chemicals. The sediment toxicity test results indicated no adverse effects on amphipod growth or survival for the sediments collected from the Toms River.

REMEDIAL ACTION OBJECTIVES

The objectives of the remedial action at the Site are twofold; to address the potential risks associated with direct contact with surface soils, and to shorten the timeframe for the OU1 groundwater remedy to achieve the groundwater restoration goals established in the 1993 ESD.

Risk-Based Preliminary Remediation Goals (PRGs) were developed to address potential direct-contact risks in the Filtercake Disposal Area under various future use scenarios. As a result, one of these scenarios, residential development, will be restricted in this area. The most realistic future land use is a restricted commercial/industrial use scenario involving a site worker. The only future construction activities that may occur in the Filtercake Disposal Area would be related to OU2 remediation efforts. Appropriate health and safety measures would be taken to prevent potential short-term risk to workers engaged in remedial activities. The potential long-term risks associated with direct contact in this area can be addressed in several ways. The remedial alternatives developed for the Site focus on addressing this risk by capping the area and preventing contact with surface soils.

Table 19 provides the surface soil PRGs calculated for the Filtercake Disposal Area under various scenarios.

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TABLE 19

Risk-Based Preliminary Remediation Goals (PRGs) for Surface Soils

SITE WORKER:

	Risk-Based PRGs (mg/kg)
	Carcinogens
Chemical:	**10^{-6}**
Arsenic	3.3
Chromium VI*	1328

* Analyzes conducted after the completion of the risk assessment indicated that this contaminant was not detected in high concentrations in the Filtercake Disposal Area.

RESIDENTIAL:

	Risk-Based PRG (mg/kg)
	Carcinogens
Chemical:	**10^{-6}**
Heptachlor Epoxide	0.07
Arsenic	0.38
	Noncarcinogens
Heptachlor Epoxide	3.8
Arsenic	87
Mercury	87

CONSTRUCTION WORKER:

	Risk-Based PRGs (mg/kg)
	Carcinogens
Chemical:	**10^{-6}**
Arsenic	11
	Noncarcinogens
Chemical:	
Arsenic	82
Mercury	82

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The first step in determining the impact of the source areas on the groundwater cleanup was to utilize a geostatistical model to develop a conceptual model of the contamination in each source area. This allowed the source area information to be input into a site-specific groundwater model to define the impact of contamination in the source areas on groundwater quality. This model, which is referred to as the Site Contaminant Transport Model (CTM), utilized a source model, transport model and flow model to estimate the mass moving from each source area to the groundwater and the effect of this contaminant migration on groundwater quality.

The CTM was developed, verified, and implemented as follows:

As a surrogate for reality The CTM is a "model" of reality that is closely tied to field data. The CTM includes the important physical processes that govern how and where contamination is moving from the source areas to the groundwater, and once in the groundwater, the ultimate fate of that contamination (i.e., extracted by a pumping well). The CTM was calibrated and verified as an acceptable model of reality by comparing model predictions with site-specific data associated with past and current conditions at the Site. Figure 25 illustrates the iterative process used to calibrate the CTM for use in the development of PRGs.

As a tool to predict future conditions at the Site Once accepted as a surrogate for reality based on recreating past and current conditions, the CTM was used to predict future conditions at the Site by defining the relationship between contamination entering the groundwater at the source areas and future groundwater quality. It is in this role that the CTM was used to define impact-to-groundwater PRGs. The goal of these PRGs is to achieve the groundwater restoration standards established in the 1993 ESD within a reasonable timeframe. In addition, the CTM was used to assess how different cleanup scenarios would affect future groundwater quality.

As discussed previously, the CTM used three sub-models to represent the movement of contaminants from the source areas to the groundwater.

Sub-model 1: The Groundwater Flow Model: Defines how groundwater moves throughout the Site. This includes all major influences on groundwater flow: geologic (i.e., the aquifer consists of layered sand, silt, and clay), and hydrologic (i.e., infiltration from rainfall, the Toms River, and water extraction wells).

Sub-model 2: The Source Model: Defines the movement of contaminants from the source areas into the groundwater. Given an estimate of how much water flows through a source area (from the flow model) and the nature and extent of contamination in the source area, estimates how much chemical mass moves from the source areas to the groundwater over time.

Sub-model 3: The Transport Model: Defines the geometry of the plumes that emanate from the sources, where plume geometry is mostly controlled by the location of the source and the direction of groundwater flow (from the flow model). Transport parameters that affect concentrations in the plume include the level of contamination in the source, dispersive mixing,

chemical adsorption to the soil, and biological decay.

Source Characterization

The Contaminant Transport Model (CTM) cannot use the source characterization data in the form presented in the Site Characteristics section of this ROD. However, this data was used to develop a geostatistical representation of contamination in the source areas that was input in the CTM, used to define Preliminary Remediation Goals (PRGs) and make cleanup decisions. This involved the construction of a block model for each source area. A block model is used to partition the source area into three-dimensional blocks of uniform size called source blocks. The size of each source block, 25 feet by 25 feet by 2 feet (i.e., approximately 47 cubic yards), represents the smallest cleanup unit, or smallest volume than can be practically excavated using conventional equipment.

The next step in the construction of the block models was to link the block model with the data collected in the source areas. Each source block possesses a number of attributes, including soil type and a concentration estimate for each COC. The concentration estimates were derived using geostatistical software and an inverse-distance calculation.

A source block is too small an entity from which to move into the CTM; therefore, working blocks were formed by combining source blocks with similar properties into much larger blocks. Large-scale working blocks are more suitable for providing information on the source areas to the CTM. Source blocks, however, remain more suitable for determining PRGs.

Typically, a working block includes several hundred to several thousand source blocks. The criteria upon which source blocks may be combined into working blocks include:

- Similar soil type (i.e., clay vs. sand)
- Similar matrix (i.e., soil vs. non-soil material)
- Similar hydrology (i.e., above or below the water table)
- Similar chemical concentration (i.e., high concentration areas vs. low concentration areas)

The next step is to develop a single concentration estimate for each COC within each working block. This estimate is an arithmetic average of the COC concentration in each source block included in the working block. The COC concentration estimate for each working block is then multiplied by the volume and density of the block to produce a chemical mass estimate for each COC. These mass estimates can then be used in the CTM. Figure 26 provides an example of a source block representation for the Filtercake Disposal Area. Figure 27 shows working blocks one and two for this area. There are a total of five working blocks in the Filtercake Disposal

Area. The OU2 FS provides more information on the development of source blocks and working blocks in the other source areas.

Developing Preliminary Remediation Goals (PRGs)

A two-step approach was used to determine the impact-to-groundwater PRGs for the Site using the CTM.

Step 1: Determine *Time of Compliance (TOC)* - under different cleanup scenarios, assess the time it takes for the aquifer to be restored.

Step 2: Determine *PRGs* - quantify the necessary level (i.e. volume) of source area remediation so the groundwater quality standards are met at a particular TOC.

The first step in determining the PRGs for the Site was to develop a target TOC. This target represented the best-case scenario timeframe for achieving the groundwater restoration goals. This best-case TOC is the timeframe necessary to clean up the existing plume (assuming no further leaching from the source areas) with the current groundwater extraction, treatment, and recharge system in place. Based on these assumptions, the best-case TOC was determined by the CTM to be approximately 30 years. In contrast, it will take hundreds of years to achieve groundwater remediation goals if the source areas are not addressed. The actual TOC will likely be longer than the best-case scenario, regardless of the PRGs established for the Site, primarily because there is contamination beneath the water table and within the Cohansey Yellow Clay that cannot be removed for treatment or disposal. Although this material can be addressed in place using in-situ treatment technologies and/or containment, these options cannot completely eliminate the leaching of contaminants from these areas.

The procedure for generating PRGs for the unsaturated zone sources consisted of the following steps:

1. Systematically removing a specific volume of soil (a certain number of source blocks) from the working block. Source blocks with the highest levels of contamination were removed first.

2. Adjust the source model leaching parameters to represent the contaminant mass remaining in the working block.

3. Run the source model to determine the concentration of each of the nine COCs in the leachate (water leaving the source area) after 30 years (the best-case TOC).

Determine whether the groundwater restoration standards have been met for all nine COCs. If they have, the current volume is the PRG for the working block. If not, repeat steps 1 to 3 until

either all nine COCs meet the standard, or there is no significant improvement in leachate water quality for additional volume removed.

To model the impact of remediating sources beneath the water table, an assumption was made that a containment approach would be utilized for those sources in and below the Cohansey Yellow Clay. In-situ bioremediation was modeled as the remedy for those sources in areas where the Yellow Clay is not present. The containment approach was estimated to be 99% effective in isolating contamination from the aquifer. The effectiveness of in-situ bioremediation was COC dependent, varied from 50% - 90%, and was based on the results of an in-situ bioremediation pilot test conducted at the Site.

For sources above the water table, an assumption was made that remediating this material will reduce leaching from the remediated soil so that "clean" groundwater that contacts this material will meet groundwater restoration standards. The CTM incorporates this assumption by eliminating (setting COC concentrations to non-detect) those source blocks within the working block that have been "remediated." Therefore, for the treatment alternatives, the underlying assumption behind PRG development is that treatment will effectively eliminate the material's potential to impact groundwater above the groundwater restoration standards.

PRG Results

PRGs have been developed for contaminated material above the water table in each source area. These PRGs represent the volume of material that must be removed from each source area and treated on site or taken off site for treatment and/or disposal. The removal of this material is intended to facilitate the groundwater cleanup. An area by area summary of PRGs is presented in Table 20. PRGs were not developed for contaminated material below the groundwater, since removing this material below the groundwater would be difficult. Contamination below the groundwater can be treated without removal (in-situ) and these types of treatments will focus on the entire zone of contamination below the groundwater and not on a volume of contaminated material. Figures 28 through 34 provide a 3-D illustration of the source blocks representative of PRG volumes. These contaminants present in the material included in the PRGs meet EPA's definition of Principal Threat Wastes, since these contaminants are likely to migrate into the groundwater at the Site.

TABLE 20

Area-Specific PRG Volumes

Plume	Area	PRG Volume (cubic yards)
		Material to be remediated by Ex-situ Treatment
South	Drum Disposal Area/Standpipe Burner Area	75,050
	Filtercake Disposal Area/Trench Disposal Area	22,950
	Lime Sludge Disposal Area	0
North	Equalization Basins	22,600
	Backfilled Lagoon Area	25,000
	Former South Dye Area	4,200
	Former Building 108/UST Area	400
	Borrow Compactor Area	1250
Total Volume		**151,450**

DESCRIPTION OF ALTERNATIVES

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) requires that each remedial alternative be protective of human health and the environment, be cost effective, comply with other statutory laws, and utilize permanent solutions and alternative treatment technologies and resource recovery technologies to the maximum extent practicable. In addition, the statute includes a preference for the use of treatment as a principal element for the reduction of toxicity, mobility or volume of hazardous substances.

Remedial Alternatives for the Ciba-Geigy Site are presented below. The components of each alternative, with the exception of Alternative 5a, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material, are discussed in detail in the final OU2 FS report. The alternatives are numbered to correspond with the designations in the OU2 FS report, with the exception of Alternative 5a. Many components of these alternatives are the same. The following paragraphs will highlight the similarities and differences in the alternatives.

Each alternative is presented with its respective cost and timeframe. The cost figures include both

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the capital costs associated with performing the remedial work and the costs associated with any long-term operation and maintenance (O&M) of the remedy. A two percent discount rate was used to calculate the present worth value of the capital and O&M costs.

The timeframes presented represent the estimated time required for mobilization, operation and demobilization of the remedial work. These timeframes do not include long-term O&M which is generally based on a thirty year period. Notwithstanding, the thirty year timeframe typically used to develop cost estimates, O&M will actually be required for longer periods for some alternatives. O&M is mainly associated with the sampling requirements for those components of each alternative that involve containing the contaminated material in place. The timeframes also do not include the time needed to negotiate the agreement between EPA and Ciba that would provide for Ciba to perform the cleanup work, or the time required to design the remedy, conduct public outreach sessions, and select a contractor to perform the cleanup work. The Agency intends to continue the high level of public participation during the design of the OU-2 remedial work at this site to ensure the public has early input to the implementation of the selected remedy. It is estimated that these pre-cleanup activities will be completed within two years after this ROD is signed.

All of the alternatives include restrictions on the long-term use of certain portions of the site.

Long-term Use Restrictions will prevent certain uses in areas of the site where waste materials are capped or other long-term remediation activities are in place. These restrictions were presented in the Current and Potential Future Land and Resource Uses section of this ROD. The restrictions will be enforced by deed restrictions placed on the site by Ciba, the property owner.

Alternative 1, No Action: The no action alternative is considered in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and provides a baseline for comparison with the other alternatives. Under this alternative, the groundwater cleanup and containment systems in place at the Site would remain, however, there will be no additional cleanup activities in the source areas. Groundwater treatment would continue at the Site until groundwater standards are achieved.

Cost: $0

Timeframe: N/A

The remaining alternatives include the excavation of drums from the Drum Disposal Area and the installation of a cap over the Filter Cake Disposal Area.

The Excavation of Drums involves the removal of an estimated 32,000 buried drums from the Stacked Drum Area within the Drum Disposal Area. (Previous estimates for the number of drums ranged up to 35,000.) The drums would be excavated, moved to a building, opened, examined and sampled. Similar materials would be combined. The final disposition of the drum material is

different for each alternative. Air monitoring during this activity and all excavation activities would be performed in accordance with 40 CFR 50 and NJAC 7:27-13. Transport and disposal of solid and hazardous wastes would be performed in accordance with regulations specified by the U.S. Department of Transportation (DOT)49 CFR 170-179, RCRA (40 CFR 258, 263, 264, and 265) and New Jersey (NJAC 7:26G, NJAC 16:49).

Installing a Cap in the Filtercake Disposal Area would prevent direct contact with the surface soils in this source area. This will address the PRGs developed for the surface soils under the site-worker scenario which is the only scenario that is a possible future long-term use in this source area.

Alternative 2, Natural Attenuation, is similar to **No Action**, however, additional monitoring would be required to evaluate the natural biological degradation processes occurring at the Site in both the soils and groundwater. Under this alternative, the drummed material would be sent off site for treatment and/or disposal.

Assumptions:

Off-site thermal treatment of 19,500 drums of material
Off-site landfill of 12,350 drums of material
Installation of 10 acres of cap

Costs:

Net Present Value - Capital Costs:	$42,580,000
Net Present Value - O & M:	$ 2,880,000
Total Costs for Alternative 2	$45,460,000

Timeframe: 2 years, primarily for drum removal and disposal

All of the following alternatives also include a Perched Water Management System in addition to the drum removal and cap in the filter cake disposal area.

Perched Water Management uses surface caps, trenches and subsurface walls to isolate contaminated material in the zone below the groundwater and reduce its contact with groundwater. The perched water management system addresses contamination in the Cohansey Yellow Clay. By removing the perched water above the clay, this system will effectively eliminate the pathway for contaminant migration from the Yellow Clay to the Primary Cohansey Aquifer. Figure 35 is a conceptual representation of a perched water management system for the Site. This system would be implemented in the Filtercake Disposal Area, Lime Sludge Disposal Area, Drum Disposal Area and the Former South Dye Area.

Alternative 3, Containment, involves the isolation of contaminated material from the groundwater. In addition to the perched management system described above, this alternative includes stabilizing portions of the Backfill Lagoon Area and installing additional caps in the Equalization Basins and Backfilled Lagoon Areas. Under this alternative, the drum contents would be transported off site for treatment and/or disposal. While EPA did not evaluate a containment alternative that included in-situ treatment, such as soil vapor extraction (SVE), pilot tests on this technology indicated that it was not effective in removing contaminants from the soil at the Site. Consequently, combining the SVE technology with containment would not significantly improve the effectiveness of the containment remedy in preventing the movement of contaminants from the source areas to the groundwater.

Assumptions:

Off-site thermal treatment of 19,500 drums of material
Off-site landfill of 12,350 drums of material
Installation of 25 acres of cap and
Installation of 45,000 square feet of barrier wall

Costs:

Net Present Value - Capital Costs:	$47,570,000
Net Present Value - O & M:	$ 8,400,000
Total for Alternative 3	$55,970,000

Timeframe: 2 years, primarily for drum removal and disposal

All of the following alternatives also include In-situ Bioremediation below the groundwater table in the Equalization Basins and the Excavation of Contaminated Soil

In-situ Bioremediation would be employed in the Equalization Basins to address contamination below the groundwater surface. The Cohansey Yellow Clay is absent in this area, therefore, a perched water management system cannot be applied. An in-situ bioremediation pilot study was conducted at the Site. The results of this study indicated that the effectiveness of this technology is COC dependant, but it is expected to remove between 50% - 90% of the contamination in the treated areas. The in-situ bioremediation technology also is very effective in minimizing the movement of contaminants from the treated material to the groundwater. In the pilot study, groundwater concentrations within the treatment cell were reduced by 95%.

The Excavation of Contaminated Soil would involve the removal of approximately 150,000 cubic yards of contaminated soil from the source areas at the Site. The volume of soil would be confirmed by field sampling to verify that the information and assumptions used in determining the PRGs for the Site were accurate. This material represents principal threat waste and is primarily

located above the groundwater at the Site, within 30 feet from the ground surface. The material would be excavated, staged, sampled and treated as appropriate for the alternative. Air monitoring during this activity would be performed in accordance with 40 CFR 50 and NJAC 7:27-13.

Alternative 4, On-site Thermal Treatment, involves the use of a thermal desorption unit to treat the excavated soil. The soil is heated to remove the contaminants. The contaminants can then be destroyed at a higher temperature in another chamber or condensed and collected for disposal. Although the type of treatment unit has not been specified, the cost estimate and timeframe projected for this alternative are based on a direct-fired unit with an afterburner to destroy the contaminants. After the soil is treated, it would be backfilled in the excavated areas. Based on published data for similar sites, it is estimated that this process will be more than 99% effective in removing contaminants from the soil. Under this alternative, approximately 30% of the drummed material would be treated in the on-site thermal treatment unit. The remainder of the drum contents would be sent off site for treatment and/or disposal. An air permit equivalency in accordance with NJAC 7:27-16 would be required to monitor and operate the thermal treatment unit.

Assumptions:

On-site thermal treatment of 9,500 drums of material
Off-site thermal treatment of 10,000 drums of material
Off-site disposal of 12,350 drums of material
On-site thermal treatment of 148,000 CY of soil
Off-site thermal treatment of 2,000 CY of soil
Installation of 25 acres of cap
Installation of 45,000 square feet of barrier wall

Cost:

Net Present Value - Capital Costs:	$86,710,000
Net Present Value - O & M:	$ 5,600,000
Total for Alternative 4:	$92,310,000

Timeframe: 5 years total, thermal treatment operations less than 2 years

Alternative 5, On-site Ex-situ Bioremediation, involves the stimulation of the natural biodegredation process to treat the excavated material. Nutrients would be added to the soil and the material would be agitated to enhance contact between the microbes and the contaminants and nutrients. The treatment process is relatively slow and the contaminated soil would be excavated at a rate that is consistent with the rate of treatment. Based on the results of bench-scale and pilot-scale tests conducted involving this technology, pre-treatment of the soil within an enclosed

area, such as a building, would be necessary to maintain air emissions within acceptable levels. The air from the building would be collected and treated before being released to the atmosphere. An air permit equivalency in accordance with NJAC 7:27-16 would be required to monitor and operate the air treatment unit. After air emissions have been reduced, the soil would be moved to an outdoor treatment area. The treated material would be backfilled on site.

The effectiveness of the bioremediation process varies based on the type of contaminant to be treated and site-specific conditions. However, the results of the bench-scale and pilot-scale tests were positive. In the pilot-scale test, COC concentrations in the treated material were reduced by approximately 90%. Leaching of COCs from this material was reduced by more than 99%. Under this alternative, approximately 25% of the drum material would be treated on site by ex-situ bioremediation. The remainder of the drum contents would be sent off site for treatment and/or disposal.

Assumptions:

On-site biological treatment of 8,500 drums of material
Off-site thermal treatment and disposal of 11,000 drums of material
Off-site disposal of 12,350 drums of material
On-site biological treatment of 145,000 CY of soil
Off-site thermal treatment of 5,000 CY of soil
Installation of 25 acres of cap
Installation of 45,000 square feet of vertical barrier wall

Cost:

Net Present Value - Capital Costs:	$78,820,000
Net Present Value - O & M:	$ 5,600,000
Total for Alternative 5:	$84,420,000

Timeframe: 8 years total, ex-situ bioremediation process approximately 6 years

Alternative 5a, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material, includes the same components as Alternative 5, On-site Ex-situ Bioremediation. The only difference between these alternatives is that Alternative 5a requires that all drummed material be treated or disposed of off site.

Assumptions:

Off-site thermal treatment and disposal of 15,250 drums of material
Off-site disposal of 16,600 drums of material
On-site biological treatment of 145,000 CY of soil

Off-site thermal treatment of 5,000 CY of soil
Installation of 25 acres of cap
Installation of 45,000 square feet of vertical barrier wall

Cost:

Net Present Value - Capital Costs:	$85,820,000
Net Present Value - O & M:	$ 5,600,000
Total for Alternative 5a:	$91,420,000

Timeframe: 8 years total, ex-situ bioremediation process approximately 6 years

In **Alternative 6, Off-site Disposal,** the excavated soil would be transported off site for treatment and/or disposal. The soil is expected to be transported by truck because most of the available treatment and disposal facilities do not have rail capacity. The timeframe and cost of this alternative are strongly dependant on the availability of appropriate off-site treatment facilities during remediation. The scenario evaluated under this alternative includes treatment and disposal of characteristically-hazardous waste at an incineration facility and disposal of non-hazardous waste at a permitted landfill. Other less costly treatment options for the characteristically-hazardous waste were explored, however, the concentrations of volatile organic contaminants in this material made off-site incineration the only viable treatment technology. Under this alternative, the drum contents would be treated and/or disposed off site.

Assumptions:

Off-site thermal treatment of 19,500 drums of material
Off-site landfill of 12,350 drums of material
Off-site thermal treatment of 50,000 CY of soil
Off-site landfill of 100,000 CY of soil
Installation of 100,000 CY of clean backfill
Installation of 25 acres of cap
Installation of 45,000 square feet of vertical barrier wall

Cost:

Net Present Value - Capital Costs	$147,300,000
Net Present Value of O & M	$ 5,600,000
Total for Alternative 6:	$152,900,000

Timeframe: 6 years

Alternative 7, the Combination Alternative, involves the use of both on-site ex-situ bioremediation and on-site thermal treatment. On-site ex-situ bioremediation would be employed for that portion of the excavated soil contaminated with highly biodegradable compounds, for which this technology should be extremely effective. The remainder of the excavated soil would be treated by on-site thermal treatment. Under this alternative, approximately 30% of the drum material would be treated on site. The remainder would be sent off site for treatment and/or disposal.

Assumptions:

On-site thermal treatment of 4,250 drums of material
On-site bioremediation of 4,250 drums of material
Off-site thermal treatment of 11,000 drums of material
Off-site disposal of 12,350 drums
On-site thermal treatment of 74,000 CY of soil
On-site bioremediation of 74,000 CY of soil
Off-site thermal treatment of 2,000 CY of soil
Installation of 25 acres of cap
Installation of 45,000 square feet of vertical barrier wall

Cost:

Net Present Value - Capital Costs:	$83,042,000
b) Net Present Value - O & M:	$ 5,600,000
Total for Alternative 7:	$88,642,000

Timeframe: 6 years total, thermal treatment operations less than 2 years, ex-situ bioremediation less than 4 years

COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, EPA considered the factors set out in CERCLA §121, 42 U.S.C. §9621, by conducting a detailed analysis of the viable remedial response measures pursuant to the NCP, 40 CFR §300.430(e)(9) and OSWER Directive 9355.3-01. The detailed analysis consisted of an assessment of the individual response measure against each of nine evaluation criteria and a comparative analysis focusing upon the relative performance of each response measure against the criteria.

Threshold Criteria *- The first two criteria are known as "threshold criteria" because they are the minimum requirements that each response measure must meet in order to be eligible for selection as a remedy.*

1. Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or institutional controls.

All of the alternatives except Alternative 1, No Action, would provide adequate protection of human health and the environment. The groundwater remedy currently in place addresses the potential health risks posed by the groundwater and the cap in the Filtercake Disposal Area, which is a component of all of the other alternatives, addresses potential surface soil risks in this area. Because the No Action Alternative is not protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria.

2. Compliance with applicable or relevant and appropriate requirements (ARARs)

Section 121(d) of CERCLA and NCP §300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as "ARARs," unless such ARARs are waived under CERCLA section 121(d)(4).

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those State standards that are identified by a state in a timely manner and that are more stringent than Federal requirements may be applicable. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site. Only those State standards that are identified in a timely manner and are more stringent than Federal requirements may be relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant

and appropriate requirements of other Federal and State environmental statutes or provides a basis for invoking a waiver.

Alternatives 2 - 7 would comply with ARARs. Major ARARs are briefly described below.

For Alternatives 2 - 7, the following are considered ARARs:

Air standards set forth in 40 CFR 50 and NJAC 7:27 would be addressed through monitoring during remedial activities. These standards would apply to all excavations of waste material.

Hazardous waste identification and listing would be performed in accordance with 40 CFR 261 and NJAC 7:26G. Hazardous waste disposal would be performed in accordance with 40 CFR 268 and NJAC 7:26G.

Transport and disposal of solid and hazardous wastes would be performed in accordance with regulations specified by the U.S. Department of Transportation (DOT) 49 CFR 170-179, RCRA (40 CFR 263, 264, and 265) and NJAC 7:26G.

In addition, for alternatives that include thermal treatment, Alternatives 4 and 7, the following are considered ARARs: NJAC 7:27, 40 CFR 60 Subpart A and 40 CFR 61 Subpart A. These regulations would require EPA or Ciba to obtain an air permit equivalency to operate the thermal treatment equipment.

For the alternatives that include ex-situ bioremediation, Alternatives 5, 5a and 7, the following are considered ARARs: NJAC 7:27 and 40 CFR 60 Subpart A. These regulations would require that EPA or Ciba obtain an air permit equivalency to operate the air treatment equipment in the ex-situ bioremediation treatment building.

In addition, the following State of New Jersey requirements are To-Be-Considered (TBC) criteria: the New Jersey Industrial Site Recovery Act, P.L. 1993, c.139 (S-1070); the resultant Hazardous Discharge Remediation Act (HDRA) and amended Brownfields and Contaminated Sites Remediation Act; the NJ Soil Cleanup Criteria developed pursuant to HDRA; and the Technical Requirements for Site Remediation.

Primary Balancing Criteria *- The next five criteria, criteria 3 through 7, are known as "primary balancing criteria". These criteria are factors with which tradeoffs between response measures are assessed so that the best option will be chosen, given site-specific data and conditions.*

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3. Long-term effectiveness and permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once

clean-up levels have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls.

Permanence is achieved for those alternatives that involve the excavation and treatment and/or off-site disposal of contaminated materials. Those alternatives that result in the greatest removal of contaminants achieve the highest degree of permanence. On this basis, the highest degree of permanence is achieved by Alternative 4, On-site Thermal Treatment, and Alternative 6, Off-site Disposal. In both alternatives, contaminants are removed from the Site with a high degree of efficiency. Although the same amount of material is excavated and treated in Alternative 5, On-site Ex-situ Bioremediation, Alternative 5a, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material, and Alternative 7, Combination Alternatives, the bioremediation process is less effective than thermal treatment in removing contaminants overall from the material. However, this distinction is not large in terms of those contaminats which represent a potential impact to groundwater following treatment, since ex-situ bioremediation has been shown to decrease leaching by 99%. This when considering leaching impacts, this technology is similarly effective in achieving the Remedial Action Objective of decreasing the timeframe for groundwater cleanup. Permanence is achieved in only the Stacked Drum Area for the Monitored Natural Attenuation and Containment Alternatives.

4. Reduction of toxicity, mobility, or volume

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy.

In order of most to least reduction in toxicity, mobility and volume on the Site, the relative ranking of the alternatives is:

1. Alternatives 4, On-site Thermal Treatment, Alternative 6, Off-site Disposal
2. Alternative 7, Combination
3. Alternatives 5 and 5a, On-site Ex-situ Bioremediation, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material
4. Alternative 3, Containment
5. Alternative 2, Monitored Natural Attenuation

In Alternative 6, Off-site Disposal, all contaminants in the excavated materials are removed from the Site. However, depending on the off-site treatment, the volume and toxicity of this material may not be impacted. The assumption made in ranking the alternatives involving on-site treatment is that ex-situ bioremediation is less efficient than thermal treatment. Thermal treatment typically removes more than 99 percent of contaminants from the treated material, including tentatively identified compounds (TICs). As stated previously, this distinction is not large when evaluating ex-situ bioremediation in relation to the Remedial Action Objective of groundwater restoration because bioremediation is effective in decreasing the leaching of contaminants to the

groundwater.

Alternative 3, Containment, ranks ahead of Alternative 2, Monitored Natural Attenuation, because the mobility of contaminants in the sources above the Primary Cohansey water table is significantly reduced in the former alternative by the elimination of water flow utilizing caps and perched water management. However, containment does not reduce the toxicity or volume of the material.

5. Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community and the environment during construction and operation of the remedy until cleanup levels are achieved.

Alternatives 3 - 7 are roughly equivalent in terms of reducing the movement of contaminants to the groundwater. Monitored Natural Attenuation does nothing to decrease the impact of the source areas on the groundwater.

Implementation timeframes are an important factor to consider in evaluating the short-term effectiveness of the alternatives. Those action alternatives that require less time to complete, if everything else is equal, can be considered more effective over the short term, because they all involve addressing the same volumes of material that exceed Preliminary Remediation Goals. A ranking of alternatives based on implementation times, from shortest to longest, follows:

1. Alternative 3, Containment (2 years for excavation of drums)
2. Alternative 4, On-site Thermal Treatment (5 years total, thermal treatment operations less than 2 years)
3. Alternative 7, Combination (6 years total, thermal treatment operations less than 2 years, bioremediation less than 4 years)
4. Alternative 6, Off-site Disposal (6 years)
5. Alternatives 5 and 5a, On-site Ex-situ Bioremediation, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material (8 years total, ex-situ bioremediation less than 6 years)

All of the alternatives can be implemented safely. The potential risks to site workers and area residents during cleanup operations will be addressed by monitoring and strict enforcement of safety standards.

6. Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered.

All of the alternatives are technically feasible, have been used at other remediation sites, and make use of standard engineering practices. Alternative 2, Monitored Natural Attenuation, is easily implemented because it involves only the collection of soil and groundwater samples and the interpretation of data, installation of a cap in the Filtercake Disposal Area, and excavation and off-site treatment/disposal of the stacked drums. The remaining alternatives are feasible, though to different degrees. A ranking of the alternatives based on technical feasibility (ease of implementation) is:

1. Alternative 2, Monitored Natural Attenuation
2. Alternative 3, Containment
3. Alternative 4, On-site Thermal Treatment
4. Alternatives 5 and 5a, On-site Ex-situ Bioremediation, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material
5. Alternative 7, Combination
6. Alternative 6, Off-site Disposal

Among the on-site treatment alternatives, thermal treatment is considered the most technically feasible because it has been implemented at many Superfund sites, is a well-developed technology, allows the greatest degree of control over the treatment process, operates with a high efficiency and requires the least time to achieve treatment goals. The implementation of this technology is well understood. The sandy soils and contaminants at the Site are well suited for thermal treatment.

Although implemented at many remediation sites, the implementation of ex-situ bioremediation for the types and variety of compounds reflected by the Contaminants of Concern and other organic compounds at the Site is innovative. Therefore, technical challenges could arise during implementation. However, the results of the pilot testing indicate that ex-situ bioremediation is technically feasible for the Site. Therefore, ex-situ bioremediation in Alternatives 5, 5a and 7 is only considered slightly less implementable than on-site thermal treatment.

Although excavation and off-site treatment/disposal of contaminated material have been successfully implemented at many Superfund sites, because of the wide variety of contaminants in the source areas, the expected large volume of characteristically-hazardous waste, and the large volume of material to be transported, Alternative 6, Off-site Disposal, is considered the least implementable of the alternatives. The implementability of this alternative is directly dependant on the continued availability of off-site treatment and disposal facilities.

The alternatives that involve on-site thermal treatment are administratively complex due to permitting requirements and the rigorous conditions that would be imposed by an air permit. Transportation issues and disposal facility requirements would also affect the administrative feasibility of Alternative 6, Off-site Disposal.

The services and materials required for the implementation of all of the alternatives are available, however, Alternative 6, Off-site Disposal, is variable depending on the continued acceptance of

the material at the selected treatment/disposal facilities. Alternatives 3, 4, 5, 5a and 7 require services and materials that are currently available and should not present a challenge.

7. Cost

Includes estimated capital and O&M costs, and net present worth value of capital and O&M costs.

The estimated present worth costs of the alternatives that do not require treatment or disposal of the contaminated soil - Alternative 2, Natural Attenuation, and Alternative 3, Containment, are less than those of the treatment and disposal alternatives. However, these alternatives do not reduce the toxicity or volume of the contaminated material. The estimated present worth cost of Alternative 5, On-site Ex-situ Bioremediation, is less than the other treatment alternatives. Alternative 5a, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material, Alternative 4, On-site Thermal Treatment, and Alternative 7, the Combination. Alternative 6, Off-site Disposal, is the most costly.

Modifying Criteria *- The final two evaluation criteria, criteria 8 and 9, are called "modifying criteria" because new information or comments from the state or the community on the Proposed Plan may modify the preferred response measure or cause another response measure to be considered.*

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8. State acceptance

Indicates whether based on its review of the RI/FS reports and the Proposed Plan, the state supports, opposes, and/or has identified any reservations with the selected response measure.

The New Jersey Department of Environmental Protection has provided EPA with comments on the Record of Decision. In its letter, the Department identified a number of State statutes and standards and requested that, at a minimum, they be referenced as To-Be-Considered, or TBC criteria. EPA has included the State requirements as TBC criteria in the ROD document. Further, the selected remedy has been developed to comply with these criteria.

9. Community acceptance

Summarizes the public's general response to the response measures described in the Proposed Plan and the RI/FS reports. This assessment includes determining which of the response measures the community supports, opposes, and/or has expressed concerns.

During the extensive public meetings and sessions held prior to, and after, the release of the draft OU2 FS report, members of the community expressed a high degree of concern and unacceptability regarding the safety of the On-site Thermal Treatment Alternative. EPA provided detailed information regarding the thermal treatment alternatives as well as, the other alternatives. Community members requested that EPA consider another alternative for remediating cleaning up the source areas. As these discussions progressed, Ciba-Geigy was conducting site specific bioremediation pilot treatment studies that demonstrated effective treatment of contaminated soils. These studies were discussed during the public meetings and some site visits. As a result of this work, the community viewed this alternative as the most acceptable alternative. The attached Responsiveness Summary addresses the comments received by the community. The community is supportive of Alternative 5a.

PRINCIPAL THREAT WASTES

This action addresses contaminants within the source areas that are likely to move into the groundwater at the Site. These materials are considered to be the principal threat wastes.

SELECTED REMEDY

Based upon consideration of the results of the investigation and studies, the requirements of CERCLA, the detailed analysis of the response measures, and public comment, EPA has determined that Alternative 5a, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material, is the appropriate remedy for addressing contamination in the source areas at the Site.

This alternative was chosen as the selected remedy because it will effectively address the primary Remedial Action Objective for the Site -- to decrease the timeframe for implementation of the OU1 groundwater remedy. While Alternative 4, On-site Thermal Treatment, Alternative 7, Combination, and Alternative 6, Off-site Disposal, will result in greater reduction in the volume of contaminants in the soil, Alternative 5a is as effective as these alternatives in reducing the impact of the source areas on the groundwater, based on the results of the on-site pilot test of this technology.

Alternative 5a was selected instead of Alternative 5, On-site Ex-situ Bioremediation, because the local community expressed concerns related to the on-site treatment of drummed material. The only difference between Alternatives 5a and 5 is that Alternative 5a requires that all drummed material be treated or disposed of off site.

Alternative 5a is significantly less costly than Alternative 6, Off-site Disposal, and as stated previously, is effective in achieving the Remedial Action Objectives for the Site. The availability of treatment facilities to accept a large volume of hazardous soil could also represent a significant

impact on the cost and short-term effectiveness of Alternative 6. Therefore, Alternative 6 was eliminated from consideration.

Alternative 4, On-site Thermal Treatment, and Alternative 7, Combination, are as effective in achieving the Remedial Action Objectives as the selected remedy. However, permitting issues associated with the thermal treatment components of these alternatives may result in delays in implementation. In addition, the local community has expressed concerns related to the thermal treatment technology. Therefore, Alternatives 4 and 7 were eliminated from consideration.

Alternative 2, Natural Attenuation, and Alternative 3, Containment, do not achieve the same level of toxicity and volume reduction and long-term effectiveness as Alternative 5a. Although Alternative 3 would significantly reduce leaching from the source areas to the groundwater, the volume and toxicity of contaminants in the source areas would remain unchanged. Therefore, these alternatives were eliminated from consideration.

The major components of the selected remedy for the Site include:

- On-site bioremediation of approximately 145,000 cubic yards of contaminated soil.
- Off-site treatment and/or disposal of approximately 5,000 cubic yards of contaminated soil. This material contains contaminants that are not suited to bioremediation. The volume represents an estimate and is subject to change based on field sampling.
- Off-site treatment and disposal of approximately 19,500 drums of filtercakes and lab wastes containing high levels of organic contaminants. The number of drums that will require treatment prior to disposal is an estimate and is subject to change based on field sampling.
- Off-site disposal of approximately 12,350 drums of solid waste and other material containing low levels of organic contaminants.
- Installation of caps and barrier walls in areas of the Site where the Cohansey Yellow Clay is present. This perched water management system will prevent the movement of contaminants from the clay into the underlying Primary Cohansey Aquifer. The cap in the Filtercake Disposal Area will also address the potential direct contact risks associated with the surface soils in this area.
- Implementation of an in-situ bioremediation system in the Equalization Basins to address contamination below the groundwater table.
- Stabilization of portions of the Lime Sludge Disposal Area that do not meet leaching standards.

- Establishment of deed restrictions to regulate the use of certain areas of the Site and prevent intrusive activities in areas that are capped.

- Optimization of the OU1 Groundwater Extraction and Recharge System.

- Appropriate environmental monitoring to ensure the effectiveness of the remedy.

The volume of soil to be excavated and treated (approximately 150,000 cubic yards) is based on the Preliminary Remediation Goals (PRGs) analysis presented in the Remedial Action Objectives section of this ROD. This analysis utilized a geostatistical model to represent the contamination in the source areas. The PRG volumes for each source area will be verified in the same manner as they were originally calculated. Random soil samples will be collected during excavation. The soil samples will be analyzed for all appropriate COCs for the source area(s). The PRG volumes will be re-calculated using these sample results. Recalculation of PRG volumes will be performed based on the significance of the analytical results. For example, if testing results indicate the absence of all COCs, no recalculation would be required. However, if results show elevated levels of COCs present, recalculation would be necessary.

The volume of soil requiring off-site disposal will also be refined by field sampling. If pre-treatment or post-treatment sampling indicates that contaminants in the soil cannot be adequately treated utilizing the on-site system, this material will be sent off site for treatment and/or disposal.

The selected remedy includes an aerobic biodegredation process that uses the microbes naturally present in the contaminated material to degrade the contaminants. Nutrients will be added to the soil; it will be mixed with a bulking agent, such as straw, and aerated. The material will be agitated periodically to promote contact between the microbes, contaminants and nutrients. The initial biodegredation steps will be conducted within an enclosed structure to control emissions. The air within the structure will be collected and treated. After air monitoring within the enclosure indicates that emissions from the material are near background levels, it will be moved outside to complete the bioremediation process.

After the performance goals for the process have been achieved, the treated soil will be backfilled on the Site. The performance goals are based on the leaching of contaminants from the treated material, since this relates to the RAO of facilitating the groundwater cleanup. Performance goals are set to insure that "clean" groundwater that comes in contact with the treated material would not be impacted above the 1993 ESD groundwater restoration standards. In most cases, this scenario represents a theoretical situation, since much of the groundwater in contact with the treated material will have been impacted by upgradient sources before the cleanup was initiated.

The Synthetic Precipitation Leaching Procedure (SPLP), which represents an equilibrium, or worst-case, leaching scenario, will be the basis of the performance test. A dilution factor of 20, to represent the actual concentrations that can be expected in the aquifer, will be employed to develop the performance goals. The dilution factor accounts for contaminant dispersion as it

contacts the groundwater. It is considered to be conservative because it does not account for the heterogeneity in the source areas which will result in lower leachate concentrations than measured by the SPLP test.

While the on-site pilot testing indicated that ex-situ bioremediation effectively decreased leaching from the treated material, and can meet PRGs, there are several issues that must be addressed during the design and implementation of this remedy. Among these issues is the treatment of several COCs that do not respond to aerobic biodegredation. Two of these contaminants, trichloroethene and tetrachloroethene, can be remediated anaerobically. If the results of testing performed before or during treatment indicate that these contaminants will not meet the performance standards, an additional anaerobic biodegredation step can be added to the process.

Another COC that does not readily biodegrade is 1,2,3 trichloropropane. During pilot testing, this contaminant was not detected at high enough levels to warrant concern. However, if it is found to be at high concentrations during remediation, an additional step may be added to the treatment process. This step will involve heating the material to low temperatures to volatilize the 1,2,3 trichloropropane. The process, which will be conducted within an enclosure, could involve heating the air used to aerate the material. The air within the building will be collected and treated.

As described previously, and presented in Figure 35, the perched water management system uses caps and subsurface barrier walls to isolate contamination in the Cohansey Yellow Clay. This material cannot be excavated since it represents a barrier for the movement of contaminants to the Primary Cohansey Aquifer. The system will be installed in the major source areas and will eliminate the effects of the perched water above the Yellow Clay. The perched water is the driving force for the movement of contaminants out of the Yellow Clay to the Primary Cohansey Aquifer. The system is expected to eliminate 95-99% of the leaching from this material. Capping will also address any direct contact risks associated with the presence of pesticides on the ground surface.

The in-situ bioremediation system will be installed in the saturated zone of the Equalization Basins. The Cohansey Yellow Clay is not present beneath this source area, and contaminated material is located down to the Cohansey/Kirkwood Transition Member. Since excavating this contaminated material is not practical, an in-situ treatment process was selected for this area. The in-situ bioremediation system will likely include wells to circulate nutrients through the system and to provide oxygen to the treatment area.

Under the selected remedy, a small amount of soil and all of the drummed material will be taken offsite for treatment and/or disposal. It is expected that the drummed material will be inspected and sampled. Similar material will and bulked within a building before shipping it off site by truck. The final disposal (e.g. thermal treatment or landfilling) will be based upon the sampling results.

Based on the PRG analysis, the material in the Lime Sludge Disposal Area does not require treatment. This is primarily because the arsenic-containing material in this area was stabilized before disposal, which significantly reduced leaching. However, as part of the remedy, the area will be sampled and analyzed to insure that the material meets leaching standards. These standards will be the same as the performance standards for the ex-situ bioremediation technology.

Deed restrictions will be established by Ciba to limit the use of certain areas of the Site. The OU1 treatment plant area and the areas that are part of the perched water management system will be included in a restricted waste management area.. Other source areas outside this zone will only be available for appropriate uses. Deed restrictions will prevent intrusive activities in all areas that are capped.

An evaluation of the effectiveness of the OU1 GERS has indicated that contaminant removal from the groundwater can be enhanced by optimizing the system through the relocation or addition of extraction wells. The GERS optimization will take advantage of the improved data base and modeling tools, obtained and developed over the last few years, in order to accelerate the plume attentuation. A further evaluation and optimization of the GERS is included in the selected remedy. Public involvement will be encouraged during the development and implementation of an overall GERS optimization plan as well as all components of the selected remedy..

The selected remedy will comply with all ARARs. The selected remedy meets the requirements of the Hazardous Discharge Remediation Act (N.J.S.A. 58:10B et seq).

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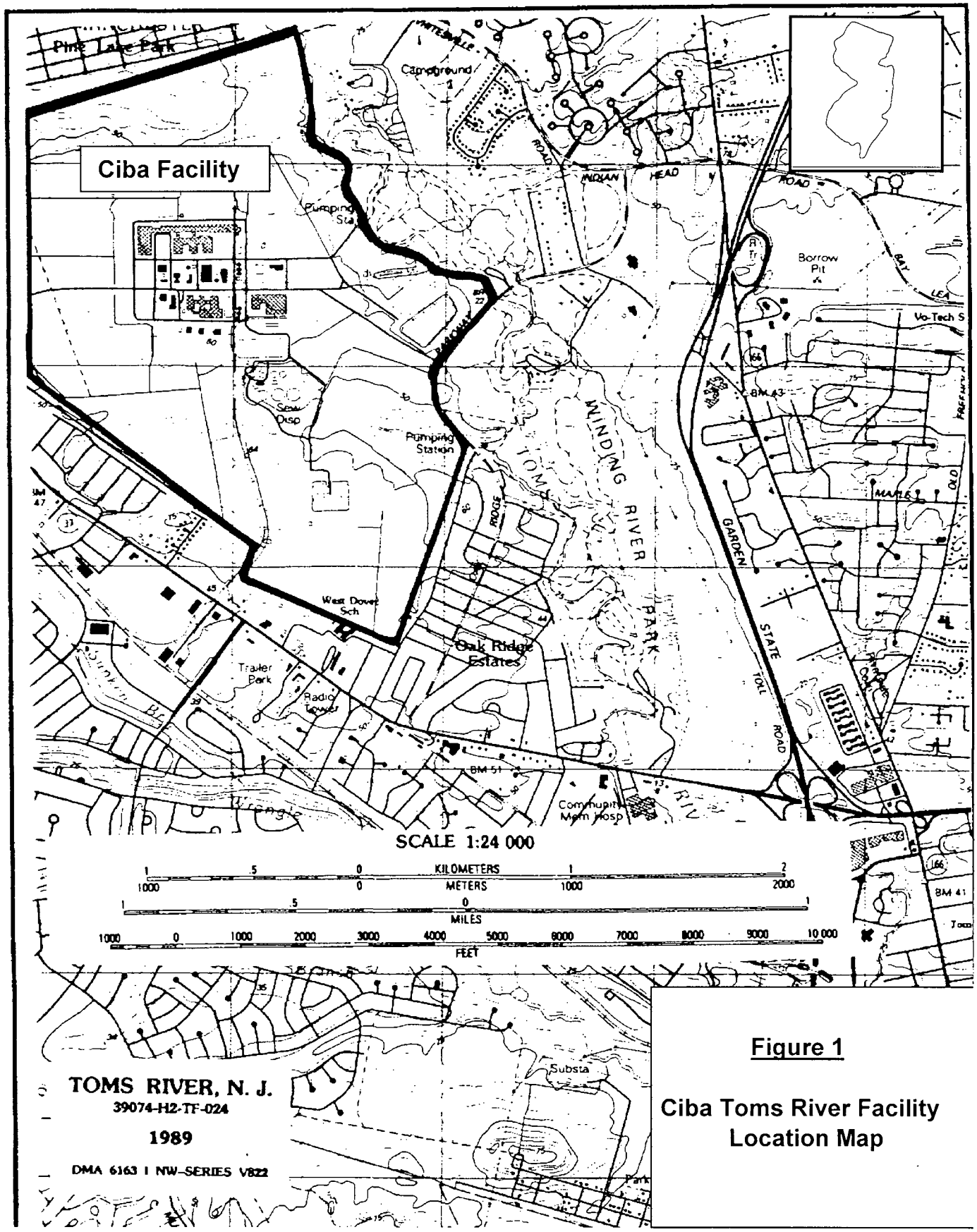


Figure 1

Ciba Toms River Facility Location Map

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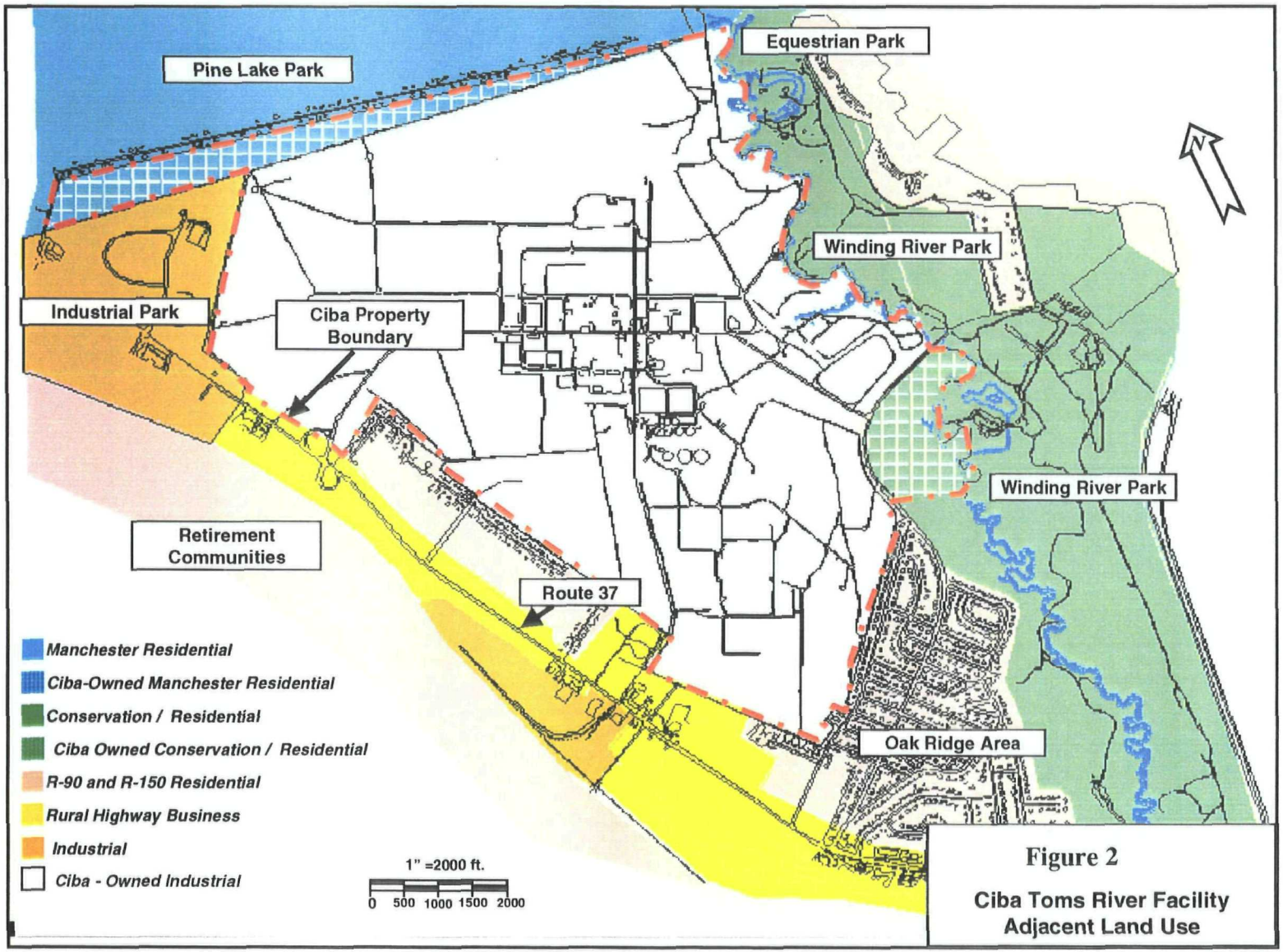
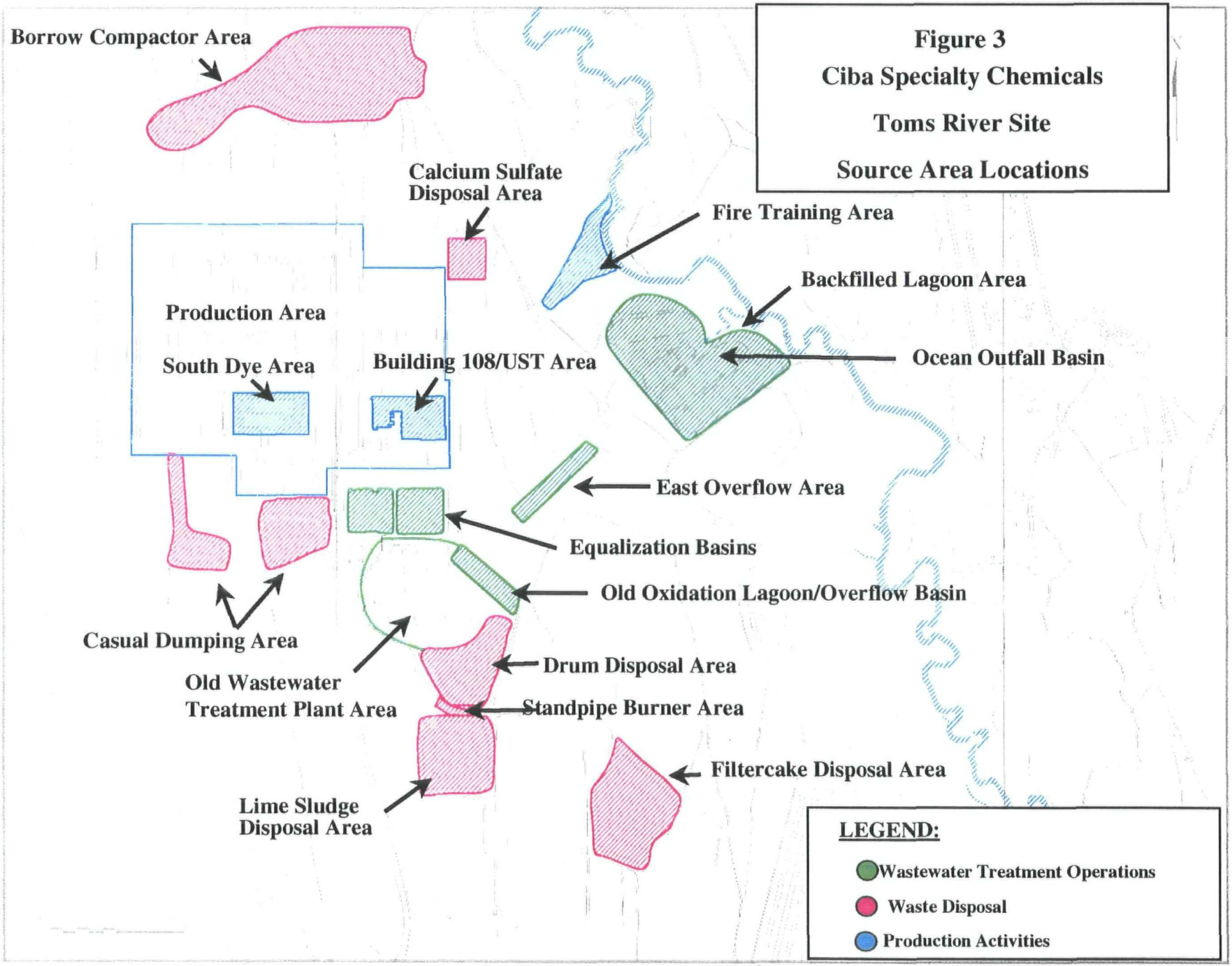


Figure 2

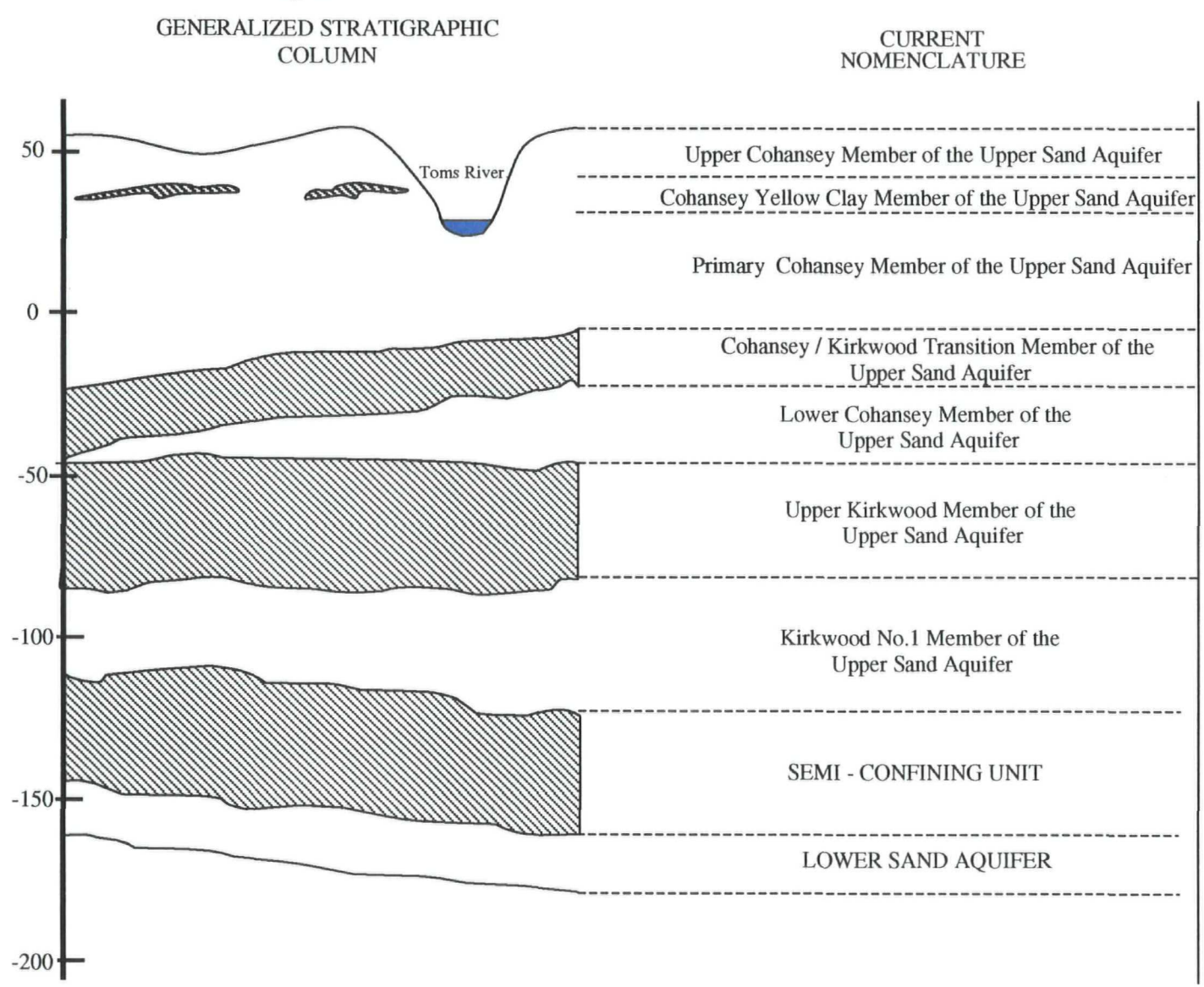
Ciba Toms River Facility
Adjacent Land Use

980086


Figure 3
Ciba Specialty Chemicals
Toms River Site
Source Area Locations
Borrow Compactor Area
Calcium Sulfate Disposal Area
Fire Training Area
Backfilled Lagoon Area
Production Area
South Dye Area
Building 108/UST Area
Ocean Outfall Basin
East Overflow Area
Equalization Basins
Old Oxidation Lagoon/Overflow Basin
Casual Dumping Area
Old Wastewater Treatment Plant Area
Drum Disposal Area
Standpipe Burner Area
Filtercake Disposal Area
Lime Sludge Disposal Area
LEGEND:
Wastewater Treatment Operations
Waste Disposal
Production Activities

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Figure 4



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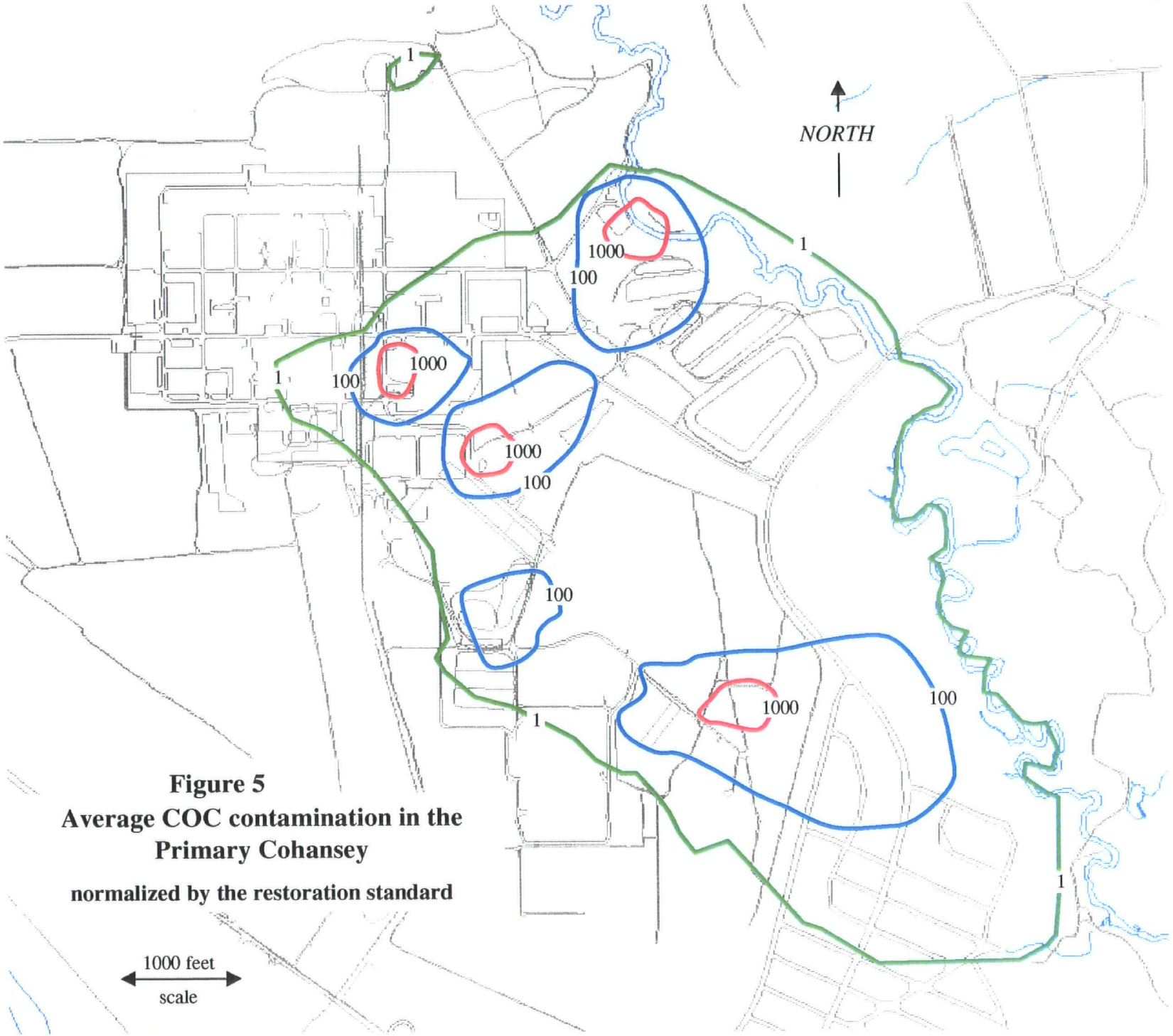
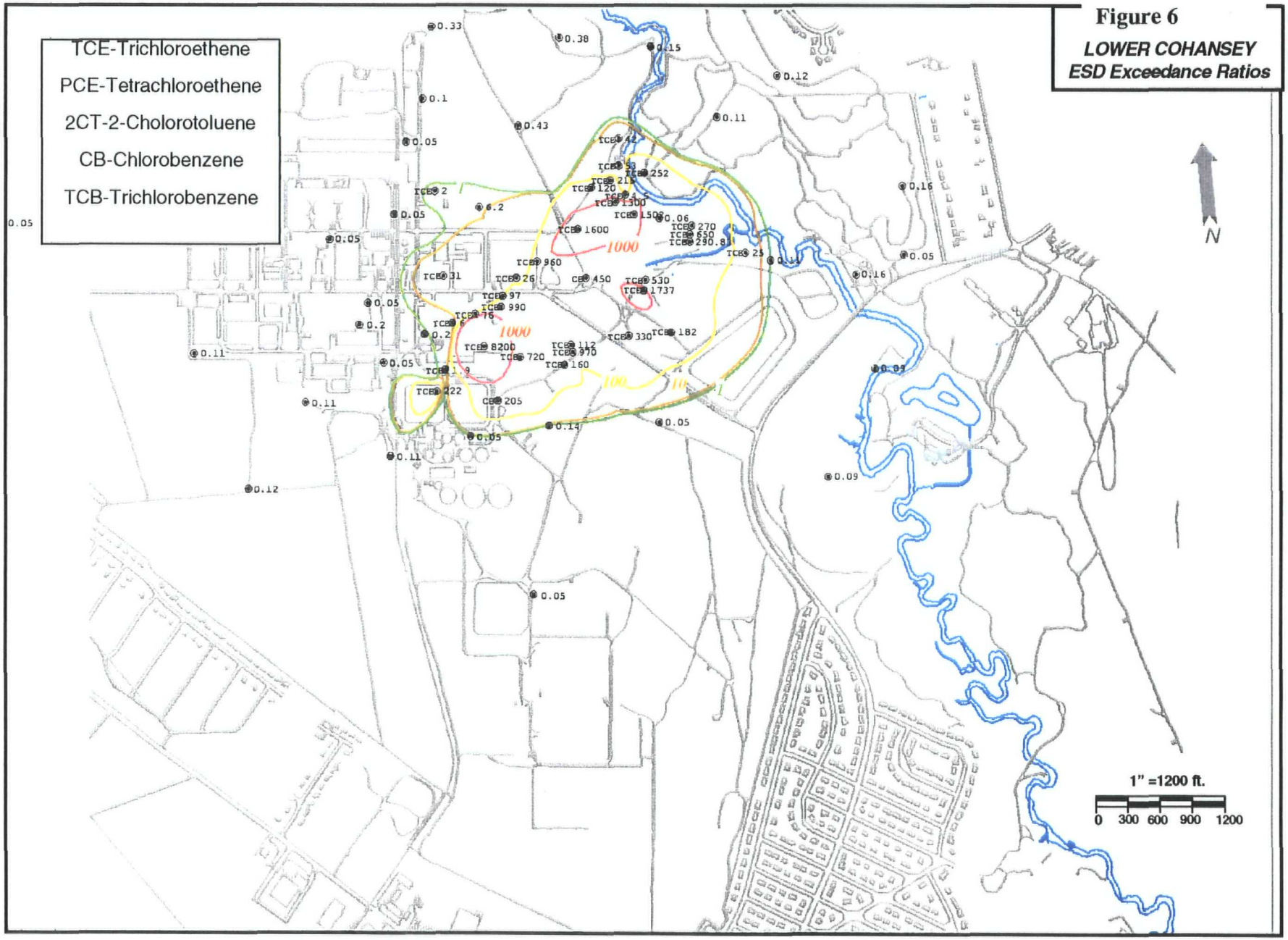


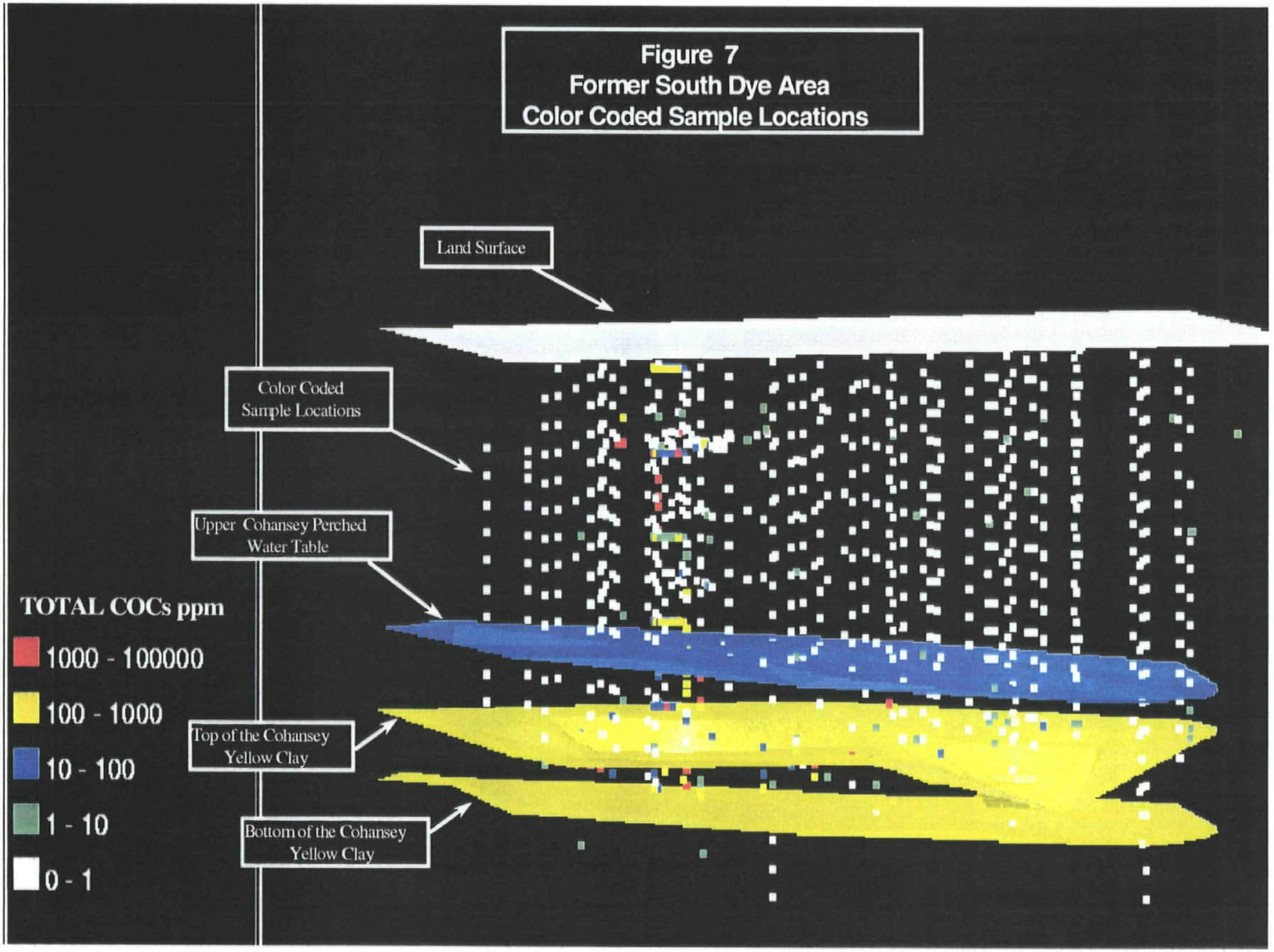
Figure 5
Average COC contamination in the Primary Cohansey

normalized by the restoration standard

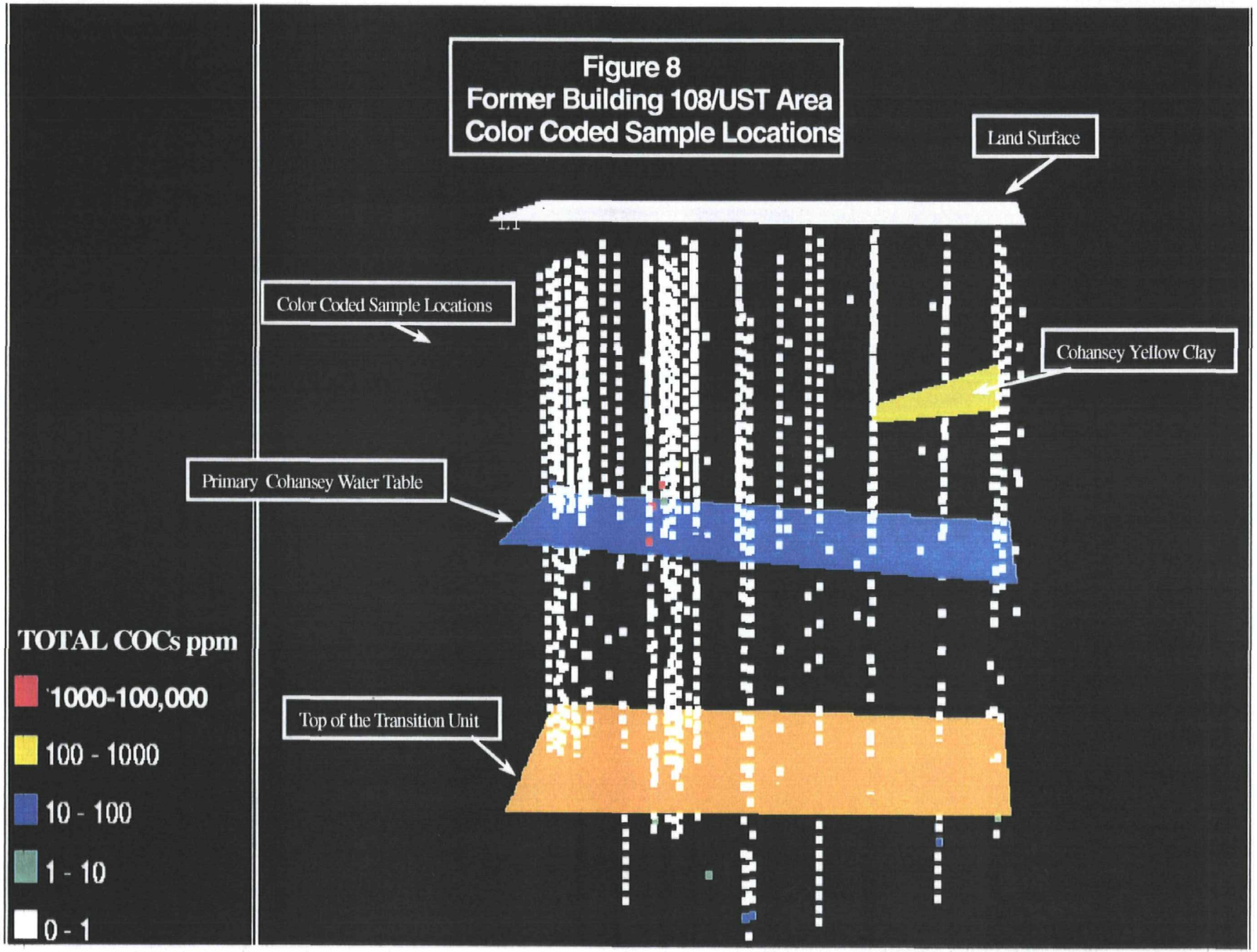
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TCE-Trichloroethene
PCE-Tetrachloroethene
2CT-2-Cholorotoluene
CB-Chlorobenzene
TCB-Trichlorobenzene
Figure 6
LOWER COHANSEY
ESD Exceedance Ratios
N
1" =1200 ft.
0 300 600 900 1200

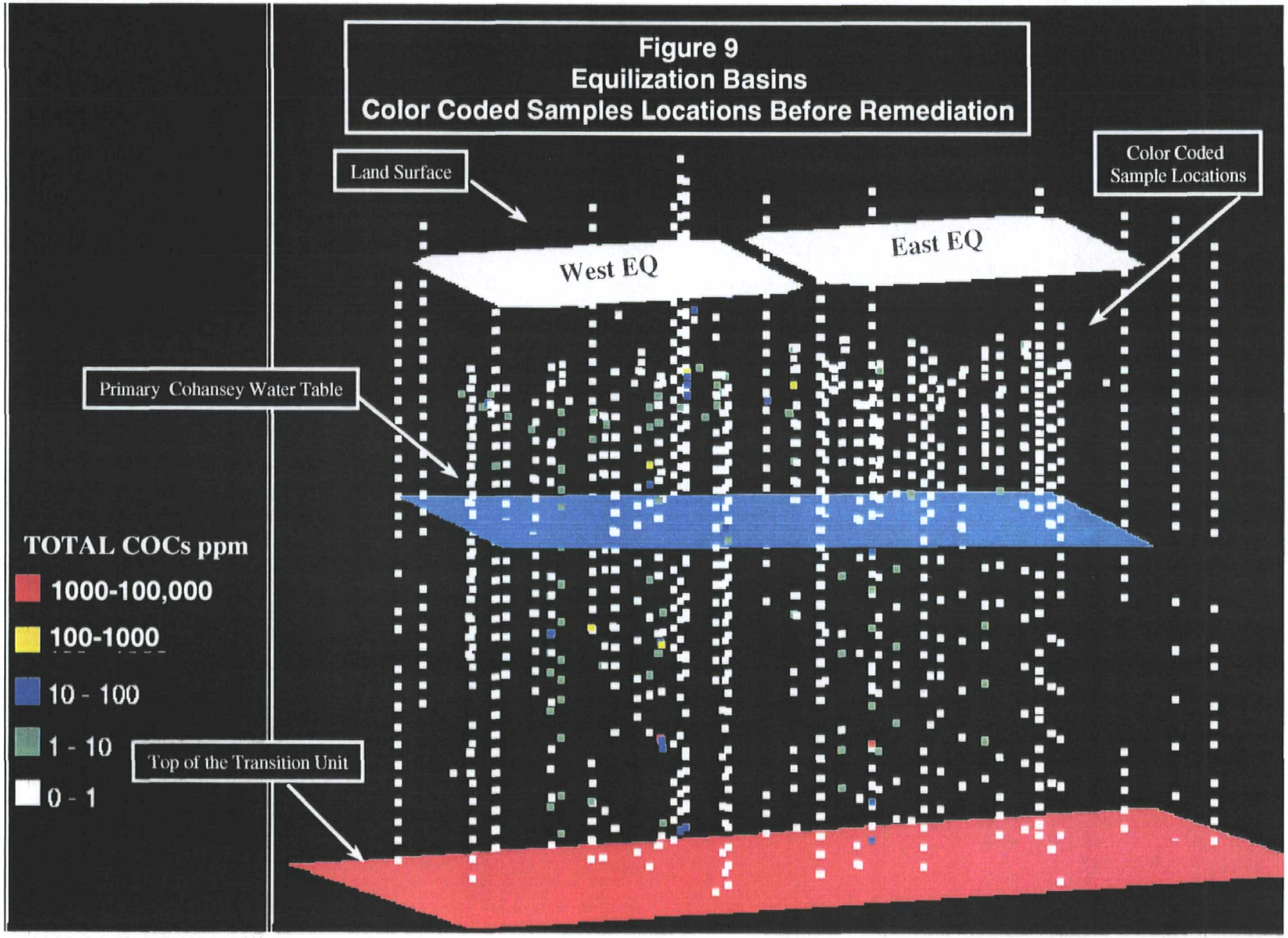
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Figure 7
Former South Dye Area
Color Coded Sample Locations
Land Surface
Color Coded
Sample Locations
Upper Cohansey Perched
Water Table
TOTAL COCs ppm
1000 - 100000
100 - 1000
10 - 100
1 - 10
0 - 1
Top of the Cohansey
Yellow Clay
Bottom of the Cohansey
Yellow Clay

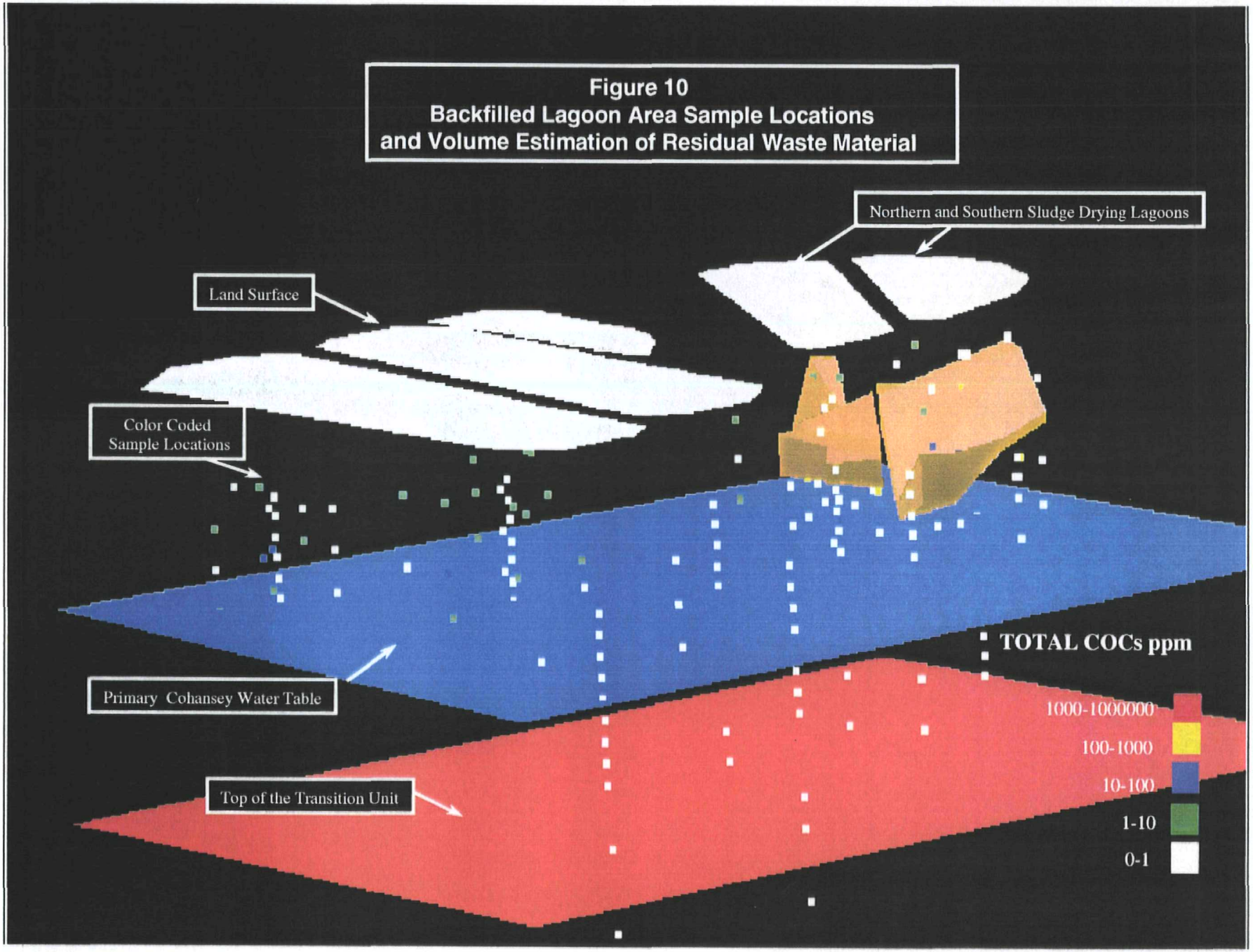
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Figure 8
Former Building 108/UST Area
Color Coded Sample Locations
Land Surface
Color Coded Sample Locations
Cohansey Yellow Clay
Primary Cohansey Water Table
Top of the Transition Unit
TOTAL COCs ppm
1000-100,000
100 - 1000
10 - 100
1 - 10
0 - 1

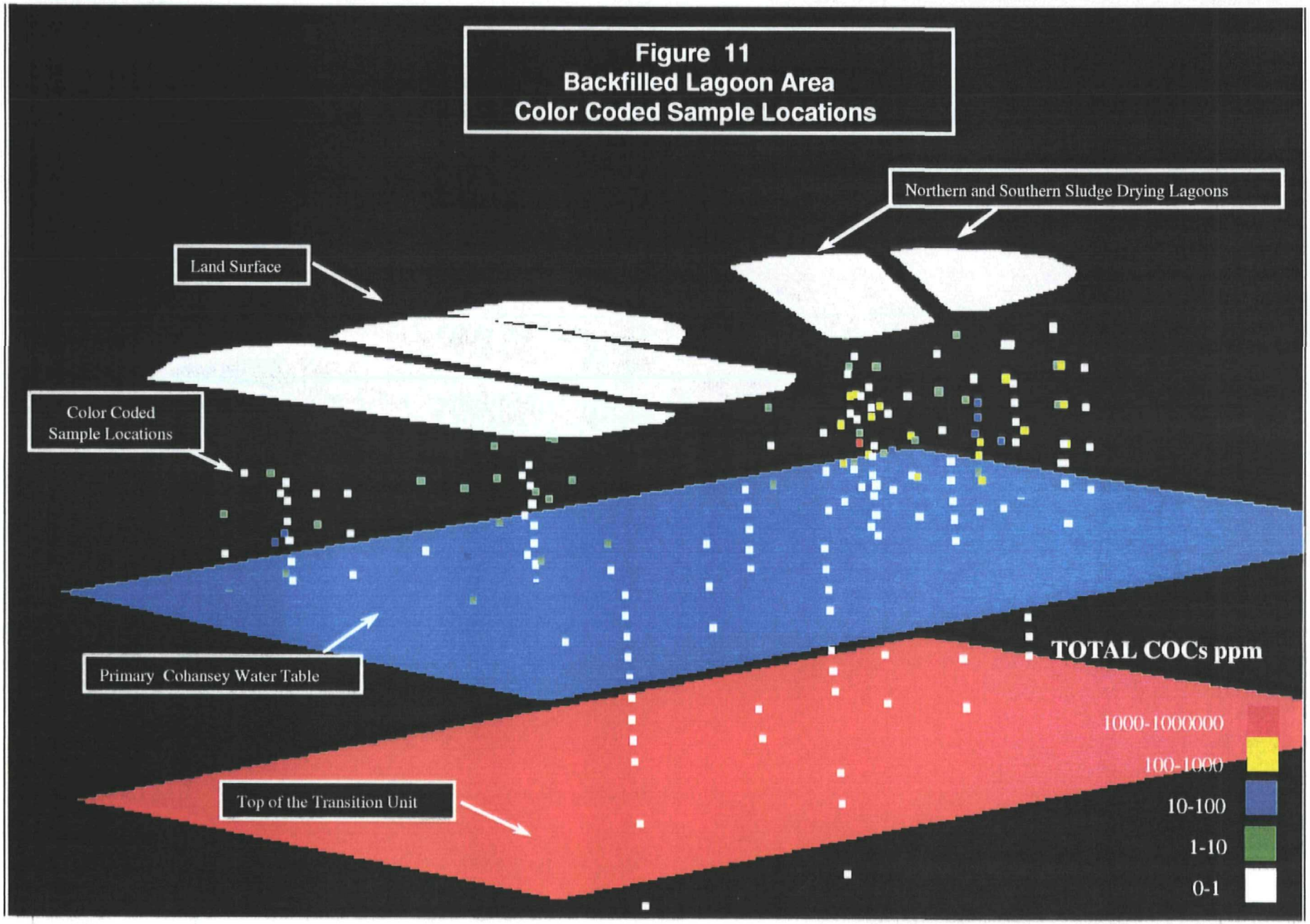
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Figure 9
Equilization Basins
Color Coded Samples Locations Before Remediation
Land Surface
Color Coded
Sample Locations
West EQ
East EQ
Primary Cohansey Water Table
TOTAL COCs ppm
1000-100,000
100-1000
10 - 100
1 - 10
0 - 1
Top of the Transition Unit

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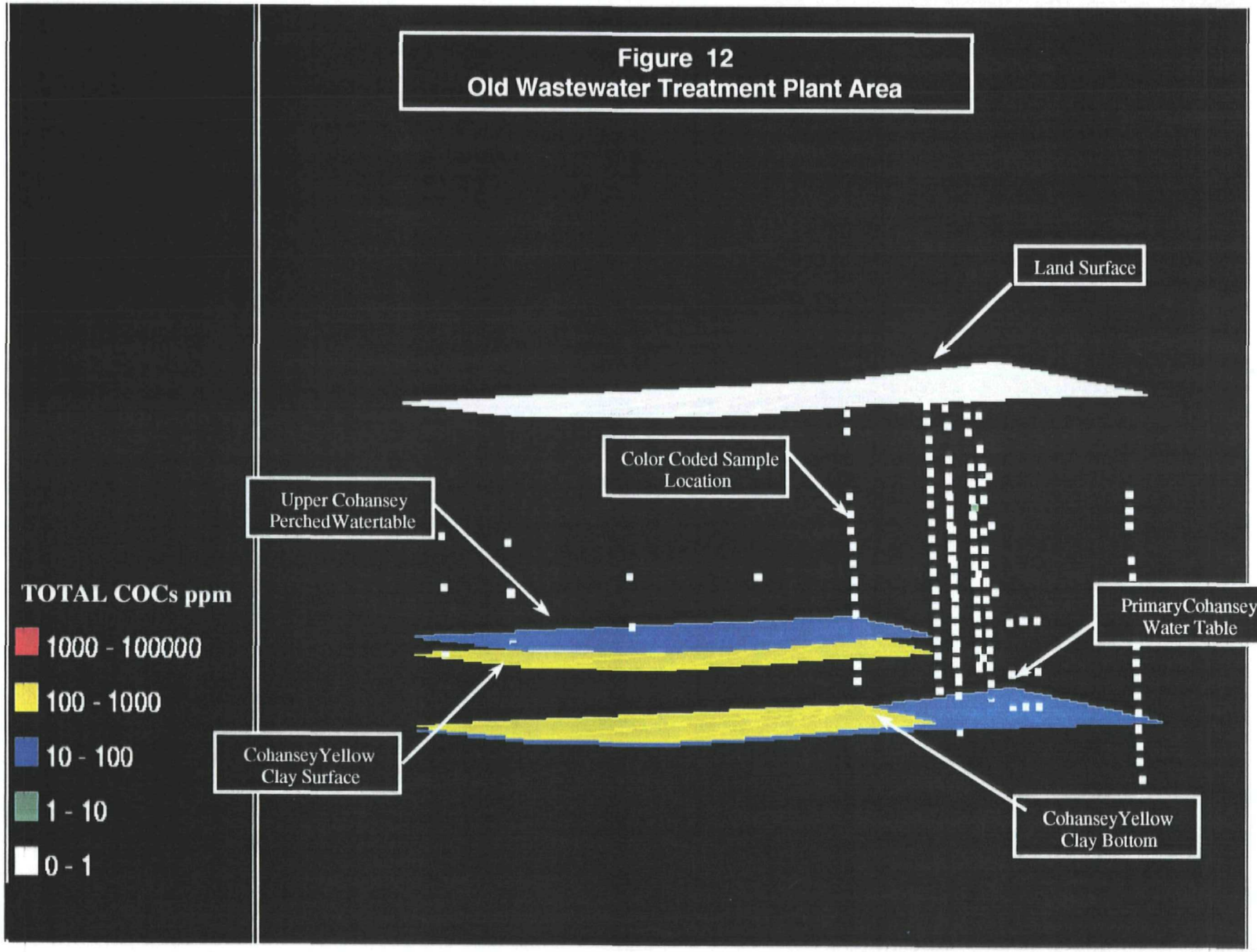

Figure 10
Backfilled Lagoon Area Sample Locations
and Volume Estimation of Residual Waste Material
Northern and Southern Sludge Drying Lagoons
Land Surface
Color Coded
Sample Locations
Primary Cohansey Water Table
Top of the Transition Unit
TOTAL COCs ppm
1000-1000000
100-1000
10-100
1-10
0-1

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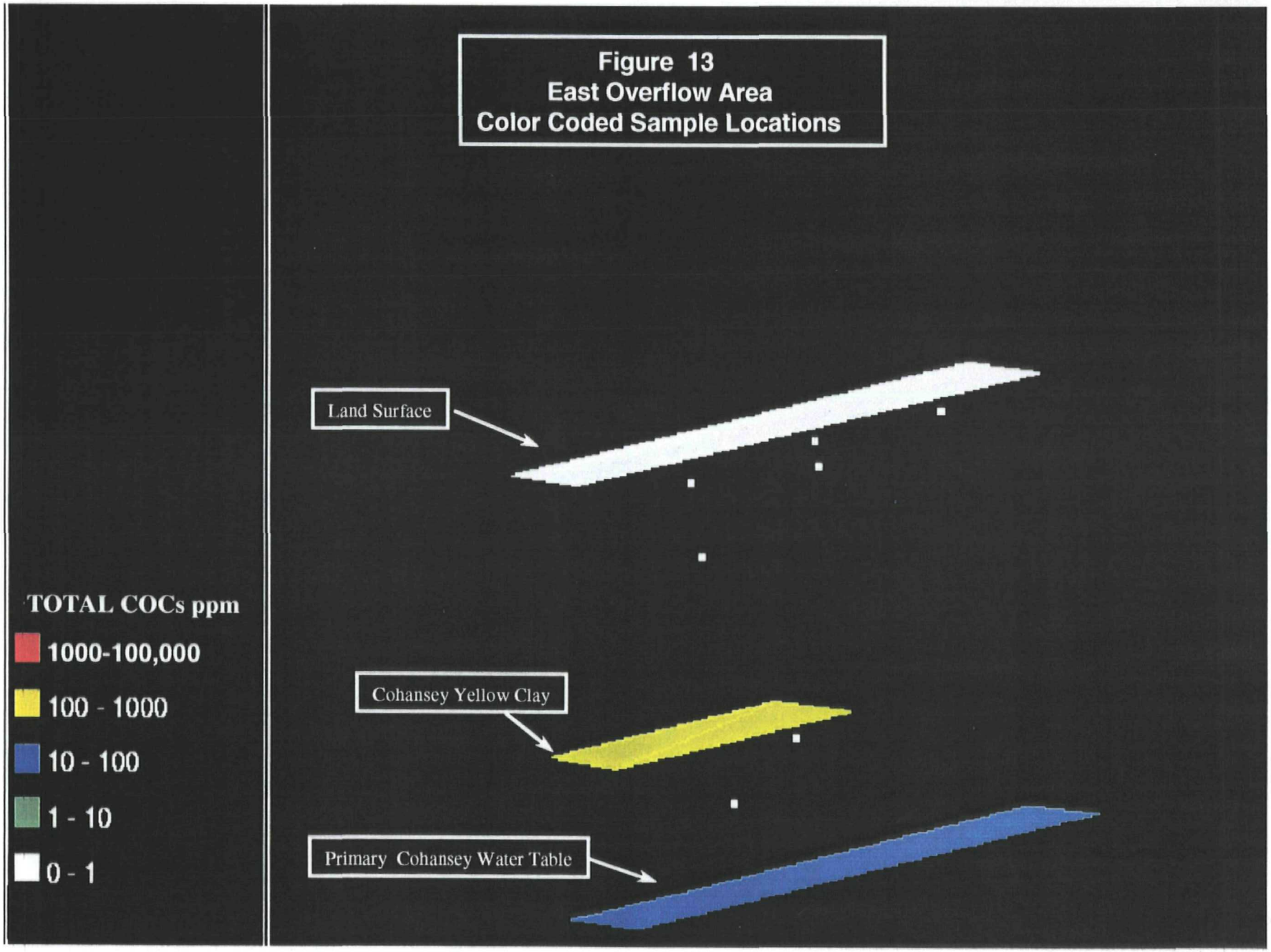
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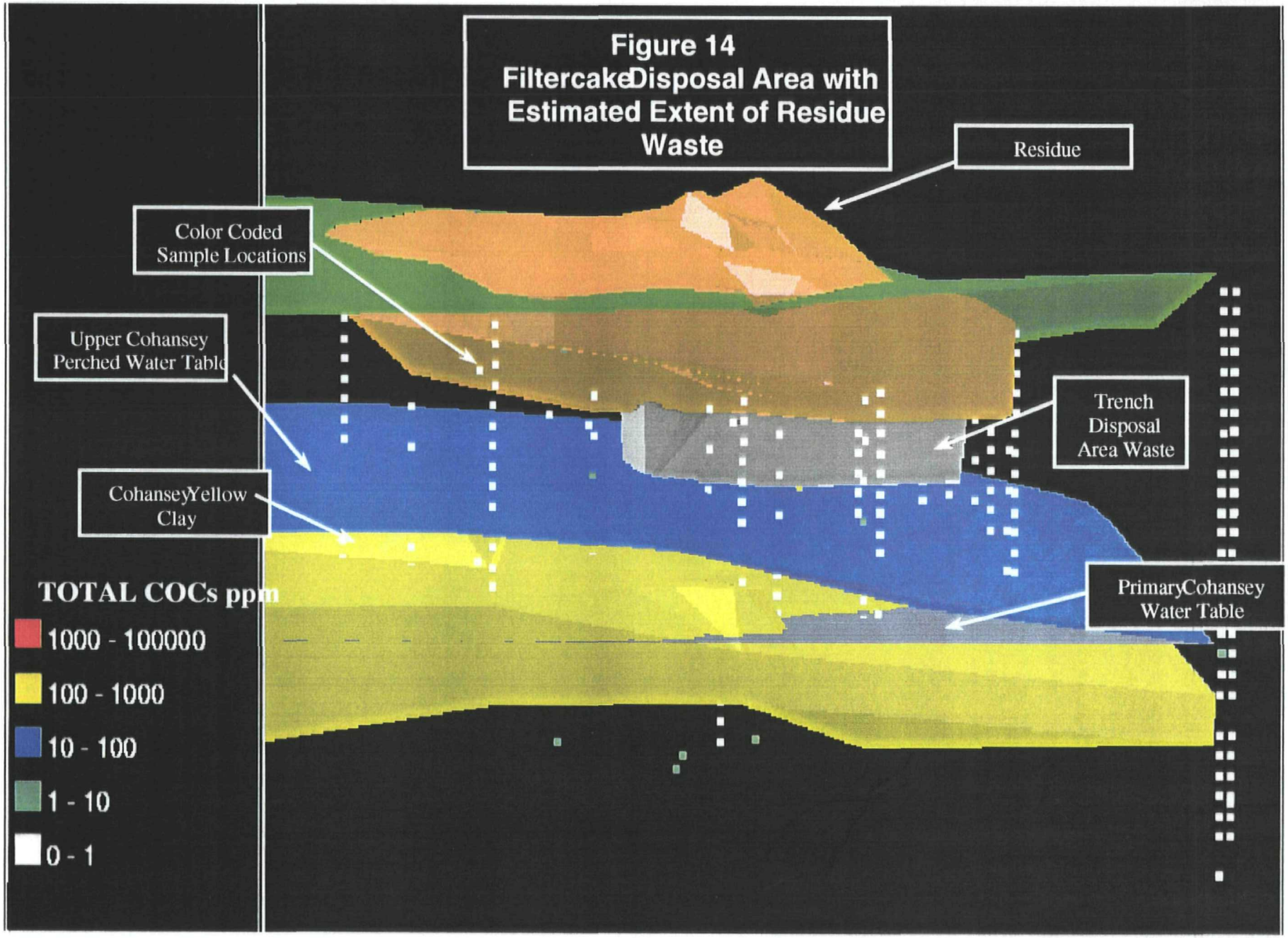
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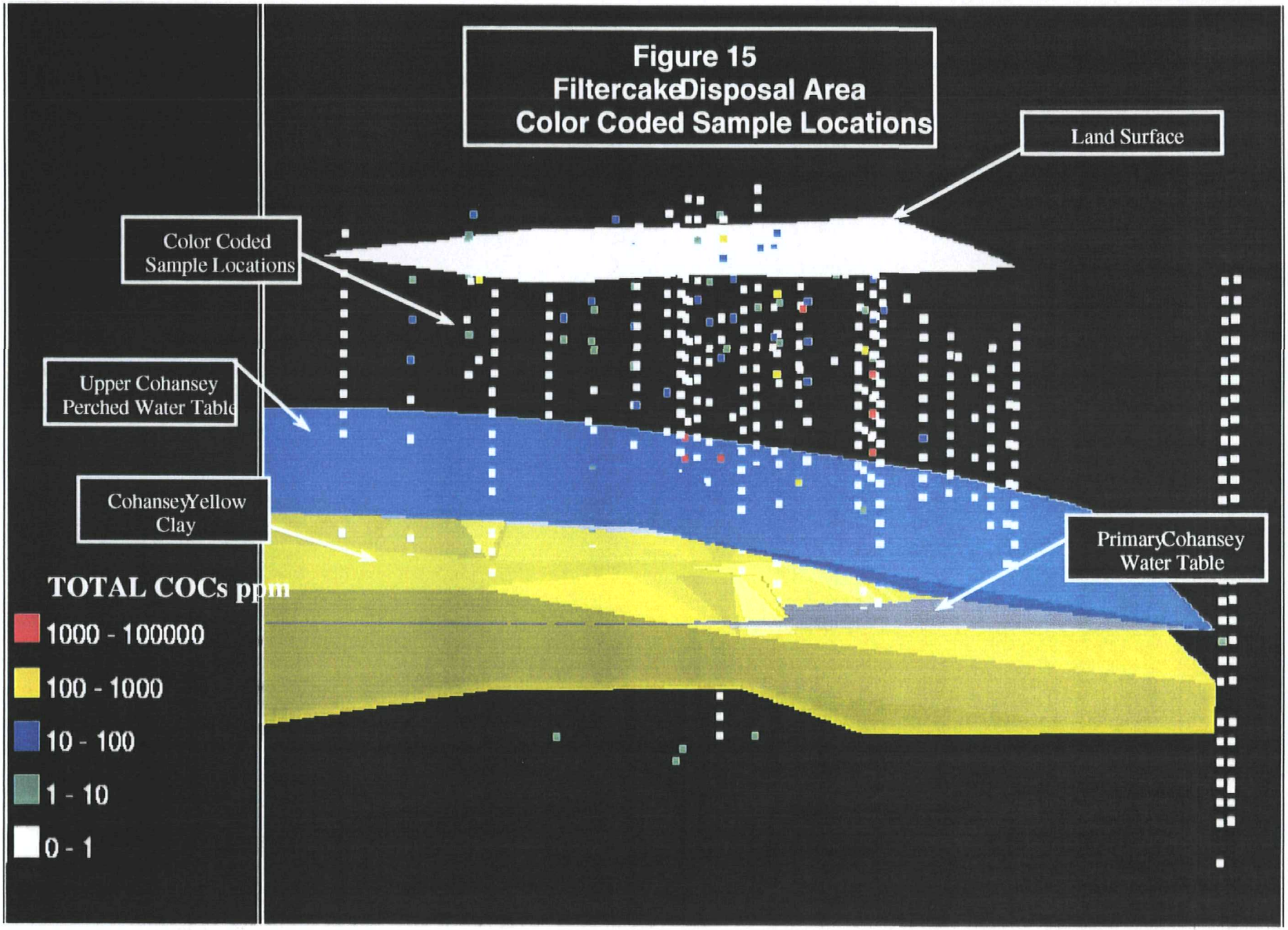
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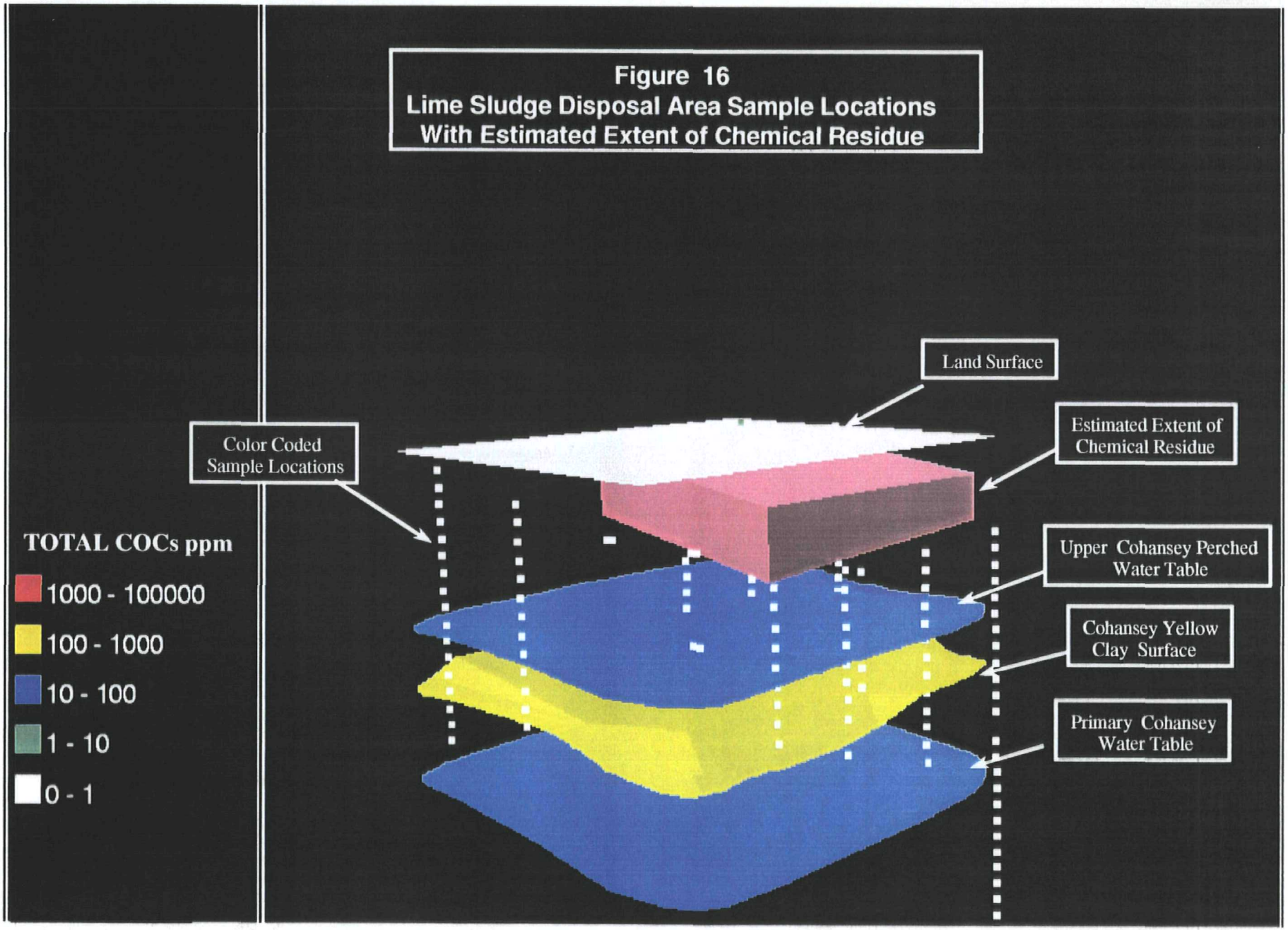
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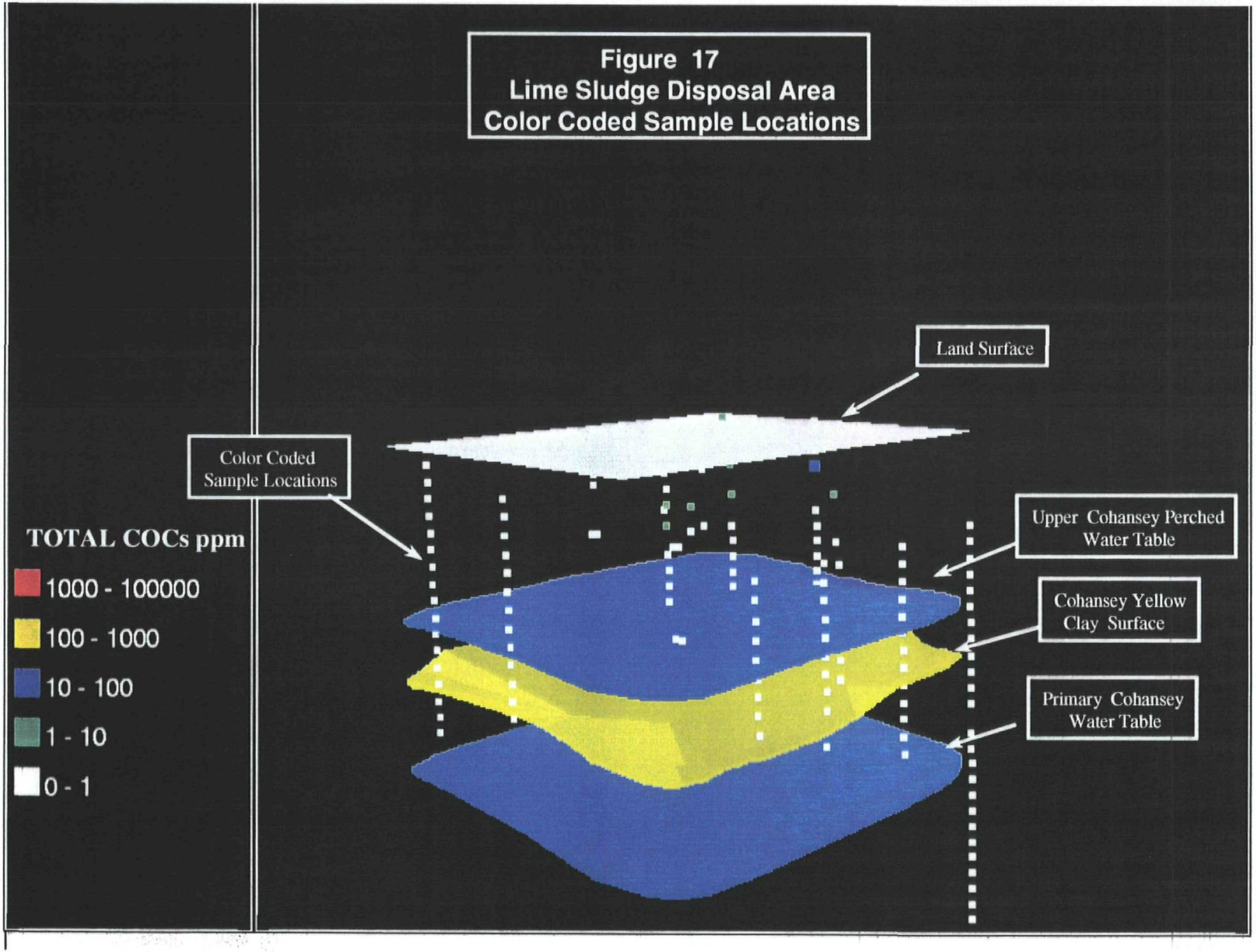
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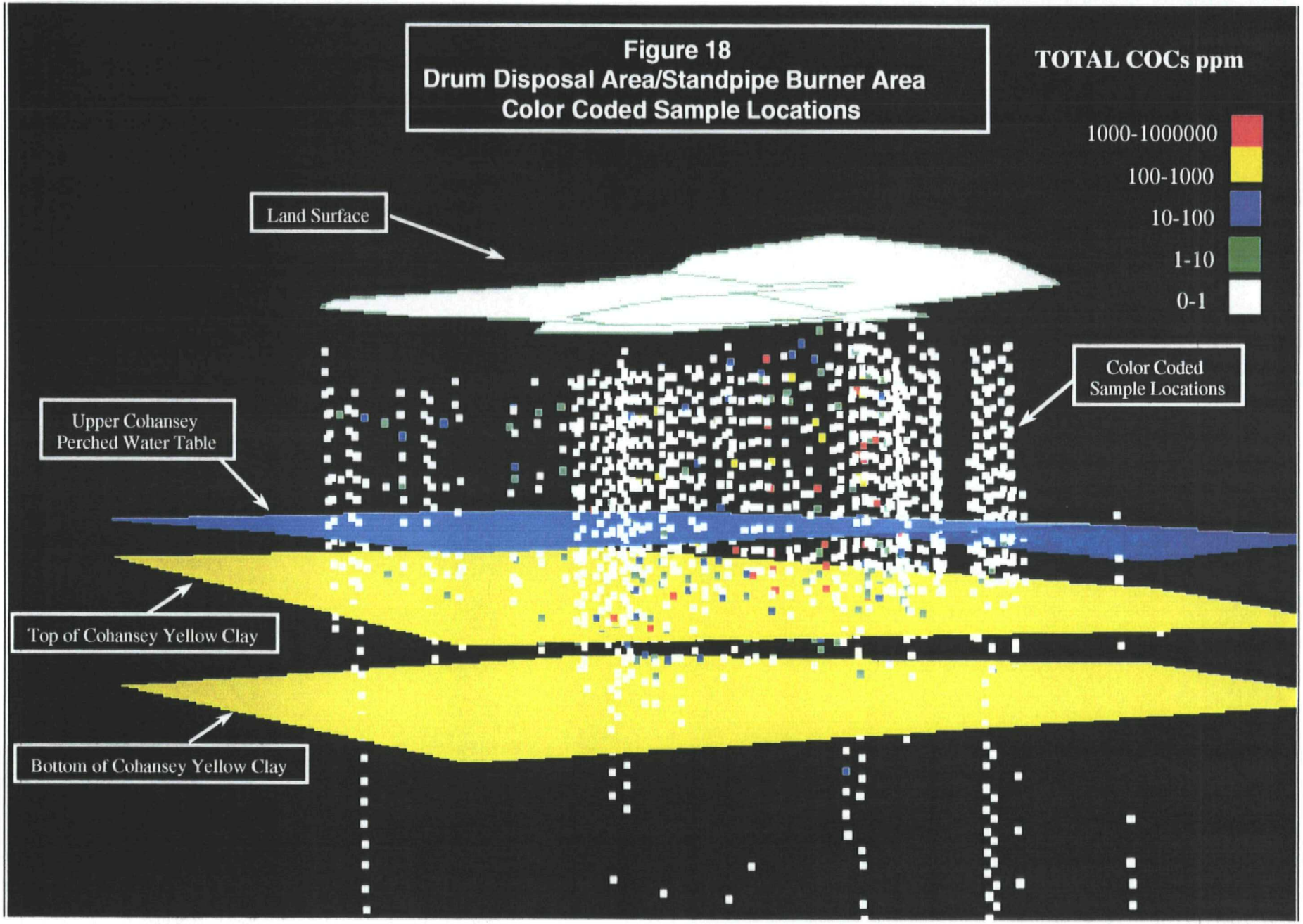
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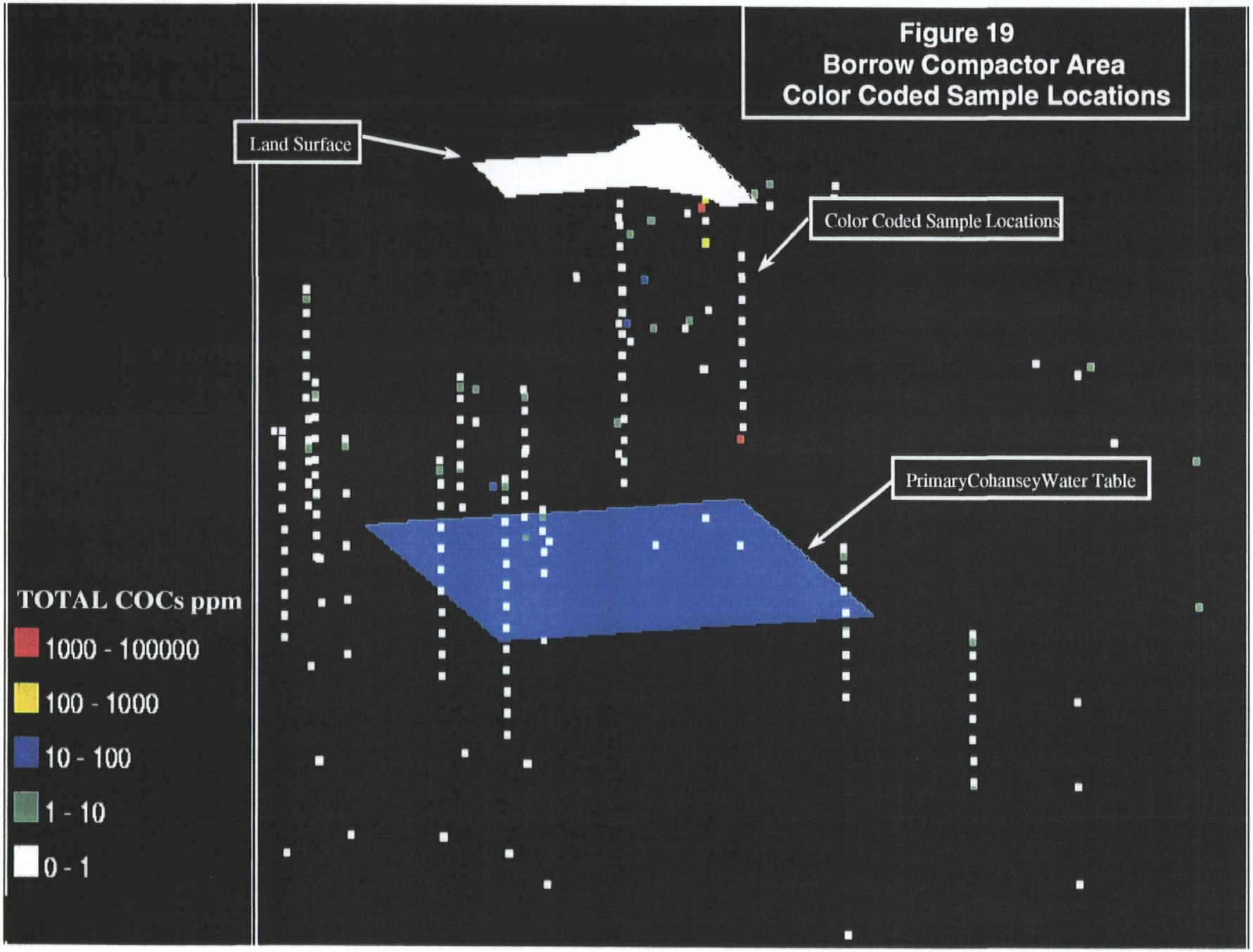
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Figure 17
Lime Sludge Disposal Area
Color Coded Sample Locations
Land Surface
Color Coded
Sample Locations
Upper Cohansey Perched
Water Table
Cohansey Yellow
Clay Surface
Primary Cohansey
Water Table
TOTAL COCs ppm
1000 - 100000
100 - 1000
10 - 100
1 - 10
0 - 1



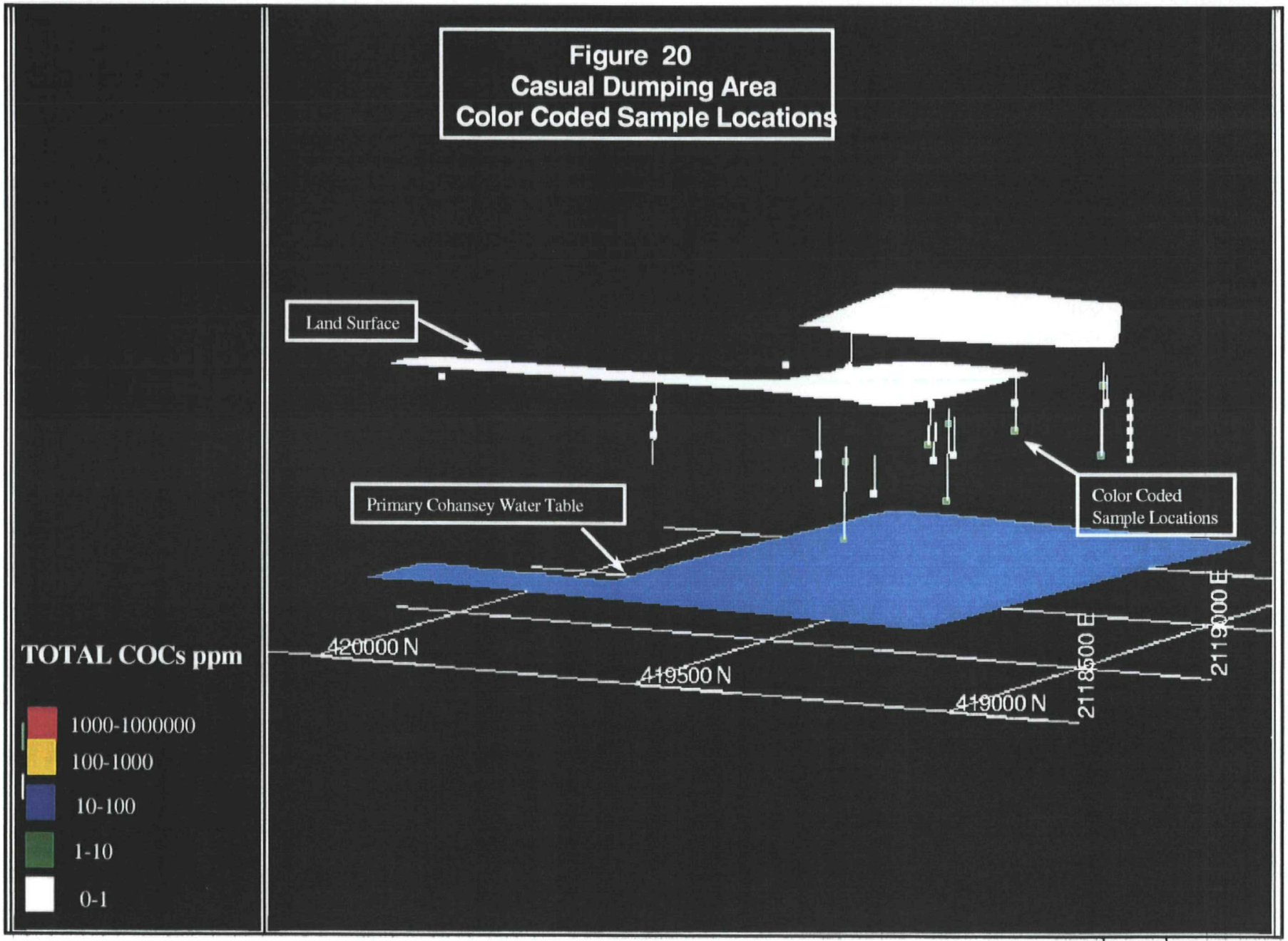
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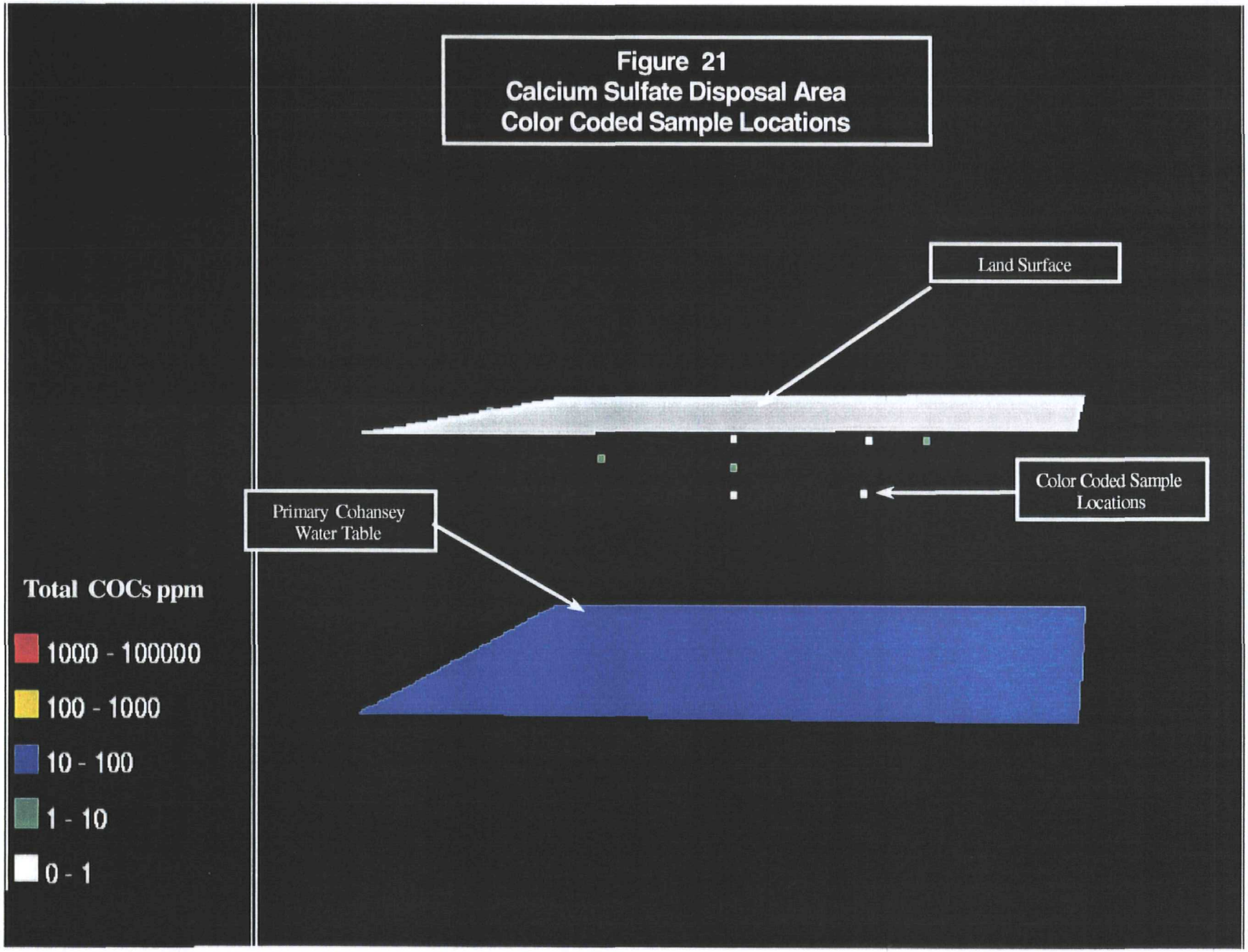
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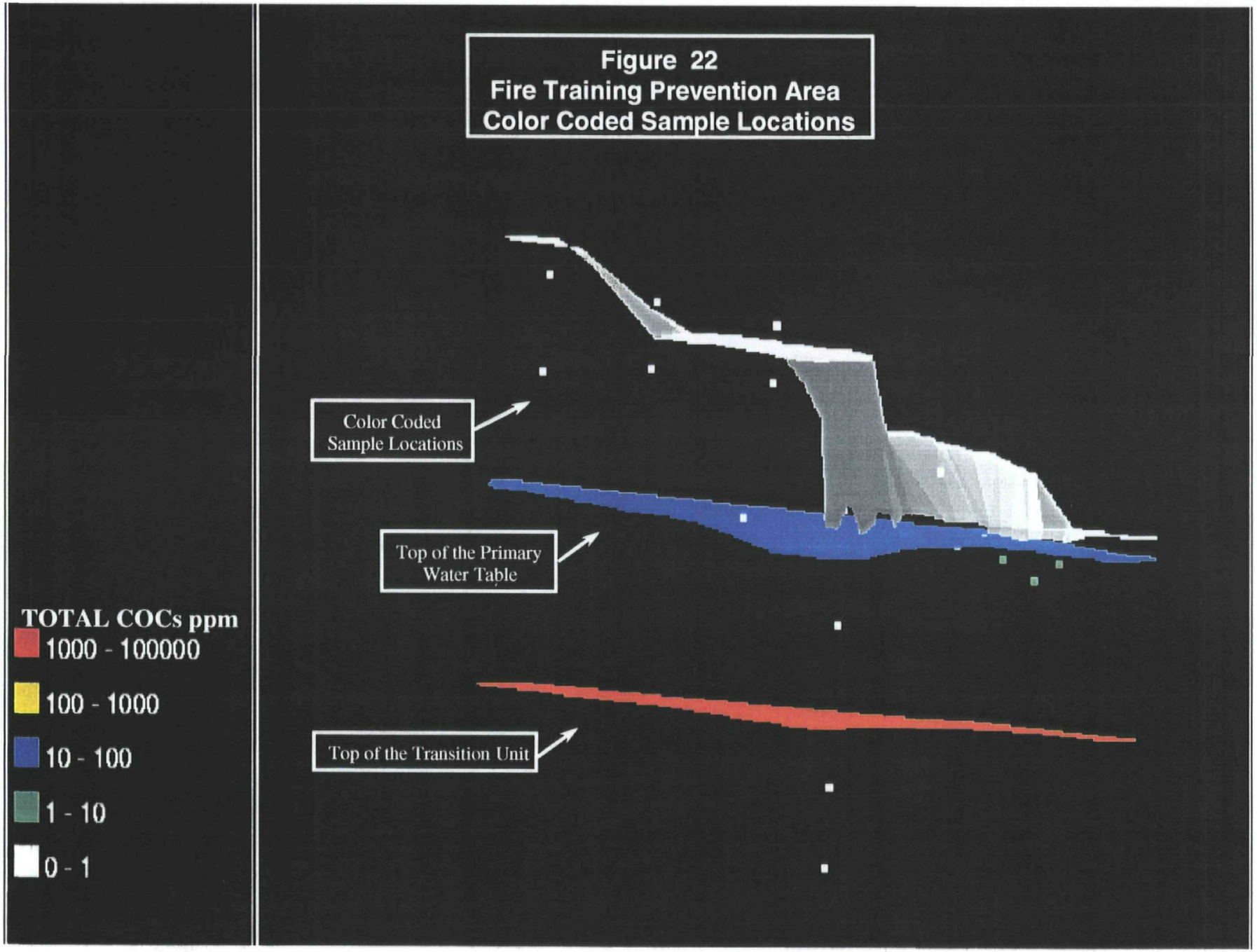
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500104



CSD_all_ sam

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Figure 22
Fire Training Prevention Area
Color Coded Sample Locations
Color Coded Sample Locations
Top of the Primary Water Table
Top of the Transition Unit
TOTAL COCs ppm
1000 - 100000
100 - 1000
10 - 100
1 - 10
0 - 1

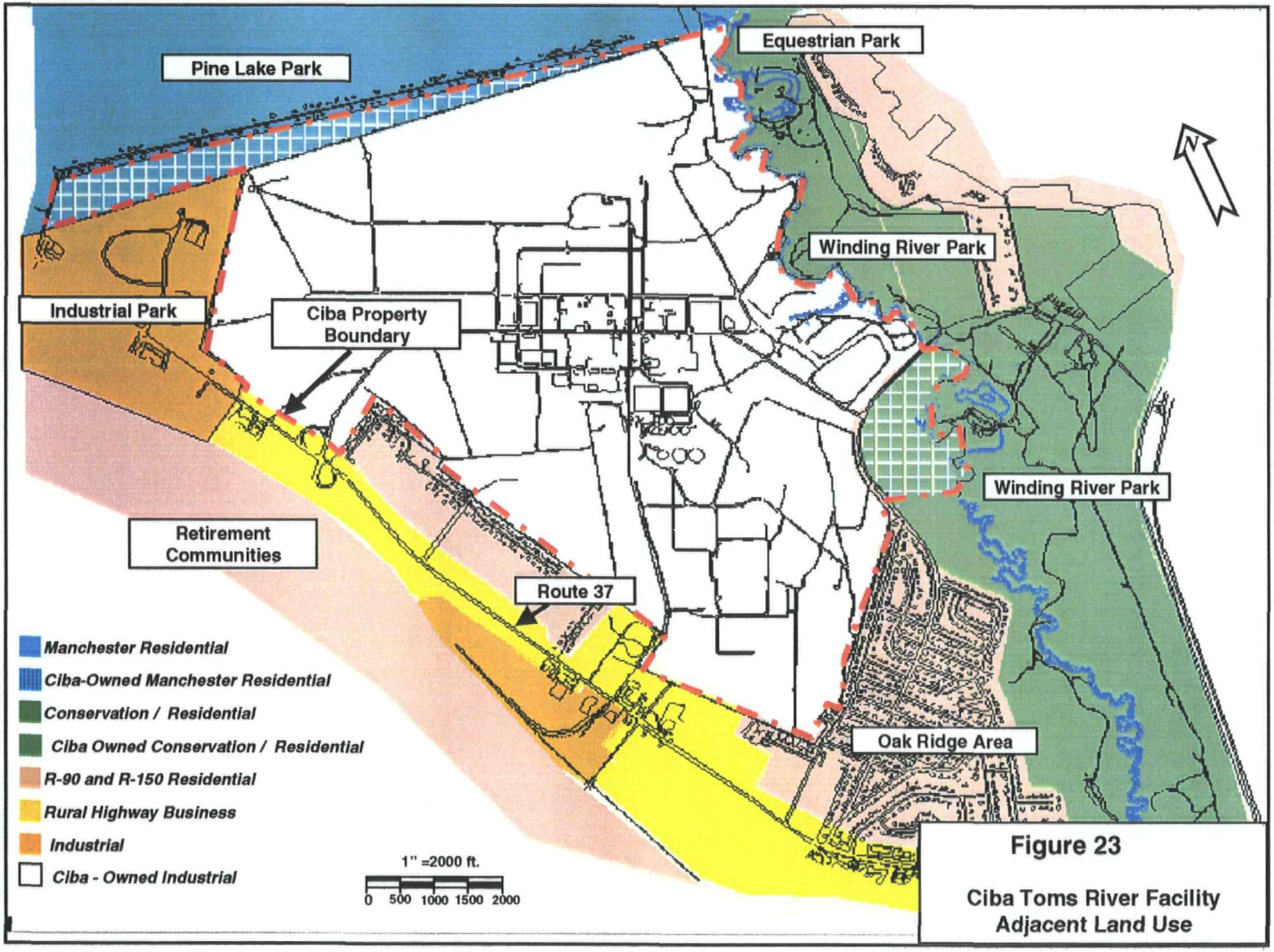
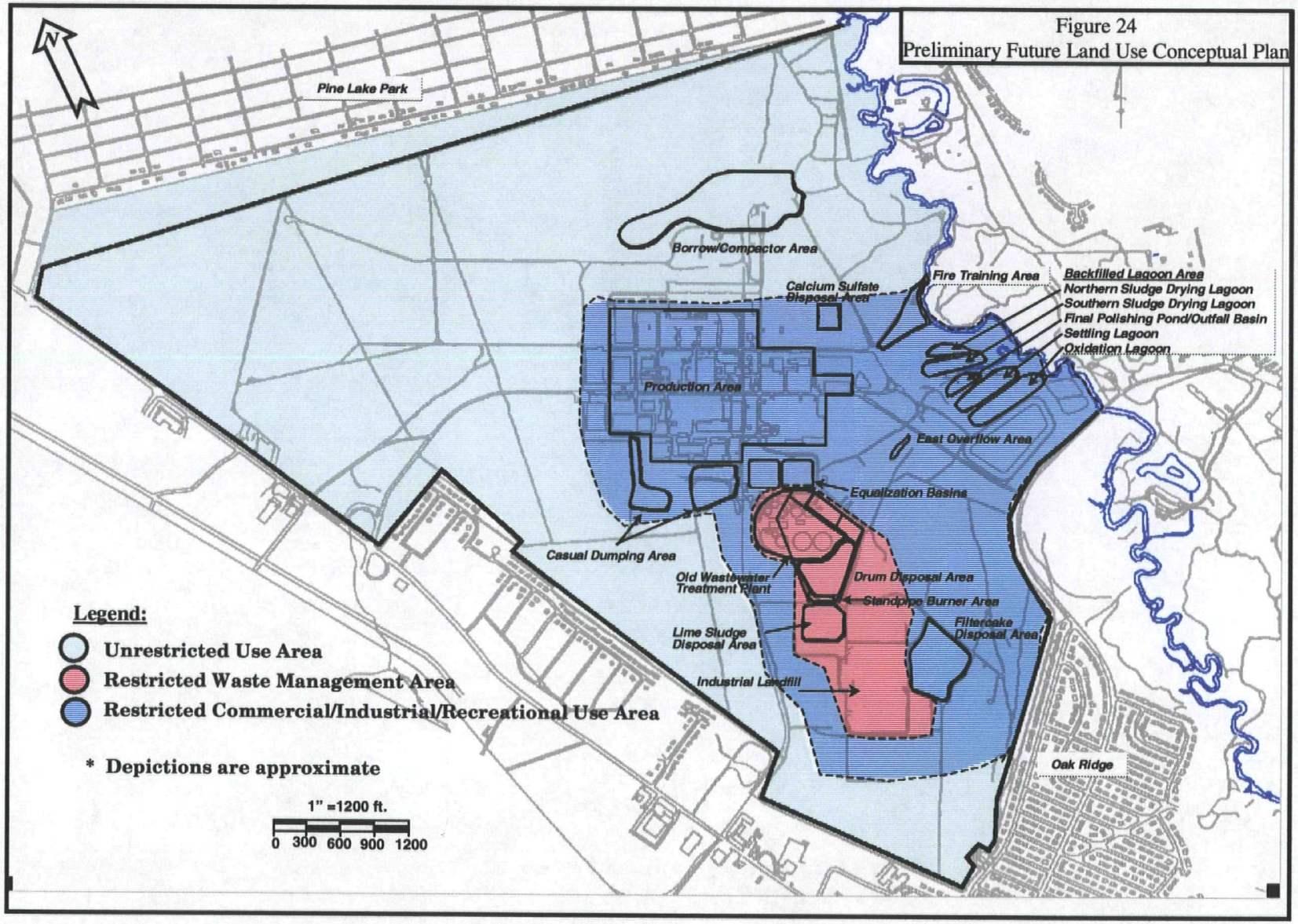


Figure 23

Ciba Toms River Facility
Adjacent Land Use

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Figure 24
Preliminary Future Land Use Conceptual Plan



500108

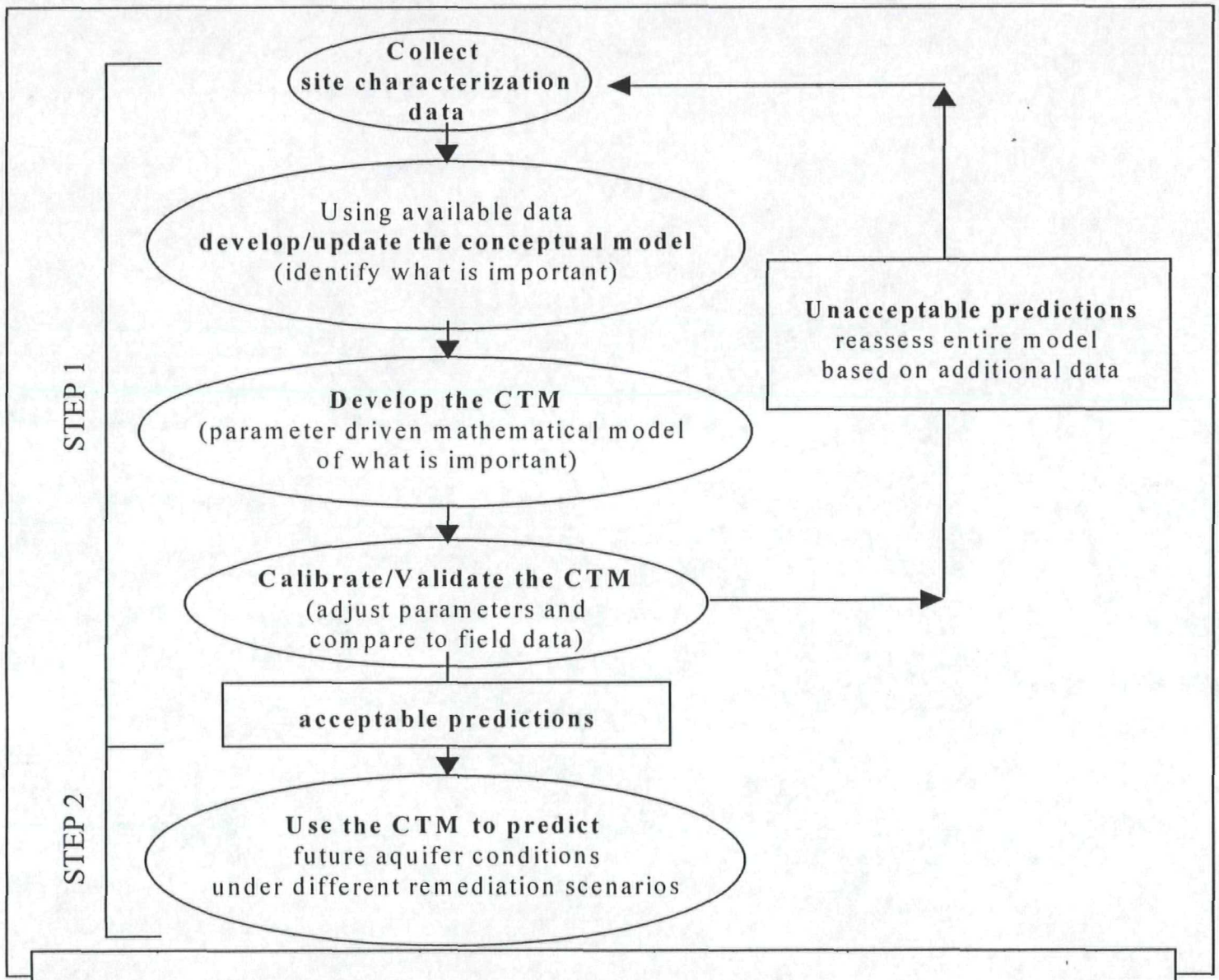
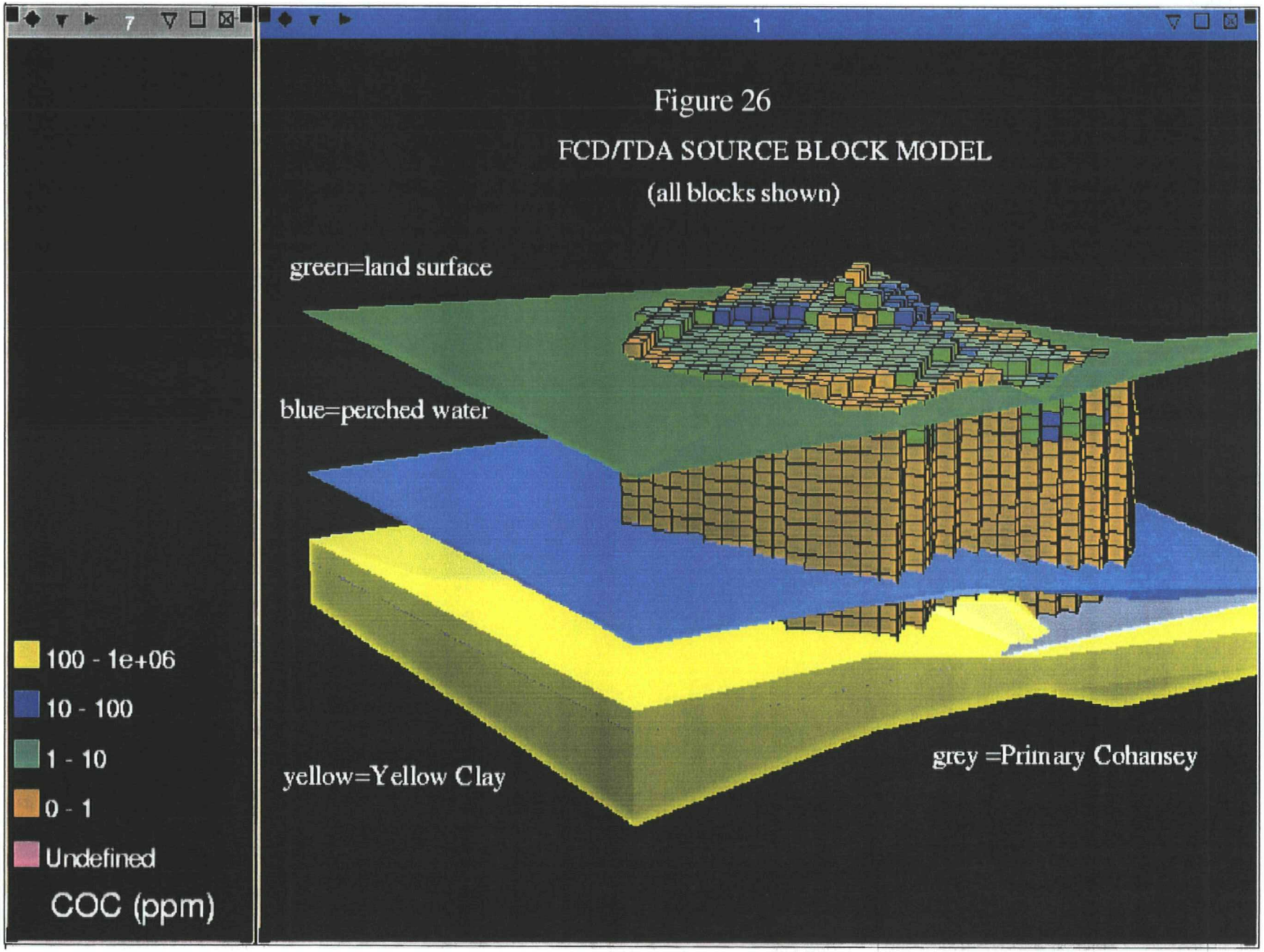
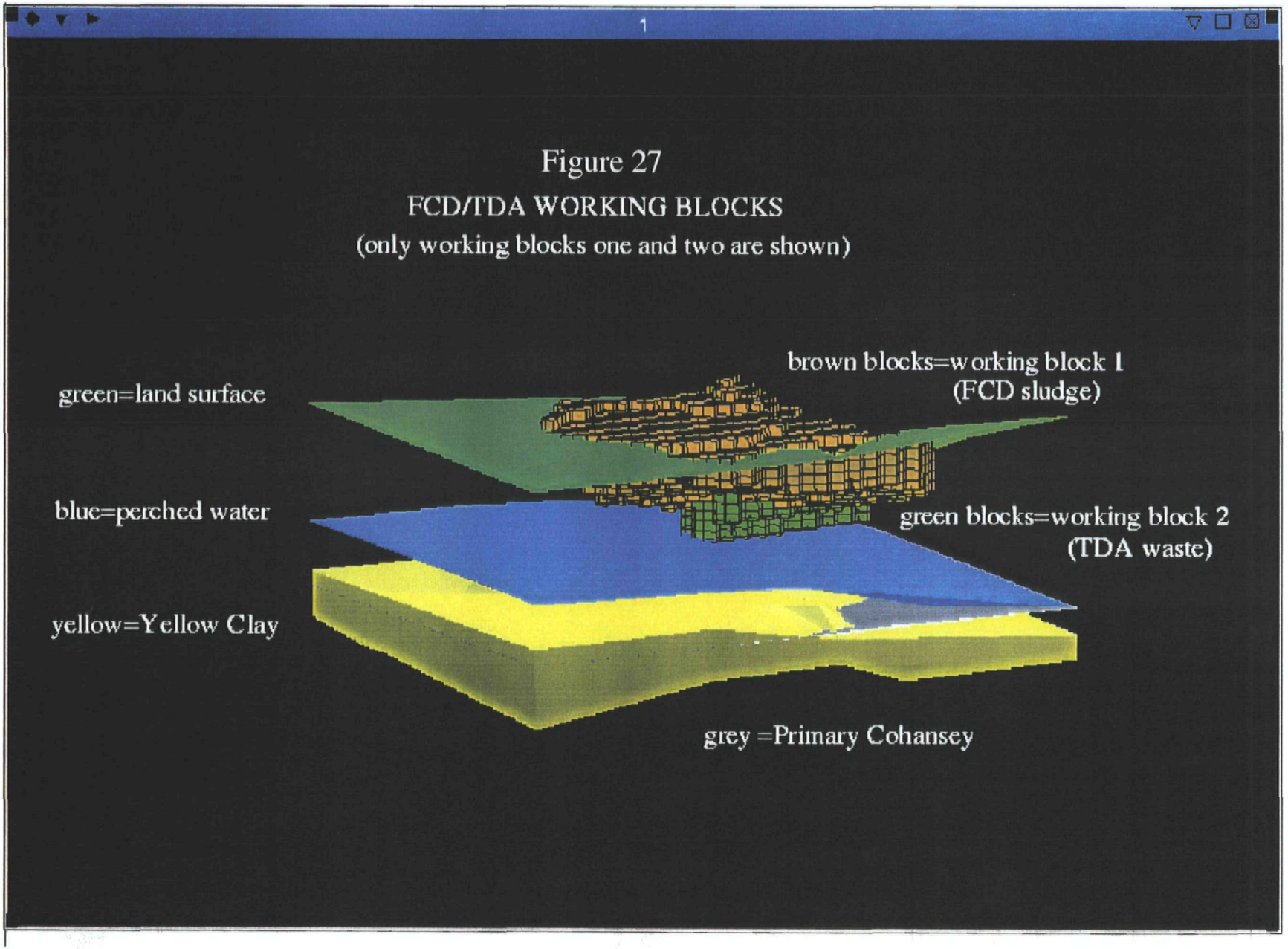
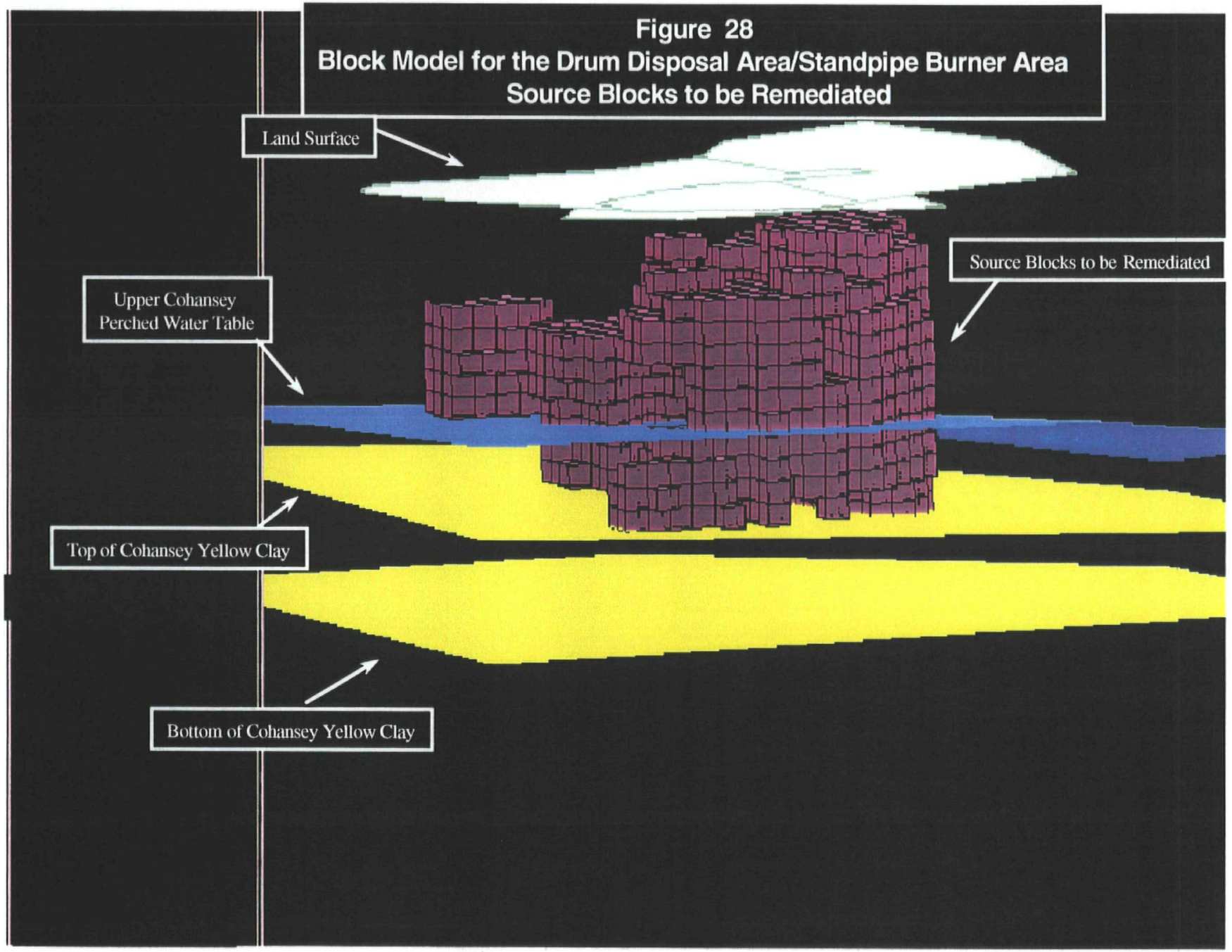


Figure 25 Illustrates the Iterative Process Used to Calibrate the Contaminant Transport Model for Use in Development of Preliminary Remediation Goals

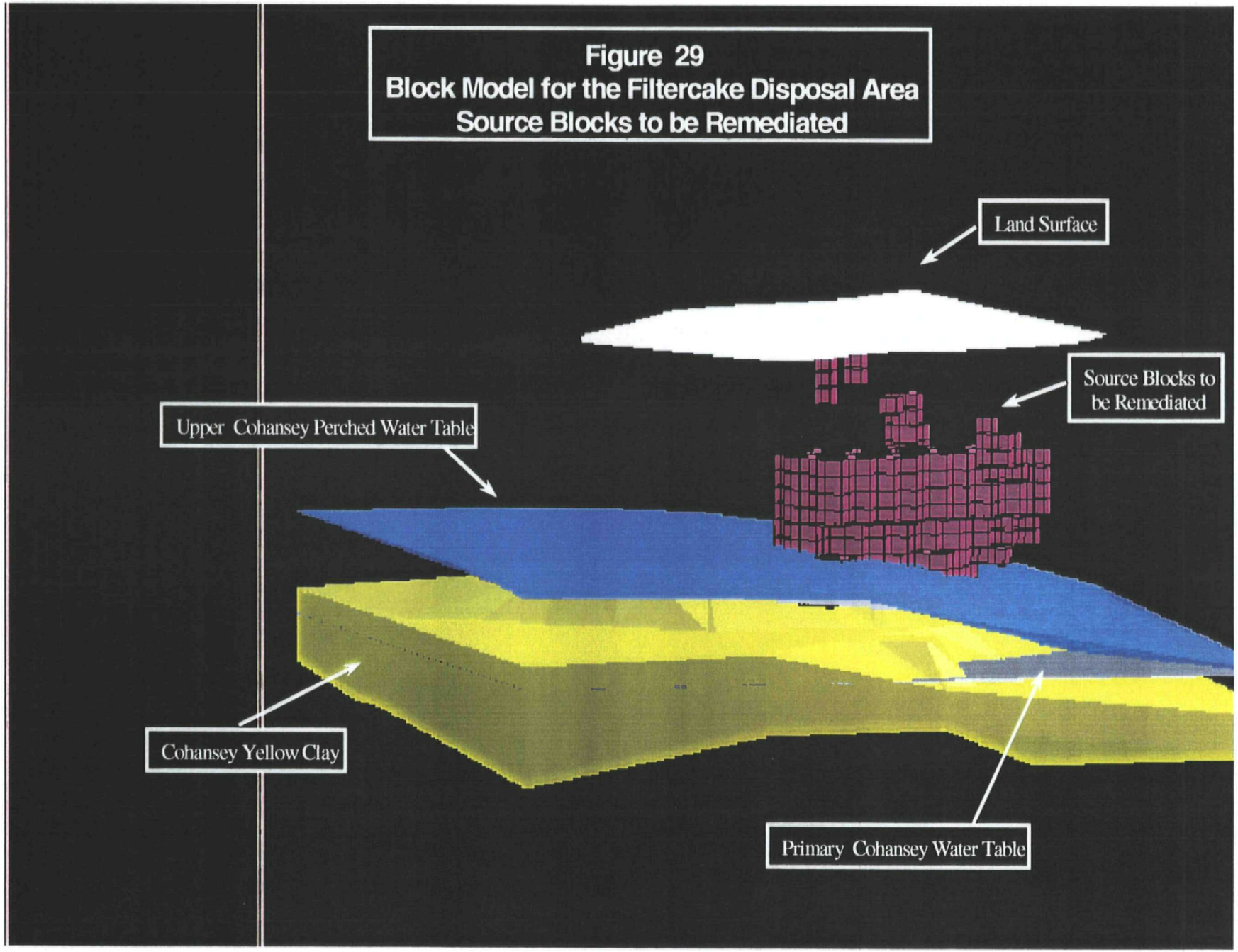
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Figure 26
FCD/TDA SOURCE BLOCK MODEL
(all blocks shown)
green=land surface
blue=perched water
yellow=Yellow Clay
grey =Primary Cohansey
100 - 1e+06
10 - 100
1 - 10
0 - 1
Undefined
COC (ppm)

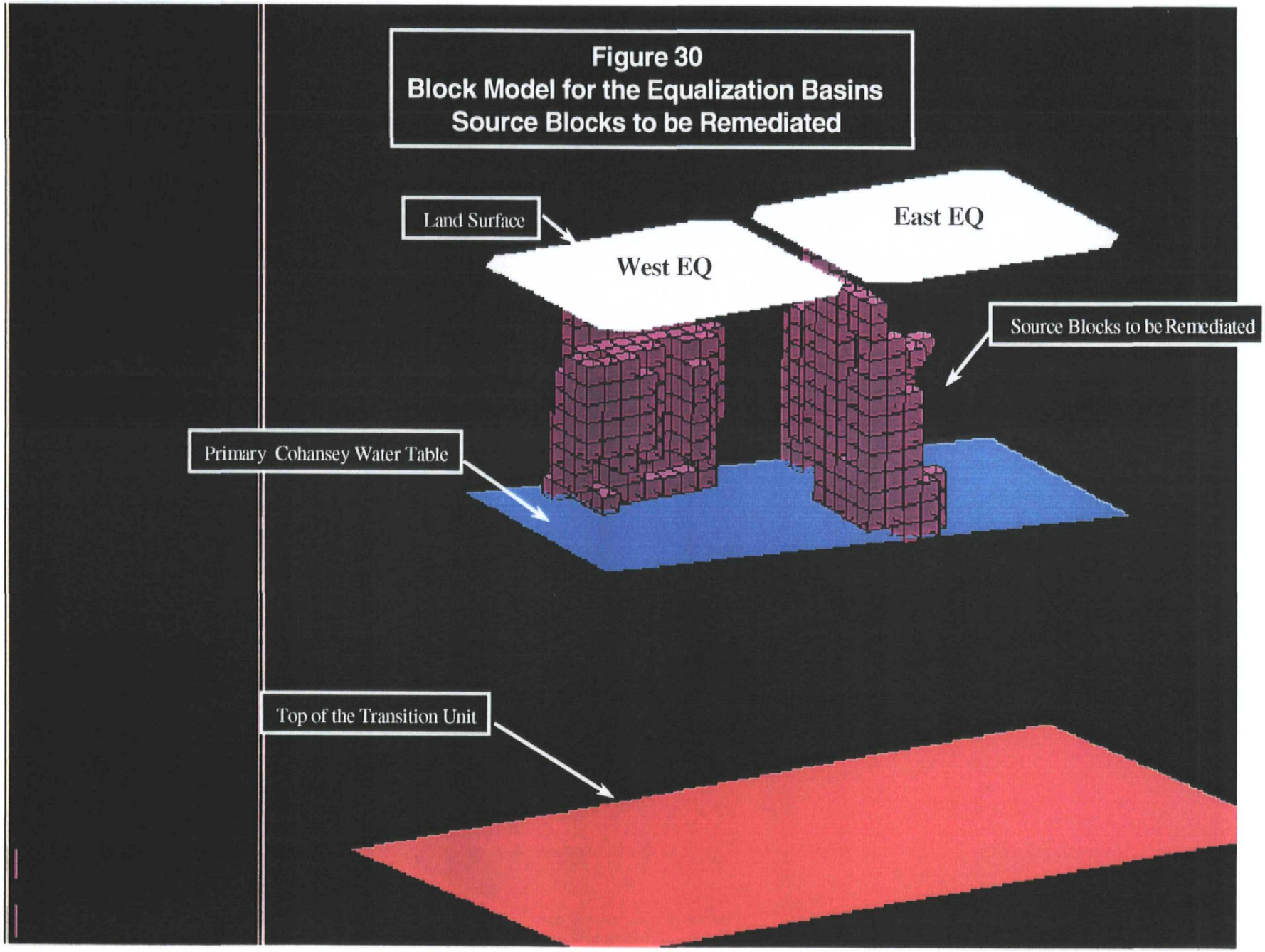

1
Figure 27
FCD/TDA WORKING BLOCKS
(only working blocks one and two are shown)
brown blocks=working block 1
(FCD sludge)
green=land surface
blue=perched water
green blocks=working block 2
(TDA waste)
yellow=Yellow Clay
grey =Primary Cohansey

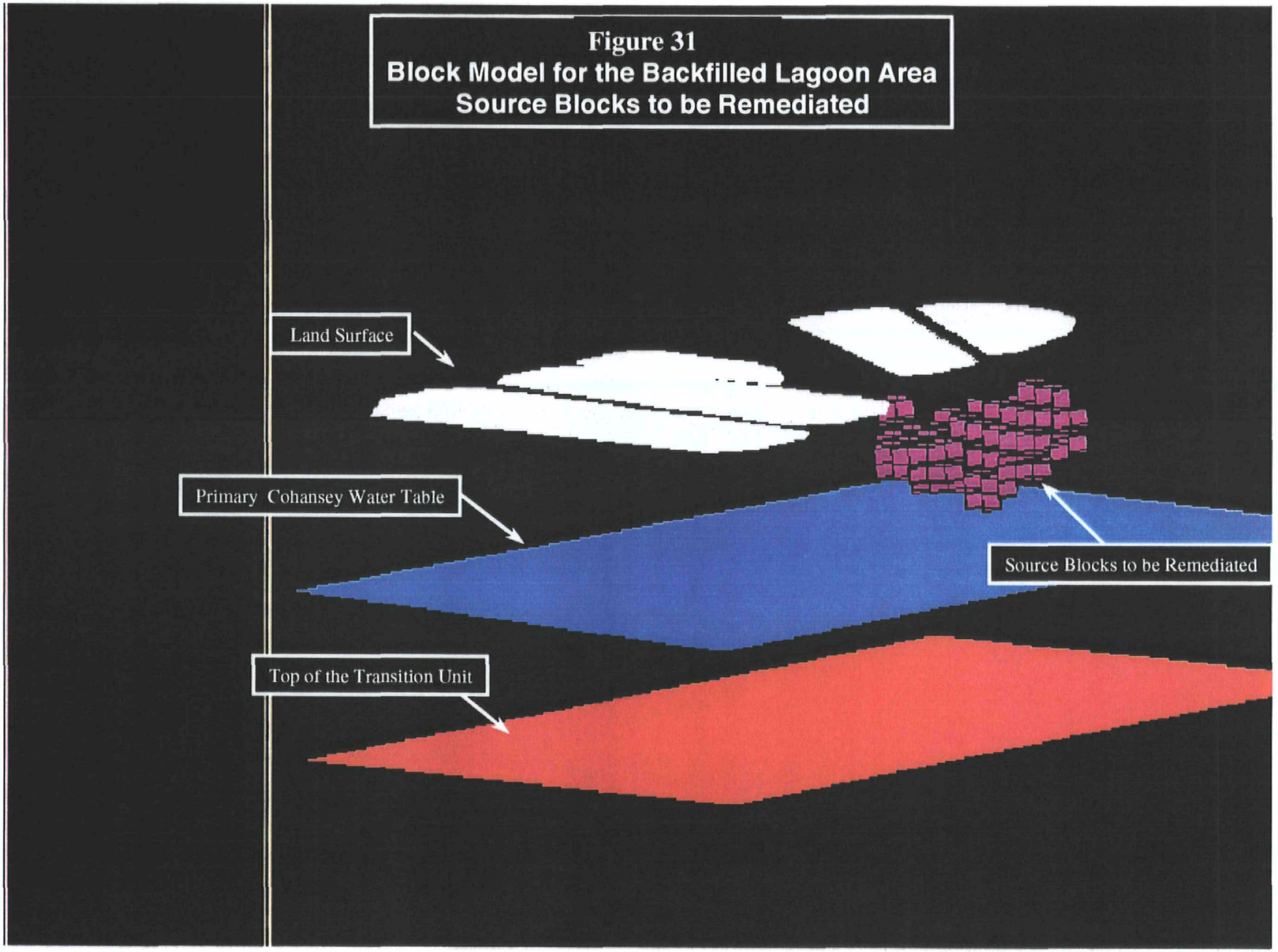

Figure 28
Block Model for the Drum Disposal Area/Standpipe Burner Area
Source Blocks to be Remediated
Land Surface
Source Blocks to be Remediated
Upper Cohansey
Perched Water Table
Top of Cohansey Yellow Clay
Bottom of Cohansey Yellow Clay

500112

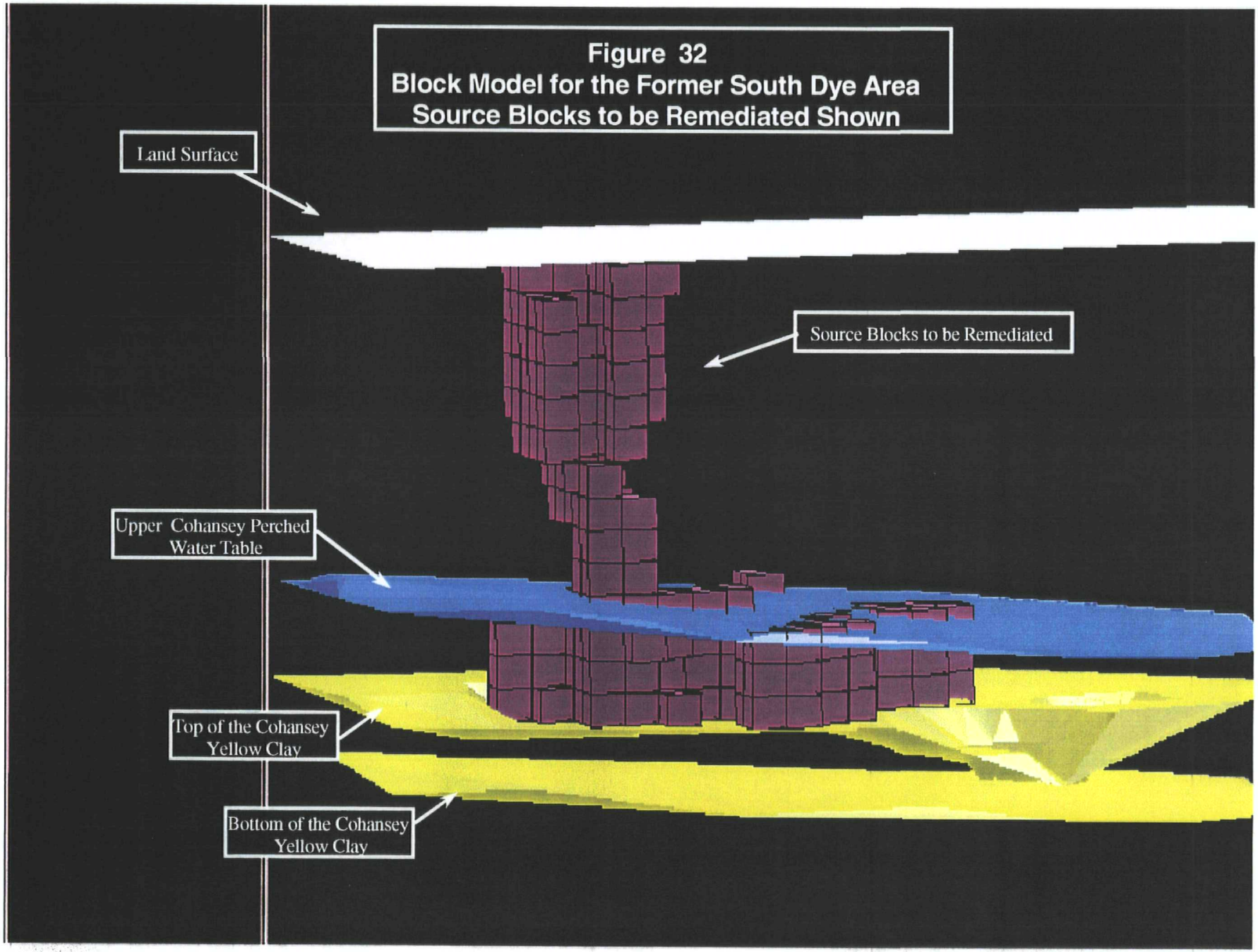

Figure 29
Block Model for the Filtercake Disposal Area
Source Blocks to be Remediated
Land Surface
Source Blocks to be Remediated
Upper Cohansey Perched Water Table
Cohansey Yellow Clay
Primary Cohansey Water Table

500113

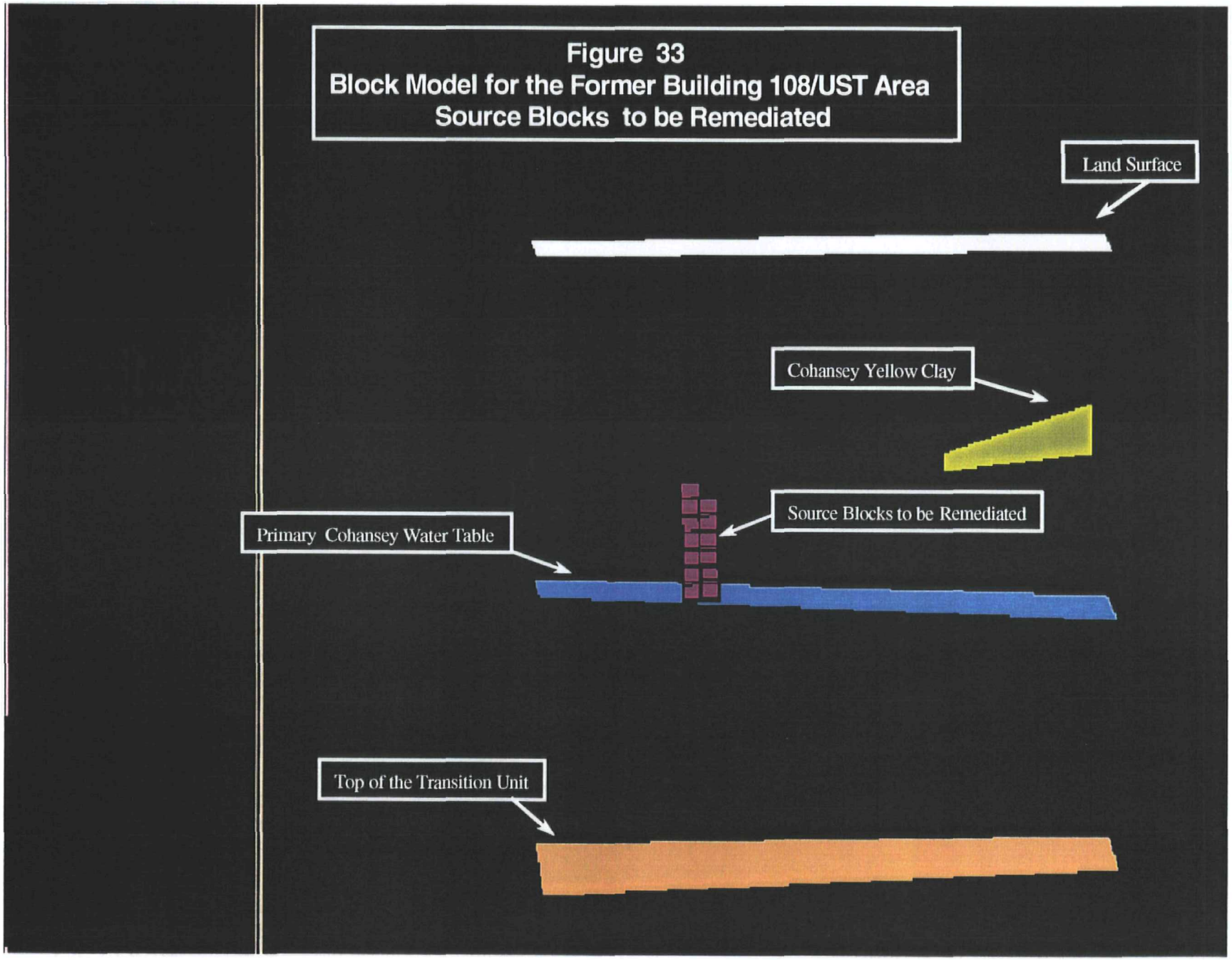

Figure 30
Block Model for the Equalization Basins
Source Blocks to be Remediated
Land Surface
East EQ
West EQ
Source Blocks to be Remediated
Primary Cohansey Water Table
Top of the Transition Unit



bla_remed blks.ps

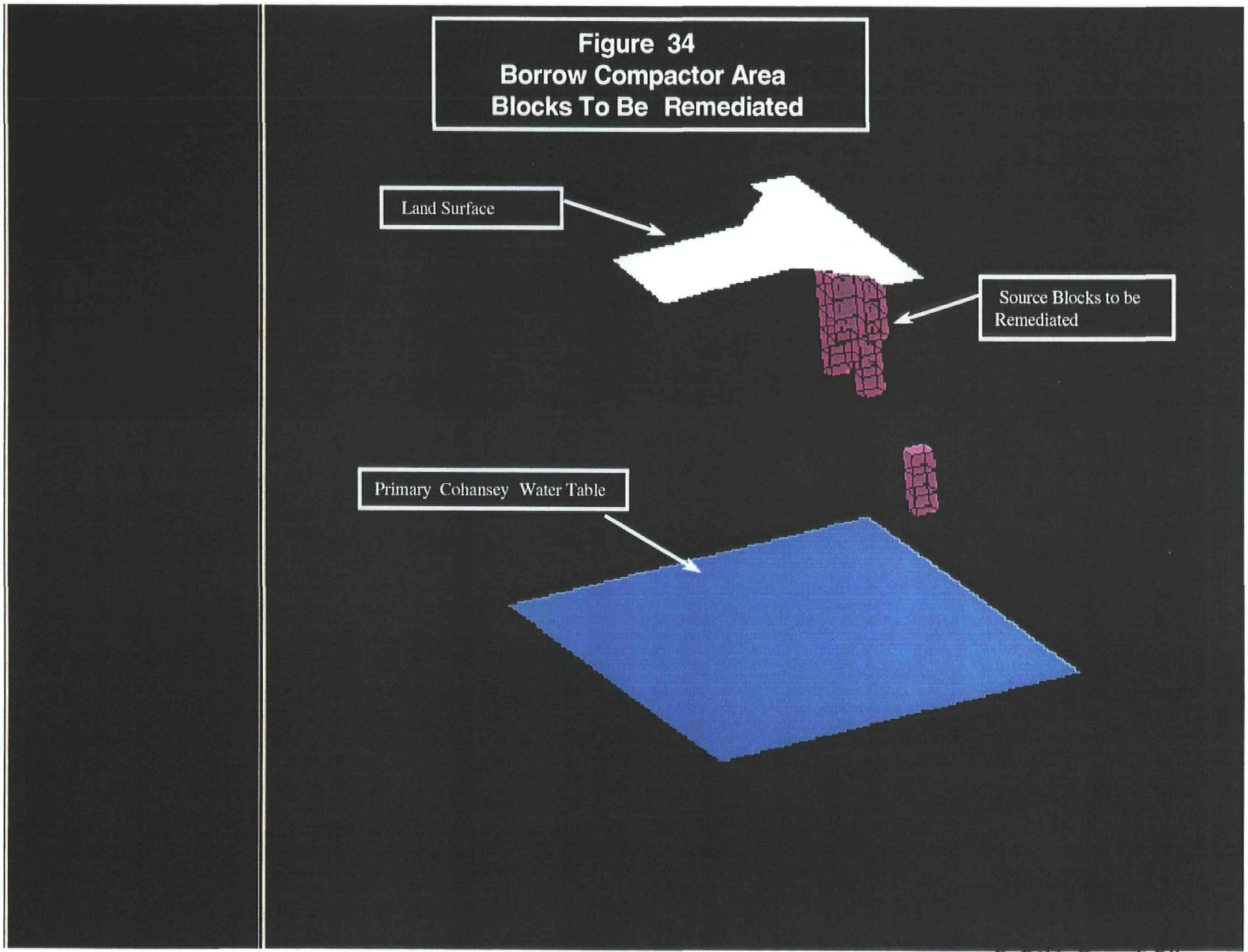

Figure 32
Block Model for the Former South Dye Area
Source Blocks to be Remediated Shown
Land Surface
Source Blocks to be Remediated
Upper Cohansey Perched Water Table
Top of the Cohansey Yellow Clay
Bottom of the Cohansey Yellow Clay

500116



108_remed blks.ps

500117



R_BCA_Remed_Blks

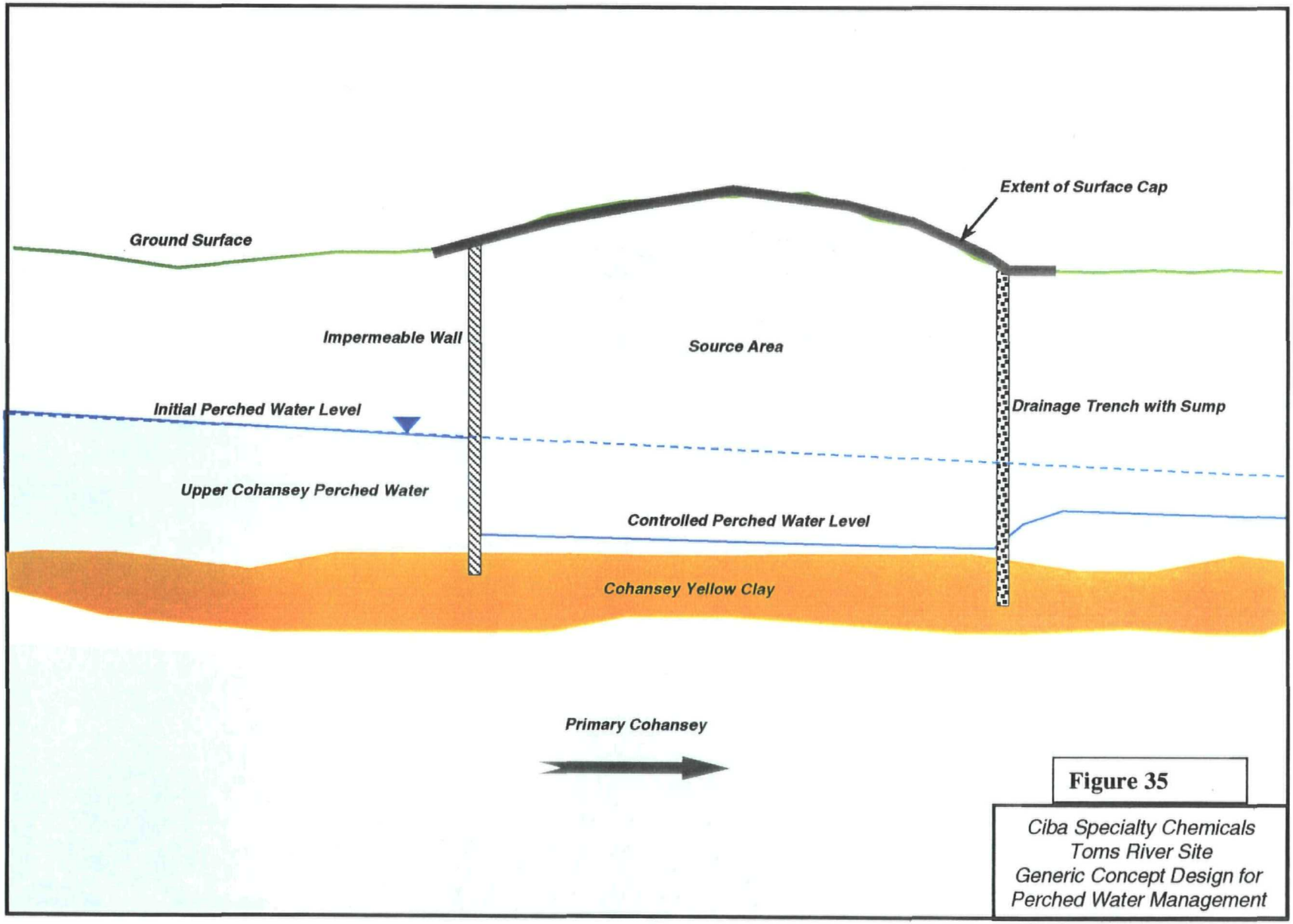


Figure 35

Ciba Specialty Chemicals
Toms River Site
Generic Concept Design for
Perched Water Management

CIBA-GEIGY CHEMICAL CORPORATION
SUPERFUND SITE
DOVER TOWNSHIP, OCEAN COUNTY, NEW JERSEY
RESPONSIVENESS SUMMARY

A. Overview

As part of its public participation responsibilities, the U.S. Environmental Protection Agency (EPA) held a public comment period from June 15, 2000 to August 15, 2000, for interested parties to comment on EPA's Proposed Plan to address the site source areas including contaminated soils and drummed material (Operable Unit 2) at the Ciba-Geigy Corporation site in Dover Township, New Jersey. In addition, on June 15 and July 12, 2000, EPA conducted public meetings to seek oral comments on the Proposed Plan. The Proposed Plan described the alternatives that EPA considered, including EPA's preferred alternative--Alternative 5A, On-site Ex-situ Bioremediation with Off-site Treatment/Disposal of Drummed Material.

In addition to comments received during the public meetings, EPA received written comments throughout the public comment period. Judging by the comments received, most of the community strongly supports EPA's preferred alternative.

The responsiveness summary contains the following sections:

A. OVERVIEW
B. BACKGROUND OF COMMUNITY INVOLVEMENT
C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES
   - -Part I: Summary and response to comments discussed at public meetings
   - -Part II: Summary and response to written comments received during the comment period

B. BACKGROUND OF COMMUNITY INVOLVEMENT

Throughout the entire Feasibility Study process, EPA has worked closely with interested residents, local officials and community groups as remedial technologies and cleanup alternatives were developed. In fact, numerous public meetings were held during the Feasibility Study process. EPA held public meetings on October 15, 1998; February 10, March 23 and 25, April 29, June 17, August 5 and 26, 1999; and January 19, 2000. EPA and Ciba-Geigy held site tours on December 3, 1998, April 17 and 21, 1999 and January 22, 2000. Finally, EPA held public availability sessions on November 10, 1999, January 26 and June 22, 2000.

On June 15, 2000, EPA released the Proposed Plan and supporting documents for Operable Unit 2 involving the remediation of the source areas associated with the Ciba-Geigy site to the public

500120

for comment. EPA made these documents available to the public in the administrative record repositories maintained at the EPA Region II office at 290 Broadway, New York, New York 10007. The documents were also available for review at the Ocean County Public Library, 101 Washington Street, Toms River, New Jersey. A notice of availability for these documents was published in the Asbury Park Press and the Ocean County Observer.

On June 15, 2000 and July 12, 2000, EPA held public meetings at the Dover Township Municipal Building to inform the public, local officials and interested citizens of the feasibility study alternatives and EPA's preferred remedy. EPA responded to all questions raised in conjunction with the proposed cleanup. In addition, on June 22, 2000, EPA held a public availability session in Toms River to discuss the proposed remedy.

C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

Part 1. Summary and response to comments discussed at public meetings

Public Comments and Responses from the June 15, 2000 Public Meeting

1. *Mr. German: Back in March 1999, bioremediation was regarded as not entirely effective. How do you remediate the portion of the polluted site that's not effectively treated?*

   Response: The Ciba site-specific pilot study performed from October 1999 to April 2000, revealed that the ex-situ biological treatment reduced Chemicals of Concern (COCs) concentrations by greater than 90%. Also, biological treatment reduced the leaching of COCs by more than 99 %. Some COCs, such as perchloroethylene (PCE) and 1,2,3 - trichloropropane (TCP), do not respond to the aerobic biodegradation process. Part of the PCE and TCP can be removed during the aeration of compost piles (volatilization). If necessary, PCE can be further treated by an additional anaerobic step, and TCP by heating the material at low temperatures to promote volatilization. Inorganic COCs will be treated by a solidification/stabilization process, if necessary, based on the result of leaching tests. Material not suited to bioremediation will be transported off site for treatment and disposal. This volume is estimated to be less than 5,000 cubic yards and will be determined in the field.

   When the eight years is up, what kind of assessment will be done to ensure that the remediation has been successful?

   Response: Leaching tests will be conducted throughout the treatment period to ensure the effectiveness of the treatment process. Any material must pass the leaching test before it can be backfilled. Also, the continuous monitoring of the groundwater, required as part of the OU1 remedy, will provide data to measure the effectiveness of the remedy. Finally, the

mechanism of the five-year remedy reviews following implementation provides a means to address results that are not consistent with expectations for the selected remedy. At that point, if necessary, other actions would be considered.

2. *Mr. Coberly: How many truck loads for off-site disposal? What path will be taken and what preventative measures will be taken to ensure safety?*

   Response: It is estimated that it will require about 400 trucks over a time period of 12-18 months to transport the drum contents off site. It is also estimated that 250 trucks over a 6-year period will be necessary to haul contaminated soil from the site. A route will be developed with local traffic enforcement officials. The community will be kept involved during the design phase. Risks associated with the truck transfer of contaminated material will be addressed by following safe worker practices and DOT requirements.

3. *Mr. Magelnicki: Why don't you remove the material by train rather than truck? How will you address the heavy metal contamination?*

   Response: Rail capability continues to be evaluated. However, as we indicated, rail services directly to the treatment or disposal facilities are limited. Metal contamination will be tested for leachability. If it does not pass the leachability test, the material will be treated via stabilization.

4. *Jack Moriarty: Where is the material in drums that are being excavated going? Are there any facilities in the country that have a permit to take this kind of material?*

   Response: The decision on final disposal sites will be made either during the design or actual construction. It would be dependent on the availability of disposal and treatment facilities at that time. We will be looking to identify those facilities that will accept this material. At this time, we don't anticipate having any problems disposing of it. There are several permitted facilities for the type of material in the drums.

5. *Stephanie Wauters: Will there be production of additional microbes into the soil for bioremediation, or will you rely on natural ones?*

   Response: The site-specific treatability study demonstrated that the microorganisms native to the soil have the ability to biodegrade the organic contaminants. Therefore, no external microorganisms will be added to the soil during the bioremediation process.

6. *John Thompson: How many drums are buried on Ciba's property?*

   Response: The drums that have been identified for the Superfund project are in the Drum Disposal Area. It is estimated that up to 35,000 drums are buried there.

7. *Ms. Feinland: You don't know where you will be transporting your material off-site but you anticipate it to be done in a year and a half. How do you know an off-site location won't add years to your estimated time frame?*

   Response: Our estimate is based on no unforeseen difficulties. We don't anticipate any problems but will be prepared to handle them. EPA disposes of material routinely from other Superfund sites.

8. *Mr. Bishop: Under the chosen remedy, what percentage of the overall acreage that Ciba now occupies would be available for development?*

   Response: About 1100 or 1200 acres would not be restricted under the chosen remedy and would be available for future development. That represents about 80% of the property.

9. *Ms. Benson: Should there be any additional safety precautions for our children that attend the elementary school that borders Ciba?*

   Response: A plan will be worked out with the community, local officials and the school to ensure the safety of the children during the cleanup effort.

Public Comments and Responses from the July 12, 2000 Public Meeting

1. *Mr. Wojcicki: Are you taking wind direction into account when you excavate?*

   Response: Yes, we will be monitoring the wind direction continuously. There will also be an air monitoring program that will be developed during the design period with community input.

2. *Mr. Gyss: What state will you be shipping your drums for off-site disposal to?*

   Response: That decision will be made either during the design or actual construction. No facility would be able to provide a commitment three years in advance of receiving the material.

3. *Mr. Minnich: Will any air escape from the building during the bioremediation process? What would cause more of a problem, the actual digging up of the contaminated soil or the atmosphere within the building with regard to parts per billion?*

Response: While we don't expect either component to cause a problem, the building where the soil is being treated will have air control equipment. Air within the structure will be collected and treated. The highest concentrations would be in the building.

4. *Mr. Hibbard: I'd like to see a plan for dealing with NAPLs (Non Aqueous Phase Liquids); they should be identified. Will there be any provisions for attempting to recover the NAPL; this needs to be addressed.*

Response: Based on the investigations to date, no recoverable NAPL has been observed on the site. Ciba will monitor the system until there is evidence that the material is not having an impact on the groundwater. The ongoing monitoring of the groundwater system indicates that the first operable unit remedial goals are being achieved -- i.e., the groundwater plume is being effectively controlled.

In the Perched Water Management, the idea of putting drainage systems there is good. However, is that going to be for thirty years or forever? Is Ciba committed to the management of this drainage forever?

Response: Ciba will be responsible for managing the site until the material in the contained areas shows that it will no longer have an impact on the groundwater.

5. *Mr. Lindenbaum: When Ciba did the pilot ex-situ process, the air was fairly heavy in the building. There was a diesel power tractor which was doing the mixing. When in full operation, what precautions will be taken to ensure safe air for the operators?*

Response: The air in the building will be captured and treated. If the air is determined to be a hazard, the person operating the equipment will have appropriate personal protection.

6. *Ms. Benson: How close is the West Dover School to the thousand-foot fence line that Ciba established?*

Response: The school boundary is at the fence line and adjoining Ciba property. It is approximately 1500 to 1800 feet from the nearest area to be excavated.

Mr. Eckel: If concentrations of pollutants at the bottom of the aquifer are discovered in areas other than the EQ Basins, perhaps the in-situ bioremediation could be extended to these areas where there is deep contamination, primarily in the south plume.

When the full-scale bioremediation begins, will you be testing for degraded metabolic products that might actually be more toxic than what you started because of the chemistry?

Response: Groundwater quality responses to the groundwater extraction and recharge system (GERS) optimization will be monitored. The mechanism of five-year reviews allows EPA to consider further actions should the selected remedy, following implementation, not meet expectations. Such enhancements might include measures like in-situ bioremediation in other areas of the site.

The results of the pilot study indicated that any metabolites formed were not toxic to microorganisms. This is based on the active biological respiration observed throughout the composting process (oxygen uptake) and lack of inhibition of biodegradation process during the entire treatment period.

7. *Ms. Borthwick: How would you heat trichloropropane to degrade it in the ex-situ bioremediation process?*

Response: The material may be heated to low temperatures to volatilize the 1,2,3-trichloropropane. The process, which would be conducted within an enclosure, could involve heating the air used to aerate the material. This air would be captured and treated.

8. *Mr. Bruce Anderson: Is there any provision for working with the state in removing all the drums from the Ciba Site?*

Response: The other drums on the Ciba site are disposed of in a landfill which has been closed under direction of the State of New Jersey. The State has issued a permit for the landfill and is responsible for regulating it. Under this permit, monitoring is routinely performed. This monitoring indicates that the landfill is not leaking, nor does it show any signs of deterioration. Consequently, the landfill was not considered a source area included in EPA's study. We have discussed this matter with State officials and indicated that any future need for remediation of the landfill should continue to be the responsibility of the State.

9. *Mr. Alex Anderson: How is the arsenic on site going to be addressed?*

Response: The arsenic in the Lime Sludge Disposal (LSD) area was stabilized at the time it was placed there. Groundwater monitoring results show the process was effective. As a result, the arsenic will stay in a stabilized form on site. The material will be tested (leaching

test) during the remediation to determine if other actions are needed. Additional stabilization/solidification will likely be required if the material fails the tests.

10. *Mr. Wojcicki: Does Ciba have a record of all the drums? Are the drums marked with their contents?*

Response: Ciba has records about the type of material that was disposed of in the drums. Yes, the drums were originally marked as to the contents. However, the disposal facility will still require additional testing before accepting the material.

Part 2. Summary and response to written comments received during the comment period

Comments Submitted by Peter Hibbard's representing Ocean County Citizens for Clean Water (OCCCW's) in a letter dated July 25, 2000. This letter also transmits the Disposal Safety Incorporated Report on the Proposed Plan.

1 We have concerns about the possibility of relatively high concentrations of chemicals remaining below the water table in the vicinity of the Drum Disposal Area and the Backfilled Lagoons.

Response: We have acknowledged the possibility of contaminant mass below the water table. However, the actual data does not support the concern that relatively high concentrations of contaminants exist below the water table in the source areas with the exception of the Equalization Basins. Disposal Safety Incorporated (DSI) is basing its interpretation on groundwater data which, if considered alone, would suggest the presence of Dense Non Aqueous Phase Liquid (DNAPL) below the water table. The data from soil borings and from the profile study do not support that conclusion. A conceptual description of the site which includes this mass as a dissolved phase is more consistent with the complete data package. See Appendix C, Section 4.4.2 of the Feasibility Study for the basis of the conclusion that deep Primary Cohansey groundwater contamination in the south plume is the result of aqueous phase transport from the Drum Disposal Area (DDA). The GERS optimization will address this dissolved phase. If, over the predicted time interval, groundwater concentrations do not respond, additional actions will be evaluated.

2. There is also some concern about the potential for additional points of contamination in the north plume area since it was not characterized as well as the south plume.

Response: We believe the north plume was as well characterized as the south plume and it is unlikely that additional points of contamination would have been discovered with additional characterization. The same processes were used in the characterization of both

plumes. For both plumes, there are a large number of monitoring and GERS wells, with more than a decade of data available from many wells. Groundwater profiling was completed in both plumes, with the same objectives. It is true that the numerical model of the north plume was not calibrated as extensively as the south plume. In developing the model, the south plume was calibrated first; so more effort was expended in that area to demonstrate proof of concept, to obtain acceptance of the modeling approach that was developed for the site. The south plume had several pumping wells installed in the mid 1980's which served as excellent points of calibration. This was not the case for the north plume. The concepts established for the south plume were then extended to the north plume.

3. *Optimization of Groundwater Extraction and Recharge System (GERS) should be a continuous process.*

Response: The GERS optimization will be an ongoing process during the course of the remedy. It is an essential step to effectively restore the groundwater as the plume is reduced during and after implementation of the remedy. Optimization will be made with reference to the dual goals of aquifer restoration and containment of the plume. Modeling of the GERS pumping and recharge will be used to optimize the system. Groundwater contaminant distributions do not change rapidly, which is supported by the data obtained since implementation of OU1, and periods on the order of five years should be appropriate for GERS optimization.

4. *If GERS is not adequate to remove any high concentrations of contaminants, expansion of the in-situ bioremediation should be considered, especially in the Drum Disposal Area and the Backfilled Lagoon Areas.*

Response: As indicated in a previous response, the mass in the deep Primary Cohansey aquifer can be accounted for in terms of dissolved mass. Therefore, the GERS is expected to be adequate. If, at any point, information is developed indicating the selected remedy is not producing the expected results, EPA would consider additional actions. In many cases, EPA would make such a determination in connection with five-year reviews of the remedy which are required by the Superfund legislation. If found to be necessary at Ciba, additional actions could include expansion of the in-situ bioremediation in other areas of the site.

5. *During the process of GERS optimization, some wells may be closed. There is considerable public concern about the closure of these wells and the potential to move contaminants through the clay to lower levels of the aquifer.*

Response: Well closures will be performed in accordance with the technical requirements of the state. Those requirements have the specific objective of eliminating the potential for vertical cross-contamination in the aquifer system.

6. *According to the Contaminant Transport Model, it is possible that the Practical Restoration Limits (PRLs) may be reached before the Aquifer Restoration Goals (ARGs). We suggest that the conclusions drawn from a model be confirmed by empirical data. The determination that the PRLs have been reached before the ARGs leaves a source to continue to contaminate the aquifer. It is conceivable that the model is not correct, or that the extent of the source has been characterized incorrectly. This is unacceptable. If extraction of additional soil will not bring the site closer to the ARGs, then additional treatment, such as capping, or in-situ bioremediation may be required. Any significant source of contamination should not be ignored.*

Response: The conclusions from the model have been drawn from data. Post-excavation sampling will be performed to determine whether the source has been characterized correctly (i.e., to verify the geostatistical characterization model) and if additional material needs to be removed. The impact of the remaining mass on groundwater quality will be measured in the ongoing groundwater monitoring program, with the results compared against the model predictions. EPA recognizes the value of a model as a predictive tool and agrees that the associated conclusions need to be confirmed by empirical data. EPA further agrees that any significant sources of contamination identified through actual post-excavation sampling should not be ignored. We will be working closely with Ciba and the community during the design and implementation of the remedy to ensure that any such contamination is addressed. As far as additional capping, it is worth noting that entire source areas (e.g., Drum Disposal Area, Lime Sludge Disposal Area, Filtercake Disposal Area and the Former South Dye Area will be capped. Capping of the Backfilled Lagoon Area is unlikely, as the sludge and some contaminated soil above the water table will be removed, thus eliminating the need for a cap.

7. *Soil stabilization: The long-term controls of soil stabilization are not proven. The use of chemical additives, especially to control the arsenic, has not been demonstrated to be effective for the timetable required here. Continued monitoring and alternatives such as solidification should be considered.*

Response: Soil stabilization/solidification is just one component of the remedy for the arsenic-containing waste in the Lime Sludge Disposal (LSD) Area, should it be required based on leaching tests. Capping and perched water management, including on-going performance monitoring, are also part of the remedy. The cap and perched water management system will require long-term maintenance and monitoring.

The performance of stabilization (and capping) of material in the LSD has already been demonstrated at the site, since it has been approximately 23 years since the closure of the LSD in 1977 and groundwater concentrations of arsenic in excess of standards have not been detected in downgradient monitor wells. The proposed remedy for this area adds protective measures to those already in place.

Solidification/stabilization involves the addition of chemicals. A range of options are available for treating material with this technology, with the appropriate ones selected based on the materials to be treated and the nature of the waste material. There is something of a continuum between stabilization and solidification, and the primary difference is in the character of the final product. A stabilized material may have the consistency of a soil, with the materials irreversibly sorbed or precipitated within the matrix. Solidified products are monolithic structures, such as concrete blocks, in which the contaminants are bound. Other than in the structure of the finished products, the ways in which contaminants are immobilized are much the same. Both stabilization and solidification will be evaluated during the design process.

8. *Bioremediation: We are concerned about the potential for metabolic by-products from microbial action potentially being toxic. While this is not expected, analysis of the end products of bioremediation should be evaluated. New compounds and new Tentatively Identified Compounds not reported in the untreated soil should be evaluated. This should be done whenever the characterization of the untreated soil changes.*

Response: Ciba monitored Tentatively Identified Compounds (TICs) using the Synthetic Precipitation Leaching Procedure (SPLP) during the pilot study. Leaching of TICs was monitored in the untreated (before composting) and treated (after composting) samples. TIC leaching was reduced by 92-97% as a result of biotreatment and the number of detected peaks was also significantly reduced. No new significant peaks were observed. The leaching test is the means by which the treatment technology performance will be evaluated.

Results of the pilot study indicated that any metabolites formed during the bioremediation process were not toxic to microorganisms. This is based on the active biological respiration observed throughout the composting process (oxygen uptake) and lack of inhibition of biodegradation process during the entire treatment period.

9. *While air monitoring will be done, we would ask for two additions to the ROD. First: define an action sequence that outlines what will be done, and on what timetable, if the action limits are detected at the excavation perimeter or at the site perimeter. Second, in 1992 during test pit excavation, there was a warning system for the school children. The warning system was not audible in areas close to the site because of the angle of the siren. While no problems were encountered in 1992, this phase of the project will take considerably longer. We will require a warning system that will protect children in transit to and from school, and the involvement of school personnel in the design of a system to protect students and teachers in the building in the event of excessive emissions. While this is a remote possibility, it is necessary for peace of mind in the community.*

Response: The sequence of events and timetable in the event of excessive emissions will be

included in the design work plan. The public will have an opportunity to comment on the plan.

EPA and Ciba recognize the importance of this issue to the community and take seriously the responsibility to involve the community during the design and implementation of the remedy. Plans to protect the school children and staff will be provided. The particulars of these plans will be detailed in the implementation work plan and will be part of the design process. During the development of this plan, the community, school officials and local government will be consulted.

10. *The areas to be restricted from development need to be further defined. Areas between the Oak Ridge Parkway and the Toms River that are owned by Ciba should be included in the restricted zone. While most of the land in that area is wetlands, small areas near the river are not. In addition, Ciba should be approached about voluntarily extending the restriction south of the identified area. This should include all the land between West Dover Elementary School and Summit East residential area. Some of this area is contaminated at levels below that of the identified plume, but at levels of concern, and are not subject to capture by GERS. Restriction to areas subject to cleanup in either OU1 or OU2 should not be subject to local control, but should be restricted in a manner that will not permit discretionary change of land use.*

Response: There is not likely to be any development on the Ciba-owned land between the Oak Ridge Parkway and the Toms River due to the proximity of the river floodplain and the presence of wetlands. The rest of the site is currently zoned for industrial use. Any changes in land use will need to undergo a zoning change process which is under local control (there is no federal control involving uses of uncontaminated, privately-held land). The process includes public notice, review and opportunity for comment. Deed restrictions will provide a legal mechanism for restricting land use. Such restrictions will include prohibitions of land uses that would result in excavation through caps or which are otherwise potentially damaging to protective systems. Also included in deed restrictions, as appropriate, is the establishment and maintenance by Ciba of institutional controls such as fencing or other access limitations. In addition, a waste management area that excludes any other land use will be established. This area will include the footprint of the groundwater treatment facilities, the Drum Disposal Area, the Standpipe Burner Area, the Lime Sludge Disposal Area, the Filtercake Disposal Area and the industrial landfill. The land formerly developed for manufacturing operations at the site, exclusive of the waste management area, will be limited to industrial or commercial uses in the future.

Disposal Safety Incorporated (DSI) Report on the Proposed Plan

1. *Three additional work blocks – Drum disposal area blocks 13 and 14, consisting of stacked drums and underlying sand, and Filtercake Disposal Area block 1, consisting of wastewater treatment sludge – should be excavated in full.*

Response: All of the soil within the stacked drums, block 13, will be excavated. Of the soil located in this work block, an estimated 6,100 yd^3 will be treated. In block 14, the sand underlying the stacked drums and overlying the Yellow Clay, amounting to an estimated 7,175 yd^3, will be treated. In block 1 of the Filtercake Disposal area, which includes wastewater treatment residue overlying Upper Cohansey sand, an estimated 5,400 yd^3 will be treated. The validity of this excavation plan will be verified with post-excavation sampling.

For all three of the work blocks referenced in the comment, the determination of the excavation volumes was made based on the process described in the Feasibility Study to meet the Preliminary Remediation Goals or Aquifer Restoration Goals. In addition, all of the material remaining behind in each of these work blocks lies within perched water management areas, which will be capped and horizontal flow controlled by impermeable barriers and drainage trenches. In this way, the remedy is protective of groundwater quality and eliminates potential direct exposure to any remaining contaminants.

2. *The ROD should require that objective criteria be established for determining whether the continuation of excavation beyond the anticipated 150,000 cubic yards of soil is warranted.*

Response: An excavation performance verification plan will be developed during the design process and be made available to the public for comment. The estimate of 150,000 cubic yards of soil to be excavated for treatment is based on model predictions. This volume estimate will be verified during implementation of the remedy through post-excavation sampling. If such sampling identifies any significant sources of contamination remaining after excavation, they will be addressed as part of the remedy.

3. *There should be a detailed study of air emissions from the selected remedy.*

Response: A detailed study of air emissions including baseline monitoring and an evaluation of potential sources associated with the selected remedy will be conducted during the remedial design.

4. *An institutional mechanism for monitoring and enforcement of land use restrictions*

should be established with permanent funding.

Response: Local zoning laws, boards, processes and deed restrictions will provide the institutional mechanisms to enforce the appropriate land use restrictions. Five-year reviews conducted by EPA will also provide an additional means of evaluating/controlling future land uses to ensure that they are appropriate with respect to the requirements of the remedy and to ensure protectiveness. In addition, any future Consent Decree with Ciba to perform the OU2 work will require deed restrictions to limit the use of certain areas of the site.

Deed restrictions will provide a binding legal mechanism for restricting land use. Such restrictions will include prohibitions of land uses that would result in excavation through caps or which are otherwise potentially damaging to protective systems. Also included in deed restrictions, as appropriate, is the establishment and maintenance by Ciba of institutional controls such as fencing or other access limitations. In addition, a waste management area that excludes any other land use will be established. This area will include the footprint of the groundwater treatment facilities, DDA, SPB, LSD, FCD and industrial landfill. The land formerly developed for manufacturing operations at the site, exclusive of the waste management area, will be limited to industrial or commercial uses in the future.

5. *Solidification rather than chemical additives should be used to stabilize soils containing leachable metals.*

Response: See response to OCCCW (P. Hibbard letter) comment number 5.

6. *The ROD should include a commitment to reoptimize the Ground Water Extraction and Remediation System (GERS), based on an additional modeling study, once the source remediation is finished.*

Response: GERS optimization will be an ongoing process, responding to changes in plume configuration based on continuing groundwater monitoring data, in order to meet the dual goals of maintaining capture of the plume and facilitating aquifer restoration. The optimization process as well as the resultant expected improvements in groundwater quality will necessitate changes in extraction well locations, the closing of some wells and the addition of others. This or a similar statement will be incorporated into the ROD. (See also response to P. Hibbard comment number 3.)

7. *The GERS optimization study should account for pooled Dense Non Aqueous Phase Liquid (DNAPL) or its residue at the bottom of the Primary Cohansey aquifer. Extraction wells should be placed near the edge of the Yellow Clay, just downgradient of the major source areas, and screened only in the bottom part of the aquifer.*
Response: GERS optimization will proceed in a manner consistent with the data and the Contaminant Transport Model will be verified and recalibrated as needed based on

that data. Future groundwater monitoring data along with existing data, which will allow the development of meaningful spatial and temporal trends, is to be used in the GERS optimization process. If the expected response of the plume to the remedy is not observed, then a reassessment will be undertaken. Appropriate wells will be added, if determined to be necessary.

The contaminant levels detected in groundwater at the bottom of the Primary Cohansey in the south plume can be explained in terms of dissolved phase transfer, and does not require the postulation of a Non Aqueous Phase Liquid phase currently sitting near the bottom of the unit. There is direct evidence for a strong downward vertical gradient in much of the south plume. The results of particle tracking studies with the model have shown that particles located in the shallow portion of the aquifer and near the source Drum Disposal Area migrate to the bottom of the aquifer in a relatively short distance. The physical explanation for this is that a groundwater recharge zone occurs in this part of the plume, such that recharging water originating as precipitation or in the perched zone pushes the contaminated groundwater downward to the bottom of the aquifer. This situation should respond to a new well as described in the comment.

8. *In-situ bioremediation, if effective in the Equalization Basins, should be extended to any other areas of the site with deep DNAPL contamination that do not respond to the re-optimized GERS system.*

Response: Groundwater quality responses to GERS optimization will be monitored. If information become available indicating the presence of DNAPL contamination which is not effectively addressed by the GERS, other actions, such as in-situ bioremediation, would be considered. Pursuant to the Superfund law, EPA formally reviews remedies such as that to be implemented at Ciba every five years. In conjunction with these reviews, EPA may pursue enhancements to the remedy if it is found not to meet expectations.

9. *Composted soils should be tested for the presence of dead-end metabolic products that may be as toxic or more toxic than the starting materials.*

Response: (See response to P. Hibbard's comment number 6.)

10. *A representative drum or drums from each category should be subject to the Toxicity Characteristic Leaching Procedure (TCLP) to determine if that category is safe for landfilling.*

Response: Characterization of the drummed material is required by the treatment/disposal facility prior to the acceptance of the material. In general, TCPL testing is typically one of the testing requirement of treatment/disposal facilities.

11. *The Backfilled Lagoon area should be excavated below the water table, as the leachate*

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from this area is not captured by the GERS.

Response: Much of this area is being captured by the GERS, with a fraction of the area lying beyond capture. Contaminants below the water table in the BLA are attributed to dissolved mass, rather than to source material. This is supported by the observation that all of the soil samples collected at depths from the Primary Cohansey water table to the top of the Cohansey/Kirkwood Transition Unit contain low levels of contaminants, at 1 ppm or less total COCs. However, should it be determined that leachate from the site is not being captured by the GERS, EPA will consider the need for additional actions.

12. *A web site should be established to communicate the progress of the cleanup to the public.*

Response: The use of a web site to communicate remedy progress will be evaluated during the design process.

Comments Submitted by Bruce Anderson in a letter dated August 11, 2000.

1. *I would like to see Cell 1 & Cell 2 incorporated into the remediation of this site. Cell 1 & Cell 2 is not a permitted landfill by the State of New Jersey, so that should not be a hold up.*

Since the early 1990's, the State of New Jersey has requested that Cell's 1 & 2, and the tank storage area become part of the remedial action. These areas must be addressed in the ROD.

I have requested a public hearing on the expired renewal permit for Ciba's landfills.

Response: The Operable Unit 2 Feasibility Study addressed the site source areas. Cells 1, 2, 3 and the leachate collection tank were not considered source areas in terms of their impact on the groundwater contamination. Consequently, they were not addressed in the Feasibility Study. However, Ciba has a RCRA permit issued by the NJDEP, which regulates the landfill and the leachate collection tank. The permit requires Ciba to comply with NJDEP regulations regarding closure and post-closure care of the facility. Included among the requirements is an ongoing monitoring program which confirms that the landfill is not leaking contaminants into the groundwater. EPA believes that the State should continue to be responsible for future decisions involving these regulated units.

2. *I would like to see a provision where only the material on the Toms River, NJ site can be part of the cleanup.*

Response: EPA will be overseeing the cleanup work at the Ciba-Geigy site in Toms River. Waste from other sites will not be brought to the Toms River site.

3. *The ROD must meet all State and Federal cleanup laws.*

Response: The ROD is prepared in accordance with Federal and State cleanup laws During the cleanup, all appropriate and relevant requirements and regulations will be met.

4. *In the ROD, it should stipulate that all drums which are removed must be sampled, labeled, photographed, and a listing of the drum contents must be available to the public.*

Response: All off-site disposal facilities require testing to identify material that will be shipped to those facilities. Therefore, appropriate testing will be performed involving the drum contents. All information related to the remediation of the drums will be made available to the public.

5. *A citizen's advisory group shall be named at a later date to oversee the cleanup of the Ciba site. No one on this panel shall have ties to the Ciba-Geigy Corporation in any form.*

Response: The Ocean County Citizens for Clean Water (OCCCW) is the recipient of a Technical Assistance Grant which provides funding for monitoring of the cleanup. We expect that OCCCW will continue to monitor the remediation activities at the Ciba-Geigy site. In addition, EPA will continue to meet with the public during the OU2 design and remedy implementation.

6. *Any additional source areas, drums or contaminated soil found during the cleanup should become part of the site cleanup plan.*

Response: A performance verification plan will be included in the requirements. This will include post-excavation sampling and analysis. If the results show significant contamination remaining, the data will be reevaluated for additional excavation requirements. If additional source areas are found during the cleanup work, EPA will determine the best method to address them.

7. *The use of railroad transportation should be looked at again. Shipping in containers via rail may still be a better option.*

Response: During the design of the remediation, the use of rail as an option to ship waste off site will be evaluated again along with other waste transportation methods.

8. *Precautions to the West Dover School must be addressed.*

***Response**: During the design process, plans will be developed to protect the children and adults at the West Dover School. These plans will be developed with input from representatives of the school board, local government and the community.*

9. *Real time monitoring of the site during cleanup must be incorporated.*

***Response**:* EPA oversight personnel will be on site daily to ensure that the cleanup work is being carried out as defined in the approved design. A monitoring program will be developed with community input during the design process. Information related to the cleanup effort will be made available to the public.

Comments Submitted by Stefany Gesser, Ocean County Planning Board, in a letter dated July 19, 2000.

1. *Will optimization of the OU-1 eliminate Northern Marshland area contamination appearing on the east side of the Toms River, as a result of migration under the river?*

Response: The pumping and treatment system is performing as expected in areas adjacent to the river. The contamination detected on the east side of the river is constrained naturally to flow toward the river and some portion is being captured by the GERS system. Optimization of GERS is not expected to enhance this area. Data shows that the river is not being impacted by the groundwater contamination. All contaminant levels are below the maximum contaminant levels for safe drinking water.

2. *The Ciba Public Health Assessment performed by ATSDR and NJDOH&SS indicated that an evaluation of the health protectiveness of the selected remedies in the released PRAP would be provided to the Community. What is the status of this task? Is the evaluation expected to be included in the Record of Decision?*

Response: EPA believes that all of the alternatives included in the Feasibility Study can be implemented safely. We expect ATSDR to release a Health Consultation in connection with the proposed remedy in the near future.

3. *1.0 Introduction, and 2.2.7.1 P2-48 Off-site areas (Marshland and plume areas located between the site and the Toms River) appear to be absent from the PRAP. Institutional controls originating individually or conjunctively from NJDEP and*

USEPA should be required to address and eliminate potential exposure pathways via off-site surface water and off-site groundwater. This could include, but not be limited to, fencing, posting, and an aerial mapped designation of a Currently Known Extent Area or Ground Water Impact Area.

Response: The plume area has been designated by NJDEP and Dover Township as a " no well" area. This designation constitutes an institutional control such that well installation permits will not be approved in this area until the plume meets groundwater standards. EPA can meet with local officials after the ROD is signed to discuss the current sampling data to determine if any additional measures need to be taken.

4. *The Community Acceptance evaluation criteria appears to have been satisfied by the 5A selection, by eliminating alternative(s) involving on-site thermal treatment. The entire process of Community involvement has been so successful at this site. Is this process being used at other Superfund sites?*

Response: We appreciate your support of our community participation effort as it relates to the Ciba-Geigy site. The problems at Ciba are complex, affecting a number of interested parties and stakeholders. We believe active community involvement to be a key factor in the development and selection of the biotreatment alternative. In general, the level of community involvement is determined at each Superfund site on a case-by-case basis.

Comment submitted by Robert Ingenito, Ocean County Board of Health, in a letter dated July 19, 2000.

The Ocean County Board of Health (OCBH) would like to thank you for all the time set aside for this project. It has been evident that you are dedicated to the remediation of this site safely and completely. The existing PRAP indicates that you have listened to public comments and incorporated these comments into the remediation. The OCBH is requesting that no new wells be installed in the Oak Ridge subdivision. If your agency does not feel that it has the authority to do this, could you make the request in writing to NJDEP.

Response: The New Jersey Department of Environmental Protection has the authority to establish well restriction areas. EPA will send a letter requesting the Department to take appropriate action regarding the well restriction issue.

Comment Submitted by Claire Lyng Rutz in a letter dated August 12, 2000.

During the recent public meeting, I requested that the EPA consider recommending

a buffer zone around areas identified to be contaminated. Within the buffer zone, I request that the EPA guide Ciba to create strong deed restrictions to assist concerned citizens in maintaining safe non-residential zoning after the cleanup is done. Currently, property south/southwest of the lime sludge disposal areas is shown to be free of contamination or restriction. Considering the proximity to West Dover grade school and residences, it would be appreciated if this portion of land could also bear deed restrictions as a buffer to contaminated areas.

Response: The ROD will identify the need for land use restrictions on the Ciba property as part of the remedy. In the waste management area, other land uses will not be allowed. This area will include the footprint of the groundwater treatment facilities, Drum Disposal Area, Standpipe Burner Area, Lime Sludge Disposal Area, Filtercake Disposal Area and industrial landfill. The land formerly developed for manufacturing operations at the site, exclusive of the waste management area, will be limited to industrial or commercial uses in the future. Land uses for other areas of the site will be the under the control of the local government. Any changes in land use will need to undergo the zoning change process under local control, which includes public notice, review and opportunity for comment.

Comments Submitted by Walter Wojcicki, Child Safe Network, dated August 3, 2000.

1. *The time line set forth is unacceptable. The toxic drums should be removed now, not in years 2003-2004. The toxic drums are the major health hazard to the community. The 35,000 drums have exhausted their life span--30 years of wear pose a risk to the community. To our knowledge, EPA has never released data on the life span of the containers nor the manner in which they were sealed. We urge the project managers to make the removal of the drums the first task to be accomplished.*

   Response: The removal of the drums in the Drum Disposal Area (DDA) will be implemented in conjunction with the excavation of the contaminated soils from the source areas. It is EPA's intent to remove the drums in an expeditious and safe manner. During the design process, it will be necessary to specify the requirements of a building to safely deal with any emissions from the handling of drums and contaminated soils. Of course, such a building will require an extensive air handling and treatment system. Previous test pits, dug in the DDA, indicated that the drums were in relatively good condition. This should help expedite their removal. EPA will also involve the community during the design process leading to the OU2 remedy implementation.

2. *These are risk questions raised with the physical removal of the toxic drums. EPA has proposed that truck transport be used for disposal of the toxic drums. The off-*

site transportation issue and the usage of trucks, in particular, raises safety and health questions that need answering. The EPA estimates 18,000 truckloads of material (this includes the toxic drums and other non and hazardous material to be shipped off site.) We have proposed on numerous occasions that rail transport be used to safeguard the community. The Ciba site has a siding which can be used for this operation. The 18,000 truckloads would be reduced considerably and the health and safety of the community would be preserved. Moving hazardous material by truck is dangerous and the government has rail cars that are designed to handle this risk. To our knowledge, the disposal activities and their impact on the health and safety of Toms River, a resort community, have not been resolved.

Response: As part of EPA's Proposed Plan, all drummed material will be shipped off site for treatment and/or disposal. The majority of the estimated 150,000 cubic yards of contaminated soils will be treated on site via a bioremediation process. At this point, the mode of transportation has not yet been determined. However, if trucks are used, we estimate that about 400 trucks over a 12-18 month period will be needed to remove the drummed material from the site. It is also estimated that 250 trucks over a 6-year period will be necessary to haul contaminated soil from the site. In total, about 650 trucks of waste, not 18,000, would be needed under Alternative 5A. On average, this would amount to about a truck per day.

3. *Written Question: The protection of the Primary Cohansey Aquifer and its 3 trillion gallons of fresh drinking water has been left to nature. The EPA insists that a thin layer of clay which acts as a barrier will minimize the movement of contamination (from the toxic dump) to the aquifer. To our knowledge, the perched water management plan proposed by EPA will run for at least 30 years before the contaminants are removed. We believe that a plan should be in place should the clay layer be compromised. The time to act is now before a disaster occurs.*

Response: The perched management plan will be implemented to minimize the movement of contaminants through the yellow clay and into the underlying aquifer. As part of this portion of the remedy, monitoring will be required to ensure that the containment systems are functioning as designed. Contingency plans can be developed as the containment systems are being constructed. Of course, the Groundwater Extraction and Recharge System (GERS) has the capacity to deal with any contaminants leaking from the containment systems. The currently operating GERS, therefore, also serves as a suitable back-up system.

4 *Written Question: The plan does not mention that 30 years have transpired since this problem began. It does not cover the off-site broken pipeline that created health problems in the area. The children cancer problem is still with us.*

Response: The Proposed Plan briefly identifies the previous operations of the major source areas including the years of operation. More information on the operational history of the source areas can be found in the Feasibility Study. With regard to the broken pipeline, the major break was cleaned up under the direction of the New Jersey Department of Environmental Protection. In view of this cleanup, the area of the pipeline break was not consider a source area for the site. Thus, it was not included in the Feasibility Study.

ATTACHMENT 5

USEPA FOURTH FIVE YEAR REVIEW

FOURTH FIVE-YEAR REVIEW REPORT FOR CIBA-GEIGY CHEMICAL CORPORATION SUPERFUND SITE

OCEAN COUNTY, NEW JERSEY

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York

John Prince, Acting Director
Emergency and Remedial Response Division

May 7, 2018
Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BLA	Backfilled Lagoon Area
CD	Consent Decree
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminants of Concern
yds^3	cubic yards
DDA	Drum Disposal Area
EPA	United States Environmental Protection Agency
EQ	Equalization Basins
ESD	Explanation of Significant Differences
FSD	Former South Dye Area
FYR	Five-Year Review
GAC	granular activated carbon
GERS	Groundwater Extraction and Recharge System
GTS	groundwater treatment system
ICs	Institutional Controls
LTMP	Long term monitoring plan
MERA	Mideast Recharge Area
MGD	million gallons per day
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NERA	Northeast Recharge Area
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Units
PAC	powdered activated carbon
PCOR	Preliminary Close Out Report
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SERA	Southeast Recharge Area
SWMP	Site-Wide Monitoring Program
TBC	To be considered
UU/UE	Unlimited use and unrestricted exposure
VOC	Volatile Organic Compounds

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the Ciba-Geigy Chemical Corporation Superfund site (Site). The triggering action for this statutory review is the completion date of the last FYR, May 01, 2013. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of two operable units (OUs), both OUs will be addressed in this FYR. OU1, which involves the extraction, treatment and on-site recharge of contaminated groundwater, is operational. OU2, which addresses contaminated material and buried drums in source areas on the Site, is complete.

The Site FYR was led by Diane Salkie, EPA remedial project manager (RPM). Other EPA participants included Marian Olsen (human health risk assessor), Michael Clemetson (ecological risk assessor), Edward Modica (hydrogeologist), and Patricia Seppi (Community Involvement Coordinator, or CIC). The current potentially responsible party (PRP), BASF, was notified of the initiation of the FYR. The review began on 10/12/2017.

Site Background

The Site is located in Toms River, Dover Township, Ocean County, New Jersey on approximately 1,350 acres of land (see Figure 1). On-site structures include piping associated with the groundwater collection system, the groundwater treatment plant, and office facilities for remediation personnel. Approximately 320 of the 1,350 acres were developed and used for manufacturing operations, waste treatment, disposal activities, and administrative and laboratory facilities. The remaining acreage is undeveloped and in its natural state. Of the 1,350 acres, 1,240 acres are Dover Township's largest single tract of industrially zoned land. In addition, 72 acres located in Manchester Township are not known to be associated with production or waste disposal and are zoned for residential use. Thirty-nine acres are in Dover Township and are zoned conservation-residential. Based on soil sampling, approximately 790 acres are outside the area requiring remediation and no restriction on their future use is necessary. Approximately 440 acres are within, or close to the remediation zone and are not appropriate for residential use. Finally, the waste management zone comprises 93 acres, the use of which is restricted to waste management activities. The entire 93 acre facility area is fenced with restricted access and is currently only being used to carry out the Site remedy.

Production operations at the Site began in late 1952. At the time, the Site was owned by the Toms River Chemical Company, which was later merged into the Ciba-Geigy Corporation. From 1970 through 1981, the Site was jointly owned by Ciba-Geigy and Sandoz Corporation. In 1981, Sandoz transferred

all interest to Ciba-Geigy. In 2008, Ciba-Geigy was purchased by BASF and all remedial activities are currently BASF's responsibility.

Residential neighborhoods, recreational areas, small commercial establishments and light industrial complexes are present near the Site. The commercial areas are situated primarily southwest of the Site. The area to the west is zoned for industrial use, light manufacturing and warehousing operations. A large recreational area, which includes several parks and the Toms River, is east of the Site. Residential areas exist along the northern and southeastern portions of the Site. Municipal water systems serve Dover Township and the surrounding communities. No residential or commercial drinking water wells are within the confines of the contaminated groundwater plume. Surface waters from the Toms River are not used as potable water.

The seven uppermost geologic members underlying the Site in descending order are: the Upper Cohansey Member, Cohansey Yellow Clay, Primary Cohansey Member, Cohansey/Kirkwood Transitional Member, the Lower Cohansey Member, Upper Kirkwood Member and the Kirkwood Number 1 Member. At some locations, a perched water system is present in the Upper Cohansey. This perched water system is referred to as the Upper Cohansey Aquifer. The perched water system can provide a pathway for movement of contaminants to lower geologic units. The Primary Cohansey Member is a water-bearing unit, referred to as the Primary Cohansey Aquifer, and is a source of drinking water in an area of New Jersey beyond the plume.

The three major Site activities were production-related activities, wastewater treatment operations and solid waste disposal. The two source areas associated with production are the Former South Dye Area (FSD) and the Building 108/Underground Storage Tank Area. During Site operations, a wastewater treatment plant existed for the treatment and disposal of process wastewater. The major source areas associated with the wastewater treatment operations are the East and West Equalization Basins (EQ Basins) and the Backfilled Lagoon Area (BLA).

Several solid waste disposal areas are known to have operated at different times during operations at the Site which include the Filtercake Disposal Area (FCD), Lime Sludge Disposal Area, Drum Disposal Area (DDA), Standpipe Burner Area and the Borrow/Compactor Area, (see Figure 1).

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Ciba-Geigy Chemical Corporation		
EPA ID: NJD001502517		
Region: 2	**State:** NJ	**City/County:** Toms River, Ocean County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: EPA ***[If "Other Federal Agency", enter Agency name]*:**
Author name (Federal Project Manager): Diane Salkie
Author affiliation: EPA Region 2
Review period: 10/12/2017 - 3/26/2018
Date of site inspection: 1/23/2018
Type of review: Statutory
Review number: 4
Triggering action date: 5/1/2013
Due date *(five years after triggering action date)*: ~~5/1/2018~~5/1/2018

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In 1984, EPA began a remedial investigation (RI) of the Site. The RI concluded that contaminated source areas on Site resulted in groundwater contamination. Based on this investigation, EPA defined the following OUs: OU1 - pertaining to groundwater; and OU2 - pertaining to known or suspected source areas.

EPA focused on identifying a remedy for groundwater contamination (OU1) first as part of a multi-phase remedy for the Site to quickly address potential public health concerns by preventing further off-site migration of groundwater contaminants. The OU2 RI found that seven source areas continued releasing contamination to the groundwater and were impacting groundwater quality. The OU2 RI and subsequent risk assessment also found that one source area, the FCD, presented a direct-contact risk under a potential on-site worker future use scenario.

A public health evaluation (PHE) in the 1989 OU1 ROD found that the cancer risks to the future resident consuming groundwater from the site were 1×10^{-2} (one in 100) exceeding the NCP risk range of 1×10^{-6} to 1×10^{-4} (i.e., one in a million to one in ten thousand) and the noncancer Hazard Index (HI) was 40 (which is 40 times greater than the goal of protection of an HI = 1) if no action were taken. Other routes of exposure such as dermal contact and inhalation were within the risk range of 1×10^{-4} (cancer risk of 1 in 10,000) to 1×10^{-6} (cancer risk of 1 in 1,000,000) and the noncancer HI was less than 1. Cancer risks and noncancer HI for recreational exposures to surface water in the Toms River, sediments in the marshland, and inhalation of air from the river or wetland were within or below the risk range and the noncancer HI was less than 1.

Contamination from the source areas penetrated through the upper five geologic layers to the Lower Cohansey aquifer. The groundwater plume in the Primary Cohansey extends off-site toward the Toms River. The OU1 ROD PHE identified the following indicator chemicals in groundwater: arsenic, barium, benzene, cadmium, chlorobenzene, chloroform, 1,2-dichloroethane, nickel, tetrachloroethene, 1,2,4-trichlorobenzene and trichloroethene.

The OU2 ROD developed a list of 12 contaminants of concern (COCs) to characterize the nature and extent of contamination: arsenic, chlorobenzene, 2-chlorotoluene, 1,2-dichlorobenzene, lead, mercury, naphthalene, nitrobenzene, tetrachloroethene, 1,2,4-trichlorobenzene, trichloroethene and 1,2,3-trichloropropane. The COCs were chosen based on the following criteria: they pose the greatest potential risk to human health and the environment; they are found in the highest concentrations in the source areas and groundwater at the Site; and/or they are most likely to move from the source areas to the groundwater.

The OU2 ROD evaluated potential risks from exposure to the FCD. The risks for the future worker from ingestion were an HI = 1.2 that slightly exceeds the noncancer goal of protection of an HI = 1 and a cancer risk of 1.1×10^{-4} from inhalation. The risks for the residential adults from ingestion of groundwater were 3×10^{-4} and the noncancer HI = 11. The future risks to the child were 2.9×10^{-4} and the noncancer HI = 92. The OU2 ROD also evaluated potential risks to construction workers from exposure to the FCD. The noncancer hazard to the future construction workers was a HI = 9.2, that exceeds the goal of protection of an HI = 1. The COCs were arsenic and mercury.

In 1994, EPA completed a wetlands characterization and ecological assessment to evaluate potential risks to the environment associated with Site contaminants. The wetlands along the Toms River, including the Marshland Area and the river itself, represent the most-likely pathway for ecological impacts related to the Site. The ecological assessment concluded that there were no adverse impacts to terrestrial and aquatic biota in these areas.

Response Actions

Initial Response

During the late 1970s and early 1980s, in response to New Jersey Department of Environmental Protection (NJDEP) directives, Ciba-Geigy performed various closure activities and geohydrologic investigations at the Site. As early as 1979, there were reports of leakage of the double-lined active landfill and remedial measures were taken under the direction of the NJDEP Solid Waste Administration. In 1980, EPA completed an identification and preliminary assessment report of the Site under the Potential Hazardous Waste Site Program. The Site was placed on the Superfund National Priorities List (NPL) in 1983.

OU1

On April 24, 1989, EPA issued a ROD for OU1 describing the selected groundwater remedy. The major remedial objectives of the OU1 ROD are:

- mitigation of the effects of groundwater contamination on public health and the environment; and
- restoration of the upper sand aquifer to drinking water standards.

The major components of this remedy included:

- sealing of contaminated irrigation wells;
- installation of a groundwater extraction and treatment system in a portion of the existing on-site wastewater treatment plan;
- extraction of contaminated groundwater until federal and state cleanup standards are met to the extent that is technically practicable;
- modify the wastewater treatment plant to treat contaminated groundwater to meet NJDEP discharge levels;
- conduct a pilot study to confirm the practability of achieving discharge levels; and
- discharge of treated groundwater to the Toms River.

In accordance with the ROD, irrigation wells near the Site were decommissioned and well restrictions (based on Ocean County Board of Health regulations) were imposed that restrict installation of domestic wells in the plume.

After EPA issued the 1989 ROD, public concerns related to the proposed discharge to the Toms River resulted in continued investigation and public involvement to develop an alternate discharge point for treated groundwater. On September 30, 1993, after conducting a technical review of the groundwater recharge proposal submitted by Ciba-Geigy Corporation, EPA issued an Explanation of Significant Differences (ESD). The ESD eliminated the discharge to the Toms River and called for the on-site recharge of treated groundwater. The ESD also established appropriate standards for discharging the

treated water, (see Table 3). The primary remedial action objective (RAO) of the OU1 ROD and ESD is aquifer restoration.

OU2

On September 29, 2000, EPA issued a ROD for OU2 describing the selected remedy for the on-site source areas. The RAOs of the OU2 ROD are to:

- address the potential risks associated with direct contact with surface soils, and
- shorten the time frame for the OU1 groundwater remedy to achieve the groundwater restoration goals established in the 1993 ESD.

The remedy includes the following major components:

- on-site ex-situ bioremediation of approximately 145,000 cubic yards (yds^3) of contaminated material from the source areas;
- excavation and off-site disposal of approximately 35,000 drums from the DDA and 5,000 yds^3 of soils not suitable for bioremediation;
- installation of caps and slurry walls in areas of the Site where the Cohansey Yellow Clay is present. This perched water management system will prevent the movement of contaminants from the clay into the underlying Primary Cohansey Aquifer. The cap in the filtercake disposal area will also address the potential direct contact risks associated with the surface soils in this area;
- installation of an in-situ bioremediation system in the equalization basins to address contamination below the groundwater table;
- establishment of deed restrictions to regulate the use of certain areas of the Site and to prevent intrusive activities in capped areas;
- optimization of the groundwater extraction and recharge system (GERS) implemented as part of OU1; and
- appropriate environmental monitoring to ensure the effectiveness of the selected remedy.

Status of Implementation

OU 1

In 1993, a consent decree (CD) was lodged between EPA and Ciba-Geigy Corporation, which allowed Ciba-Geigy to design, construct and operate the groundwater extraction, treatment and recharge systems. All work was conducted with EPA oversight.

The groundwater treatment system (GTS) component for the GERS was constructed from the original wastewater treatment plant (existing from site operations) and consisted of aerators and powdered activated carbon (PAC), followed by polishing in granular activated carbon (GAC). The resulting GERS originally included 43 pumping wells designed to extract a maximum of four million gallons per day (MGD) of contaminated groundwater (see Figure 2). The systems became fully operational in March 1996.

Three recharge areas were created: the Northeast Recharge Area (NERA), Mideast Recharge Area (MERA) and the Southeast Recharge Area (SERA), (see Figure 2). Before recharge began, all recharge water went to the NERA to eliminate potential for treated water to enter a public water supply well located across the Toms River. Groundwater electrical conductance is monitored at wells in the NERA

to track groundwater recharge movement and ensure that it does not move to the Pine Lake Park community located northwest of NERA.

OU 2

The design of the OU2 source area remedy was completed in summer 2003 and on-site construction began in October 2003. Construction activities consisted of erection of a pre-engineered building for the ex-situ treatment system, an air emissions treatment system, a shed to house the aboveground components of the in-situ treatment system, excavation of contaminated soil from the source areas and installation of landfill caps and slurry walls at the DDA/FCD/FSD soil depository.

The OU2 ROD identified a number of discrete, pre-determined volumes at each of the source areas, called source blocks, which were calculated using fate and transport and groundwater flow models. The source blocks determined the amount of soil to be removed and treated in the ex-situ treatment system. Once all end-point concentrations were reached within a source block, the treated soil was placed under a landfill cap in the DDA/FCD/FSD soil depository. The OU2 ROD required installation of impermeable caps and slurry walls in the three source areas (DDA/FCD/FSD) underlain by clay, to prevent movement of contaminants from the clay into the Primary Cohansey aquifer. Ciba-Geigy used this perched water management system to redirect the flow of groundwater in the Upper Cohansey around the source areas.

In 2003, 47,055 drums were removed from DDA source area and sent off-site for disposal. Soil was excavated from the DDA as well as the FCD, treated, and backfilled in place.

Remediation of the EQ Basins included excavation and ex-situ treatment of contaminated soil as well as in-situ treatment of soil in the saturated zone which could not be effectively excavated. In-situ treatment was implemented in two phases. Phase 1 installation consisted of a single extraction well and single injection well, and operated from 2004 through 2006. Phase 2 involved the installation of additional injection wells and extraction wells, and a horizontal infiltration gallery. Phase 2 operation began in June 2007. In 2009, one additional injection well was installed. Groundwater from the area was pumped from the extraction wells, oxygenated and then re-injected to stimulate aerobic, biological treatment of contamination in the saturated zone. Throughout its operation, the system required extensive maintenance related to the plugging and corresponding decreases in capacity of the extraction and injection wells.

One component of the OU2 remedy is optimization of the GERS implemented as part of OU1. The GERS optimization was initiated in 2000. In 2003-2004, based on groundwater quality, operation and maintenance data, and flow modeling analysis, nine of the original extraction wells were idled and three new wells were installed. In 2016, a second optimiztion idled ten extraction wells located in the PCOPH based on their locations on the periphery of the plume or very low COC mass recovery rates.

In August 2010, BASF conducted a Remedial Process Optimization (RPO) project to evaluate further optimization. One of the recommendations of the RPO was optimization of the EQ Basins. With EPA's concurrence, the operation of aerobic treatment was discontinued in August 2011 in preparation for the characterization activities. From 2011–2014, BASF performed further investigations and characterizations of the EQ Basins to initiate the optimization process.

Soil was excavated, treated on-site and placed in the DDA/FCD/FSD depository from the remaining sources: the BLA, the FSD and the BCA. Before the ex-situ treatment facility was demolished, samples

of the concrete floors and the secondary treatment pad were collected in accordance with an EPA-approved decommissioning plan. The treatment building material, which consisted mostly of metal, was disassembled, decontaminated and recycled. The nonmetal material was disposed of off-site as nonhazardous waste. EPA allowed the concrete and asphalt rubble to be milled, blended and used at the DDA/FCD/FSD depositional area for road material. Decommissioning was completed on November 4, 2010. A Preliminary Close-Out Report was signed in September 2012, documenting that all on-site construction was completed.

In addition, in 2014, BASF upgraded the GTS system from the former wastewater treatment plant to new, self-contained air stripping and liquid granular activated carbon (LGAC) adsorption system. Due to the high levels of iron in the aquifer, BASF added an iron removal system consisting of a sludge thickening unit and geotube. The non-hazardous sludge cake is removed and disposed of at an approved landfill. The update resulted in a more efficient water treatment system with the same end result of meeting discharge permit requirements. A final remedial action completion report, which included optimization of the GTS and GERS was completed by BASF and approved by EPA in 2015.

IC Summary Table

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	No	Contaminated groundwater	Restrict the use of groundwater	Classification Exception Area
Soil	Yes	Yes	Block 411, Lots 6.02 and 6.03	Restrict land use	Deed restrictions Planned date 2023

The OU1 ROD required sealing of contaminated residential irrigation wells in the Cardinal Drive area. Drinking water in the area of the Site is provided by supply wells that are owned by the United Water Company. In 2001, NJDEP approved a classification exception area (CEA) restricting the installation of new wells into the Cohansey and Kirkwood aquifers in the vicinity of the Site.

The OU2 ROD requires restrictions on the property deed to prevent any intrusive activities in the capped areas of the Site. The OU2 ROD contained three conceptual future land use areas for the Site based on anticipated conditions following remedy implementation: unrestricted use area, restricted waste management area, and restricted commercial/industrial/recreational use area.

Unrestricted use Area – This area had no known industrial activity. This area which is currently locally zoned as commercial/industrial, requires no land-use restrictions.

Restricted Waste Management Area - This area which includes the footprint of the groundwater treatment facilities, DDA, Standpipe Burner Area, Lime Sludge Disposal Area, FCD and industrial landfill, requires land-use restrictions to prevent any intrusive activities in the capped areas of the Site.

Restricted Commercial/Industrial/Recreational Area – This area which includes the historical industrial production areas requires land-use restrictions to prevent the construction of residential structures.

The deed restriction for the property to ensure future land use, consistent with the OU2 ROD, is expected to be implemented in the future. In preparation of the deed restrictions, in 2013, the Township subdivided the property into three lots with Block 411, lot 6.01, 6.02 and 6.03.

Systems Operations/Operation & Maintenance

The GERS is currently operated by BASF and their contractor, Brown and Caldwell. The OU1 CD required Ciba-Geigy (and now BASF) to perform periodic sampling to determine the effectiveness of the OU1 extraction and recharge system in capturing the groundwater plume. The requirements of this sampling effort are provided in the annual LTMP and involve the collection of on-site groundwater samples and water level measurements. The LTMP incorporates the following monitoring programs: the site-wide monitoring program (SWMP) to monitor groundwater and the GERS; the Toms River Monitoring Program for monitoring surface water of the Toms River; and the NERA monitoring. A Wetlands Monitoring Program was in place from development in 1994 until 2002 when EPA eliminated the requirement because no changes were recorded.

The SWMP is a groundwater data collection program that monitors water quality and elevation and provides information used to evaluate the GERS. The groundwater elevation measurements are taken from 340 wells and one round of water quality data is collected annually from monitoring wells. For the operation year 2016, water samples were collected in 65 monitoring wells. The groundwater quality samples are analyzed for all of the 94 parameters listed in Table 5 on odd numbered years (2015, 2017, etc.). During even numbered years (2016, 2018, etc.) the metals analysis is limited to GERS wells only, see Table 5. To monitor the performance of the OU2 remedial action perched water management system of slurry walls and caps, an OU-2 LTMP was developed. The groundwater monitoring portion of the OU-2 LTMP was developed as part of the 2009 OU-1 LTMP and includes eight extraction wells and 13 monitoring wells located downgradient of the source areas. Some of the downgradient wells have elevated results due to the fact that associated cap and slurry wall work were completed in late 2010, and this area is likely still dewatering, as designed.

The LTMP requires groundwater monitoring in several off-site areas to determine the impact of the groundwater extraction, treatment and recharge systems in protecting these areas. Off-site monitoring is done primarily in two areas; in the parkland east of the Toms River and in the Oak Ridge Area, a residential subdivision south of the Site. Portions of these areas have been impacted by the contaminant plume, which comprises all groundwater that exceeds the standards from Table 2 of the ESD, (Table 3 in this document).

The final part of the SWMP,the Toms River Monitoring Program, is in place to evaluate whether the GERS is effective at containing contaminated groundwater before it discharges to the Toms River, located to the east of the Site. There are two monitoring locations denoted, TR-1 which is located upstream of the Site and TR-5, downstream of the Site. The NERA Monitoring program evaluates changes to flow patterns from recharged groundwater by monitoring groundwater hydraulics and water quality in the northeast portion of the Site. The goal of the NERA monitoring program is to prevent recharge water from entering the residential community of Pine Lake Park.

Potential Site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Site.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the third FYR as well as the recommendations from the third FYR and the current status of those recommendations.

Table 2: Protectiveness Determinations/Statements from the 2013 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The OU1 remedy is protective of human health and the environment.
2	Short-term Protective	The source control remedy at OU2 is protective of human health and the environment in the short term. In order for the remedy to be protective in the long term, deed restrictions need to be established.
Sitewide	Short-term Protective	The remedies at the Site are protective of human health and the environment in the short term. In order for the remedy to be protective in the long term, deed restrictions need to be established.

The only issue identified during the 2013 FYR was that ICs were not implemented and the recommendation was for BASF to implement deed restrictions. During the past five years, to facilitate the implementation of ICs, the property was subdivided by the township, however, deed restrictions have not yet been implemented.

In addition, an upgrade of the GTS system from PAC to an air stripper was completed in 2014 and BASF is further investigating the EQ Basins as part of an optimization recommendation.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On October 2, 2017, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 31 Superfund sites in New York and New Jersey, including the Ciba-Geigy site. The announcement can be found at the following web address: https://wcms.epa.gov/sites/production/files/2017-10/documents/five_year_reviews_fy2018_final.pdf.

In addition to this notification, a public notice was made available in the Toms River website, on 4/6/2017, stating that there was a FYR and inviting the public to submit any comments to the EPA. The results of the review and the report will be made available at the Site information repository located at the Ocean County Public Library, 101 Washington Street, Toms River, NJ or the EPA Region 2, Superfund Records Center at 290 Broadway, 18th Floor, New York, New York 10007.

Data Review

LTMP Annual reports have been submitted from 2005 through 2016. In 2016, of the 37 wells that comprised the GERS at the time of the LTMP reporting, 12 achieved less than 75% of their designed pumping rate. In addition, 56 pumps were replaced and 19 wells were redeveloped due to iron fouling. Compared to 2011, the number of pumps replaced and wells redeveloped have increased. As previously mentioned, seven extraction wells were idled near the end of 2016 and three more in early 2017. While the extraction wells have shown difficulty in achieving design specifications due mostly to iron fouling, the system has achieved its goal of reducing and containing contaminated groundwater, as shown through monitoring of the groundwater and Toms River. In addition, an upgrade of the GTS system from PAC to an air stripper in 2014 continues to meet surface water discharge requirements.

BASF had addressed the above referenced iron fouling issue with a deposit control agent, FeREMED, which is designed to prevent precipitation and deposition of metal oxides. However, with the upgrade to the GTS system and more frequent pump maintenance, the additive is no longer necessary. The effluent continues to meet standard requirements specified in the ESD (see Table 3).

The LTMP incorporates the following monitoring programs: the SWMP to monitor groundwater and the GERS; the Toms River Monitoring Program for monitoring surface water of the Toms River; and the Northeast Recharge Area monitoring.

The off-site monitoring results, which are presented in the LTMP Annual reports, show a reduction in chemical concentrations in areas impacted by the plume and indicate that the system has been effective in preventing the migration of the plume. Figures 7-1, 7-2 and 7-3 located in Appendix C, are figures from the 2016 LTMP showing the plume concentrations of total contaminants of concern (TCOC) in the Primary Cohansey, Lower Cohansey and Kirkwood Sands aquifers, respectively. A comparison of the 2016 data with the 1995-1996 data indicates both a reduction in contaminant concentrations and in the number of COCs detected that exceed groundwater restoration standards. Overall, analysis of groundwater monitoring data indicates that the groundwater remedy is functioning as designed in order to attain the more stringent of the federal and/or state MCLs established in the 1993 ESD.

The 2011 LTMP annual report began to provide monitoring results from groundwater wells located downgradient of the OU2 remediated sources. The 2016 LTMP report concludes that the treatment system consistently meets performance criteria. Results in wells downgradient of the SDA, DDA and the FDA still show elevated results, however, the cap and slurry wall which were completed in 2010 are still dewatering these areas as designed. Data will continue to be collected form the downgradient wells, to ensure the OU2 remedy is functioning as designed.

The Toms River has been sampled repeatedly in the past to determine the impact of the Site on river quality. Surface water, sediment and toxicity samples have been collected in the river. Based on the results of these samples, it was determined that river quality was not negatively affecting environmental receptors. Although site-related chemicals have been detected in the river, concentrations have been below New Jersey's surface water and drinking water standards. In 2016, no volatile organic compounds (VOCs) were detected in the surface water samples. Aluminum was found at similar levels upstream and downstream in 2016 as has been the case, at fluctuating levels, in the previous five years.

The 2016 groundwater monitoring results from along the Site's northern border supports the conclusion that no treated water from the recharge areas has migrated under the Pine Lake Park residential area.

In 2010, BASF initiated an RPO project, to optimize the existing OU1 system at Site. As part of the RPO, an evaluation report was submitted to the EPA in May 2011 recommending continuing remedial efforts at the site of the EQ Basins. In 2013 and 2014, BASF conducted an investigation in the EQ Basins, to further define the nature and extent of contamination, define groundwater flow behavior and update the conceptual site model. Sampling was conducted via a membrane interface probe system, confirmation soil sampling, installation of additional monitoring wells and review of hydrogeologic data. The sampling delineated sources in the groundwater and BASF is currently assessing options for remediation.

Site Inspection

The inspection of the Site was conducted on 1/23/2018. In attendance were Diane Salkie, Jeff Josephson and Michael Clemetson of the EPA and EPA's oversight consultant, Kavitha Subramaniam of CDM Smith. Representing the PRPs were Steve Havlik, Fred Goelz, Laura McMahon, Karyllan Mack, and Dave Johnson of BASF. In addition, their consultants attended as follows: Jeff Caputi, Marek Ostrowski and Peter Randazzo of Brown and Caldwell; Tom Legel of AGC; and Jay Ash of AMO. The purpose of the inspection was to assess the protectiveness of the remedy. Brown and Caldwell provided a presentation consisting of background information as well as progress and changes made since the last FYR. This included GERS update, EQ basin status, deed notices and CEA recertification. Following the presentation, some members accompanied the EPA personnel on a site tour, visiting the GTS, capped areas, recharge basins and locations of demolished structures.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Question A Summary:

Analysis of data over the past five years indicates that the groundwater treatment system has consistently met the treatment standards provided in the 1989 ROD and 1993 ESD. The Pine Lake Park residential areas have not been impacted by the contaminant plume or treated recharge water. Actions such as the fencing around the Site and the continuous security activities are in place to interrupt exposures to potential trespassers. The effectiveness of the extraction, treatment and recharge system is continually monitored through groundwater, river and effluent sampling. Optimization of the GTS occurred in 2014 and continues to meet discharge requirements. An additional optimization to the number of GERS wells was initiated in 2016 resulting in discontinuation of extraction wells. Future monitoring will assess the effect of this action on the plume. NJDEP approved a CEA restricting the installation of new drinking water wells into the Cohansey and Kirkwood aquifers in the vicinity of the Site.

Remedial Action Performance

According to the 2016 LTMP report, the VOC plume has been reduced in size over time, especially away from the source areas. Based on model data, the performance of the GERS over the 2016 operational year has led to a capture envelope that has reduced in size relative to the design or target envelope. Throughout the plume, both near the sources and especially away from the sources, the

predominant concentration trends in the monitoring wells are either decreasing, or are stable at levels lower than prior to the GERS.

The OU-2 source area remedy has been completed in 2010 for all sources except the saturated zone at the EQ Basins. The EQ Basin was further delineated to define the nature and extent of contamination, define groundwater flow behavior and update the conceptual site model. The sampling delineated sources in the groundwater and BASF is currently assessing options for optimization of the remedy.

Changes in distribution and magnitude of the dissolved-phase impacts are expected to occur as a result of OU-2 implementation, and will be monitored over time.

System Operations/O&M

Analysis of groundwater system monitoring data indicates that the groundwater remedy is functioning as designed in order to treat extracted water to the more stringent of the federal and/or state MCLs as specified in the 1993 ESD.

In 2014, BASF upgraded the GTS system from the former wastewater treatment plant to a new, self-contained air stripping and LGAC adsorption system. The update resulted in a more efficient water treatment system with the same end result of meeting discharge permit requirements.

The OU2 remedy addressing soil contamination was completed in 2012. This remedy addressed the direct contact exposure to soils through caps to prevent direct exposure and prevent contamination from spreading from the clay into the Primary Cohansey aquifer through the installation of slurry walls. Groundwater monitoring is in place to ensure the remedy is functioning as designed.

Implementation of Institutional Controls and Other Measures

A CEA has been established to prevent direct exposure through the use of groundwater as a drinking water source. Consistent with the OU2 ROD, appropriate deed restrictions and ICs will be put in place or maintained to protect human health from direct exposure to soils based on potential future land use.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Question B Summary:

There have been no changes in the physical conditions at the Site that would affect the protectiveness of the remedy. There have been no changes in the Applicable or Relevant and Appropriate Requirements (ARARs), and there are no new standards which would affect the protectiveness of the remedy.

Changes in Standards and TBCs

Table 4 provides a comparison of the remediation levels established in the OU1 ROD and updated in Table 2 of the ESD with their respective current residential risk-based concentrations. The current risk-based concentration for total arsenic is below the remediation level of 50 micrograms per liter (µg/L). The MCL of 50 µg/L was subsequently updated in 2001 to 10 µg/l. Additionally, the ESD revised the effluent standard to 8 µg/L. However, due to the GERS treatment and slurry walls, the plume is

contained and the most recent effluent arsenic result reported in the fourth quarter of 2016 was undetected at a detection level of 0.4 µg/L.

Changes in Toxicity and Other Contaminant Characteristics

The following chemicals being re-evaluated through the Integrated Risk Information System (IRIS) process include inorganic arsenic, chromium VI, and vanadium and compounds. The toxicity data and cleanup levels for these chemicals will need to be re-evaluated when the IRIS chemicals are updated. Although the risk numbers may change, the remedial alternatives developed for the Site focus on addressing the risk by capping the area and preventing direct contact with surface soils. The remedy also prevents further groundwater contaminant migration through the Perched Water Management System and groundwater monitoring.

Changes in Exposure Pathways

The exposure assumptions used to estimate the potential cancer risks and noncancer hazards in the risk assessment supporting the RODs and ESD for human health followed the risk assessment guidance for Superfund and associated guidance used by the Agency remain valid. During the Site RI, EPA determined that the contaminated soil under current conditions and industrial zoning posed no unacceptable human health risk from direct soil contact. Under future conditions ingestion of soils from the FCDA by future residents (adult and child) and construction workers exceeded the risk range. In 2014, EPA's Superfund program updated exposure assumptions (OSWER directive 9285.6-03). These updates do not change the conclusions of the risk assessment or the cleanup goals.

Region 2 has evaluated a number of properties with elevated concentrations of groundwater contaminants where potential vapor intrusion may occur. EPA conducted sampling in October 2007 at properties near the facility. EPA found that contaminant concentrations in the soil gas beneath the structures and in the indoor air at these properties did not require any further investigation or remediation.

Although the ecological risk assessment screening values used to support the OU1 and OU2 RODs may not necessarily reflect the current methodology, the remedy remains protective of ecological receptors as the contaminated soil has been addressed by the remedy. Additionally, based on the monitoring the Toms River does not appear to be adversely impacted by the Site.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

There is no information that calls into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 02	**Issue Category: Institutional Controls**			
	Issue: Deed restrictions have not been completed			
	Recommendation: BASF, NJDEP and the Township of Toms River need to complete the deed restrictions.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	2023

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)		
Operable Unit: 01	*Protectiveness Determination:* Protective	*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: The OU1 groundwater remedy is protective of human health and the environment		
Operable Unit: 02	*Protectiveness Determination:* Short-term Protective	*Planned Addendum Completion Date:* Click here to enter a date
Protectiveness Statement: The OU2 source control remedy is protective of human health and the environment in the short-term. However, in order for the remedy to be protective in the long term, deed restrictions need to be established.		

Sitewide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	*Planned Addendum Completion Date:* Click here to enter a date

Protectiveness Statement:
The OU2 source control remedy is protective of human health and the environment in the short-term. However, in order for the remedy to be protective in the long term, deed restrictions need to be established.

VIII. NEXT REVIEW

The next FYR report for the Ciba-Geigy Superfund Site is required five years from the completion date of this review.

APPENDIX A – REFERENCE LIST

- Brown and Caldwell. March 2014. *2013 Annual Report for OU-1 Long-Term Monitoring Plan (LTMP) and Groundwater Portion of OU-2 LTMP Ciba-Geigy Toms River Site Toms River, New Jersey*. Project No. 003-6045
- Brown and Caldwell. June 2015. *2014 Annual Report for OU-1 Long-Term Monitoring Plan (LTMP) and Groundwater Portion of OU-2 LTMP Ciba-Geigy Toms River Site Toms River, New Jersey*. Project No. 003-6045
- Brown and Caldwell. May 2016. *2015 Annual Report for OU-1 Long-Term Monitoring Plan (LTMP) and Groundwater Portion of OU-2 LTMP Ciba-Geigy Toms River Site Toms River, New Jersey*. Project No. 003-6045
- Brown and Caldwell. June 2017. *2016 Annual Report for OU-1 Long-Term Monitoring Plan (LTMP) and Groundwater Portion of OU-2 LTMP Ciba-Geigy Toms River Site Toms River, New Jersey*. Project No. 003-6045
- Brown and Caldwell. June 2016. *Equalization Basins Source Characterization Report Ciba-Geigy Toms River Site Toms River, New Jersey*
- Brown and Caldwell. June 2017. *Groundwater Extraction and Recharge System (GERS) Optimization Analysis Ciba Geigy Toms River Site, Toms River, New Jersey*
- BASF. June 2013 – September 2017. *Operable Unit 1 Operations, Maintenance and Monitoring and Remedial Process Optimization Progress Report*

APPENDIX B – ADDITIONAL TABLES

TABLE 3 – ESD EFFLUENT DISCHARGE LIMIT (µg/L)			
PARAMETER	**STANDARD**	**PARAMETER**	**STANDARD**
ORGANIC		**INORGANIC**	
1,1,1-Trichloroethane	15	Total Arsenic	8
1,1,2,2-Tetrachloroethane	2	Total Cadmium	3
1,1,2-Trichloroethane	2	Total Chromium	50
1,1-Dichloroethylene	2	Total Copper	10
1,2,3-Trichlorobenzene	8	Total Iron	300
1,2,3-Trichloropropane	20	Total Lead	10
1,2,4-Trichlorobenzene	5	Total Mercury	2
1,2-cis-Dichloroethylene	5	Dissolved Nickel	22
1,2-Dichlorobenzene	77	Total Selenium	10
1,2-Dichloroethane	2	Total Zinc	15
1,2-Dichloropropane	1		
1,2-trans-Dichloroethylene	10	**PHYSICAL**	
1,3-Dichlorobenzene	31	Chloride	250
1,3-trans-Dichloropropylene	Monitor	Nitrogen, nitrate	10
1,4-Dichlorobenzene	10	Sulfate	250
2-Butanone	150	Total dissolved solids	500
2-Chloroethyl Vinyl Ether	Monitor	Total suspended solids	40
Acetone	700	pH	SU 5-9
Acrylonitrile	50		
Benzene	1		
Benzidine	50		
Bis(2-ethylhexyl)phthalate	30		
Carbon tetrachloride	2		
Chlorobenzene	3		
Chloroform	3		
Dibromochloromethane	5.5		
Ethylbenzene	32		
Methylene chloride	2		
Naphthalene	15		
Nitrobenzene	10		
o-Chlorotoluene	Monitor		
p-Chlorotoluene	Monitor		
PCBs	0.5		
Phenol	10		
Styrene	50		
Tetrachloroethylene	1		
Toluene	26		
Trichloroethylene	1		
Vinyl chloride	2		
Xylenes, total	20		

Table 4 Groundwater Remediation Levels Compared with Residential Risk-Based Concentrations

Chemical	Cleanup standard (ppb)	Concentration with Risk Level of 10-6 (ppb)	Concentration with noncancer Hazard Quotient (HQ) = 1 (ppb)	Conclusion
Arsenic	50 (new standard is 10 ppb as of 2001)	0.052	6	MCL (50 ppb) is in upper bound or risk range but exceeds an HI = 1. MCL (10 ppb) is within the risk range but exceeds the non-cancer HQ = 1.
Benzene	1	0.46	33	MCL within the risk range and non-cancer HQ = 1.
Cadmium	5.0	None	9.2	Below HQ = 1.
Chlorobenzene	4.0	None	78	Below HQ = 1.
Chloroform	NA	0.22	97	No cleanup level in ROD for comparison.
1,2-dichloroethane	2.0	0.17	13	Level within the risk range and below HQ = 1.
Nickel	NA	None	390 (based on soluble salts)	No cleanup level in ROD for comparison.
Tetrachloroethylene	1.0	11	41	Below risk range and HQ = 1
1,2,4-trichlorobenzene	NA	1.2	4.1	No cleanup level in ROD for comparison.
Trichloroethylene	1.0	0.49	2.8	Within risk range and below HQ = 1.

- Risk levels obtained from the November 2017 Regional Screening Levels.

TABLE 5 - SITE-WIDE MONITORING PROGRAM - ANALYTICAL PARAMETERS

Organics (µg/L)	MDL	Organics (µg/L)	MDL	Organics (µg/L)	MDL	Organics (µg/L)	MDL
1,1,1,2-Tetrachloroethane	0.5	1,3-Dichlorobenzene	1	Chloroethane	0.5	Methyl-T-Butyl Ether	0.5
1,1,1-Trichloroethane	0.5	1,3-Dichloropropane	0.5	Chloroform	0.5	Naphthalene	1
1,1,2,2-Tetrachloroethane	0.5	1,3-Trans-Dichloropropylene	0.5	Dichlorobromomethane	0.5	N-Butylbenzene	1
1,1,2-Trichloroethane	0.5	1,4-Dichlorobenzene	1	Dichlorodifluoromethane	0.5	N-Propylbenzene	1
1,1-Dichloroethane	0.5	2,2-Dichloropropane	0.5	Diethyl Ether	2	O-Xylene	0.5
1,1-Dichloroethylene	0.5	2-Chloroethyl Vinyl Ether	2	Ethyl Methacrylate	1	P-Chlorotoluene	1
1,1-Dichloropropylene	1	2-Chlorotoluene	1	Ethylbenzene	0.5	Pentachloroethane	1
1,2,3-Trichlorobenzene	1	2-Hexanone	3	Hexachlorobutadiene	2	P-Isopropyltoluene	1
1,2,3-Trichloropropane	1	3-Chloropropene	1	Hexachloroethane	1	Sec-Butylbenzene	1
1,2,4-Trichlorobenzene	1	Acetone	6	Isopropylbenzene	1	Styrene	1
1,2,4-Trimethylbenzene	1	Acrolein	40	M+P-Xylene	0.5	Tert-Butylbenzene	1
1,2-CIS-Dichloroethylene	0.5	Acrylonitrile	4	Methacrylonitrile	10	Tetrachloroethylene	0.5
1,2-Dibromo-3-Chloropropane	2	Benzene	0.5	Methyl Bromide	0.5	Tetrahydrofuran	4
1,2-Dibromoethane	0.5	Bromobenzene	1	Methyl Chloride	0.5	Toluene	0.5
1,2-Dichlorobenzene	1	Bromochloromethane	1	Methyl Ethyl Ketone	3	Trans-1,4-Dichloro-2-Butene	15
1,2-Dichloroethane	0.5	Bromoform	0.5	Methyl Iodide	0.5	Trichloroethylene	0.5
1,2-Dichloropropane	0.5	Carbon Disulfide	1	Methyl Isobutyl Ketone	3	Trichlorofluoromethane	0.5
1,2-Trans-Dichloroethylene	0.5	Carbon Tetrachloride	0.5	Methyl Methacrylate	1	Vinyl Chloride	0.5
1,3,5-Trimethylbenzene	1	Chlorobenzene	0.5	Methylene Bromide	0.5	Xylenes,Total	0.5
1,3-Cis-Dichloropropylene	0.5	Chlorodibromomethane	0.5	Methylene Chloride	2		

Inorganics (mg./L)	MDL		Other Parameters			
Arsenic	0.0078		TSS (mg/L)	1		
Cadmium	0.00064		TDS (mg/L)	9.7		
Chromium	0.002		pH (standard units)	---		
Copper	0.0032		Nitrite (mg/L)	0.04		
Iron	0.0333		Sulfate (mg/L	0.3		
Lead	0.0051		Chloride (mg/L)	0.2		
Mercury	0.00005					
Nickel	0.0021					
Selenium	0.0082					
Zinc	0.0042					

MDL – Method Detection Limit

APPENDIX C – SITE FIGURES

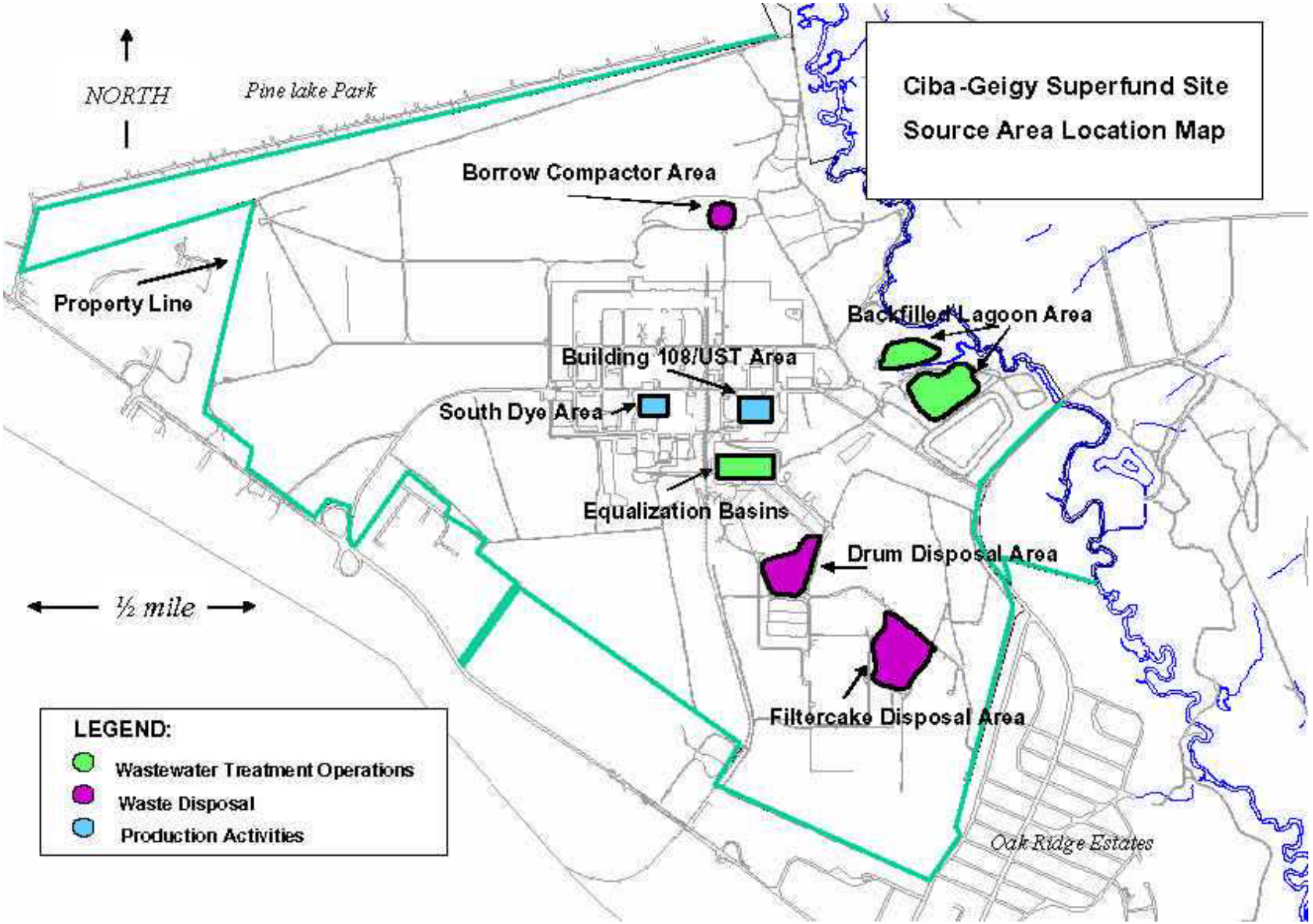


Figure 1 – OU2 Source Areas

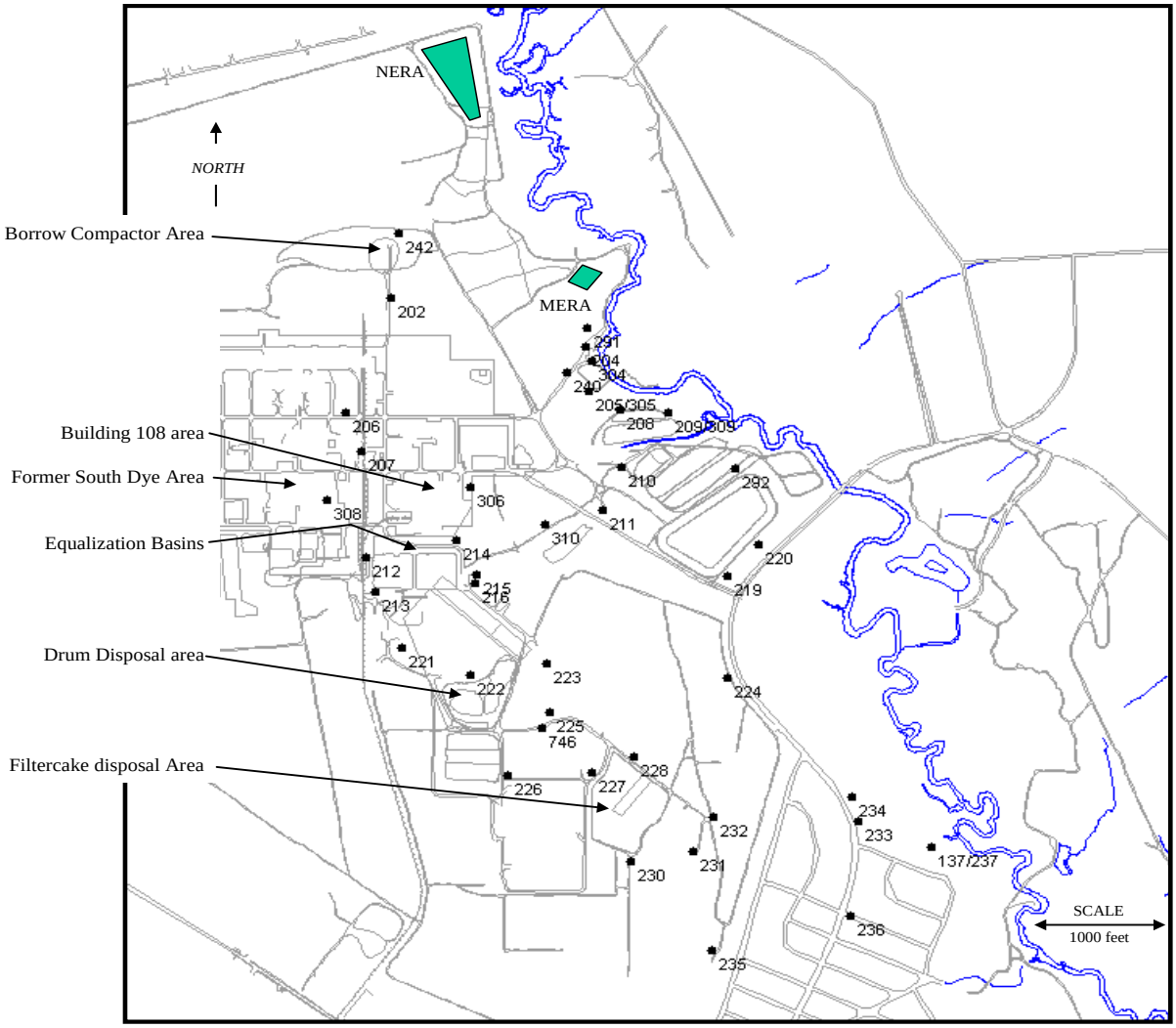


Figure 2 GERS Original Design

* from the Brown and Caldwell, 2011 Annual Report fo OU-1 Long-Term Monitoring Plan (LTMP) and Groundwater Portion of OU-2 LTMP, Ciba-Geigy Toms River Site, Toms River, New Jersey, August 2012

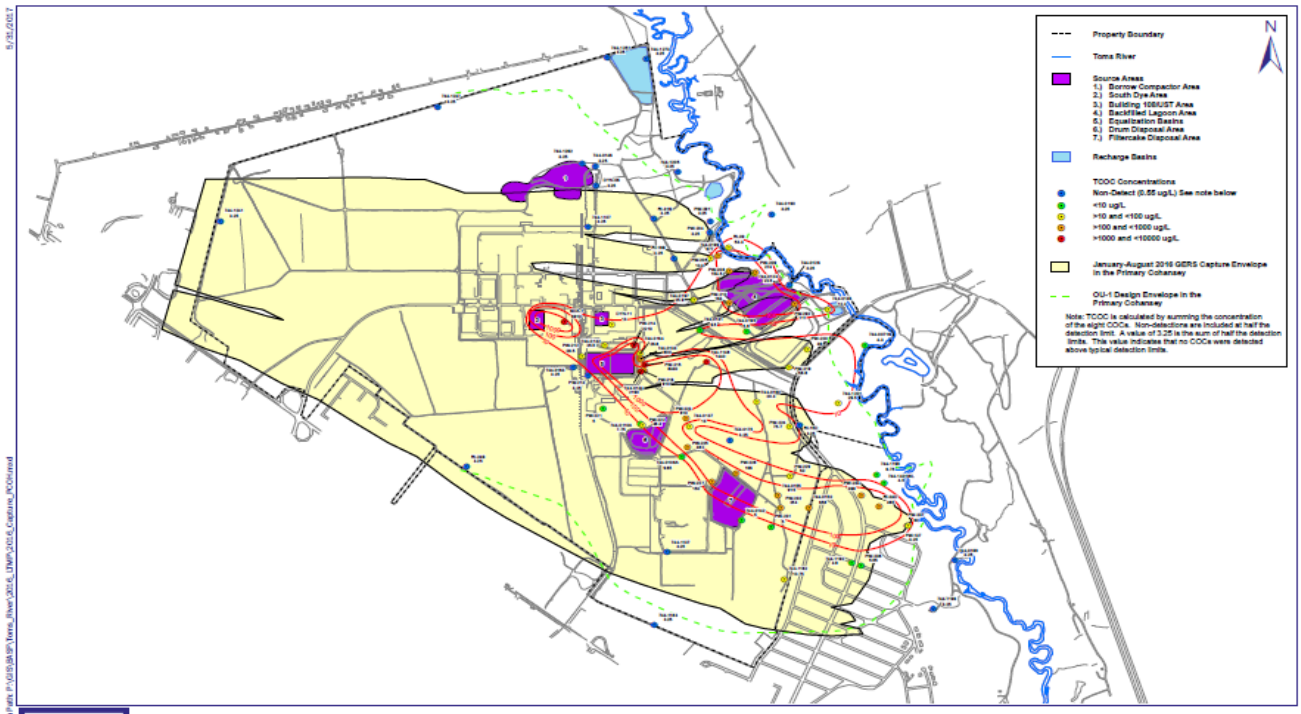


FIGURE 7-1
2016 TCOC CONCENTRATIONS AND MODELED CAPTURE IN THE PRIMARY COHANSEY MODEL LAYERS 1, 2, 3
CIBA-GEIGY TOMS RIVER SITE, TOMS RIVER NJ

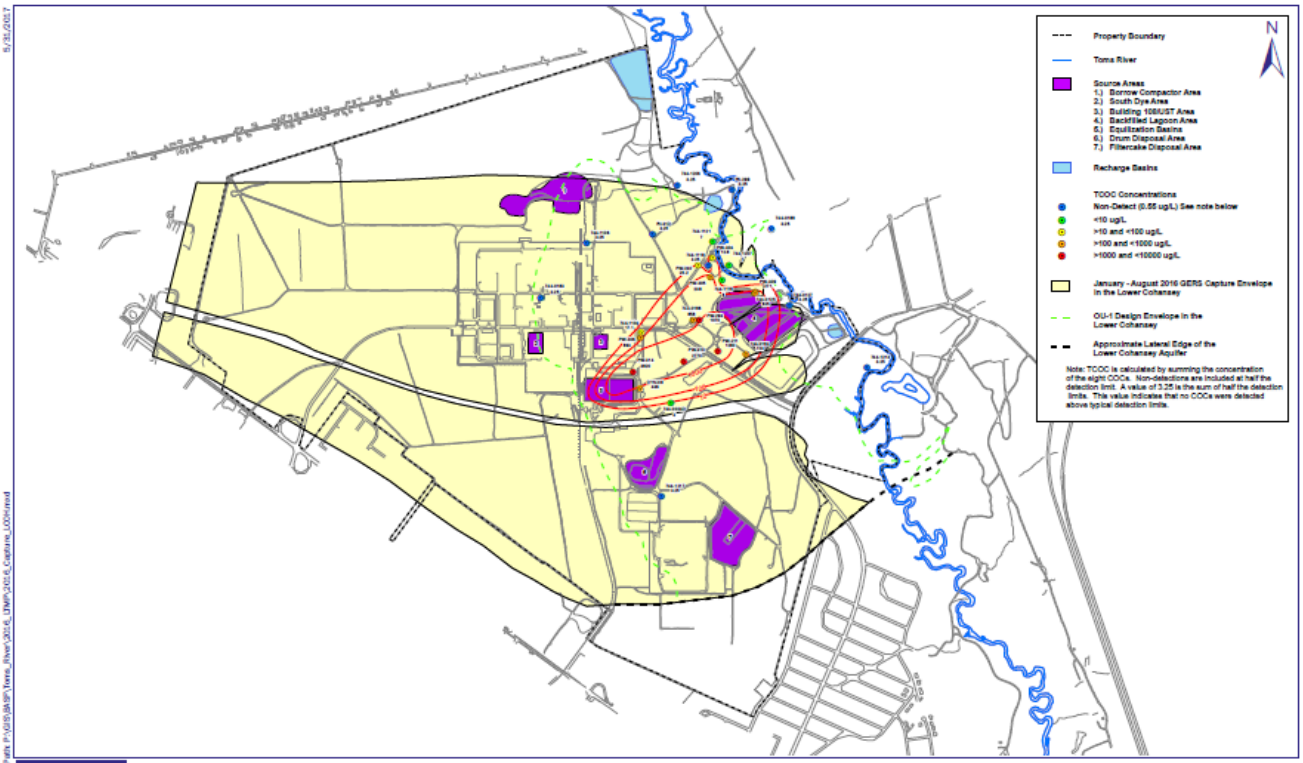


FIGURE 7-2
2016 TCOC CONCENTRATIONS AND MODELED CAPTURE IN THE LOWER COHANSEY MODEL LAYER 5
CIBA-GEIGY TOMS RIVER SITE, TOMS RIVER NJ

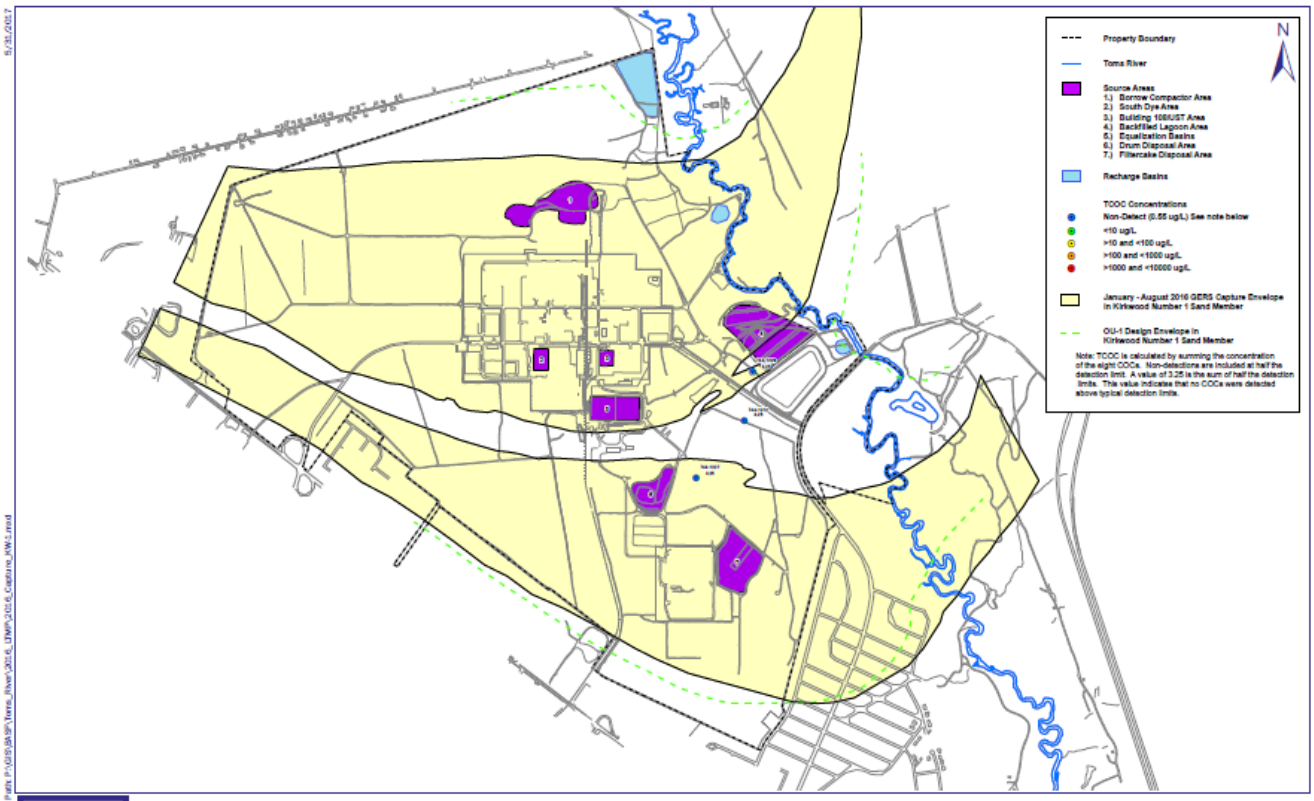


FIGURE 7-3
2016 TCOC CONCENTRATIONS AND MODELED CAPTURE IN THE KIRKWOOD NUMBER 1 SAND MEMBER MODEL LAYER 7
CIBA-GEIGY TOMS RIVER SITE, TOMS RIVER NJ

ATTACHMENT 6

DOCUMENTATION DESCRIBING SITE ENHANCEMENTS

DOCUMENTATION DESCRIBING SITE ENHANCEMENTS

The project has been designed to enhance biodiversity on this former industrial facility. Biodiversity planning has been a component of the project design process. Components of the biodiversity planning include maximizing the height of the leading edge of the panels, wildlife friendly fencing, and reduced panel density along with the creation of at least seven plant communities. These plant communities include grasslands and wildflower meadows that maximize re-establishment of native plants and specifically formulated to provide habitat for imperiled wildlife species, grassland birds and pollinator insects. Additionally, vegetation best management practices have been developed specifically to enhance grassland bird breeding habitat and maximize plant diversity. The project includes preservation of approximately 45 acres of forest on the property.

The project's biodiversity measures and management practices have been incorporated into the regulatory approvals for the project to ensure that the practices are maintained in perpetuity. The success of the practices will be monitored by a higher education institution and the results submitted to the New Jersey Department of Environmental Protection and in published, peer reviewed articles.

The biodiversity practices have been developed in close coordination with the NJDEP endangered species professionals and the property owner and will be incorporated into overall biodiversity measures proposed for the overall property.

Buffer (~30 acres)

- Maximum height 48”
- Grasses and forbs selected
  - Provide grassland habitat for reptiles, insects, birds, and small mammals
  - Soil erosion control
- Maintenance – rotational mowing in fall to control undesirable plants (e.g. woodies and goldenrod)

Vegetative Species

- Specific species still to be determined based on seed availability.
- Image is representative of the type of native grassland and wildflower plant community that will be targeted. Specific species shown in the image may not be available or compatible with the final selection.



Plant Height Cross-Section

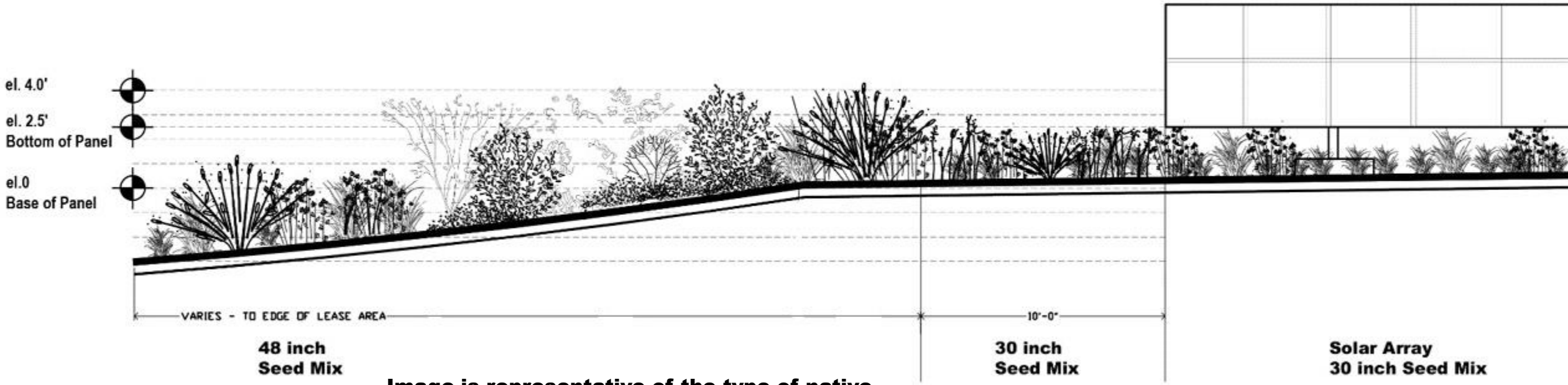


Image is representative of the type of native grassland and wildflower plant community that will be targeted. Specific species shown in the image may not be available or compatible with the final selection.

ATTACHMENT 7

COPY OF COMPLETED PERMIT READINESS CHECKLIST

Updated 10/11/16

NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION

OFFICE OF PERMIT COORDINATION AND ENVIRONMENTAL REVIEW

PERMIT READINESS CHECKLIST

FOR PCER OFFICE USE ONLY

DATE RECEIVED ___ PRC ID NUMBER ___

Completion of this form will assist the Department in determining what permits might be needed to authorize a project and to insure that all appropriate programs attend a pre-application meeting. Please fill out the below form as completely as possible, noting any areas you are not sure of and including any information about the project and the site that might help the Department determine the permitting needs of the project.[1]

1. Please complete the following questions if applicable and return to the Department with a **1 to 2 page narrative description of project, its function, and its benefits; as well as a site plan, maps, aerial photos, GIS shape files, etc.**

A. GENERAL INFORMATION

1. Name of Proposed Project Toms River Solar Project

2. Consultant/Contact Information (if any) Weston Solutions, Inc.

3. Name/Address of Prospective Applicant Toms River Merchant Solar, LLC
   Address/tel./fax T: 802-359-6585; F: 802-295-4417

4. Does the project have any existing NJDEP ID#s assigned? i.e., Case number, Program Interest (PI)#, Program ID#? See Attachment D.

B. PROPOSED PROJECT LOCATION

Street Address/munic. 227 Oak Ridge Parkway, Toms River
County Ocean Zip Code 08755
Block No. 411 Lot _No. 6.03
X Coordinate in State Plane (project centroid) 567,013.30 E
Y Coordinate in State Plane (project centroid) 416,917.24 N

[1] Please be advised that this form is not a permit application. To receive authorization, approval, or a permit to conduct regulated activities, a formal application must be filed and a formal permit or authorization issued by the appropriate Bureau within the Department prior to the conduct of regulated activity. This form is used solely for the Department's preliminary review and discussion of this project to determine what permits or authorizations may be needed to conduct the proposed activity. Any guidance offered to the applicant during this process is not binding on the Department or the applicant and a final response can only be rendered through the actual issuance of permits, approvals, or authorizations.

C. PROPOSED ACTIVITY DESCRIPTION AND SCHEDULE

1. Project Type: ___ New Construction ___ Brownfield Redevelop. ___
   Alternative Energy X Other (Please describe) Ground mount solar photovoltaic project

   a) Estimated Schedule: Date permits needed or desired by, beginning construction date; construction completion, and operation of facility date: Construction start: Summer 2019; Construction completion/operation: End of year 2019
   b) Funding Source: Is any Federal Funding being used for this project? N/A
      State Funding over 1 million dollars? N/A
      Is funding secured at this time? ___ Is funding conditional? ___ If so, on what?___
   c) Is the project contingent on receiving the identified funding? N/A
      If yes, explain ___
   d) What DEP permits do you think you need for this project? (The Department will confirm this through the PRC process). CAFRA, FWW LOI, FHA –JD,

2. For additional guidance on Department permits, please refer to the Permit Identification Form (PIF) which will be forwarded upon request. The PIF does not need to be filled out or submitted to the Department.

   a) Which Department(s), Bureau(s), and staff have you contacted regarding your proposed project? Land-Use; Bureau of Energy and Sustainability – Subsection t
   b) Are there any Department permits that will need to be modified as a result of this project. Please explain and identify the project reviewer of the permit to be modified. No permit modifications are anticipated.

   c) Please identify any pre-permit actions or modifications you have applied for or obtained from the Department or other state agencies for this project: NONE
      1) Water Quality Management Plan consistency _____
      2) Highlands Consistency _____
      3) Wetland Delineation (LOI) _____
      4) Tidelands Conveyance _____
      5) Flood Hazard Jurisdiction or determinations _____
      6) Water Allocation _____
      7) Site Remediation RAW, Remedial Action Permit – Soil and or Groundwater, NJPDES Discharge to Ground Water, NJPDES Discharge to Surface Water, No Further Action Response Action Outcome _____
      8) Landfill Disruption Approval _____
      9) Landfill Closure Plan _____
      10) Other _____

3. Please submit this Permit Readiness Checklist form, completed to the extent possible, electronically to Ruth.Foster@dep.nj.gov and Megan.Brunatti@dep.nj.gov and one (1) copy via mail[2] with the following items if available:

[2] Submit to: New Jersey Department of Environmental Protection
Office of Permit Coordination and Environmental Review
P.O. Box 420, Mail Code 07J
Trenton, New Jersey 08625
Street Location: 401 East State Street, 7th Floor East Wing
Telephone Number:(609) 292-3600
Fax Number: (609) 292-1921

(a) The completed Permit Readiness Checklist;
(b) A description of the proposed project;
(c) Any overarching regulatory or policy call(s) or guidance that the Department must make or make known prior to the receipt of the application to determine the project's feasibility, regulatory, or review process.
(d) USGS map(s) with the site of the proposed project site boundaries clearly delineated (including the title of the USGS quadrangle sheet from which it was taken)[3];
(e) Aerial photos/GIS information regarding the site;
(f) A site map including any known environmental features (wetlands, streams, buffers, etc[4]);
(g) Site plans to the extent available;
(h) Street map indicating the location of the proposed project;
(i) Any other information that you think may be helpful to the Department in reviewing this project.
(j) List of any local or regional governments or entities, their historical involvement in this project or site, identification of conflicts with DEP rules; with contact names and information whose attendance/input would be helpful in facilitating this project, ie Soil Conservation Districts, health departments, local zoning officials, etc.

D. The following are questions by Program to guide the Department in its determination of what permits may be needed to authorize this project. If the questions do not apply to the proposed project please indicate N/A. Please include any other information you think may be helpful for the Department to determine which permits are needed.

WATER AND WASTE WATER INFORMATION

DEP Safe Drinking Water Program (609) 292-5550
http://www.nj.gov/dep/watersupply/

Is the project located within an existing water purveyor service area? If yes, which one? N/A

Will the project affect any land or water controlled by a Water Supply Authority or water purveyor in New Jersey? If so, please identify and explain. N/A

Does the purveyor have adequate firm capacity and allocation to support project demand? N/A

Do water pipes currently extend to the project location? N/A

If not, is it located within a franchise area? N/A

Does the project have an approved Safe Drinking Water main extension permit? N/A

Will the project affect any land or water controlled by a Water Supply Authority or water purveyor in New Jersey? If so, please identify and explain. N/A

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[3] USGS maps may be purchased from NJDEP, Maps and Publications, P.O. Box 420, Trenton 08625-0420; (609) 777-1038

[4] NJGIS information

DEP Water Allocation Program (609) 292-2957
http://www.nj.gov/dep/watersupply

Is the project seeking a new ground water allocation or modification? If yes, does the project have all necessary well location and safe drinking water permits? N/A

Is the project located within an area of critical water supply concern? N/A

Will this project have the capability to divert more than 100,000 gallons per day from a single source or a combination of surface or groundwater sources? N/A

Will this project draw more than 100,000 gallons per day of ground or surface water for construction or operation? N/A

WATER POLLUTION MANAGEMENT ELEMENT

DIVISION OF WATER QUALITY

Non-Point Pollution Control (609) 292-0407
http://www.nj.gov/dep/dwq/bnpc_home.htm

The **Bureau of Non-Point Pollution Control** (BNPC) is responsible for protecting and preserving the state's groundwater resources through the issuance of NJPDES Discharge to Groundwater Permits and is responsible for permitting industrial facilities and municipalities under NJPDES for discharges of stormwater to waters of the State.

Groundwater Section (609) 292-0407

This Program does not issue NJPDES-DGW permits for remediation operations.

The following definitions should be used to assist in identifying discharge activities:
Subsurface disposal system is any contrivance that introduces wastewater directly to the subsurface environment, such as, but not limited to: septic systems, recharge beds, trench systems, seepage pits, and dry wells.
Injection/recharge wells are constructed such that they are deeper than they are wide, receive effluent via gravity flow or pumping, and include dry wells and seepage pits.
Overland flow is the introduction of wastewater to the ground surface, over which the wastewater travels and eventually percolates or evaporates.
Industrial wastewater is any wastewater or discharge which is not sanitary or domestic in nature, including non-contact or contact cooling water, process wastewater, discharges from floor drains, air conditioner condensate, etc.

1. Will the project/facility have a sanitary wastewater design flow which discharges to groundwater in excess of 2,000 gallons per day? N/A
2. Will the project/facility generate a discharge to groundwater of industrial wastewater in any quantity? N/A
3. Will the project/facility involve the discharge to groundwater by any of the following activities or structures, or include as part of the design any of these activities or structures? N/A

Please indicate which:
Upland CDF (Dredge Spoils) Spray Irrigation _____
Overland Flow Subsurface Disposal System (UIC) _____
Landfill Infiltration/Percolation Lagoon _____
Surface Impoundment _____

Please specify the source of wastewater for every structure identified above (e.g., sanitary wastewater to a subsurface disposal system or non-contact cooling water to a dry well): N/A

Please specify lining materials for each lined structure identified as being used by the proposed project and give its permeability in cm/sec (e.g., 8-inch thick concrete lined evaporation pond at 10-7 cm/sec): N/A

Does your project/facility include an individual subsurface sewage disposal system design for a facility with a design flow less than 2,000 gallons per day which does not strictly conform to the State's standards? N/A

Does your project involve 50 or more realty improvements? N/A

DEP Pretreatment and Residuals program (609) 633-3823

Will the project involve the discharge of industrial/commercial wastewater to a publicly owned treatment works (POTW)? N/A
If yes, name of POTW: _____
Volume of wastewater (gpd): _____

Will/does this project involve the generation, processing, storage, transfer and/or distribution of industrial or domestic residuals (including sewage sludge, potable water treatment residuals and food processing by-products) generated as a result of wastewater treatment. If so, please explain.
N/A

Stormwater Program (609) 633-7021
http://www.njstormwater.org/
http://www.state.nj.us/dep/dwq/ispp_home.html

Will your site activity disturb more than one acre? YES

Will any industrial activity be conducted at the site where material is exposed to the rain or other elements? N/A

Does your facility have an existing NJPDES permit for discharge of stormwater to surface groundwater? NO

Is your facility assigned one of the following Standard Industrial Classification (SIC) Codes? N/A
(To determine your SIC Code see the box "Industry Code" on your New Jersey Department of Labor Quarterly Contribution Report.

Surface Water Permitting (609) 292-4860
http://www.nj.gov/dep/dwq/swp.htm

Will this wastewater facility discharge to Surface Water? N/A Yes/No _____

If yes, state the name of the proposed receiving stream N/A

Describe the proposed discharge of wastewater to Surface Water N/A

If no, how is the wastewater proposed to be discharged (e.g., to be conveyed to another STP, Publicly Owned Treatment Works, etc. _____

MUNICIPAL FINANCE AND CONSTRUCTION ELEMENT

Treatment Works Approvals (609) 984-4429
http://www.nj.gov/dep/dwq/twa.htm

Will this project include the construction, expansion or upgrade of a domestic or industrial wastewater treatment facility or an off-site subsurface disposal system that generates more then 2,000 gallons per day? N/A If yes, explain _____

Will the project result in a construction design of more than 8000 gallons of water discharge per day? N/A

Office of Water Resources Management Coordination (609)777-4359
http://www.state.nj.us/dep/wrm

Sewer Service

Is the project in an approved sewer service area for the type of waste water service needed? N/A
If yes, what is the name of the sewer service area? _____

Has this project received endorsement from the appropriate sewer authority with adequate conveyance and capacity? N/A

Do waste water pipes currently extend to the project location? N/A

Is the project consistent with and in an area covered by an up to date Wastewater Management Plan? N/A

Will an amendment to the existing WQMP be required to accommodate this project? N/A

If tying into an offsite treatment plant, is the capacity and conveyance system currently available? N/A

What is the volume of wastewater that will be generated by the project? N/A

DEP Land Use Regulation (609) 777-0454
http://www.nj.gov/dep/landuse

Does the project involve development at or near, or impacts to the following; describe the type and extent of development in regards to location and impacts to regulated features:

Water courses (streams) N/A

State Open Waters? N/A

Freshwater Wetlands and/or freshwater wetland transition areas? N/A

Flood Hazard areas and/or riparian buffers N/A

Waterfront development areas N/A

Tidally Flowed Areas N/A

Bureau of Tidelands Management: N/A http://www.nj.gov/dep/landuse/tl_main.html

The CAFRA Planning Area? YES http://www.state.nj.us/dep/gis/cafralayers.htm

`DEP NATURAL AND HISTORIC RESOURCES

Green Acres Program (609) 984-0631
http://www.nj.gov/dep/greenacres

Does the project require a diversion of State property or parkland, lease of same, lifting of a Green Acres of Land Use deed restriction, or work within an existing easement? N/A Will any activity occur on State owned lands? N/A If so please describe. _____

Does the project require a diversion of property funded with federal Land and Water Conservation Funding? N/A. If so, please describe _____.

Does the project include activities that are under the jurisdiction of the Watershed Property Review Board? If so, please describe. N/A _ Has the Watershed Property Review Board made a jurisdictional determination? N/A

Division of Parks and Forestry: State Park Service 609-292-2772

Is the temporary use of State lands administered by the New Jersey State Park Service required for pre-construction, construction and/or post construction activities? N/A If so, please describe.

Division of Parks and Forestry: State Forestry Services (609) 292-2530
http://www.nj.gov/dep/parksandforests/forest

Forest clearing activities/No Net Loss Reforestation Act
Will construction of the project result in the clearing of ½ acres or more of forested lands owned or maintained by a State entity**?** N/A
If so, how many acres? _____

Division of Parks and Forestry: Office of Natural Lands Management (609) 984-1339
http://www.nj.gov/dep/parksandforests/natural/index.html

Is the project within a State designated natural area as classified in the Natural Areas System Rules at N.J.A.C. 7:5A? N/A
If so, please describe. _____

State Historic Preservation Office – SHPO (609) 292-0061
http://www.state.nj.us/dep/hpo/index.htm

Is the site a Historic Site or district on or eligible for the State or National registry? N/A
Will there be impacts to buildings over 50 years old? N/A
Are there known or mapped archeological resources on the site? N/A

Dam Safety Program (609) 984-0859
http://www.nj.gov/dep/damsafety

Will the project involve construction, repair, or removal of a dam? N/A
If so, please describe _____

Fish and Wildlife (609) 292-2965
http://www.nj.gov/dep/fgw

Will there be any shut off or drawdown of a pond or a stream? N/A

Threatened and Endangered Species Program

Are there records of any Threatened and Endangered species, plant, or animal in this project area? YES

Will the proposed development affect any areas identified as habitat for Threatened or Endangered Species? YES

SITE REMEDIATION PROGRAM (609) 292-1250
http://www.nj.gov/dep/srp/

Office of Brownfield Reuse (609) 292-1251

Is the project located on or adjacent to a known or suspected contaminated site? YES
http://www.nj.gov/dep/srp/kcsnj/

Is the project within a designated Brownfield Development Area? N/A
http://www.nj.gov/dep/srp/brownfields/bda/index.html

Has a No Further Action, Response Action Outcome, or Remedial Action Permit been issued for the entire project area? Phase I ESA underway to determine applicability.

If not, what is the current status of remediation activities? See Attachment A, Project Description.
Please include remedial phase, media affected and contaminant(s) of concern.

Name of current SRP Case Manager or Licensed Site Remediation Professional and Preferred Identification (PI) Number No current SRP Case Manager (previously Anne Pavelka); See Attachment D for list of PI Numbers.

Is the applicant a responsible party for contamination at the property? N/A

Is the project located on a landfill that will be redeveloped for human occupancy? N/A If yes, is there an approved Landfill Closure Plan? _____

Dredging and Sediment Technology (609) 292-1250

Does the project involve dredging or disposing of dredge materials? N/A

SOLID AND HAZARDOUS WASTE MANAGEMENT PROGRAM (609) 633-1418
http://www.nj.gov/dep/dshw/

Does the project receive, utilize, or transport solid or hazardous wastes? N/A

Will the project involve the disposing of hazardous Substances per 40 CFR part 261 and NJAC 7:26? N/A

Will the project include operation of a solid waste facility according to N.J.A.C. 7:26-1-et seq.? N/A

Is the project a solid waste facility or recycling center? N/A

Is the project included in the appropriate county Solid Waste Management Plan? N/A Explain _____

AIR QUALITY PERMITTING PROGRAM
http://www.nj.gov/dep/aqpp

Will activity at the site release substances into the air? N/A

Does the project require Air Preconstruction permits per N.J.A.C. 7.27-8.2©1? N/A

Will your project require Air Operating permits (N.J.A.C. 7:27--22.1)? N/A

Will the project result in a significant increase in emissions of any air contaminant for which the area is nonattainment with the national ambient air quality standards (all of NJ for VOC and NOx; 13 counties for fine particulates), thereby triggering the Emission Offset Rule at NJAC7:27-18? N/A

Will the project emit group 1 or 2 TXS toxic substances listed in NJAC 7:27-17? N/A

Will the project emit hazardous air pollutants above reporting thresholds in NJAC7:27 8, Appendix 1? N/A

Will the project result in stationary diesel engines (such as generators or pumps) or mobile diesel engines (such as bulldozers and forklifts) operating on the site? If so, which?
N/A

RADIATION PROTECTION AND RELEASE PREVENTION (609) 984-5636
www.state.nj.us./dep/rpp

Will the operation receive, store or dispose of radioactive materials? N/A

Will the operation employ any type of x-ray equipment? N/A

DISCHARGE PREVENTION PROGRAM (DPCC) (609) 633-0610
www.nj.gov/dep/rpp

Is this a facility as defined in N.J.A.C. 7:1E in which more than 20,000 gallons of Hazardous substances other then petroleum or greater than 200,000 gallons of petroleum are stored? N/A

TOXIC CATASTROPHE PREVENTION ACT (TCPA) (609) 633-0610

HTTP://WWW.STATE.NJ.US/DEP/RPP/BRP/TCPA/INDEX.HTM

Is this a facility that handles or stores greater than a threshold amount of extraordinarily hazardous substances as defined in N.J.A.C. 7:31? N/A

Bureau of Energy and Sustainability (609)633-0538
http://www.nj.gov/dep/aqes/energy.html
http://www.nj.gov/dep/aqes/sustainability.html

GREEN DESIGN (609) 777-4211

Have you incorporated green design features into this project? Examples of green design features may include: renewable energy, water conservation and use of low impact design for stormwater.

Yes_X___ No_____

Will this project be certified by any of the following green building rating systems? N/A

New Jersey Green Building Manual? _____
http://greenmanual.rutgers.edu/

US Green Building Council's LEED (Leadership in Energy and Environmental Design)? _____
http://www.usgbc.org/

ASHRAE Standard 189.1? _____
http://www.ashare.org/publications/page/927

National Green Building Standard ICC 700-2008? _____
http://www.nahbgreen.org

USEPA's ENERGY STAR? _____
http://www.energystar.gov/index.cfm?c=business.bus_index

INNOVATIVE TECHNOLOGY (609) 292-0125

Is an environmental and energy innovative technology included in this project? X Y N

Is this technology used for manufacturing alternative fuels? Y X N
- If yes, what is the non-fossil feedstock(s) used for manufacturing the fuels?
Biomass Municipal Solid Waste Other Non-Fossil Feedstocks

-What will be the primary use of the manufactured alternative fuels?
CHP System Micro Turbine Fuel Cells

For other innovative technology type, what is the proposed application?
X Energy Site Remediation Drinking Water Wastewater

For other innovative energy systems, what is the source of energy?
X Solar Wind Tidal/Wave Hydroelectric Geothermal

Is there independent third-party performance data for the technology? Y N

Has the technology been verified by an independent third-party entity? Y N

Is this technology in use at any other location at this time? Y N
- If yes, please provide location _____

DEP COMPLIANCE AND ENFORCEMENT

Does the applicant have outstanding DEP enforcement violations, and if so, what is the status? N/A

If yes, please identify the case, case manager, program, and phone number. _____

Does the proposed project facilitate compliance where there is a current violation or ACO? N/A

COMMUNITY ENGAGEMENT (609)292-2908

The Department is committed to the principles of meaningful and early community engagement in the project's approval process. The Department has representatives available who could discuss community engagement issues with you and we encourage this communication to take place at the earliest possible time.

(a) What community groups and stakeholders have you identified that may be interested in or impacted by this project? No impacts to community, other than the inherently beneficial attributes associated with renewable energy are expected.

(b) How have you or will you engage community and stakeholders in this project? Please supply individuals or stakeholder groups contacted or who have been identified for community engagement. No community stakeholders have been engaged with to date, as we believe and we would hope that it will not be necessary due to the inherently beneficial nature of the project.

(c) What are the potential impacts of this project on the community? The project will provide clean, renewable power to the local distribution grid.

(d) How do you intend to mitigate these potential impacts? N/A

(e) What are the community concerns or potential concerns about this project? N/A

(f) How do you intend to address these concerns? N/A

(g) As part of this project, do you plan to perform any environmental improvements in this community?

Please provide the Department with an additional 1 to 2 page narrative description of the project, focusing on its function and its local/regional environmental, social, and economic benefits and impacts. Also, what sensitive receptors are present and how might they be affected by this project?

GENERAL

Is the project subject to:

Highlands Regional Master Plan – Planning or Preservation Area? N/A
http://www.nj.gov/dep/highlands/highlands_map.pdf

Pinelands Comprehensive Management Plan? N/A
http://www.state.nj.us/pinelands/cmp/

D&R Canal Commission Standards N/A
http://www.dandrcanal.com/drcc/maps.html

Delaware River Basin Commission N/A
(609) 883-9500
http://www.state.nj.us/drbc/

US Army Corp of Engineers review? YES

ATTACHMENT 8

PROOF OF MEETING WITH NJDEP PCER

Jendrasiak, Ryan

From: Nolan, Katherine <Katherine.Nolan@dep.nj.gov>
Sent: Thursday, December 20, 2018 9:41 AM
To: sgouin@ghclaw.com; eshanley@pvone.com; scott.hessen@edf-re.com; Kirkpatrick, Brian; Jendrasiak, Ryan; Dempsey, Joe
Cc: Davis, Lindsey; Migliarino, Maurice; Davis, Kelly; Papperman, Ray; Salkie, Diane; Hill, Erin; Goldman, MaryAnne; Garner, Jamal; Lindner, William; Pepe, David
Subject: Toms River Solar 12/18/18 meeting follow up
Attachments: 12-18-18 sign in sheet.pdf

**** External Email ****
Ryan and Company,

It was a pleasure to meet with you on Tuesday.

As per our discussion, please provide your meeting minutes within the next 2 weeks. Our office will distribute the draft meeting minutes to the DEP programs for review and comments, any changes/revisions will be sent your way so you may finalize. These minutes will memorialize your meeting with DEP and the topics discussed.

If you wish to have an additional follow-up meetings, please let our office know and we will coordinate and schedule the meeting accordingly. If you would like to work with the programs directly, we just ask that you keep us copied on any correspondence so we may update our records.

To close out this email, below is a courtesy conceptual summary of possible permits and action items this project may require (but not limited to): *** this is neither a comprehensive nor a technical summary ***

Energy & Sustainability: Erin Hill
- Submit Subsection T application to NJBPU as soon as possible.
- Energy & Sustainability will consult with SRP for review.

Site Remediation & Waste Management: Ray Papperman, Bill Lindner, Maurice Migliarino, MaryAnne Goldman
- SRP Brownfields will review the Subsection T application and coordinate with Energy & Sustainability.
- Based on current design, the project will not impact Landfills.

New Jersey Board of Public Utilities: Jamal Garner
- Submit Subsection T application.
- BPU may be transitioning their SREC program.

Land Use: Lindsey Davis
- The applicant has previously met with LU and determined that a CAFRA permit is required for the project.

T&E: Kelly Davis
- Potential timing restrictions for tree clearings.
    - Will be determined during Land Use permitting process.

NJPDES Stormwater: Eleanor Krukowski
- Stormwater was not able to attend the meeting, but provides the following guidance:
- Construction projects that disturb 1 acre or more of land, or less than 1 acre but are part of a larger common plan of development that is greater than 1 acre, are required to obtain coverage under the Stormwater

construction general permit (5G3). Applicants must first obtain certification of their soil erosion and sediment control plan (251 plan) form their local soil conservation district office. Upon certification, the district office will provide the applicant with two codes process (SCD certification code and 251 identification code) for use in the DEPonline portal system application. Applicants must then become a registered user for the DEPonline system and complete the application for the Stormwater Construction General Authorization. Upon completion of the application the applicant will receive a temporary authorization which can be used to start construction immediately, if necessary. Within 3-5 business days the permittee contact identified in the application will receive an email including the application summary and final authorization.

Next Steps:

- Submit draft meeting minutes.
- Submit Application.
- Additional meetings/consultation as necessary.

Should circumstances or conditions be or become other than as set forth in the information that was recently provided to the NJDEP, the comments and regulatory requirements provided above are subject to change and may no longer hold true. Statements made within this email are not indicative that the NJDEP has made any decisions on whether the proposed project will be permitted. OPCER looks forward to working with you on the proposed project.

If you have any questions or concerns, please let me know.

Sincerely,

Katie Nolan
New Jersey Department of Environmental Protection
Office of Permit Coordination & Environmental Review
401 East State Street
Trenton, NJ 08625-0420
Mailcode: 401-07J

Office #: (609) 272-3600
Direct #: (609) 984-6506
Fax #: (609) 633-1196
Email: Katherine.Nolan@dep.nj.gov

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ATTACHMENT 9

COPIES OF PERMITS

State of New Jersey
DEPARTMENT of ENVIRONMENTAL PROTECTION
Division of Air Quality
Bureau of Air Permits
401 E. State Street, 2nd floor, P.O. Box 420, Mail Code 401-02
Trenton, NJ 08625-0420

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

Air Pollution Control
Preconstruction Permit and Certificate to Operate
Construction of a New Source

Permit Activity Number: PCP150001 **Program Interest No: 78001**

Mailing Address	Plant Location
STEPHEN HAVLIK EHS REMEDIATION SPECIALIST BASF CORP 227 OAK RIDGE PKWY Toms River, NJ 08755	BASF CORP 227 Oak Ridge Pkwy Toms River Ocean County, New Jersey

Approval Date: 05/04/2015
Expiration Date: 05/03/2020

The New Jersey Department of Environmental Protection (Department) has reviewed the above referenced air pollution control permit application. On the basis of the information provided, the Department concludes that the application satisfies all applicable requirements of the New Jersey Air Pollution Control regulations codified at N.J.A.C. 7:27 et seq. This permit allows for inspection and evaluation of the equipment by the Department to assure conformance with all provisions of N.J.A.C. 7:27 et seq. and any other applicable federal requirements codified at 40 CFR 52, 60, 61 and 63.

The equipment, that is authorized to be installed and operated under this approval, is described in Section A, Source Operations and Section D, Equipment Inventory. Equipment at the facility referenced by this Permit shall be operated in accordance with the Conditions of Approval set forth in Section D, Facility Specific Requirements.

The Department hereby issues this permit and certificate under the authority of chapter 106, P.L. 1967(N.J.S.A 26:2C-9.2). You may construct, reconstruct, install, or modify the above referenced equipment and/or control apparatus consistent with the approval.

The approved Permit is available for download in PDF format which contains the facility's specific requirements (compliance plan) at: http://www.nj.gov/dep/aqpp. After accessing the web site, click on "Approved PCP Permits" listed under "Reports" and then type in your Program Interest (PI) Number, 78001, as instructed on the screen. You will be able to view,

print or electronically store your permit. If you have any questions regarding this permit approval, please contact the Department at the Preconstruction Permit Help Line available from 9:00 AM to 4:00 PM daily, where you may speak to someone about any technical questions you may have. The Preconstruction Permit Technical Help Line number is 609-292-6716.

If, in your judgment as an applicant for an air pollution control permit, the Department is imposing any unreasonable Condition of Approval, you may contest the Department's decision and request a contested case hearing pursuant to the Administrative Code at N.J.A.C. 7:27-1.32(a). All requests for contested case hearings must be received in writing by the Department within twenty (20) calendar days of the date you receive this permit approval and must contain the information specified in the Administrative Hearing Request Checklist and Tracking Form.

If you have any non technical questions please use the Bureau's number 609- 292-0834. If you have any questions when filing a General Permit please use the General Permit Help number 609-633-2829.

Approved by:

William Kuehne
Environmental Engineer 4 (Supervisor)
Preconstruction Permits

Administrative Hearing Request Checklist and Tracking Form

I. Document Being Appealed

Name of the Facility	Facility ID Number	Permit Activity Number	Issuance Date
BASF CORP	78001	PCP150001	

II. Contact Information

Name of Person Requesting Hearing	Name of Attorney (if applicable)
Address:	**Address:**
Telephone:	**Telephone:**

III. Please include the following information as part of your request:

A. The date the permittee received the permit decision;
B. Two printed copies of the document being appealed – for submitting to address 1 below;
A PDF copy of the document being appealed on a CD – for submitting to address 2 below
C. The legal and factual questions you are appealing;
D. A statement as to whether or not you raised each legal and factual issues during the permit application process;
E. Suggested revised or alternative permit conditions;
F. An estimate of the time required for the hearing;
G. A request, if necessary, for a barrier-free hearing location for physically disabled persons;
H. A clear indication of any willingness to negotiate a settlement with the Department prior to the Departments processing of your hearing request to the Office of Administrative Law;

Mail this form, completed, signed and dated with all of the information listed above, including attachment, to:

1. New Jersey Department of Environmental Protection
Office of Legal Affairs
Attention: Adjudicatory Hearing Requests
401 E. State Street, P.O. Box 402
Trenton, New Jersey 08625

2. Mail Code: 401-02
New Jersey Department of Environmental Protection
Air Quality Program
P.O. Box 420
Trenton, New Jersey 08625-0420
Phone: (609) 633-2829

_____ _____

Signature **Date**

Administrative Hearing Request Checklist and Tracking Form

IV. If you are not the applicant but rather an interested person claiming to be aggrieved by the permit decision, please include the following information:

1. The date you or your agent received notice of the permit decision (include a copy of that permit decision with your hearing request);
2. Evidence that a copy of the request has been delivered to the applicant for the permit which is the subject of the permit decision;
3. A detailed statement of which findings of fact and/or conclusion of law you are challenging;
4. A description of your participation in any public hearings held in connection with the permit application and copies of any written comments you submitted;
5. Whether you claim a statutory or constitutional right to a hearing, and, if you claim such a right, a reference to the applicable statute or explanation of how your property interests are affected by the permit decision;
6. If the appeal request concerns a CAFRA permit decision, evidence that a copy of the request has been delivered to the clerks of the county and the municipality in which the project which is the subject of the permit decision is located;
7. Suggested revised or alternative permit conditions;
8. An estimate of the time required for the hearing;
9. A request, if necessary, for a barrier-free hearing location for physically disable persons;
10. A clear indication of any willingness to negotiate a settlement with the Department prior to the Department's transmittal of the hearing request to the Office of Administrative Law;

Mail this form, completed, signed and dated with all of the information listed above, including attachment, to:

New Jersey Department of Environmental Protection
Office of Legal Affairs
Attention: Adjudicatory Hearing Requests
401 East State Street, P.O. Box 402
Trenton, New Jersey 08625-0402

Mail Code: 401-02
New Jersey Department of Environmental Protection
Air Quality Program
P.O. Box 420
Trenton, New Jersey 08625-0420
Phone: (609) 633-2829

_____ _____

Signature **Date**

AIR POLLUTION CONTROL PRECONSTRUCTION PERMIT

Table of Contents

Facility Name: BASF CORP
Facility ID No.: 78001
Permit Activity No.: PCP150001

Section A

AUTHORIZED SOURCE OPERATIONS

Section B

ACRONYMS

Section C

GENERAL PROVISIONS AND AUTHORITIES

Section D

PERMIT INFORMATION

AIR POLLUTION CONTROL PRECONSTRUCTION PERMIT

Section A

Facility Name: BASF CORP
Facility ID No.: 78001
Permit Activity No.: PCP150001

AUTHORIZED SOURCE OPERATIONS

This Preconstruction Permit and the Certificate to Operate for the following equipment is issued pursuant to N.J.A.C. 7:27-8.

Description of Source Activity

Source Operation Type: Natural Gas-fired Emergency Generator

Source Operation Description: One natural gas-fired Reciprocating Internal Combustion Engine (RICE) used as an Emergency Generator, 477 bhp, 275 kW and 4.24 MMBtu/hr. The engine is EPA certified to CO – 5.4 g/kW-hr, NOx– 2.7 g/kW-hr and VOC – 1.3 g/kW-hr.

Source Operation Details: The sources authorized by this permit shall be operated within the parameters specified in the Equipment, Control Device, and/or Emission Unit/Batch Process Operating Scenario Details of this permit. Operation of the authorized sources within these parameters is required in addition to compliance with the conditions specified in Section D– Facility Specific Requirements.

AIR POLLUTION CONTROL PRECONSTRUCTION PERMIT

Section B

Facility Name: BASF CORP
Facility ID No.: 78001
Permit Activity No.: PCP150001

ACRONYMS

BTS	Bureau of Technical Services
CEMS	Continuous Emissions Monitor System
CFR	Code of Federal Regulations
CO	Carbon Monoxide
COMS	Continuous Opacity Monitor System
EPA	United States Environmental Protection Agency
HAP	Hazardous Air Pollutant
N.J.A.C.	New Jersey Administrative Code
NJDEP	New Jersey Department of Environmental Protection
NOx	Oxides of Nitrogen
PM-2.5	All particulate matter having an aerodynamic diameter less than or equal to a nominal 2.5 microns
PM-10	All particulate matter having an aerodynamic diameter less than or equal to a nominal 10 microns
PST	Performance Specification Test
REO	Regional Enforcement Office - NJDEP
SO_2	Sulfur Dioxide
TSP	Total Suspended Particulate Matter
VOC	Volatile Organic Compounds

AIR POLLUTION CONTROL PRECONSTRUCTION PERMIT

Section C

Facility Name: BASF CORP
Facility ID No.: 78001
Permit Activity No.: PCP150001

GENERAL PROVISIONS AND AUTHORITIES
Preconstruction Permits

1. Not-withstanding compliance with other provisions of N.J.A.C. 7:27-1 et seq., no person shall cause, suffer, allow or permit to be emitted into the outdoor atmosphere substances in quantities which shall result in air pollution as defined at N.J.A.C. 7:27-5.1. [N.J.A.C. 7:27-5.2(a)]

2. The permittee shall not construct, reconstruct, install, or modify a significant source or control apparatus serving the significant source without first obtaining a preconstruction permit under N.J.A.C. 7:27-8. [N.J.A.C. 7:27-8.3(a)]

3. The permittee shall not operate (nor cause to be operated) a significant source or control apparatus serving the significant source without a valid operating certificate. [N.J.A.C. 7:27-8.3(b)]

4. Permit Revisions:

   The permittee shall not take any action which requires a permit revision, compliance plan change, seven-day-notice change, amendment, or change to a batch plant permit, under any applicable provision at N.J.A.C. 7:27-8.17 through 8.23, without complying with that applicable provision.

   The following summarize N.J.A.C. 7:27-8.18 through 8.21:

   a. The permittee shall file a permit revision request and receive approval from the Department prior to increasing any maximum allowable emission limit, increasing actual emissions, to a rate or concentration greater than a maximum allowable emission, causing the emissions of a new air contaminant, use a new raw material, reconstructing equipment, change the ground level concentration of an air contaminant in an area where the public has access, replace the permitted source, or constructing or installing a new significant source. [N.J.A.C. 7:27-8.18]

   b. The permittee shall file a compliance plan change request and receive approval from the Department prior to decreasing the frequency of testing, monitoring, recordkeeping, or reporting, changing the monitoring method, changing a level, rate, or limit of an operational parameter included in the conditions, or reducing a source's potential to emit. [N.J.A.C. 7:27-8.19]

   c. At least seven days prior to proceeding with a physical or operational change that is outside the scope of activities allowed by this permit, but will not increase emissions over the allowable emissions and will not alter the stack characteristics, the permittee shall file a seven-day-notice change. The permittee

may proceed with the proposed changes seven days after such notice is filed with the Department. [N.J.A.C. 7:27-8.20]

d. The permittee shall file an amendment within 120 days of making any change of the information which allows the Department to identify and contact the permittee, changing the name, number or designation of any equipment or stack covered by this permit, changing the parameters of a stack in such a way to reduce the ground level concentration of an air contaminant, or correction of a typographical error that will not result in an increase of actual or allowable emissions. [N.J.A.C. 7:27-8.21]

The permittee shall review the provisions of N.J.A.C. 7:27-8.18 through 7:27-8.21 to determine the appropriate type of request to file.

5. The permittee shall make the preconstruction permit or certificate, together with any amendments, seven-day-notices, or other documents related to the permit and certificate, readily available for Department inspection on the operating premises. [N.J.A.C. 7:27-8.3(d)]

6. The permittee shall not use or cause to be used the equipment or control apparatus unless all components connected or attached to, or serving, the equipment or control apparatus, are functioning properly and are in compliance with the preconstruction permit and certificate and all conditions and provisions thereto. [N.J.A.C. 7:27-8.3(e)]

7. A preconstruction permit is not transferable either from the location authorized in the preconstruction permit to another location, or from any one piece of control apparatus or equipment to another piece of control apparatus or equipment. [N.J.A.C. 7:27-8.3(f)]

8. Once a permit or certificate is issued, the permittee is fully responsible for compliance with N.J.A.C. 7:27-8 and with the permit and certificate, including adequate design, construction, and operation of the source, even if employees, contractors, or others work on or operate the permitted source. If the Department issues any other requirement with the force of law, such as an order, which applies to the source, the permittee is also responsible for compliance with that requirement. [N.J.A.C. 7:27-8.3(g)]

9. Preconstruction permits and certificates do not any way relieve the permittee from the obligation to obtain necessary permits from other government agencies and to comply with all other applicable Federal, State, and local rules and regulations. [N.J.A.C. 7:27-8.3(h)]

10. The permittee shall not suffer, allow, or permit any air contaminant detectable by the sense of smell, to be present in the outdoor atmosphere in such quantity and duration which is, or tends to be, injurious to human health or welfare, animal or plant life or property, or would unreasonably interfere with the enjoyment of life or property. This shall not include an air contaminant which occurs only in areas over which the permittee has exclusive use or occupancy. In determining whether an odor unreasonably interferes with the enjoyment of life or property, the Department shall consider all of the relevant facts and circumstances, including, but not limited to, the character, severity, frequency, and duration of the odor, and the number of persons affected thereby. In considering these and other relevant facts and circumstances, no one factor shall be dispositive, but each shall be considered relevant in determining whether an odor interferes with the enjoyment of life or property, and, if so, whether such interference is unreasonable considering all of the circumstances. [N.J.A.C.7:27-8.3(j)]

11. The Department and its representatives have the right to enter and inspect any facility or property in accordance with N.J.A.C. 7:27-1.31. [N.J.A.C. 7:27-8.3(m)]

12. There shall be an affirmative defense to liability for penalties for a violation of a preconstruction permit or certificate occurring as a result of an equipment malfunction, an equipment start-up, an equipment shutdown, or during the performance of necessary maintenance. The affirmative defense shall be asserted and established as required pursuant to P.L. 1993. c.89 (adding N.J.S.A. 26:2C-19.1 through 2C-19.5) and any rules the Department promulgates thereunder, and shall meet all of the requirements thereof. There shall also be an affirmative defense to liabilities for penalties or other sanctions for noncompliance with any technology based emission limitation in this permit or certificate, if the noncompliance was due to an emergency as defined at N.J.A.C. 7:27-22.1, provided that the affirmative defense is asserted and established in compliance with 40 CFR 70.6(g) and meets all requirements thereof. [N.J.A.C. 7:27-8.3(n)]

13. The permittee shall not cause or use the equipment specified in a preconstruction permit in a manner that will result in the emission of any air contaminant not listed in the Facility Specific Requirements in this Preconstruction Permit at a rate equal to or higher than the applicable reporting threshold set forth at N.J.A.C. 7:27-8 Appendix I, Table A or B. [N.J.A.C. 7:27-8.4(k)1]

14. No air contaminant, or category of air contaminant, where accepted by the Department, shall be emitted other than those approved in the preconstruction permit. [N.J.A.C. 7:27-8.13(a)]

15. Any person to whom the Department has issued a preconstruction permit or certificate shall comply with all terms and conditions of any order related to the preconstruction permit or certificate. [N.J.A.C. 7:27-8.13(a)]

16. The permittee shall maintain all records required in the preconstruction permit for a period of five (5) calendar years from the calendar year within which the record was generated. [N.J.A.C. 7:27-8.13(a)]

17. The Department may change the conditions of approval of any approved certificate to operate at the time of renewal of a temporary operating certificate; at the time of approval or renewal of a five-year operating certificate; or at any time during the period a certificate is in effect, if the Department determines that such change is necessary to protect human health or welfare or the environment. [N.J.A.C. 7:27-8.13(b)]

18. Upon request of the Department, the permittee shall submit to the Department information relevant to the operation of equipment and control apparatus including all information specified at N.J.A.C. 7:27-8.13(c). [N.J.A.C. 7:27-8.13(c)]

19. If the conditions of a preconstruction permit or certificate to operate require the Department to incur any of the following charges, the permittee shall reimburse the Department for the full amount of these charges: (1) The charges billed by any phone company for the maintenance of a dedicated telephone line required by this permit or the certificate to operate for the electronic transmission of data; or (2) The charges billed by any laboratory for performing the analysis of audit samples collected pursuant to testing or monitoring required by this permit or the certificate to operate. [N.J.A.C. 7:27-8.13(g)]

20. Any exceedance of the operating requirements or emission concentrations specified in a preconstruction permit shall be reported within three (3) business days, by writing to the Regional Enforcement Office. [N.J.A.C. 7:27-8.13(h)]

21. The permittee shall, when requested by the Department, provide such testing facilities exclusive of instrumentation and sensing devices as may be necessary for the Department to determine the kind and amount of air contaminants emitted from the equipment or control apparatus. The testing facilities shall include the utilities, the structure to hold testing equipment and/or personnel, and any ports in stacks needed to carry out testing required by this permit. During testing by the Department, the equipment and control apparatus shall be operated under such conditions within their capacities as may be requested by the Department. The test facilities may be either permanent or temporary, at the discretion of the person responsible for their provision, and shall conform to all applicable laws, regulations, and rules concerning safe construction and safe practice. Testing facilities, which contain platforms and other means of personnel access, shall conform to OSHA standards. [N.J.A.C. 7:27-8.13(i)]

22. Upon request of the Department, the permittee shall submit to the Department any record relevant to any permit or certificate. Such records shall be submitted to the Department within thirty (30) days of the request by the Department or within a longer time period if approved in writing by the Department. [N.J.A.C. 7:27-8.15(a)]

23. The permittee shall submit any required report in a format and on a schedule approved by the Department. Such report shall be transmitted on paper, on computer disk, or electronically, at the discretion of the Department. [N.J.A.C. 7:27-8.15(b)]

24. Any report submitted to the Department, including but not limited to, a report submitted as an amendment of this permit or the certificate to operate pursuant to N.J.A.C. 7:27-8.3(c) shall include, as an integral part of the report, certifications complying with N.J.A.C. 7:27-1.39. [N.J.A.C. 7:27-8.15(c)]

25. Upon request of the Department, the permittee shall report on forms obtained from the Department the air contaminant actual emissions and information relevant thereto, of any air contaminant or category of air contaminant emitted by the equipment, control apparatus, or source operation. [N.J.A.C. 7:27-8.15(d)]

26. Any emission limit values in a preconstruction permit shall be interpreted to be followed by inherent trailing zeros (0) in the decimal portion of the limit to three significant figures (e.g. a printed limit of "1 lb/hr" means a limit of "1.00 lb/hr").

27. This listing of requirements reflects the state rules and regulations that apply to a majority of sources. If a specific requirement in a rule or regulation that applies to a permittee is not included in this section or in the Facility Specific Requirements it does not relieve the permittee from the obligation to comply with that regulation.

28. Process monitors must be operated at all times when the associated process equipment is operating except during outage time allowed by Department guidelines/procedures or as outlined in Technical Manual 1005. The Permittee must keep a service log as required.

29. The following Department offices may be referenced in a preconstruction permit. Please use the following addresses when submitting any correspondence to these offices:

Bureau of Technical Services
P. O. Box 437
380 Scotch Road
West Trenton, NJ 08625

Central Regional Enforcement Office
P. O. Box 407
Trenton, NJ 08625-0407

Northern Regional Enforcement Office
7 Ridgedale Avenue
Cedar Knolls, NJ 07927

Southern Regional Enforcement Office
2 Riverside Drive – Suite 201
Camden, NJ 08102

30. In accordance with the Air Pollution Control Act at N.J.S.A. 26:2C-19(e), any operation of the equipment which may cause off-property effect, including odors, shall be immediately reported by calling the NJDEP Environmental Action Hotline at (877) 927-6337.

31. In accordance with N.J.A.C. 7:27-21, facilities are required to submit annual emission statements of their actual emissions if the Potential-to-emit for the entire facility exceeds the following thresholds (including all emissions from the facility, both permitted and unpermitted). Additional information about Emission Statement reports can be obtained by calling (609) 984-5483.

AIR CONTAMINANT	Threshold in Tons per Year
VOC (Volatile Organic Compounds	10
NOx (Oxides of Nitrogen)	25
CO (Carbon Monoxide)	100
SO_2 (Sulfur Dioxide)	100
TSP (Total Suspended Particulates)	100
$PM_{2.5}$ (Particulate Matter ≤ 2.5 microns)	100
PM_{10} (Particulate Matter ≤ 10 microns)	100
NH_3 (Ammonia)	100
Lead	5

32. In accordance with N.J.A.C. 7:27-22, facilities are required to submit a Title V Operating Permit application, within one year, if the potential-to-emit for the entire facility exceeds any of the following thresholds (including all emissions from the facility, both permitted and unpermitted). Additional Information about Operating Permits can be obtained by calling the Operating Permit Hotline at (609) 633-8248.

AIR CONTAMINANT	Threshold in Tons per Year
VOC (Volatile Organic Compounds)	25
NOx (Oxides of Nitrogen)	25
CO (Carbon Monoxide)	100
SO_2 (Sulfur Dioxide)	100
TSP (Total Suspended Particulates)	100
PM_{10} (Particulate Matter ≤ 10 microns)	100
Lead	10
Any HAP (Hazardous Air Pollutant)	10
All HAPs Collectively	25
Any other Air Contaminant	100

AIR POLLUTION CONTROL PRECONSTRUCTION PERMIT

Section D

Facility Name: BASF CORP
Facility ID No.: 78001
Permit Activity No.: PCP150001

PERMIT INFORMATION

FACILITY SPECIFIC REQUIREMENTS

REASON FOR APPLICATION

FACILITY PROFILE (GENERAL)

EQUIPMENT INVENTORY

EMISSION POINT INVENTORY

EMISSION UNIT/BATCH PROCESS INVENTORY

ATTACHMENTS TO THE PERMIT

New Jersey Department of Environmental Protection
Facility Specific Requirements

Emission Unit: U1 Operation of the emergency generator

Operating Scenario: OS Summary

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
1	CO <= 0.164 tons/yr from normal testing and maintenance operations only. Does not include emissions from any emergency operation. [N.J.A.C. 7:27- 8.13(h)]	None.	None.	None.
2	NOx (Total) <= 0.082 tons/yr from normal testing and maintenance operations only. Does not include emissions from any emergency operation. [N.J.A.C. 7:27-8.13(h)]	None.	None.	None.
3	VOC (Total) <= 0.039 tons/yr from normal testing and maintenance operations only. Does not include emissions from any emergency operation. [N.J.A.C. 7:27-8.13(h)]	None.	None.	None.
4	Methane <= 0.049 tons/yr from normal testing and maintenance operations only. Does not include emissions from any emergency operation. [N.J.A.C. 7:27-8.13(h)]	None.	None.	None.
5	Emissions of all other air contaminant, not listed in this permit, shall be below their reporting thresholds for contaminants listed at N.J.A.C. 7:27-8 Appendix I or below 0.05 lb/hr for all other air contaminants. [N.J.A.C. 7:27- 8.13(a)]	None.	None.	None.
6	Maximum No. of Billable Compliance Inspections <= 4 inspections over the life of the Operating Certificate. The permittee will be invoiced for a service fee per inspection pursuant to N.J.A.C. 7:27-8.6 after the periodic compliance inspection is conducted. [N.J.A.C. 7:27- 8.13(e)]	None.	None.	None.

New Jersey Department of Environmental Protection
Facility Specific Requirements

Emission Unit: U1 Operation of the emergency generator

Operating Scenario: OS1 Operation of natural gas generator in emegency conditions

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
1	A natural gas fired, rich burn four stroke reciprocating internal combustion engine coupled with a generator with rated output of 275 kW, rated engine output of 477 bhp (standby), with a displacement of < 10 liters per cylinder, model year 2014 used in its originally purchased condition, manufactured by Generac Modern Group Power System, Engine Model SG 275, USEPA Certificate # EGNXB12.92C3-041, certified to comply with 40 CFR 60 Subpart JJJJ Emergency Use only, having a Maximum Gross Heat Input <= 4.24 lb/MMBTU. [N.J.A.C. 7:27- 8.13(h)]	Maximum Gross Heat Input: Monitored by documentation of construction once initially : Engine nameplate or manufacturer records indicating engine/generator size {HP, kW or MMBTU/hr}, manufacturer name, model no. and manufacturing year. [N.J.A.C. 7:27-8.13(d)1]	Maximum Gross Heat Input: Recordkeeping by manual logging of parameter or storing data in a computer data system once initially. All records pertaining to engine manufacturer specifications, shall be kept on-site or at the permittee's main office all times, readily made available to the Department or its representatives upon request. [N.J.A.C. 7:27- 8.13(d)3]	None.
2	Opacity <= 20 % , exclusive of visible condensed water vapor, except for a period of not longer than 10 consecutive seconds. [N.J.A.C. 7:27- 3.5]	None.	None.	None.
3	TSP <= 2.54 lb/hr. [N.J.A.C. 7:27- 4.2(a)]	None.	None.	None.
4	CO <= 3.27 lb/hr based on vendor guarantee of 5.4 g/kW-hr, as proposed by the applicant. [N.J.A.C. 7:27- 8.13(h)]	None.	None.	None.
5	NOx (Total) <= 1.64 lb/hr based on vendor guarantee of 2.7 g/kW-hr, as proposed by the applicant. [N.J.A.C. 7:27- 8.13(h)]	None.	None.	None.
6	VOC (Total) <= 0.79 lb/hr based on vendor guarantee of 1.3 g/kW-hr, as proposed by the applicant. [N.J.A.C. 7:27- 8.13(h)]	None.	None.	None.
7	Methane <= 0.98 lb/hr based on AP-42 Table 3.2-3 Emission Factor of 2.3 E-01 lb/MMBtu, as proposed by the applicant. [N.J.A.C. 7:27- 8.13(h)]	None.	None.	None.
8	Fuel use is limited to Natural Gas only. [N.J.A.C. 7:27- 8.13(a)]	None.	None.	None.

New Jersey Department of Environmental Protection
Facility Specific Requirements

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
9	Hours of Operation <= 100 hr/yr for testing and maintenance, as requested by the permittee. This does not include emergency operating hours. The limit on the allowable hours for testing and maintenance in accordance with the documentation from manufacturer, the vendor, or the insurance company associated with the engine. [N.J.A.C. 7:27- 8.13(h)]	Hours of Operation: Monitored by hour/time monitor continuously. Permittee shall install and operate a totalizing, non-resettable hour meter monitoring the total hours of operation for the generator. [N.J.A.C. 7:27- 8.13(d)2]	Hours of Operation: Recordkeeping by manual logging of parameter or storing data in a computer data system upon occurrence of event. The owner or operator shall maintain on site and record the following information: For each time the emergency generator is specifically operated for testing or maintenance: i. The reason for its operation; ii. The date(s) of operation and the start up and shut down time; iii. The total operating time for testing or maintenance based on the generator's hour meter; and iv. The name of the operator. [N.J.A.C. 7:27-19.11]	None.

New Jersey Department of Environmental Protection
Facility Specific Requirements

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
10	Each emergency generator shall be located at the facility and produce mechanical or thermal energy, or electrical power exclusively for use at the facility. This emergency generator shall be operated only: 1. During the performance of normal testing and maintenance procedures, as recommended in writing by the manufacturer and/or as required in writing by a Federal or State law or regulation, 2. When there is power outage or the primary source of mechanical or thermal energy fails because of an emergency, or 3. When there is a voltage reduction issued by PJM and posted on the PJM internet website (www.pjm.com) under the "emergency procedures" menu. [N.J.A.C. 7:27-19.1]	Monitored by hour/time monitor continuously. [N.J.A.C. 7:27- 8.13(d)2]	Recordkeeping by manual logging of parameter or storing data in a computer data system at the approved frequency. The owner or operator shall maintain on site and record the following information: 1. Once per month, the total operating time from the generator's hour meter. 2. For each time the emergency generator is specifically operated for testing or maintenance: i. The reason for its operation; ii. The date(s) of operation and the start up and shut down time; iii. The total operating time for testing or maintenance based on the generator's hour meter; and iv. The name of the operator; and 3. If a voltage reduction is the reason for the use of the emergency generator, a copy of the voltage reduction notification from PJM or other documentation of the voltage reduction. The owner or operator of an emergency generator shall maintain the above records for a period no less than five years after the record was made and shall make the records readily available to the Department or the EPA upon request. [N.J.A.C. 7:27-19.11]	None.

New Jersey Department of Environmental Protection
Facility Specific Requirements

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
11	This emergency generator shall not be used: 1. For normal testing and maintenance on days when the Department forecasts air quality anywhere in New Jersey to be "unhealthy for sensitive groups," "unhealthy," or "very unhealthy" as defined in the EPA's Air Quality Index at http://airnow.gov/, as supplemented or amended and incorporated herein by reference, unless required in writing by a Federal or State law or regulation. Procedures for determining the air quality forecasts for New Jersey are available at the Department's air quality permitting web site at http://www.state.nj.us/dep/aqpp/aqforecast; and 2. As a source of energy or power after the primary energy or power source has become operable again. If the primary energy or power source is under the control of the owner or operator of the emergency generator, the owner or operator shall make a reasonable, timely effort to repair the primary energy or power source. [N.J.A.C. 7:27-19.2(d)]	Other: The Permittee shall check the air quality forecast for New Jersey available at the Department air quality website at http://www.state.nj.us/dep/aqpp/aqforecast prior to operating during testing and maintenance periods.[N.J.A.C. 7:27-8.13(d)1].	None.	Submit a report: Upon occurrence of event. The permittee shall report any non-compliance in writing within 3 working days after the event to the Regional Enforcement Office. [N.J.A.C. 7:27-8.13(d)4]
12	All requests, reports, applications, submittals, and other communications to the Administrator pursuant to Part 60 shall be submitted in duplicate to the Regional Office of US Environmental Protection Agency. Submit information to: Director, Division of Enforcement & Compliance Assistance, US EPA, Region 2, 290 Broadway, New York, NY 10007-1866. [40 CFR 60.4(a)]	None.	None.	Submit a report: As per the approved schedule to EPA Region 2 as required by 40 CFR 60. [40 CFR 60.4(a)]
13	Copies of all information submitted to EPA pursuant to 40 CFR Part 60, must also be submitted to the appropriate Regional Enforcement Office of NJDEP. [40 CFR 60.4(b)]	None.	None.	Submit a report: As per the approved schedule to the appropriate Regional Enforcement Office of NJDEP as required by 40 CFR 60. [40 CFR 60.4(b)]

New Jersey Department of Environmental Protection
Facility Specific Requirements

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
14	No owner or operator subject to NSPS standards in Part 60, shall build, erect, install, or use any article, machine, equipment or process, the use of which conceals an emission which would otherwise constitute a violation of an applicable standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard which is based on the concentration of a pollutant in the gases discharged to the atmosphere. [40 CFR 60.12]	None.	None.	None.
15	Changes in time periods for submittal of information and postmark deadlines set forth in this subpart, may be made only upon approval by the Administrator and shall follow procedures outlined in 40 CFR Part 60.19. [40 CFR 60.19]	None.	None.	None.
16	The owner or operator of a new certified natural gas Emergency SI ICE (except gasoline and rich burn engines that use LPG) with a maximum engine power of => 130 HP manufactured after January 1, 2009 must meet the emission standards for emergency engines summarized in Table 1 in 40 CFR 60 Subpart JJJJ as follows: NOx <= 2.0 g/HP-hr (2.7 g/kW-hr), CO <= 4.0 g/HP-hr (5.4 g/kW-hr), VOC <= 1.0 g/HP-hr (1.3 g/kW-hr). or NOx <= 160 ppmvd @15% O2, CO <= 540 ppmvd @15% O2, VOC <= 86 ppmvd @15% O2. [40 CFR 60.4233(e)]	Monitored by documentation of construction once initially. The permittee shall purchase a stationary SI ICE certified to the emission standards in 40 CFR 60.4233(e), for the same model year. [40 CFR 60.4243(b)(1)]	Recordkeeping by manual logging of parameter or storing data in a computer data system once initially. The owner or operator of a SI ICE engine must keep certifications related to the applicable emission standards. [40 CFR 60.4245(a)]	None.
17	The owner or operator of stationary spark ignition internal combustion engine (SI ICE) must operate and maintain SI ICE that achieve the emission standards as required in 40 CFR 60.4233 over the entire life of the engine. [40 CFR 60.4234]	None.	Other: The owner or operator must keep records of the documentation that the engine meets the emission standards and keep the manufacturer's emission-related written instructions for the entire life of the engine.[40 CFR 60.4245(a)].	None.

New Jersey Department of Environmental Protection
Facility Specific Requirements

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
18	Starting on January 1, 2011, if the emergency stationary SI internal combustion engine that is greater than or equal to 130 HP and less than 500 HP that was built on or after January 1, 2011, does not meet the standards applicable to non-emergency engines, the owner or operator must install a non - resettable hour meter. [40 CFR 60.4237(b)]	Monitored by documentation of construction once initially. The owner or operator of an emergency stationary internal combustion engine must install a non-resettable hour meter upon startup of the engine. [40 CFR 60.4245(b)]	Recordkeeping by manual logging of parameter or storing data in a computer data system once initially. For all stationary SI emergency ICE greater than or equal to 130 HP and less than 500 HP manufactured on or after July 1, 2011 that do not meet the standards applicable to nonemergency engines, the owner or operator of must keep records of the hours of operation of the engine that is recorded through the non-resettable hour meter. [40 CFR 60.4245(b)]	None.
19	The owner or operator of a SI ICE who must comply with the emission standards specified in 40 CFR 60.4233(d) or (e), must demonstrate compliance by purchasing an engine certified according to procedures specified in 40 CFR 60 Subpart JJJJ, for the same model year. In addition, the owner or operator must operate and maintain the certified stationary SI ICE and control device according to the manufacturer's emission-related written instructions, keep records of conducted maintenance to demonstrate compliance, but no performance testing is required for an owner or operator. The owner or operator must also meet the requirements as specified in 40 CFR part 1068, subparts A through D, as they apply to the owner or operator. If the engine settings are adjusted according to and consistent with the manufacturer's instructions, the stationary SI ICE will not be considered out of compliance. If the certified stationary SI ICE and control device is not operated and maintained according to the manufacturer's emission-related written instructions, the engine will be considered a non-certified engine, and the owner or operator must demonstrate compliance according to 40 CFR 60.4243 (a)(2)(i) through (iii), as appropriate. [40 CFR 60.4243(b)]	Other: The owner or operator must demonstrate compliance as prescribed in 40 CFR 60.4243(b).[40 CFR 60.4243].	Other: The owner or operator must keep records of the documentation that the engine meets the emission standards.[40 CFR 60.4245(a)].	None.

New Jersey Department of Environmental Protection
Facility Specific Requirements

Ref.#	Applicable Requirement	Monitoring Requirement	Recordkeeping Requirement	Submittal/Action Requirement
20	Emergency stationary spark ignition internal combustion engine (SI ICE) may be operated for the purpose of maintenance checks and readiness testing limited to 100 hours per year, provided that the tests are recommended by Federal, State or local government, the manufacturer, the vendor, or the insurance company associated with the engine. There is no time limit on the use of emergency stationary ICE in emergency situations. The owner or operator may petition the Administrator for approval of additional hours to be used for maintenance checks and readiness testing, but a petition is not required if the owner or operator maintains records indicating that Federal, State, or local standards require maintenance and testing of emergency ICE beyond 100 hours per year. [40 CFR 60.4243(d)]	Monitored by hour/time monitor continuously by hours of operation. [40 CFR 60.4245(b)]	Other: The owner or operator must document how many hours are spent for emergency operation, including what classified the operation as emergency and how many hours are spent for non-emergency operation. [40 CFR 60.4245(b)].	None.
21	Owners and operators of all stationary spark ignition internal combustion engines (SI ICE) must keep records of the information in 40 CFR 60.4245(a)(1) through (4) as follows: All notification submitted to comply with 40 CFR 60 Subpart JJJJ and all documentation supporting any notification; maintenance conducted on the engine; for a certified engine, keep documentation from the manufacturer that the engine is certified; if engine is not a certified engine or is a certified engine operating in a non-certified manner, documentation that the engine meets the emission standards. [40 CFR 60.4245(a)]	None.	Other: The owner or operators of all SI ICE must keep records of the information in 40 CFR 60.4245(a)(1) through (4) as follows: (1) All notification submitted to comply with 40 CFR 60 Subpart JJJJ and all documentation supporting any notification; (2) maintenance conducted on the engine; (3) for a certified engine, keep documentation from the manufacturer that the engine is certified; (4) if engine is not a certified engine or is a certified engine operating in a non-certified manner, documentation that the engine meets the emission standards. [40 CFR 60.4245(a)].	None.
22	A new or reconstructed stationary reciprocating internal combustion engine (RICE) located at an area HAP source must meet the requirements of 40 CFR 63 by meeting the requirements of 40 CFR 60 Subpart JJJJ, for spark ignition engines. No further requirements apply for such engines under 40 CFR 63. [40 CFR 63.6590(c)]	Other: Comply with all applicable provisions at NSPS JJJJ. [40 CFR 63].	Other: Comply with all applicable provisions at NSPS JJJJ. [40 CFR 63].	None.

BASF CORP (78001)
PCP150001

Date: 5/5/2015

New Jersey Department of Environmental Protection
Reason for Application

Permit Being Modified

Permit Class: **Number:** 0

Description of Modifications: Install and operate a new emergency generator powered by natural gas for use only during the emergency conditions.

BASF CORP (78001)
PCP150001

Date: 5/5/2015

New Jersey Department of Environmental Protection
Facility Profile (General)

Facility Name (AIMS): BASF Corporation

Facility ID (AIMS): 78001

Street Address: 227 OAK RDG PKWY
TOMS RIVER , NJ 08755

Mailing Address: 227 OAK RDG PKWY
TOMS RIVER, NJ 08755

State Plane Coordinates:

X-Coordinate:	563,631
Y-Coordinate:	420,280
Units:	New Jersey State Plane 8
Datum:	NAD83
Source Org.:	DEP-GIS
Source Type:	GPS

County: Ocean

Location Description: The site is located in Ocean county on Oak Ridge Parkway off Route 37.

Industry:

Primary SIC:	
Secondary SIC:	
NAICS:	562910

New Jersey Department of Environmental Protection
Facility Profile (General)

Contact Type: Air Permit Information Contact

Organization: Brown and Caldwell
Name: Karnam Ramanand
Title: Supervising Scientist
Phone: (856) 330-9324 x
Fax: ( ) - x
Other: (732) 581-1116 x
Type: Mobile
Email: KRamanand@brwncald.com

Org. Type: Corporation
NJ EIN:

Mailing Address: 535 Suite 355 Route 38
Cherry Hill, NJ 08002

Contact Type: Fees/Billing Contact

Organization: BASF Corporation
Name: Fred Goelz
Title: EHS Specialist
Phone: (973) 245-5267 x
Fax: (732) 281-8314 x
Other: ( ) - x
Type:
Email: fred.goelz@basf.com

Org. Type: Corporation
NJ EIN:

Mailing Address: 227 Oak Ridge Parkway
Toms River, NJ 08755

Contact Type: Responsible Official

Organization: BASF Corporation
Name: Stephen Havlik
Title: Senior Remediation Specialist
Phone: (973) 245-5271 x
Fax: (732) 281-8314 x
Other: ( ) - x
Type:
Email: steve.havlik@basf.com

Org. Type: Corporation
NJ EIN:

Mailing Address: 227 Oak Ridge Parkway
Toms River, NJ 08755

BASF CORP (78001)
PCP150001

Date: 5/5/2015

New Jersey Department of Environmental Protection
Equipment Inventory

Equip. NJID	Facility's Designation	Equipment Description	Equipment Type	Certificate Number	Install Date	Grand-Fathered	Last Mod. (Since 1968)	Equip. Set ID
E1	Generator-NG	Generator run by natural gas for emergency use	Emergency Generator		5/4/2015	No		

BASF CORP (78001)
PCP150001

Date: 5/5/2015

New Jersey Department of Environmental Protection
Emission Points Inventory

PT NJID	Facility's Designation	Description	Config.	Equiv. Diam. (in.)	Height (ft.)	Dist. to Prop. Line (ft)	Exhaust Temp. (deg. F)			Exhaust Vol. (acfm)			Discharge Direction	PT Set ID
							Avg.	Min.	Max.	Avg.	Min.	Max.		
PT1	Generator742	Generator near Bldg 742	Round	4	6	2,000	1,088.0	363.0	1,450.0	1,403.0	468.0	1,870.0	Up	

Date: 5/5/2015

BASF CORP (78001)
PCP150001

New Jersey Department of Environmental Protection
Emission Unit/Batch Process Inventory

U 1 Gen_Oper Operation of the emergency generator

UOS NJID	Facility's Designation	UOS Description	Operation Type	Signif. Equip.	Control Device(s)	Emission Point(s)	SCC(s)	Annual Oper. Hours Min.	Annual Oper. Hours Max.	VOC Range	Flow (acfm) Min.	Flow (acfm) Max.	Temp. (deg F) Min.	Temp. (deg F) Max.
OS1	Generator_NG	Operation of natural gas generator in emegency conditions	Standby	E1		PT1		0.0	100.0		468.0	1,870.0	363.0	1,450.0

78001 BASF CORP PCP150001 E1 (Stationary Reciprocating Engine)
Print Date: 4/22/2015

Make:	Generac
Manufacturer:	Generac Modern Group Power Systems
Model:	SG275
Maximum Rated Gross Heat Input (MMBtu/hr):	4.24
Class:	Rich Burn
Description:	
Duty:	Standby Power
Description:	
Minimum Load Range (%):	
Maximum Load Range (%):	
Stroke:	4-stroke
Power Output (BHP):	477
Electric Output(KW):	275
Compression Ratio:	10.1
Ignition Type:	Spark
Description:	
Engine Speed (RPM):	2150
Engine Exhaust Temperature (°F):	1450
Air to Fuel Ratio at Peak Load:	7.82
Ratio Basis:	Volume Basis
Lambda Factor (scfm/scfm):	
Brake Specific Fuel Consumption at Peak Load (Btu/BHP-hr):	8893
Output Type:	Electric
Heat to Power Ratio:	
Is the Engine Using a Turbocharger?	(●) Yes ( ) No
Is the Engine Using an Aftercooler?	(●) Yes ( ) No

Is the Engine Using (check all that apply):

A Prestratified Charge (PSC)	☐	A NOx Converter	☐
Air to Fuel Adjustment (AF)	☐	Ignition Timing Retard	☐
Low Emission Combustion	☐	Non-Selective Catalytic Retard (NSCR)	☐
Other	☐		

Description:

Have you attached a diagram showing the location and/or the configuration of this equipment?	( ) Yes (●) No	Have you attached any manuf.'s data or specifications to aid the Dept. in its review of this application?	(●) Yes ( ) No

Comments: Engine model year: 2014

Include Emission Rates on the Potential to Emit Screen for each contaminant in ppmvd @ 7%O2 in addition to lbs/hr and tons/yr.

State of New Jersey

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Mail Code - 401-02B
Water Pollution Management Element
Bureau of Nonpoint Pollution Control
P.O. Box 420 – 401 E. State St.
Trenton, NJ 08625-0420
Tel:609-292-0407 / Fax:609-777-0432

BOB MARTIN
Commissioner

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

08/05/2016

Fred Goelz
BASF Corp
PO Box 71
Toms River, NJ 08754-0071

Re: Ground Water Renewal Final Permit Action
Cat: F – Landfill – Industrial/Commercial
J – Surface Impoundment - Industrial
NJPDES NJ0105244 P.I. No. 46207
BASF Corp.
Toms River Twp, Ocean County

Dear Fred Goelz:

Enclosed is a **final** New Jersey Pollutant Discharge Elimination System (NJPDES) permit action identified above which has been issued in accordance with N.J.A.C. 7:14A.

No written comments were received on the draft action during the comment period, and no provisions of the draft permit have been changed in the final permit. Therefore, the right by you, or any third party, to contest the permit conditions in an adjudicatory hearing is hereby waived pursuant to N.J.A.C. 7:14A-15.13.

As per N.J.A.C. 7:14A-4.2(e)3, any person planning to continue discharging after the expiration date of an existing NJPDES permit shall file an application for renewal at least 180 calendar days prior to the expiration of the existing permit.

Questions or comments regarding the final action should be addressed to Gregory Chin at 609-292-0407.

Sincerely,

Ron Bannister, P.G., Section Chief
Bureau of Nonpoint Pollution

Enclosures
c: Permit Distribution List

finalcov.doc

NEW JERSEY POLLUTANT DISCHARGE ELIMINATION SYSTEM

The New Jersey Department of Environmental Protection hereby grants you a NJPDES permit for the facility/activity named in this document. This permit is the regulatory mechanism used by the Department to help ensure your discharge will not harm the environment. By complying with the terms and conditions specified, you are assuming an important role in protecting New Jersey's valuable water resources. Your acceptance of this permit is an agreement to conform with all of its provisions when constructing, installing, modifying, or operating any facility for the collection, treatment, or discharge of pollutants to waters of the state. If you have any questions about this document, please feel free to contact the Department representative listed in the permit cover letter. Your cooperation in helping us protect and safeguard our state's environment is appreciated.

Permit Number: NJ0105244
P.I. No. 46207
Final: Ground Water Renewal Permit Action

Permittee:
BASF Corp
227 Oak Ridge Pkwy
Toms River, NJ 08755

Co-Permittee:

Property Owner:
BASF Corp
227 Oak Ridge Pkwy
Toms River, NJ 08755

Location Of Activity:
BASF Corp
Oak Ridge Pkwy
Toms River, NJ 08754-0071

Authorization(s) Covered Under This Approval	Issuance Date	Effective Date	Expiration Date
F – Landfill – Industrial/Commercial J – Surface Impoundment - Industrial	08/05/2016	09/01/2016	08/31/2021

By Authority of:
Commissioner's Office

DEP AUTHORIZATION
Ron Bannister, P.G., Section Chief
Bureau of Nonpoint Pollution Control
Division of Water Quality

(Terms, conditions and provisions attached hereto)

New Jersey Department of Environmental Protection
Division of Water Quality
Bureau of Nonpoint Pollution Control (Ground Water)
401 East State Street, Trenton, NJ 08625

FACT SHEET

This fact sheet sets forth the principal facts and the significant factual, legal, and policy considerations examined during preparation of the permit.

PERMIT ACTION: Ground Water Renewal Permit Action

Category: F - Landfill monitoring
J - Stormwater basin monitoring

Name and Address of the Applicant:

BASF Corp
227 Oakridge Parkway
Toms River, NJ 08754

Name and Address of the Facility/Site:

BASF Corp
227 Oak Ridge Pkwy
Toms River, NJ 08754

Name and Classification of the Receiving Water:

Discharge is to the ground waters of the State, Category II-A, of the Tertiary Cohansey Formation.

Description of the Facility:

The site, owned by BASF Corporation, is approximately 1,400 acres, of which only 320 acres were developed for chemical manufacturing. The facility began operation in 1952, but began phasing out various operations in 1984 and ceased manufacturing totally in 1996.

At present, nothing remains at the site from previous industrial processes except the landfill. The landfill consists of three cells. Cell 1 has a double liner with a leachate collection/detection system and is properly capped. Illegal drums were discovered in Cell 2 and were removed. Cell 2 has been empty and inactive since 1993 when the liner material and remaining sludge from the cell were removed and placed in Cell 3. Cell 3 currently has a temporary cap. Cell 3 of the landfill had received sludge from the onsite remediation treatment system, only. The sludge is "fixed" and categorized as ID 27 material. These former sludge pits have been treated with USEPA oversight using in-situ and ex-situ treatment systems. Caps and slurry walls were installed in December 2010.

This permit is being renewed to monitor the landfill, to determine if the liner may be leaking, through monitoring of ground water and the leachate collection system. The landfill is in "detection monitoring" status. BASF Corp. also monitors stormwater from the landfill that is collected in a basin at the facility. BASF has submitted an approved Ground Water Protection Program (GWPP) plan to the Department's Bureau of Nonpoint Pollution Control and is required to perform monitoring activities as stated in the plan.

Location of the Facility:

Toms River Township, Ocean County
Lots: 6, 84, 124 Block: 411

Type and Quantity of the Wastes, Fluids, or Pollutants:

In 1993, Ciba entered into a consent decree with the EPA and is undergoing remediation of ground water pursuant to CERCLA. Ciba also entered into an ACO with the Department and is required to maintain hydraulic control of the ground water at the site. Waste disposal at the landfill ceased in March 2006 and Permit No. 150700673 was not renewed when it expired on 6/28/06. However, BASF continues to submit to NJDEP, Division of Solid and Hazardous Waste, the Solid Waste Facility Monthly Disposal and Materials Recovery Report.

A ground water remediation system has been in operation since 1996, treating and recharging approximately 1.8 million gallons of ground water per day. Since 2003, the treatment system has generated an average of 840 cubic yards of sludge each year. Currently, all of the non-hazardous sludge from the recharge system is disposed of off-site.

There is also an I/P lagoon onsite for infiltration of stormwater.

Ground Water Monitoring:

A Ground Water monitoring program is required for all sanitary landfills in New Jersey. The Solid Waste Management Act (N.J.S.A. 13-1E-1 *et seq.*) and its implementing regulations (N.J.A.C. 7:26-1 *et seq.*) require all sanitary landfills in New Jersey to implement a ground water monitoring program under a NJDPES-DGW permit. The purpose of the required monitoring programs is to detect whether or not there is a release of pollutants from the sanitary landfill. If there is a statistically significant evidence of a release, the owner/operator is required to take certain steps to identify the source of the release, to evaluate if the Ground Water Quality Standards (N.J.A.C. 7:9-6) have been contravened, to evaluate the extent of the contamination, to correct the system or component that caused the release, and to take appropriate steps to remediate contamination and/or the source in accordance with other applicable regulations, such as N.J.A.C. 7:26C and N.J.A.C. 7:26-2A.1-2A.9. The details of this monitoring program are included in a Department approved Ground Water Protection Program plan (GWPP) certified by the permittee to comply with all the State and Federal regulations, in particular, 40 CFR 264, and N.J.A.C. 7:14A. This GWPP plan is part of the administrative record which is on file at the offices of the NJDEP located at 401 East State Street, Trenton, Mercer County, New Jersey. It is available for inspection, by appointment, between 8:00 A.M. and 4:30 P.M., Monday through Friday. Appointments for inspection may be scheduled by calling (609) 292-0400.

Residuals Conditions:

Analysis of the industrial sludge for most of the parameters found on Table III-C-1 of Part III is required because they were detected in previous sludge quality monitoring data submitted to the Department under the Sludge Quality Assurance Regulations (SQAR, N.J.A.C. 7:14C). Analysis for Methyl ethyl ketone and 4-Methyl-2-pentanone are being continued because these are monitored parameters for the groundwater monitoring wells and could be expected to be present. The frequency of monitoring is dependent on the amount of sludge produced. A review of sludge production data from 2010 to present indicates that the amount of sludge generated continues to be less than 290 dry metric tons per year (SQAR Category 6) so no changes were made to the reporting forms.

All treatment works with a discharge regulated under N.J.A.C. 7:14A must have permits that implement applicable technical standards for residuals management. Generally, the permit issued to the treatment works generating the residual will include applicable residual quality monitoring as well as other general conditions required by N.J.A.C. 7:14A-6. In addition, the permit may include conditions related to any aspect of residual management developed on a case-by-case basis where the Department determines that such conditions are necessary to protect public health and the environment.

The permit may also include conditions establishing requirements for treatment works that send residual to other facilities for final use or disposal. Thus, **ALL** residual preparers (that is, generators as well as persons who manage the residual) are required to submit basic information concerning their residual use and disposal practices. This basic information is submitted by compliance with the Sludge Quality Assurance Regulations (N.J.A.C. 7:14C).

The documents listed below have been used to establish the residual conditions of the Permit:

a. United States Environmental Protection Agency "Standards for the use or disposal of sewage sludge" (40 CFR Part 503),
b. "New Jersey Pollutant Discharge Elimination System" (N.J.A.C. 7:14A),
c. Technical Manual for Residuals Management, May 1998,
d. USEPA Part 503 Implementation Guidance, EPA 833-R-95-001, October 1995. This document is a compilation of federal requirements, management practices and EPA recommended permit conditions for sewage sludge use and management practices,
e. USEPA A Plain English Guide to the EPA Part 503 Biosolids Rule, EPA/832/R-93/003, September 1994,
f. New Jersey "Statewide Sludge Management Plan", January 2006 and
g. New Jersey "Sludge Quality Assurance Regulations" (SQAR), N.J.A.C. 7:14C.

Name, Bureau, and Phone Number of Contact Person:

Greg Chin, Environmental Specialist 3
Bureau of Nonpoint Pollution Control
Phone: (609) 633-7021 or (609) 292-0407

Permit Summary Table:

The following items were used to formulate the basis of the ground water requirements of the permit:

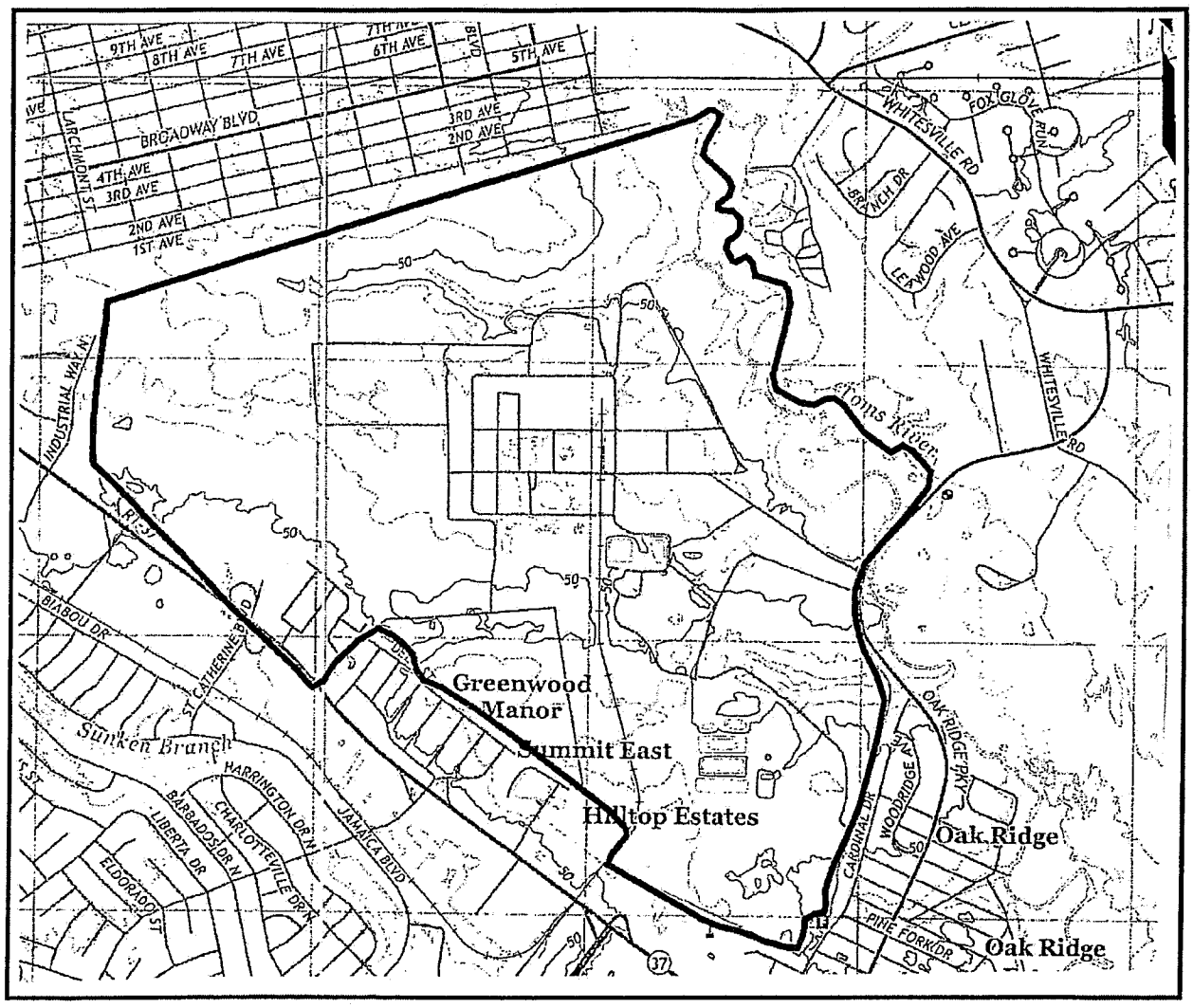
1	N.J.S.A. 58:10A-1 *et seq.*, New Jersey Water Pollution Control Act.*
2	N.J.A.C. 7:14A-1 *et seq.*, New Jersey Pollutant Discharge Elimination System Regulations*
3	NJPDES-DGW Permit NJ0105244.
4	Ground Water Sampling Data submitted under NJPDES Permit NJ0105244.
6	The NJPDES-DGW Permit Application and GWPP plan submitted March 3,2016.
7	Solid Waste Management Regulations ((N.J.A.C. 7:26).
8	Sludge Quality Assurance Regulations (N.J.A.C. 7:14C).
9	Ground Water Quality Standards (N.J.A.C. 7:9-6)
10	Solid Waste Facility Permit 1507000673.

*The document is part of the administrative record, but is not physically included in the record.

The discharge described above is a regulated activity under the New Jersey Water Pollution Control Act, N.J.S.A. 58:10A-1 *et seq.*, and its implementing regulations, the New Jersey Pollutant Discharge Elimination System (NJPDES) N.J.A.C. 7:14A-1 *et seq*. The permit has been developed pursuant to these regulations and is based on the administrative record, which contains any permit application submitted, correspondence concerning the permit, the Fact Sheet and documents cited therein, the results of any past monitoring, the draft permit, and any past permits issued to the facility under these regulations.

BASF Corporation

Toms River, Ocean County
NJPDES-DGW Permit No. NJ0105244
Toms River Quadrangle



Scale 1:24000

1 0 1

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929



QUADRANGLE LOCATION

PART I
GENERAL REQUIREMENTS: NJPDES

A. General Requirements of all NJPDES Permits

1. Requirements Incorporated by Reference

a. The permittee shall comply with all conditions set forth in this permit and with all the applicable requirements incorporated into this permit by reference. The permittee is required to comply with the regulations, including those cited in paragraphs b. through e. following, which are in effect as of the effective date of the final permit.

b. General Conditions

Penalties for Violations	N.J.A.C. 7:14-8.1 et seq.
Incorporation by Reference	N.J.A.C. 7:14A-2.3
Toxic Pollutants	N.J.A.C. 7:14A-6.2(a)4i
Duty to Comply	N.J.A.C. 7:14A-6.2(a)1 & 4
Duty to Mitigate	N.J.A.C. 7:14A-6.2(a)5 & 11
Inspection and Entry	N.J.A.C. 7:14A-2.11(e)
Enforcement Action	N.J.A.C. 7:14A-2.9
Duty to Reapply	N.J.A.C. 7:14A-4.2(e)3
Signatory Requirements for Applications and Reports	N.J.A.C. 7:14A-4.9
Effect of Permit/Other Laws	N.J.A.C. 7:14A-6.2(a)6 & 7 & 2.9(c)
Severability	N.J.A.C. 7:14A-2.2
Administrative Continuation of Permits	N.J.A.C. 7:14A-2.8
Permit Actions	N.J.A.C. 7:14A-2.7(c)
Reopener Clause	N.J.A.C. 7:14A-6.2(a)10
Permit Duration and Renewal	N.J.A.C. 7:14A-2.7(a) & (b)
Consolidation of Permit Process	N.J.A.C. 7:14A-15.5
Confidentiality	N.J.A.C. 7:14A-18.2 & 2.11(g)
Fee Schedule	N.J.A.C. 7:14A-3.1
Treatment Works Approval	N.J.A.C. 7:14A-22 & 23

c. Operation And Maintenance

Need to Halt or Reduce not a Defense	N.J.A.C. 7:14A-2.9(b)
Proper Operation and Maintenance	N.J.A.C. 7:14A-6.12

d. Monitoring And Records

Monitoring	N.J.A.C. 7:14A-6.5
Recordkeeping	N.J.A.C. 7:14A-6.6
Signatory Requirements for Monitoring Reports	N.J.A.C. 7:14A-6.9

e. Reporting Requirements

Planned Changes	N.J.A.C. 7:14A-6.7
Reporting of Monitoring Results	N.J.A.C. 7:14A-6.8
Noncompliance Reporting	N.J.A.C. 7:14A-6.10 & 6.8(h)
Hotline/Two Hour & Twenty-four Hour Reporting	N.J.A.C. 7:14A-6.10(c) & (d)
Written Reporting	N.J.A.C. 7:14A-6.10(e) &(f) & 6.8(h)
Duty to Provide Information	N.J.A.C. 7:14A-2.11, 6.2(a)14 & 18.1
Schedules of Compliance	N.J.A.C. 7:14A-6.4
Transfer	N.J.A.C. 7:14A-6.2(a)8 & 16.2

PART II

GENERAL REQUIREMENTS: DISCHARGE CATEGORIES

A. Additional Requirements Incorporated By Reference

1. Requirements Incorporated by Reference

a. For new construction, expansion or major repairs of regulated discharge units subject to N.J.A.C. 7:14A-22 and 23, the permittee shall obtain a Treatment Works Approval. For new construction, the permittee shall obtain the necessary Treatment Works Approval(s) to design, construct and operate a discharge unit capable of meeting any limits set forth in this permit.

2. Operator Notification

a. Pursuant to N.J.A.C. 7:10A-1.1 et seq. every wastewater system not exempt pursuant to N.J.A.C. 7:10A-1.1(b) requires a licensed operator. The operator of a system shall meet the Department's requirements pursuant to N.J.A.C. 7:10-1.1 and any amendments. The name of the proposed operator, where required, shall be submitted to the Department at the address below, in order that his/her qualifications may be determined prior to initiating operation of the treatment works.

i. Notifications shall be submitted to:

NJDEP
Examination and Licensing Unit
P.O. Box 417
Trenton, New Jersey 08625
(609)777-1012

b. The permittee shall notify the Department of any changes in licensed operator within two weeks of the change.

B. General Conditions

1. Scope

a. The issuance of this permit shall not be considered as a waiver of any applicable federal, state, and local rules, regulations and ordinances.

2. Permit Renewal Requirement

a. Permit conditions remain in effect and enforceable until and unless the permit is modified, renewed or revoked by the Department.

b. Submit a complete permit renewal application: 180 days before the Expiration Date.

3. Notification of Non-Compliance

a. The permittee shall notify the Department of all non-compliance when required in accordance with N.J.A.C. 7:14A-6.10 by contacting the DEP HOTLINE at 1-877-WARNDEP (1-877-927-6337).

b. The permittee shall submit a written report as required by N.J.A.C. 7:14A-6.10 within five days.

4. Notification of Changes

a. The permittee shall give written notification to the Department of any planned physical or operational alterations or additions to the permitted facility when the alteration is expected to result in a significant change in the permittee's discharge and/or residuals use or disposal practices including the cessation of discharge in accordance with N.J.A.C. 7:14A-6.7.

b. Prior to any change in ownership, the current permittee shall comply with the requirements of N.J.A.C. 7:14A-16.2, pertaining to the notification of change in ownership.

5. Access to Information

a. The permittee shall allow an authorized representative of the Department, upon the presentation of credentials, to enter upon a person's premises, for purposes of inspection, and to access / copy any records that must be kept under the conditions of this permit.

6. Operation Requirements

a. The permittee shall notify the applicable Bureau of Water Compliance and Enforcement office and the Bureau of Permit Management, prior to initiating discharges from newly constructed discharge facilities.

7. Contingency Requirements

a. When a regulated unit causes contravention of the Ground Water Quality Standards of N.J.A.C. 7:9-6, corrective measures shall be implemented to address the problem. Such measures may include more extensive monitoring of the soil and ground water, remediation of the release, or an upgrade or closure of the existing system.

b. When any regulated unit must be removed from service for reasons other than routine maintenance and/or scheduled rotation; or creates an unpermitted discharge; or fails hydraulically, the permittee shall:

i. Immediately cease any unpermitted discharge and implement the appropriate section of the facility's O & M Manual.

ii. Immediately contact the Department's Emergency Hotline at 1-877-927-6337 and contact the appropriate regional Bureau of Water Compliance and Enforcement. For details on reporting time frames please refer to N.J.A.C. 7:14A-6.2 and 6.10.

iii. Notify the Bureau of Engineering to determine if a Treatment Works Approval is required prior to repairing the failing regulated unit.

iv. If a new or altered regulated unit is to be constructed, the permittee must first obtain approval through modification of a GWPP or by applying for a NJPDES Permit modification, demonstrate that the alteration or new system shall reasonably improve the existing situation and obtain a letter approving the technical information before applying for a Treatment Works Approval. The NJPDES permit may be modified at a later date to reflect the change in the disposal systems if the improvement significantly changes the conditions of the permit.

v. For units which rely on infiltration where the probable cause of hydraulic failure is unintentional overloading of the disposal area due to unequal distribution of the discharge or heavy rain, snow melt, etc., the permittee shall continue to implement the measures outlined in the facility's O & M Manual until the failing disposal area drains and returns to operational status. If the failing disposal area is determined to be under-sized for the given flow or physically clogged, Department approved measures must be taken to rectify the situation

8. Residuals Management

a. The permittee shall comply with land-based sludge management criteria and shall conform with the requirements for the management of residuals and grit and screenings under N.J.A.C. 7:14A-6.15(a), which includes:

i. Standards for the Use or Disposal of Residual, N.J.A.C. 7:14A-20;

ii. Section 405 of the Federal Act governing the disposal of sludge from treatment works treating domestic sewage;

iii. The Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq., and the Solid Waste Management Rules, N.J.A.C. 7:26;

iv. The Sludge Quality Assurance Regulations, N.J.A.C. 7:14C;

v. The Statewide Sludge Management Plan promulgated pursuant to the Water Quality Planning Act, N.J.S.A. 58:11A-1 et seq., and the Solid Waste Management Act, N.J.S.A. 13:1E-1 et seq.; and

vi. The provisions concerning disposal of sewage sludge and septage in sanitary landfills set forth at N.J.S.A. 13:1E-42 and the Statewide Sludge Management Plan.

vii. Residual that is disposed in a municipal solid waste landfill unit shall meet the requirements in 40 CFR Part 258 and/or N.J.A.C. 7:26 concerning the quality of residual disposed in a municipal solid waste landfill unit. (That is, passes the Toxicity Characteristic Leaching Procedure and does not contain "free liquids" as defined at N.J.A.C. 7:14A-1.2.)

b. If any applicable standard for residual use or disposal is promulgated under section 405(d)of the Federal Act and Sections 4 and 6 of the State Act and that standard is more stringent than any limitation on the pollutant or practice in the permit, the Department may modify or revoke and reissue the permit to conform to the standard for residual use or disposal.

c. The permittee shall make provisions for storage, or some other approved alternative management strategy, for anticipated downtimes at a primary residual management alternative. The permittee shall not be permitted to store residual beyond the capacity of the structural treatment and storage components of the treatment works. N.J.A.C. 7:14A-20.8(a) and N.J.A.C. 7:26 provide for the temporary storage of residuals for periods not exceeding six months, provided such storage does not cause pollutants to enter surface or ground waters of the State. The storage of residual for more than six months is not authorized under this permit. However, this prohibition does not apply to residual that remains on the land for longer than six months when the person who prepares the residual demonstrates that the land on which the residual remains is not a surface disposal site or landfill. The demonstration shall explain why residual must remain on the land for longer than six months prior to final use or disposal, discuss the approximate time period during which the residual shall be used or disposed and provide documentation of ultimate residual management arrangements. Said demonstration shall be in writing, be kept on file by the person who prepares residual, and submitted to the Department upon request.

d. The permittee shall comply with the appropriate adopted District Solid Waste or Sludge Management Plan (which by definition in N.J.A.C. 7:14A-1.2 includes Generator Sludge Management Plans), unless otherwise specifically exempted by the Department.

e. The preparer must notify and provide information necessary to comply with the N.J.A.C. 7:14A-20 land application requirements to the person who applies bulk residual to the land. This shall include, but not be limited to, the applicable recordkeeping requirements and certification statements of 40 CFR 503.17 as referenced at N.J.A.C 7:14A-20.7(j).

f. The preparer who provides residual to another person who further prepares the residual for application to the land must provide this person with notification and information necessary to comply with the N.J.A.C. 7:14A-20 land application requirements.

g. Any person who prepares bulk residual in New Jersey that is applied to land in a State other than New Jersey shall comply with the requirement at N.J.A.C. 7:14A-20.7(b)1.ix to submit to the Department written proof of compliance with or satisfaction of all applicable statutes, regulations, and guidelines of the state in which land application will occur.

PART III
LIMITS AND MONITORING REQUIREMENTS

MONITORED LOCATION GROUP: stormwater lagoon

Monitored Location Group Members

IO01

GW Discharge WCR - Semi Annual Reporting Requirements:

Submit a Semi-Annual WCR: Submit basin sampling results in the monitoring report as required in the approved Ground Water Protection Program plan.

Table III - A - 1: GW Discharge WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
pH	Precipitation	REPORT	SU	Grab	January thru December
Petrol Hydrocarbons, Total Recoverable	Precipitation	REPORT	MG/L	Grab	January thru December
Solids, Total Dissolved (TDS)	Precipitation	REPORT	MG/L	Grab	January thru December

MONITORED LOCATION GROUP: Landfill Monitoring Wells

Monitored Location Group Members

1130 GW Monitoring Well, 1150 GW Monitoring Well, 1151 GW Monitoring Well, 1153 GW Monitoring Well, 1155 GW Monitoring Well

GW Mon. Well WCR - Semi Annual Reporting Requirements:

Submit a Semi-Annual WCR: Semi-annual monitoring reports shall be submitted in accordance with the schedule in the approved Ground Water Protection Program (GWPP) plan. The approved GWPP takes precedence when any conflicts between the GWPP and the following two tables for ground water monitoring exist.

Table III - B - 1: GW Mon. Well WCR - Semi Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Specific Conductance	Monitoring Well	REPORT	UMHO/ CM	Grab	January thru December
pH	Monitoring Well	REPORT	SU	Grab	January thru December
Toluene	Monitoring Well	REPORT	UG/L	Grab	January thru December
Methyl ethyl ketone	Monitoring Well	REPORT	UG/L	Grab	January thru December
4-Methyl-2-pentanone	Monitoring Well	REPORT	UG/L	Grab	January thru December
Elev of Original Ground Level	Monitoring Well	REPORT	0.01FT	Measured	January thru December
Depth To H2o From Origin Ground Level	Monitoring Well	REPORT	0.01FT	Calculated	January thru December
Elev. Top Mon. Well Casing above MSL	Monitoring Well	REPORT	0.01FT	Measured	January thru December
Depth To Water Table From Top Of Casing	Monitoring Well	REPORT	0.01FT	Measured	January thru December

MONITORED LOCATION:
SI6A Spent Carbon/Iron Sludge

DISCHARGE CATEGORY(IES):
GW - Discharge to Groundwater

Location Description

Every year a representative sample of the dewatered spent carbon/iron sludge shall be obtained and analyzed pursuant to the Sludge Quality Assurance Regulations (SQAR, N.J.A.C. 7:14C) when removed for use or disposal.

Contributing Waste Types

Ind Residual-Other

Residuals DMR Reporting Requirements:

Submit an Annual DMR: due 60 calendar days after the end of each calendar year.

Table III - C - 1: Residuals DMR Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Solids, Total	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	%TS	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Nitrate Nitrogen, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Nitrogen, Kjeldahl Total, Dry Wt	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Nitrogen, Ammonia Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			

Residuals DMR Reporting Requirements:
Submit an Annual DMR: due 60 calendar days after the end of each calendar year.

Table III - C - 1: Residuals DMR Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Arsenic, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Selenium, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Copper, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Cadmium, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Zinc, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Lead, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Nickel, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			

Residuals DMR Reporting Requirements:
Submit an Annual DMR: due 60 calendar days after the end of each calendar year.

Table III - C - 1: Residuals DMR Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
Mercury, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Chromium, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Iron, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Naphthalene Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Nitrobenzene Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
1,2-Dichlorobenzene, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
1,2,4-Trichloro-benzene, Dry Wt	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			

Residuals DMR Reporting Requirements:
Submit an Annual DMR: due 60 calendar days after the end of each calendar year.

Table III - C - 1: Residuals DMR Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
1,3-Dichlorobenzene, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
1,4-Dichlorobenzene, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Chlorobenzene, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Tetrachloroethylene, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Toluene, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Trichloroethylene, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
1,1,1-Trichloro-ethane, Dry Wt	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			

Residuals DMR Reporting Requirements:
Submit an Annual DMR: due 60 calendar days after the end of each calendar year.

Table III - C - 1: Residuals DMR Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** **PHASE End Date:**

Parameter	Sample Point	Limit	Limit	Units	Limit	Limit	Limit	Units	Frequency	Sample Type
1,2-Dichloroethane, Dry Weight	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
1,2-trans-Dichloro ethylene, Dry Wt	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
Methyl ethyl ketone	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			
4-Methyl-2-pentanone	Residuals	*****	*****	*****	*****	REPORT Monthly Average	*****	MG/KG	1/Year	Composite
January thru December	QL	***	***		***	***	***			

Residuals WCR - Annual Reporting Requirements:
Submit an Annual WCR: due 60 calendar days after the end of each calendar year.

Table III - C - 3: Residuals WCR - Annual Limits and Monitoring Requirements

PHASE: Final **PHASE Start Date:** **PHASE End Date:**

Parameter	Sample Point	Compliance Quantity	Units	Sample Type	Monitoring Period
Amt Sludge Rmvd, Wet Cubic Yards	Industrial Residuals	REPORT	WCY/YR	Calculated	January thru December
Amt Sludge Rmvd, Wet Metric Tons	Industrial Residuals	REPORT	WMT/YR	Calculated	January thru December
Amt Sludge Rmvd, Gallons	Industrial Residuals	REPORT	GAL/YEAR	Calculated	January thru December
Total Amount of Sludge Removed	Industrial Residuals	REPORT	DMT/YR	Calculated	January thru December
Solids, Total	Industrial Residuals	REPORT	%TS	Composite	January thru December

Residuals Transfer Reporting Requirements:

Submit a Monthly RTR: due 60 calendar days after the end of each calendar month.

PART IV

SPECIFIC REQUIREMENTS: NARRATIVE

Notes and Definitions

A. Footnotes

1. Conditions Associated with Ground Water Monitoring

a. All completed monitoring forms and the statistical analyses shall be submitted annually, as an integrated report, to: Division of Water Quality, Bureau of Nonpoint Pollution Control, P.O. Box 029, Trenton, New Jersey 08625.

b. The method detection limits (MDL) specified in 40 CFR Part 136-Method 624 and/or 625 should be achieved, and the quality assurance and quality control methods specified in 40 CFR Part 136-Method 624 and 625 shall be utilized. Documentation of these quality assurance and quality control measures, including the results of field and trip blanks, must be submitted within 30 days of a written request from the Department.

c. After the first year of sampling, the permittee may propose another analytical method for Departmental approval. Such a proposal shall be accompanied by a statement explaining how the method adequately monitors all the compounds of concern.

d. The Department reserves the right to direct the permittee to use other analytical methods by giving the permittee 30 days written notice to do so.

e. The priority pollutant metals shall be analyzed by atomic absorption methods. For ground water samples, the method chosen must allow the analysis to achieve the practical quantitation levels as specified in the GWQS.

f. When sampling for Petroleum Hydrocarbons or Oil and Grease in ground water monitoring wells, "None Noticeable" means that no visible sheen or noticeable odor is detected from the sample. The laboratory and sampling personnel shall report any noticeable sheen and/or odor.

g. The parameter pH is to be field determined.

B. Definitions

1. Conditions Associated with Both Discharge Monitoring and Ground Water Monitoring

a. "Annual" ("year") means monitoring conducted at a minimum of once every twelve calendar months.

b. "Bimonthly" means monitoring conducted at a minimum frequency of once every two calendar months.

c. "Grab" means an individual sample collected over a period not exceeding 15 minutes.

d. "Month(ly)" means monitoring conducted at a minimum of once every calendar month.

Notes and Definitions

e. "None Noticeable" means that no visible sheen or noticeable odor is detected from the ground water sample. The laboratory and sampling personnel shall report any noticeable sheen and/or odor.

f. "Quarter(ly)" means monitoring conducted at a minimum frequency of once every three calendar months.

g. "Semiannual(ly)" means monitoring conducted at a minimum frequency of once every six calendar months.

Discharge to Groundwater

A. GWPP Requirements

1. General Provisions

a. The permittee shall maintain at the facility a Department approved document (plan) describing a Ground Water Protection Program (GWPP), developed in accordance with this permit. This GWPP shall include provisions to demonstrate that the operation of any and all regulated units does not contravene the Ground Water Quality Standards (N.J.A.C. 7:9-6)(GWQS). The GWPP shall demonstrate compliance with all other applicable rules and regulations related to protection of ground water such as 40 CFR 264 and 40 CFR 258 (or as promulgated in New Jersey Administrative Code), and the Underground Injection regulations found in N.J.A.C. 7:14A. The GWPP shall also be conducted in a manner that ensures consistency and compliance with the GWQS.

b. The permittee shall implement all provisions of their DEP approved GWPP plan developed in accordance with this permit.

c. The permittee shall abide by all other applicable provisions of this permit.

d. The permittee shall submit to the Department, in accordance with the schedule outlined in the approved GWPP plan, a summary of the sample data collected while performing the provisions of the approved GWPP. The summary report format shall be as stated in the approved GWPP plan.

e. The permittee shall submit, along with the summary of the sample data, a report certifying compliance with the provisions of the most recent Department approved GWPP plan. This compliance report must identify, at a minimum, the following:

   i. A list of the objectives that were to be accomplished by the end of the reporting period that were identified in the approved GWPP plan.

   ii. A narrative description of what objectives were accomplished during the reporting period and an evaluation as to the effectiveness of the accomplishments.

   iii. An explanation of why objectives were not completed, if applicable, in the timeframes specified in the approved GWPP plan.

   iv. An identification as to whether an updated GWPP plan was submitted to replace the Departmental approved GWPP.

   v. A discussion of the statistical methods utilized and the results of the statistical analyses.

f. The permittee may propose to modify any and all provisions of the GWPP at any time. To modify a GWPP plan the Permittee shall submit to the Department an amended GWPP plan for review at least 90 days prior to the proposed implementation of the change in the GWPP. The Department will notify the permittee in writing prior to the proposed date to implement the change if the amended GWPP cannot be approved by the Department due to deficiencies. If the Department does not respond in writing within 90 days of receipt, the approval is automatically granted. If the Department notifies the permittee that the amended or modified GWPP is not approved, the permittee may request a permit modification if the permittee believes the proposed changes are necessary to maintain an adequate monitoring network. The permittee shall implement all the provisions of the latest approved GWPP until a new GWPP is approved or when the permit modification is issued.

Discharge to Groundwater

g. An updated GWPP plan shall be submitted to the Department 180 days prior to the expiration date of this permit as part of the renewal application package required in N.J.A.C. 7:14A-4.2(e)3.

h. The permittee shall place a notice in the operating record whenever an amended GWPP is approved by the Department. This notice will include a copy of the newly approved GWPP plan.

i. As public information, the permittee shall send copies of the amended GWPP to the Department's permitting and enforcement bureaus, to the Clerk's Office of the municipality where the facility is locate, and the local Health Department, and shall maintain a copy on site as public information.

2. GWPP Plan Requirements

a. Unless an alternate program is approved in advance, a GWPP plan shall include, at a minimum, the following components.

i. A narrative description of the facility, and discussion of its operations;

ii. The identification of all regulated units, potential sources of contamination that would impact the regulated unit, and all sensitive receptors (i.e., potable wells, surface waters, wetlands, wildlife protection areas, etc.) within one-half mile of the site. These shall be tabulated when possible;

iii. The identification of all activities and/or processes which generate pollutants which will subsequently be discharged to the regulated units;

iv. The identification of all materials used in the processes which generate pollutants and/or those materials that may come in contact with the discharge, which contain constituents that are pollutants identified by the GWQS;

v. A detailed description of a monitoring program capable of facilitating an evaluation of the impact of the discharge to the ground water resources of the State. It shall include at a minimum: Requirements for the use of treatment works, materials management, best management plans, discharge sampling, flow limitations, effluent limitations, monitoring wells, lysimeters, piezometers, alarms, hydraulic control devices, and inspections as the Department determines necessary to ensure that the discharge does not contravene the ground water quality standards in N.J.A.C. 7:9-6.
A monitoring well system, consisting of monitoring wells located in each aquifer that may be impacted by the discharge. Unless the permittee demonstrates otherwise to the satisfaction of the Department, the monitoring well system shall consist of a minimum of one hydraulically upgradient well capable of determining background water quality, as specified in N.J.A.C. 7:14A-1 et seq., and at least three hydraulically downgradient wells.
One or more of the monitoring programs identified in N.J.A.C. 7:14A-7.6(d).

vi. A sampling schedule and systematic statistical analysis of the monitoring data. Guidance is available from the Department regarding the creation of a sampling schedule and statistical analysis.

vii. A plan specifying actions the permittee will undertake in the event monitoring results demonstrate a statistically significant exceedance has occurred. When conducting leak detection monitoring, this means a statistical evidence of a leak. When conducting attenuation monitoring, this means exceedence of the ground water quality standards at the point of compliance.

viii. An Operation and Maintenance (O&M) Manual for the regulated units shall be included with the copy of the GWPP that is kept onsite.

ix. Provisions for implementing the reporting and technical requirements outlined in this permit. Guidance for preparing or implementing the provisions of a GWPP plan is available from the Department.

B. Monitoring Requirements

1. Conditions Associated with Discharge and Ground Water Monitoring

a. All discharge and ground water monitoring shall be conducted as specified in the approved GWPP and reflected in Part III.

b. All discharge and ground water sampling shall be conducted in accordance with the Department's current Field Sampling Procedures Manual; or an alternate method approved by the Department in writing.

c. Each analysis required by this permit (except for those parameters that are field determined) shall be performed by a New Jersey Certified Laboratory that is certified to perform that analysis.

d. Sampling shall begin as specified in the approved GWPP.

e. Parameters with a "Report" requirement have no limit established by this permit. The permittee is still required to analyze the discharge sample for the parameter and report its value. Failure to sample and report the value is a permit violation

f. All ground water elevations must be determined prior to evacuation and sampling of the wells.

g. The permittee must develop a sampling plan in accordance with the method specified in N.J.A.C. 7:14A-7.7 of the NJPDES regulations and in the latest version of the Department's Field Sampling Procedures Manual.

i. This sampling plan must utilize field and trip blanks as specified in the Field Sampling Procedures Manual.

ii. The permittee must submit the sampling plan within 30 days of a written request from the Department.

h. When ground water monitoring wells are utilized as part of the approved GWPP, ground water monitoring well sample results will be analyzed by the methods specified in the approved GWPP plan. After reviewing the results, the Department may request that the permittee modify the GWPP to address any problems identified by the sample results. If the permittee does not modify the GWPP, the Department may modify or revoke the existing permit and issue a permit which addresses the problems identified by the sample results.

i. When ground water monitoring wells are utilized as part of the approved GWPP, the monitoring wells identified in the facility's plot plan as specifically located to monitor the regulated unit(s) shall be sampled according to the schedule outlined in the approved GWPP plan.

2. Conditions Associated with Residuals Monitoring in Part III

a. For the purposes of monitoring sludge quality, sample collection, preservation and analysis shall be performed in a manner consistent with 40 CFR 503.8 and the Sludge Quality Assurance regulations (N.J.A.C. 7:14C).

C. Reporting Requirements

1. Conditions Associated with Discharge and Ground Water Monitoring

a. Ground water monitoring data shall be submitted to the Department on either Ground Water Waste Characterization Report, on 3.5 inch diskettes or other method outlined in the Department approved GWPP Plan. The ground water monitoring data shall be submitted to the Department according to the schedule outlined in the permittee's approved GWPP Plan.

b. Failure to submit ground water monitoring data in accordance with the provisions above is a permit violation and may place the permittee subject to civil and administrative penalties pursuant to N.J.S.A 58:10A-10 et seq.

c. The discharge monitoring and ground water monitoring reports shall be postmarked no later than the 25th day of the month following the completed monitoring period and should be received by the Department no later than the 1st day of the next month.

2. Conditions Associated with Residuals Monitoring in Part III

a. For purposes of reporting sludge quality, the permittee shall report monitoring results on the Discharge Monitoring Reports (DMR) or other monitoring report forms where forms are specified, and all applicable information required on the forms shall be entered in the manner specified therein before submission.

D. Recordkeeping Requirements

1. Conditions Associated with ground water, stormwater and residuals monitoring in Part III

a. The permittee shall retain records of all monitoring information including all calibration and maintenance records, all original strip chart recordings for continuous monitoring instrumentation, copies of all reports, and all data used to complete the application for this permit.

b. Records of monitoring information shall include the date, locations and time of the sampling or measurements, the individual who performed the sampling or measurements, the date the samples were collected, the date the samples were analyzed, the individual who performed the analysis, the analytical method used, and the results.

c. All records shall be retained for 5 years

d. All records shall be available for Department review during periodic inspections or submitted upon written request.

E. Submission Requirements

1. Operations & Maintenance Manual

a. Prepare Operation and Maintenance (O&M) Manual: within 90 days from the effective date of the permit (EDP) , submit a certification that the O & M Manual has been prepared. (Effective: 6/1/2003)

b. If the items required in the O & M Manual are addressed in another document which has been approved by the Department, the permittee may submit a letter to the BNPC referencing which document contains the applicable information.

c. The most recent version of the O & M Manual as well as all records of maintenance and inspections must be kept on-site at all times and be available for inspection upon request by the Department.

d. The permittee must educate all appropriate personnel and licensed operators (as applicable) as to the contents and procedures of the O & M Manual to ensure proper implementation.

e. The O & M Manual shall include, at a minimum, the following provisions, as applicable:

i. A list of all pollutants generated and/or discharged to all units regulated by this permit.

ii. A schedule of maintenance and inspections of the processes including the pollutant generation, conveyance and the discharge unit(s).

iii. A schedule of the required inspections for all monitoring devices (piezometers, ground water monitoring wells, lysimeters, flow meters, etc.).

iv. Requirements established in this permit for unit-specific maintenance and inspection.

v. Assessment of emergency situations which affect the discharge activities as outlined in N.J.A.C. 7:14A-6.12(d)3. Emergency procedures in the O & M Manual shall not create an unpermitted discharge or contravene any rules or regulations. If the discharge flows to the regulated units without the aid of pumps, the emergency plan only needs to address equipment and emergency procedures.

vi. Procedures for correcting emergency situations.

vii. Procedures for notifying the appropriate agencies.

viii. Location of any onsite temporary or permanent pollutant storage areas.

ix. Provisions for utilizing previously approved and constructed diversion mechanisms, if applicable. These provisions shall include the ability to monitor for permit compliance.

f. After an emergency situation has been corrected, the permittee shall review the emergency procedures in place and submit, if necessary, an updated O & M Manual.

g. The permittee shall notify in writing the appropriate Bureau of Water Compliance and Enforcement office no less than 180 days prior to the expected closure of the regulated unit requesting current closure requirements. The permittee, upon receipt of these requirements, shall submit a closure plan the permit issuing bureau for review and approval.

2. General Provisions

a. All the above referenced materials shall be submitted, as applicable, to the following address:

Division of Water Quality
Bureau of Nonpoint Pollution Control
P.O. BOX 029
Trenton, New Jersey 08625

3. Requirements for Infiltration-Percolation Lagoons

a. In order to maintain the infiltrative capacity of the lagoon, infiltrative surfaces shall be scarified periodically through the removal of accumulated organic material, and/or disking or harrowing the surface soil layer, in order to maintain the infiltrative capacity of the lagoon. (A schedule of this shall be incorporated into the O & M Manual.)

b. Lagoons may be recontoured to correct minor side wall and berm defects, alter side wall slope or similar changes or corrections after notifying the permit issuing bureau in writing of the proposed changes. Notification shall include the submittal of plans for the proposed change and an estimated time for completion.

4. Requirements for all Basins

a. For the purpose of this permit, a basin is a collective term used to describe a variety of regulated units at NJPDES-DGW permitted facilities. Examples of these basins are infiltration/percolation lagoons or surface impoundments which may be referenced by the permittee as retention, settling, storage or detention ponds, basins, lagoons, lined or unlined basins. The common feature of these basins is that they are topographic depressions or bermed areas designed to hold, treat and/or transmit pollutants.

b. Unauthorized discharges from basins are prohibited.

c. The following items should be addressed in the facility's O & M Manual.

i. A schedule of physical inspections of all visible portions and areas surrounding the basin unit(s) to:
Ensure that the liner material and berms have remained structurally sound;
- Detect evidence of any deterioration, breakout, malfunctions or improper operation of the over-topping control system;
- Detect sudden drops in the level of the basin contents not associated with normal operation of the regulated unit;
- Detect erosion or other signs of deterioration in berms or other containment devices;
- Detect the presence of liquids in the leak detection system, if employed.

ii. A protective cover shall be maintained on earthen dikes to prevent erosion and maintain integrity. However, the dikes shall be free of vegetation having invasive root systems that could displace the earthen materials upon which the structural integrity of the dike is dependent.

iii. A course of action shall be outlined for procedures to be implemented in the event the basin must be removed from service for an extended period of time for reasons other than routine maintenance and/or scheduled rotation of permitted discharge areas. This course of action must address how the discharge will be handled which can include diversion of the discharge to a previously approved reserved disposal area.

d. No basin that was removed from service due to structural collapse, overtopping or nonuse may be restored to service unless that portion of the basin which failed was repaired.

i. If the basin was removed from service due to actual or imminent bank or side wall failure, a New Jersey licensed Professional Engineer shall certify by signature and seal the structural integrity of the bank and side wall prior to the redirection of flow to the basin. Said certification shall be received by the Department prior to the resumption of discharge to the basin.

ii. If a basin was inactive for more than six months due to structural collapse or overtopping, the permittee shall obtain a certification from a New Jersey licensed Professional Engineer that it is structurally sound. The certification shall be signed and sealed by the New Jersey licensed Professional Engineer and shall establish that the banks, dikes, and foundation of the basin will withstand the physical and chemical stresses of resumed operation. If the basin is lined, the certification shall also state that the lined basin will not discharge to ground water.

iii. If the original basin system or portions thereof were insufficient or inadequate, the permittee shall propose a new upgraded system. The new basin system will be installed upon issuance of a TWA from the Bureau of Engineering. A new site plan shall be submitted along with any necessary revisions to the O & M Manual.

iv. The basin may not become operational unless all inspections and necessary repairs have been completed.

F. Conditions Relating to Ground Water Discharge Units

1. General Provisions

a. Failure to operate and maintain treatment works and facilities which are installed or used by the permittee to achieve compliance with the terms and conditions of the permit as specified in the O&M Manual.

b. The permittee shall notify the Department in writing whenever there is a change in operation which could potentially effect the characteristics of a regulated discharge.

c. When a regulated unit poses a potential health risk or hazard, measures should be taken to restrict unauthorized access to the site or unit and to minimize the potential for contact with the pollutants.

d. If the discharge from a regulated unit causes contravention of the GWQS, the permittee is required to implement corrective measures in accordance with the contingency requirements outlined in Part III of this permit.

G. Conditions Relating to Ground Water Monitoring Wells

1. Applicability

a. This section applies only to those facilities using ground water monitoring wells as part of their GWPP.

2. Well Installation & Abandonment Requirements

a. The permittee shall provide a minimum of 2 weeks notification to the BNPC prior to installing any wells required by this permit. At the permittee's option, a representative of the BNPC will assist in field locating the wells prior to the installation of the wells or, if possible, on the day the wells are to be drilled.

b. Satisfactory ground water monitor wells are defined in N.J.A.C. 7:14A-9.4 of the NJPDES regulations and shall be subject to Departmental approval. If the wells do not meet these standards, they must be replaced with satisfactory wells.

c. All wells must be installed by a licensed New Jersey well driller pursuant to N.J.S.A. 58:4A-6 and constructed according to the specifications outlined in the latest edition of the Department's Field Sampling Procedures Manual for the appropriate site conditions (bedrock formation, unconsolidated, and confined unconsolidated aquifers). At the time of construction, the well driller must possess a valid well permit number for each well.

d. Replacement wells that are installed within 20 feet of the damaged wells require Department notification at the same time the well certification forms are submitted. Replacement wells installed greater than 20 feet from the damaged wells require prior written approval from the Department. Replacement wells must be sampled between the fourteenth day and the thirtieth day after their installation and development. The requirement to replace a damaged well does not relieve the permittee from compliance with the monitoring schedule.

e. Inadequate or damaged wells must be properly sealed and abandoned pursuant to N.J.S.A. 58:4A-4.1 et. seq. All sealing must be performed by a New Jersey licensed well driller who is certified to seal wells. Instructions regarding sealing, a list of certified drillers to seal wells, and well abandonment forms may be obtained by contacting the Bureau of Water Allocation at (609) 292-2957.

3. Well Certifications

a. For an existing well, if the information required on the Certifications (Forms A and B) cannot be determined or the well is not adequately constructed to meet the requirements of this permit, the Department may require its replacement. Criteria to be used by the Department in judging the adequacy of a well will be related to the well's ability to provide a representative ground water sample from the interval of the formation which the Department requires to be sampled.

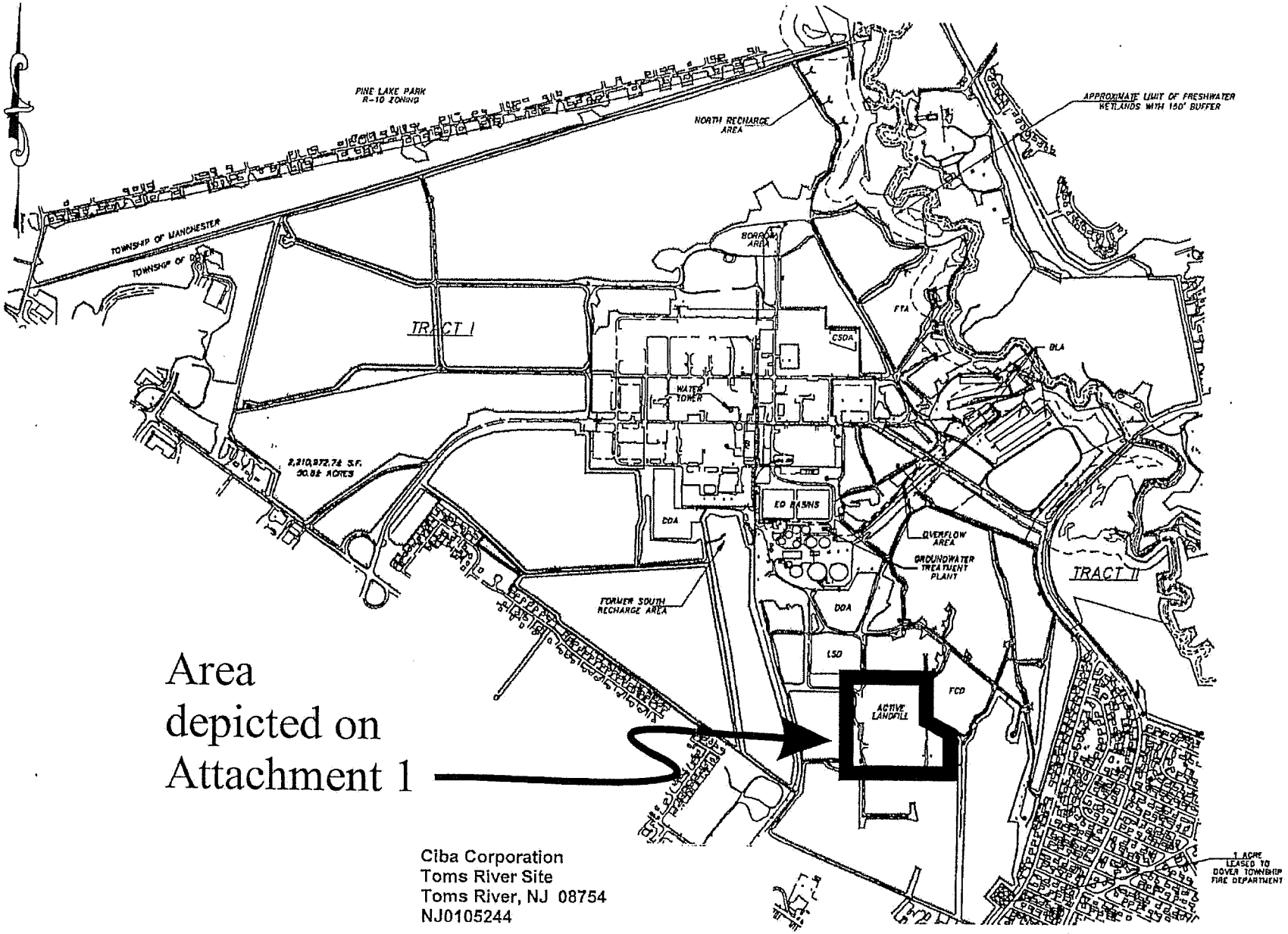
4. Maintenance and Record Keeping

a. Each well shall be inspected on a regular basis (as specified in the approved GWPP) for structural integrity and/or damage.

i. The permittee shall maintain a complete inspection record indicating dates of inspection, inspector's name, and conditions observed.

ii. These records shall be made available to the Department upon request.

iii. Failure to maintain complete and accurate records, or to submit them upon request, is a violation of this permit.



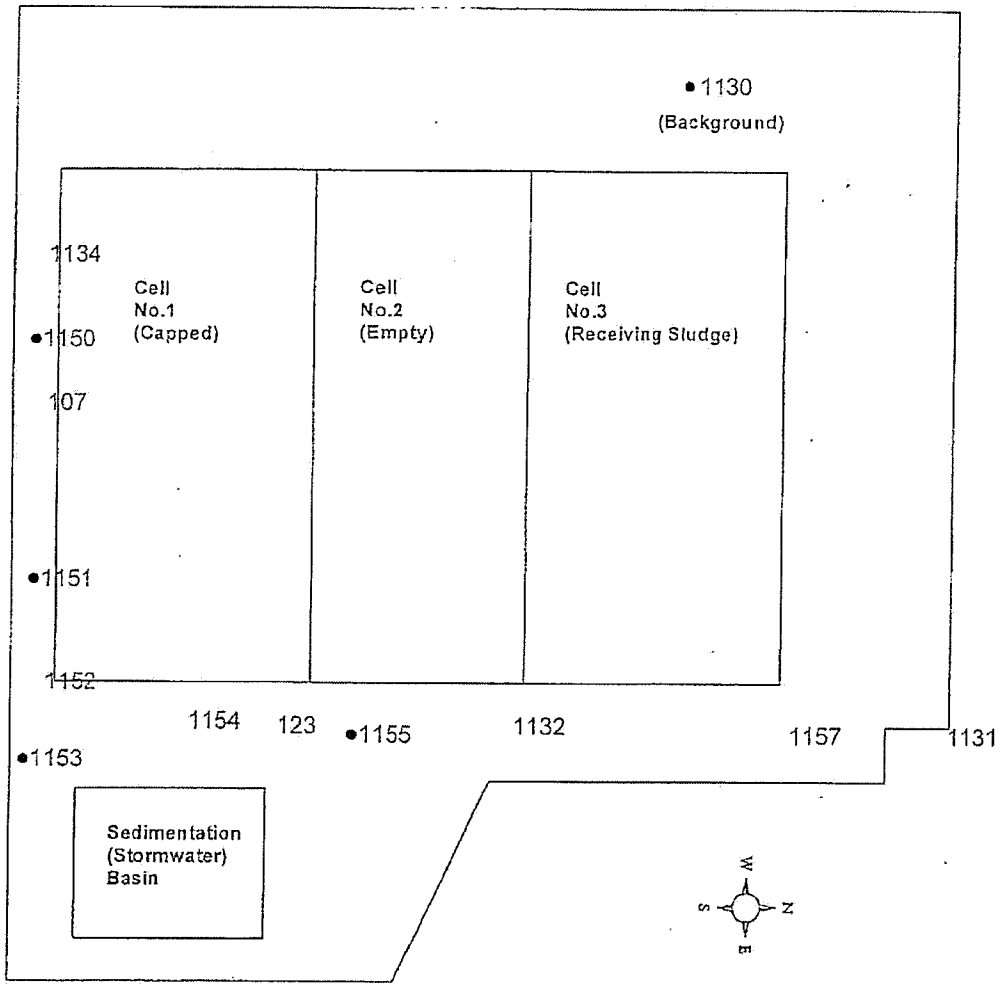
Area depicted on Attachment 1

Ciba Corporation
Toms River Site
Toms River, NJ 08754
NJ0105244

Site Plan

0 800 1600
Approximate Scale in Feet

WELL LOCATION MAP



Well Type

- Chemical Monitoring
  Upper Cohansey Water Level Monitoring

Ciba Specialty Chemicals Corp.
Industrial Waste Landfill

Attachment 1

PERMIT/CERTIFICATE

State of New Jersey

Department of Environmental Protection

Environmental Regulation
Division of Air Quality
Air Quality Permitting Element
Mail Code 401-02
P.O. Box 420
Trenton, NJ 08625-0420

Certificate to Operate Control Apparatus and/or Equipment

Facility ID: 78001
Facility Name: BASF CORP

Mailing Address:
227 OAK RIDGE PKWY
Toms River , NJ 08753

Plant Location:
227 OAK RIDGE PKWY
Toms River , NJ 08753

County:
Ocean

Location Description:

Permit ID: PCP 960005
Permit Type: Construction of New Source

Status: Renewed
Status Date: 05/17/2016

Effective: 08/31/1989
Expiration: 05/22/2021

Designation of Equipment: CLOSED LANDF

Equipment Description: CLOSED LANDFILL CELL NO. 1

Certificate to Operate Control Apparatus and/or Equipment

This five year certificate is being issued under the authority of Chapter 106, P.L. 1967 N.J.S.A.26:2C-9.2. The possession of this document does not relieve you from the obligation of complying with all provisions of the New Jersey Administrative Code, Title 7, Chapter 27.

In addition to the facility specific requirements listed in this permit, the facility must comply with all applicable rules and requirements as well as the information contained in the approved permit. The facility must also comply with any applicable requirements of the N.J.A.C. 7:27-8.1 et. Seq. and other state rules summarized in the General Provisions for Preconstruction Permits, www.state.nj.us/dep/aqpp/applying.html

Pursuant to N.J.A.C. 7:27-8.13(b), the department may modify the conditions of approval of this certificate at the time of renewal or at any time when the certificate is in force, if deemed necessary to protect human health, welfare or the environment.

You may also be subject to fees for services that are performed by the Department in accordance with the conditions of approval of this permit and 7:27-8.13(e). If you fail to pay a fee, the Department may assess civil administrative penalties and/or revoke this certificate.

In accordance with N.J.S.A. 54:4-3.56 to 3.58, you may be entitled to an exemption from municipal property taxation if your control device is taxed and is considered to be an air pollution control device. A tax exemption application may be obtained at www.state.nj.us/dep/aqpp/downloads/forms/TaxExemptionForm2.pdf.

In accordance with N.J.A.C. 7:27-8.3(d), you shall make this certificate readily available for inspection on the operating premises.

State of New Jersey

CHRIS CHRISTIE
GOVERNOR

KIM GUADAGNO
LT. GOVERNOR

DEPARTMENT OF ENVIRONMENTAL PROTECTION

BOB MARTIN
COMMISSIONER

Mail Code 401-04Q
Division of Water Supply & Geoscience
New Jersey Geological and Water Survey Element
Bureau of Water Allocation & Well Permitting
401 E. State Street - P.O. Box 420
Trenton, New Jersey 08625-0420
Tel #: (609) 984-6831 - Fax #: (609) 633-1231
http://www.nj.gov/dep/watersupply/

December 14, 2015

BASF Corp
227 Oak Ridge Parkway
Toms River, NJ 08755
Attn: Fred Goelz

Dear Mr. Goelz:

Re: **Water Allocation Permit Equivalency - Renewal**
Program Interest ID/Permit No. 2622E
Activity No. EQP150001

Enclosed is a Permit Equivalency issued pursuant to the Water Supply Management Act, N.J.S.A. 58:1A-1 et seq. This Equivalency becomes effective on January 1, 2016 and is to divert water from 37 wells in the following Municipalities and County:

MUNICIPALITY	COUNTY
Eagleswood Twp	Ocean
Toms River Twp	Ocean

EQP150001 is your Permit Activity Number, and 2622E is now your Program interest ID and will appear on all forms and correspondence from the Bureau of Water Allocation. Please reference your Program Interest ID and Activity No. in all correspondence.

Please be advised that as you are responsible for complying with the terms and conditions of the enclosed equivalency and you should review them thoroughly. Failure to comply with any or all of the terms and conditions could result in penalties and/or revocation of the equivalency.

Very truly yours,

Terry D. Pilawski, Chief
Bureau of Water Allocation & Well Permitting

Enclosure

CERTIFIED MAIL NO. 7014-2870-0001-6015-4558

C: Bureau of Water Allocation & Well Permitting
Anne Pavelka, Case Manager, SRP
Central Bureau of Water Compliance & Enforcement
Ken Komar, BWAWP

State of New Jersey
Department of Environmental Protection
Bureau of Water Allocation
PO Box 426, Trenton, New Jersey 08625-0426

Permit Equivalency

The New Jersey Department of Environmental Protection grants this permit* in accordance with your application, attachments accompanying same application, and applicable laws and regulations. This permit is also subject to further conditions and stipulations enumerated in the supporting documents.

Program Interest ID/ Permit Number: 2622E **Activity Number:** EQP150001	**Issuance Date:** 12/14/2015	**Effective Date:** 01/01/2016	**Expiration Date:** 12/31/2020

Name and Address of Applicant

BASF CORP
227 Oak Ridge Parkway
Toms River, NJ 08755

Location of Activity/Facility
Toms River Twp, Eagleswood Twp
Ocean County

Type of Permit	**Statute(s)**
Water Allocation Permit Equivalency - Renewal	N.J.S.A. 58:1A-1

This permit grants permission to divert water from the approved sources in the attached permit inventory, in the following municipalities, for the following water uses:

MUNICIPALITY	COUNTY
Eagleswood Twp	Ocean
Toms River Twp	Ocean

Water Uses: Pollution Control

This permit is subject to the attached Conditions.

Approved by the authority of:
Bob Martin, Commissioner
Department of Environmental Protection

Terry D. Pilawski, Chief
Bureau of Water Allocation & Well Permitting

12/14/15
Date

** Permit means Certification, Approval, Registration, Equivalency, etc.*

12/11/2015

RENEWAL
STAFF REPORT

In the matter of

BASF Corp.

Application No. 2622E to renew a permit to divert water from thirty-seven wells in the Cohansey sand in Toms River Township, Ocean County

On July 6, 2005 Water Allocation Permit No. 2167P was issued to BASF Corporation, 227 Oak Ridge Parkway, Toms River, New Jersey 08754. A CERCLA Application for a Permit Equivalency was filed on May 1, 2015 requesting convergence of the previously approved Water Allocation Permit to a Permit Equivalency, retaining the privilege to divert a maximum of 102 million gallons of water during any month (MGM) at a maximum rate of 2940 gallons per minute (gpm) not to exceed 1122 million gallons per year (MGY) from existing Well Nos. PW-137, PW-204, PW-205, PW-208, PW-209, PW-210, PW-211, PW-212, PW-213, PW-214, PW-215, PW-216, PW-219, PW-220, PW-221, PW-222, PW-223, PW-224, PW-225, PW-227, PW-228, PW-229, PW-231, PW-232, PW-234, PW-236, PW-237, PW-240, PW-291, PW-292, PW-293, PW-304, PW-305, PW-306, PW-309, PW-310, and PW-314; between 30 to 112 feet deep, screened in the Cohansey aquifer.

Finding of Fact

1. The former Ciba Geigy Site, acquired by BASF Corporation on April 1, 2010, is regulated under the Federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 and as such should be monitored as a Permit Equivalency;

2. The previous permit required that sixteen (16) wells identified in the inactive well group be sealed by a licensed New Jersey well driller if the wells were not utilized for a period of more than three years. A review of historic annual inactive well inspection reports submitted to the Bureau demonstrates that the identified wells have not been utilized since at least 2005. The applicant has indicated that they will be optimizing the entire groundwater and extraction system within the next two years in compliance with the Record of Decision issued for the site by the EPA and wish to maintain the inactive wells until after the review.

3. A review of quarterly diversion reports indicates the following water use:

Year	Annual Use (mg)	Maximum Monthly Use (mg)	Average Monthly Use (mg)	Existing Allocation (MGM)	(MGY)
2014	456.126	59.593 (NOV)	38.011	102	1122
2013	647.284	60.748 (MAR)	53.940	102	1122

Year	Annual Use (mg)	Maximum Monthly Use (mg)	Average Monthly Use (mg)	Existing Allocation (MGM)	(MGY)
2012	590.177	61.435 (MAY)	49.181	102	1122
2011	604.405	54.404 (JAN)	50.367	102	1122
2010	653.765	58.282 (MAY)	54.480	102	1122

Staff Analysis/Conclusion

1. The Water Allocation Permit should be converted to a Permit Equivalency with the previously approved limits of 102 MGM and 1122 MGY and be renewed for a ten year term;

2. The maximum diversion rate of 2940 gpm should be carried forward;

3. The sixteen (16) well identified in the inactive well group should remain in the Equivalency Permit until after the remediation is optimized. Any wells that are not needed at that time should be sealed and proof of abandonment submitted to the Bureau.

Recommendations

Issuance of the permit is recommended with an expiration date of ten years from the effective date and is subject to the attached specific conditions:

12/14/15 JGG 12/11/15

Date: 12/11/2015

Kenneth M. Komar
Bureau of Water Allocation
& Well Permitting

BASF CORP
2622E

Permit Equivalency : EQP150001

Permit Inventory

Water Diversion Sources - Water may be diverted under this permit from the following sources:

Source Designation (Well Permit No. or Intake No.)	Description	Subject Item ID
COHANSEY AQUIFER SOURCES	ALL WELLS LISTED	WSMS0001134073
3300015055	WELL PW-229 (748-1000)	WSWL0000068477
3300018898	WELL PW-215 (754-1000)	WSWL0000068485
3300018899	WELL PW-216 (755-1000)	WSWL0000068486
3300032356	WELL PW-240	WSWL0000068530
3300032357	WELL PW-137	WSWL0000068531
3300032358	WELL PW-237	WSWL0000068532
3300032359	WELL PW-236	WSWL0000068533
3300032360	WELL PW-234	WSWL0000068534
3300032400	WELL PW-224	WSWL0000068535
3300032401	WELL PW-291	WSWL0000068536
3300032402	WELL PW-204	WSWL0000068537
3300032403	WELL PW-304	WSWL0000068538
3300032404	WELL PW-209	WSWL0000068539
3300032405	WELL PW-309	WSWL0000068540
3300032406	WELL PW-208	WSWL0000068541
3300032407	WELL PW-210	WSWL0000068542
3300032408	WELL PW-292	WSWL0000068543
3300032409	WELL PW-220	WSWL0000068544
3300032410	WELL PW-219	WSWL0000068545
3300032413	WELL PW-212	WSWL0000068548
3300032414	WELL PW-213	WSWL0000068549
3300032415	WELL PW-214	WSWL0000068550
3300032416	WELL PW-221	WSWL0000068551
3300032417	WELL PW-222	WSWL0000068552
3300032419	WELL PW-310	WSWL0000068554
3300032435	WELL PW-225	WSWL0000068555
3300032437	WELL PW-227	WSWL0000068557
3300032455	WELL PW-223	WSWL0000068560
3300032458	WELL PW-205	WSWL0000068563
3300032459	WELL PW-211	WSWL0000068564
3300032537	WELL PW-306	WSWL0000068567
3300033462	WELL PW-231	WSWL0000340876
3300033463	WELL PW-228 (747-1000)	WSWL0000340877

Water Diversion Sources - Water may be diverted under this permit from the following sources:

Source Designation (Well Permit No. or Intake No.)	Description	Subject Item ID
3300033464	WELL PW-232	WSWL0000340878
3300028236	WELL PW-305	WSWL0000431186
3300043131	WELL PW-293	WSWL0000708142
3300043132	WELL PW-314	WSWL0000708143

Remaining Subject Items (monitoring wells, wells to be sealed, etc) - The following items are present but are not approved diversion sources:

Source Designation	Source Description	Subject Item ID
3300000044	WELL 200A	WSWL0000068354
3300000047	WELL 100A	WSWL0000068355
3300000958	WELL 400	WSWL0000068368
3300001033	WELL 502	WSWL0000068371
3300001142	WELL 503	WSWL0000068382
3300001257	WELL 504	WSWL0000068401
3300015053	WELL 746	WSWL0000068475
3300032411	WELL PW-202	WSWL0000068546
3300032412	WELL 207	WSWL0000068547
3300032418	WELL PW-308	WSWL0000068553
3300032436	WELL PW-226	WSWL0000068556
3300032438	WELL PW-230	WSWL0000068558
3300032439	WELL PW-235	WSWL0000068559
3300032456	WELL PW-206	WSWL0000068561
3300032457	WELL PW-242	WSWL0000068562
3300001032	WELL 404	WSWL0000078328

BASF CORP
2622E

Permit Equivalency : EQP150001

Group Subject Items - The following items are grouped sources for the purpose of setting permit requirements outlined in this document:

Group Designation	Group Description	Group Subject Item ID	Group Members
BASF CORP	2622E WA PERMIT EQUIV - ALL DIVERSION SOURCES	WSWA0001124371	INACTIVE WELL GROUP, WELLS 100A, 200A, 207, 400, 404, 502, 503, 504, 746; PW-202, 308, 226, 230, 235, 206, 242 (WARG801662)
			COHANSEY AQUIFER SOURCES, ALL WELLS LISTED (WSMS1134073)
COHANSEY AQUIFER SOURCES	ALL WELLS LISTED	WARG0000078384	3300015055, WELL PW-229 (748-1000) (WSWL068477)
			3300018898, WELL PW-215 (754-1000) (WSWL068485)
			3300018899, WELL PW-216 (755-1000) (WSWL068486)
			3300032356, WELL PW-240 (WSWL068530)
			3300032357, WELL PW-137 (WSWL068531)
			3300032358, WELL PW-237 (WSWL068532)
			3300032359, WELL PW-236 (WSWL068533)
			3300032360, WELL PW-234 (WSWL068534)
			3300032400, WELL PW-224 (WSWL068535)
			3300032401, WELL PW-291 (WSWL068536)
			3300032402, WELL PW-204 (WSWL068537)
			3300032403, WELL PW-304 (WSWL068538)
			3300032404, WELL PW-209 (WSWL068539)
			3300032405, WELL PW-309 (WSWL068540)
			3300032406, WELL PW-208 (WSWL068541)
			3300032407, WELL PW-210 (WSWL068542)
			3300032408, WELL PW-292 (WSWL068543)
			3300032409, WELL PW-220 (WSWL068544)

Group Subject Items - The following items are grouped sources for the purpose of setting permit requirements outlined in this document:

Group Designation	Group Description	Group Subject Item ID	Group Members
COHANSEY AQUIFER SOURCES	ALL WELLS LISTED	WARG0000078384	3300032410, WELL PW-219 (WSWL068545)
			3300032413, WELL PW-212 (WSWL068548)
			3300032414, WELL PW-213 (WSWL068549)
			3300032415, WELL PW-214 (WSWL068550)
			3300032416, WELL PW-221 (WSWL068551)
			3300032417, WELL PW-222 (WSWL068552)
			3300032419, WELL PW-310 (WSWL068554)
			3300032435, WELL PW-225 (WSWL068555)
			3300032437, WELL PW-227 (WSWL068557)
			3300032455, WELL PW-223 (WSWL068560)
			3300032458, WELL PW-205 (WSWL068563)
			3300032459, WELL PW-211 (WSWL068564)
			3300032537, WELL PW-306 (WSWL068567)
			3300033462, WELL PW-231 (WSWL340876)
			3300033463, WELL PW-228 (747-1000) (WSWL340877)
			3300033464, WELL PW-232 (WSWL340878)
			3300028236, WELL PW-305 (WSWL431186)
			3300043131, WELL PW-293 (WSWL708142)
			3300043132, WELL PW-314 (WSWL708143)
INACTIVE WELL GROUP	WELLS 100A, 200A, 207, 400, 404, 502, 503, 504, 746; PW- 202, 308, 226, 230, 235, 206, 242	WARG0000801662	3300000044, WELL 200A (WSWL068354)

Group Subject Items - The following items are grouped sources for the purpose of setting permit requirements outlined in this document:

Group Designation	Group Description	Group Subject Item ID	Group Members
INACTIVE WELL GROUP	WELLS 100A, 200A, 207, 400, 404, 502, 503, 504, 746; PW- 202, 308, 226, 230, 235, 206, 242	WARG0000801662	3300000047, WELL 100A (WSWL068355)
			3300000958, WELL 400 (WSWL068368)
			3300001033, WELL 502 (WSWL068371)
			3300001142, WELL 503 (WSWL068382)
			3300001257, WELL 504 (WSWL068401)
			3300015053, WELL 746 (WSWL068475)
			3300032411, WELL PW-202 (WSWL068546)
			3300032412, WELL 207 (WSWL068547)
			3300032418, WELL PW-308 (WSWL068553)
			3300032436, WELL PW-226 (WSWL068556)
			3300032438, WELL PW-230 (WSWL068558)

Group Subject Items - The following items are grouped sources for the purpose of setting permit requirements outlined in this document:

Group Designation	Group Description	Group Subject Item ID	Group Members
INACTIVE WELL GROUP	WELLS 100A, 200A, 207, 400, 404, 502, 503, 504, 746; PW- 202, 308, 226, 230, 235, 206, 242	WARG0000801662	3300032439, WELL PW-235 (WSWL068559)
			3300032456, WELL PW-206 (WSWL068561)
			3300032457, WELL PW-242 (WSWL068562)
			3300001032, WELL 404 (WSWL078328)

BASF CORP
2622E

Permit Equivalency : EQP150001

Permit Requirements

Limit Requirements

The following limits apply and are the maximum permitted allocation:

Final Permit Phase from 01/01/2016 -

Subject Item	Parameter	Limit
BASF CORP, 2622E WA PERMIT EQUIV - ALL DIVERSION SOURCES (WSWA1124371)	Maximum Diversion Rate	<= 2940 Gallons Per Minute. [N.J.A.C. 7:19- 2]
	Water Diverted	<= 102 Million Gallons Per Month. [N.J.A.C. 7:19- 2]
		<= 1122 Million Gallons Per Year. [N.J.A.C. 7:19- 2]

Other Limit Requirements

Final Permit Phase from 01/01/2016 -

Subject Item	Parameter	Limit
3300015055, WELL PW-229 (748-1000) (WSWL68477)	Rated Pump Capacity	<= 40 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300018898, WELL PW-215 (754-1000) (WSWL68485)	Rated Pump Capacity	<= 25 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300018899, WELL PW-216 (755-1000) (WSWL68486)	Rated Pump Capacity	<= 25 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032356, WELL PW-240 (WSWL68530)	Rated Pump Capacity	<= 92 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032357, WELL PW-137 (WSWL68531)	Rated Pump Capacity	<= 30 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032358, WELL PW-237 (WSWL68532)	Rated Pump Capacity	<= 25 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032359, WELL PW-236 (WSWL68533)	Rated Pump Capacity	<= 230 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032360, WELL PW-234 (WSWL68534)	Rated Pump Capacity	<= 85 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032400, WELL PW-224 (WSWL68535)	Rated Pump Capacity	<= 150 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032401, WELL PW-291 (WSWL68536)	Rated Pump Capacity	<= 25 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032402, WELL PW-204 (WSWL68537)	Rated Pump Capacity	<= 40 Gallons Per Minute. [N.J.A.C. 7:19- 2]

Other Limit Requirements

Final Permit Phase from 01/01/2016 -

Subject Item	Parameter	Limit
3300032403, WELL PW-304 (WSWL68538)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032404, WELL PW-209 (WSWL68539)	Rated Pump Capacity	<= 16 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032405, WELL PW-309 (WSWL68540)	Rated Pump Capacity	<= 16 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032406, WELL PW-208 (WSWL68541)	Rated Pump Capacity	<= 25 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032407, WELL PW-210 (WSWL68542)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032408, WELL PW-292 (WSWL68543)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032409, WELL PW-220 (WSWL68544)	Rated Pump Capacity	<= 40 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032410, WELL PW-219 (WSWL68545)	Rated Pump Capacity	<= 16 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032413, WELL PW-212 (WSWL68548)	Rated Pump Capacity	<= 40 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032414, WELL PW-213 (WSWL68549)	Rated Pump Capacity	<= 25 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032415, WELL PW-214 (WSWL68550)	Rated Pump Capacity	<= 40 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032416, WELL PW-221 (WSWL68551)	Rated Pump Capacity	<= 25 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032417, WELL PW-222 (WSWL68552)	Rated Pump Capacity	<= 16 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032419, WELL PW-310 (WSWL68554)	Rated Pump Capacity	<= 25 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032435, WELL PW-225 (WSWL68555)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032437, WELL PW-227 (WSWL68557)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032455, WELL PW-223 (WSWL68560)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032458, WELL PW-205 (WSWL68563)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032459, WELL PW-211 (WSWL68564)	Rated Pump Capacity	<= 85 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300032537, WELL PW-306 (WSWL68567)	Rated Pump Capacity	<= 85 Gallons Per Minute. [N.J.A.C. 7:19- 2]

Other Limit Requirements

Final Permit Phase from 01/01/2016 -

Subject Item	Parameter	Limit
3300033462, WELL PW-231 (WSWL340876)	Rated Pump Capacity	<= 40 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300033463, WELL PW-228 (747-1000) (WSWL340877)	Rated Pump Capacity	<= 85 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300033464, WELL PW-232 (WSWL340878)	Rated Pump Capacity	<= 85 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300028236, WELL PW-305 (WSWL431186)	Rated Pump Capacity	<= 40 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300043131, WELL PW-293 (WSWL708142)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]
3300043132, WELL PW-314 (WSWL708143)	Rated Pump Capacity	<= 75 Gallons Per Minute. [N.J.A.C. 7:19- 2]

Monitoring Requirements

Final Permit Phase from 01/01/2016 -

Subject Item	Requirement	Frequency	Monitored Parameter	Monitoring Method
COHANSEY AQUIFER SOURCES, ALL WELLS LISTED (WSMS1134073)	The monthly diversion quantity from the group of sources indicated shall be monitored. [N.J.A.C. 7:19-2]	Each Month	Water Diverted	Meter

Submittal/Action Requirements

Final Permit Phase from 01/01/2016 -

Applicable Subject Items	Submittal/Action Type	Requirement
COHANSEY AQUIFER SOURCES, ALL WELLS LISTED (WSMS1134073)	Submit Private Quarterly Report	The required monitoring results shall be recorded on the form provided by the Department. The completed form shall be submitted within 30 days after the end of each quarter. [N.J.A.C. 7:19- 2]
3300001032, WELL 404 (WSWL78328)	Submit Initial Inactive Well Inspection Report Form	The permittee shall certify the well as inactive. A completed Initial Inactive Well Inspection Report form, provided by the Department, shall be submitted within 90 days of the effective date of this permit. [N.J.A.C. 7:19- 1]

Submittal/Action Requirements

Final Permit Phase from 01/01/2016 -

Applicable Subject Items	Submittal/Action Type	Requirement
3300000044, WELL 200A (WSWL68354)	Submit Annual Inactive Well Certification Form	The permittee shall certify the inactive wells are structurally sound, protected from vandalism and contamination, and not a threat to the public health by completing the Inactive Well Certification form. If the inactive well was operated during the year, the total number of hours and gallons pumped shall also be reported on the certification. The form shall be submitted by January 31st of each year. [N.J.A.C. 7:19- 1]
3300000047, WELL 100A (WSWL68355)		
3300000958, WELL 400 (WSWL68368)		
3300001033, WELL 502 (WSWL68371)		
3300001142, WELL 503 (WSWL68382)		
3300001257, WELL 504 (WSWL68401)		
3300015053, WELL 746 (WSWL68475)		

Submittal/Action Requirements

Final Permit Phase from 01/01/2016 -

Applicable Subject Items	Submittal/Action Type	Requirement
3300032411, WELL PW-202 (WSWL68546)	Submit Annual Inactive Well Certification Form	The permittee shall certify the inactive wells are structurally sound, protected from vandalism and contamination, and not a threat to the public health by completing the Inactive Well Certification form. If the inactive well was operated during the year, the total number of hours and gallons pumped shall also be reported on the certification. The form shall be submitted by January 31st of each year. [N.J.A.C. 7:19- 1]
3300032412, WELL 207 (WSWL68547)		
3300032418, WELL PW-308 (WSWL68553)		
3300032436, WELL PW-226 (WSWL68556)		
3300032438, WELL PW-230 (WSWL68558)		
3300032439, WELL PW-235 (WSWL68559)		
3300032456, WELL PW-206 (WSWL68561)		

Submittal/Action Requirements

Final Permit Phase from 01/01/2016 -

Applicable Subject Items	Submittal/Action Type	Requirement
3300032457, WELL PW-242 (WSWL68562)	Submit Annual Inactive Well Certification Form	The permittee shall certify the inactive wells are structurally sound, protected from vandalism and contamination, and not a threat to the public health by completing the Inactive Well Certification form. If the inactive well was operated during the year, the total number of hours and gallons pumped shall also be reported on the certification. The form shall be submitted by January 31st of each year. [N.J.A.C. 7:19- 1]
3300001032, WELL 404 (WSWL78328)		
BASF CORP, 2622E WA PERMIT EQUIV - ALL DIVERSION SOURCES (WSWA1124371)	Submit Renewal Application	A renewal application must be submitted three months prior to the expiration date. [N.J.A.C. 7:19- 2]

Text Requirements

All Phases

COHANSEY AQUIFER SOURCES, ALL WELLS LISTED (WSMS1134073)

1. The pumping equipment capacity may be increased and well locations may be changed provided that the maximum diversion rate and the monthly and annual allocation limits are not exceeded. The permittee must notify the Bureau of Water Allocation and Well Permitting in writing 30 days prior to any such changes. [N.J.A.C. 7:19- 2]

BASF CORP, 2622E WA PERMIT EQUIV - ALL DIVERSION SOURCES (WSWA1124371)

2. At a minimum, each diversion source flow meter shall be calibrated at least once every five years. [N.J.A.C. 7:19- 2]
3. The permittee shall investigate to the Department's satisfaction complaints by users of wells or surface water supplies within the zone of influence of its diversion to determine what impact the diversion has had on such wells or surface water supplies. A report on these investigations shall be forwarded to the Bureau of Water Allocation and Well Permitting. Any well or surface water supply which becomes damaged, dry, has reduced capacity, reduced water quality or is otherwise rendered unusable as a water source as a result of the permittee's diversions shall be repaired or replaced at the expense of the permittee. Work shall be in accordance with all State, County and Municipal construction standards for potable water. After reviewing all applicable investigational reports the Department of Environmental Protection, along with the USEPA, will make the final determination regarding the validity of such complaints, the scope or sufficiency of such investigations, and will determine how to resolve any problems resulting from the diversion. [N.J.A.C. 7:19- 2]
4. The operation of the water withdrawal project shall not cause long-term progressive lowering of groundwater levels, permanent loss of storage capacity or substantial impact on low flows of perennial streams or serve to spread the contamination. [N.J.A.C. 7:19- 2]
5. All well construction and decommissioning activity shall be conducted in accordance with N.J.A.C. 7:9D et seq. and applicable regulations. [N.J.A.C. 7:19- 2]
6. The local Health Department shall be notified of the proposed diversion within 30 days of the issuance date of this permit equivalency and prior to the start of pumping. [N.J.A.C. 7:19- 2]

Text Requirements

All Phases

BASF CORP, 2622E WA PERMIT EQUIV - ALL DIVERSION SOURCES (WSWA1124371)

7. All well owners within the estimated zone of influence of the diversion shall be notified within 30 days of the issuance date of this permit equivalency and prior to the start of pumping. [N.J.A.C. 7:19- 2]
8. The pumping equipment capacity may be increased and well locations may be changed provided that the maximum diversion rate and the water diverted monthly and annual allocation limits are not exceeded. The permittee must notify the Bureau of Water Allocation and Well Permitting in writing 30 days prior to any such changes. [N.J.A.C. 7:19- 2]
9. The issuance of this permit shall not be deemed to affect in any way action by the Department of Environmental Protection of the State of New Jersey on any future application. [N.J.A.C. 7:19- 2]
10. No change in plans or specifications shall be made except with the prior written permission of the Department of Environmental Protection of the State of New Jersey. [N.J.A.C. 7:19- 2]
11. The granting of this permit shall not be construed to in any way affect the title or ownership of property, and shall not make the Department of Environmental Protection or the State a party in any suit or question of ownership of property. [N.J.A.C. 7:19- 2]
12. This permit does not waive the obtaining of Federal or other State or local government consent when necessary. This permit is not valid and no work shall be undertaken until such time as all other required approval's and permits have been obtained. [N.J.A.C. 7:19- 2]
13. A copy of this permit shall be kept at the facility site, and shall be exhibited upon request of any authorized Department representative. [N.J.A.C. 7:19- 2]
14. The Department has the right to enter and inspect any site, building, or equipment, or any portion thereof, owned or operated by the permittee, at any time, in order to ascertain compliance or noncompliance with N.J.S.A. 58:1A-1 et seq., 58:4A-4.1 et seq., 58:12A-1 et seq., these rules, or any other agreement or order issued or entered into pursuant thereto. Such right shall include, but not be limited to, the right to require the testing of any equipment at the facility, to sketch or photograph any portion of the site, building or equipment, to copy or photograph any document or records necessary to determine such compliance or noncompliance, and to interview any employees or representative of the owner, operator, or permittee. Such right shall be absolute and shall not be conditioned upon any action by the Department, except the presentation of appropriate credentials as requested and compliance with appropriate standard safety procedures. [N.J.A.C. 7:19- 2]
15. This permit may be transferred, with the consent of the Department, but only for the identical use of the waters. [N.J.A.C. 7:19- 2]
16. If the authorized diversion privileges are not currently diverted, subject to contract, or reasonably required for a demonstrated future need, they shall revert back to the State upon renewal or modification of the permit. [N.J.A.C. 7:19- 2]
17. The permittee shall protect each source from vandalism, tampering, and contamination at all times. [N.J.A.C. 7:19- 2]
18. This permit shall expire as indicated on the permit approval cover page; however, any action required pursuant to a critical area designation shall take precedence over this expiration date. [N.J.A.C. 7:19- 2]

Administrative Hearing Request Checklist
And Tracking Form for Permits

1. Permit Being Appealed:

_____
Title and Type of Permit

_____ _____
Issuance Date of Permit Permit Number

2. Person Requesting Hearing:

_____ _____
Name/Company Name of Attorney (if applicable)

_____ _____

_____ _____
Address Address of Attorney

3. The following information must be included with the request:

a. The date the permittee received the final permit;
b. A copy of permit with a list of all permit conditions and issues contested;
c. The legal and factual questions at issue;
d. A statement as to whether or not the permittee raised each legal and factual issues during the public comment period of the permit;
e. Suggested revised or alternative permit conditions;
f. An estimate of the time required for the hearing;
g. A request, if necessary, for a barrier-free hearing location for physically disabled persons;
h. A clear indication of any willingness to negotiate a settlement with the Department prior to the Department's processing of the hearing request to the Office of Administrative Law; and
i. This form, completed with all of the information listed above, signed, and dated, including attachments, to:

   i. Office of Legal Affairs
   ATTENTION: Adjudicatory Hearing Requests
   Department of Environmental Protection
   401 East State Street
   P.O. Box 402
   Trenton, New Jersey 08625-0402

   ii. Terry D. Pilawski, Chief
   Mail Code 401-04Q
   Division of Water Supply & Geoscience
   Bureau of Water Allocation & Well Permitting
   P.O. Box 420
   Trenton, New Jersey 08625

   iii. All co-permittees (w/attachments)

4. Signature: _____ Date: _____

PHILIP D. MURPHY
GOVERNOR

SHEILA Y. OLIVER
LT. GOVERNOR

State of New Jersey

DEPARTMENT OF ENVIRONMENTAL PROTECTION

CATHERINE R. McCABE
Commissioner

Mail Code 401-04Q
Division of Water Supply & Geoscience
Water System Operations Element
Bureau of Water System Engineering
401 E. State Street - P.O. Box 420
Trenton, New Jersey 08625-0420
Tel #: (609) 292-2957 - Fax #: (609) 633-1495
https://www.nj.gov/dep/watersupply/

ePERMIT

The New Jersey Department of Environmental Protection grants this permit in accordance with your application, attachments accompanying same application and applicable law and regulations. This permit is also subject to further conditions and stipulations enumerated in the supporting documents which are agreed to by the permittee upon acceptance of the permit.

Permit No.	**Issuance Date**	**Effective Date**	**Expiration Date**
WPC190001	July 30th, 2002	April 1st, 2019	March 31st, 2020

Name and Address of Applicant	**Location of Activity/Facility**	
Basf Corporation 227 Oak Ridge Parkway Toms River, NJ 08754-0071	Toms River Twp, Ocean County	
Physical Connection ID No. **1373**	**Type of Permit** Renewed Physical Connection Permit	**Statute(s)** NJSA 58:11-9.1 et seq. & NJSA 58:12A-1 et seq.

This permit grants permission to: Maintain, own and operate a Physical Connection between an approved Public Community Water System and an Unapproved Water Supply at the named location(s), in consideration of the electronically submitted Permit Application received on January 17, 2019.

Type and Size of Backflow Preventer Valves Permitted:

Subject Item No.	Local Name	Size	Manuf.	Model No.	Serial No.	Type	BP	DC
WSPC0000177411	Meter Building	6 in	Watts	909	251458	Reduced Pressure Zone		

Location and supply details

BP = bypass DC = detector check

Subject Item No.	Location - Address	Lot	Block	Public Supply PWSID	Local Administrative Authority	Unapproved supply	Comments	Vault
WSPC0000177411	Oak Ridge Pkwy, Dover Twp			1507005	Ocean County Health Department	Industrial Well		

Approved by the Authority of:

Catherine R. McCabe
Commissioner
Department of Environmental Protection

Steven Pudney C.Eng. MICE, Section Chief
Bureau of Water System Engineering

* The word permit means approval, certification, registration etc.

NJEMS\sd_phys_connect_epermit_renew_auto_10/05/18

New Jersey is an Equal Opportunity Employer
Recycled Paper

Basf Corporation
1373

SDW Physical Connections Permit: WPC190001

Permit Requirements

Submittal/Action Requirements

Applicable Subject Items	Submittal/Action Type	Requirement
1373,BASF Corporation(WSPG1069000)	Submit Online Renewal Application	In accordance with N.J.A.C. 7:10-10.5(e) an online permit renewal shall be submitted at least sixty days prior to expiry of this permit. . [N.J.A.C. 7:10-10]

Text Requirements

All Phases

1373,BASF Corporation (WSPG1069000)

1. For this permit to remain valid, each backflow prevention device listed on this permit shall be inspected and tested for tightness under prevailing pressure conditions at least once every three months pursuant to N.J.A.C. 7:10-10.6(a)1. [N.J.A.C. 7:10-10]
2. For this permit to remain valid, each double check valve or double swing check valve assembly backflow prevention device listed on this permit shall be dismantled and internally inspected annually in the third or fourth calendar quarters. An internal inspection shall consist of the dismantling of a double check valve assembly or reduced pressure zone backflow preventer assembly to visually inspect the integrity of the internal mechanism including the clappers, discs, springs and facing rings pursuant to N.J.A.C. 7:10-10.6(a)2. After reassembly, the owner of the facility shall have the backflow prevention device tested for tightness to ensure integrity of the device. [N.J.A.C. 7:10-10]
3. A reduced pressure zone backflow preventer assembly shall not be subject to the internal inspection pursuant to N.J.A.C. 7:10-10.6(a)2 above except for routine maintenance as specified by the manufacturer, or for investigation of a malfunction, or as specifically required by the supplier of water pursuant to N.J.A.C. 7:10-10.6(a)4. [N.J.A.C. 7:10-10]
4. The Department shall approve a reduction in the frequency of the pressure tests conducted pursuant to N.J.A.C. 7:10-10.6(a)1 if the owner of the facility in which the physical connection is located demonstrates to the Department that the facility is not in operation during any time in a calendar year pursuant to N.J.A.C. 7:10-10.6(a)3. [N.J.A.C. 7:10-10]
5. For this permit to remain valid, the inspections and testing required pursuant to N.J.A.C. 7:10-10.6(a) shall be conducted by a certified tester who holds a valid backflow prevention device tester's certificate issued by a certifying agency approved by the Department pursuant to N.J.A.C.

7:10-10.8. [N.J.A.C. 7:10-10]

6. **No administrative change to an existing Physical Connection Permit shall be made without notifying the New Jersey Department of Environmental Protection within 14 days of such change pursuant to N.J.A.C. 7:10-10.7(a). [N.J.A.C. 7:10-10]**
7. **No modification to an approved physical connection installation as listed in N.J.A.C. 7:10-10.7(b) shall be made prior to modifying this physical connection permit, except as provided in N.J.A.C. 7:10-10.7(d). [N.J.A.C. 7:10-10]**
8. **A copy of this Permit and records of pressure tests, maintenance and annual internal inspections on the Quarterly Test and Maintenance shall be kept at the facility, for at least five (5) years and shall be exhibited upon request of Department Personnel, supplier of water or administrative authority. N.J.A.C. 7:10-10.2(f) [N.J.A.C. 7:10-10]**
9. **Upon completion of each test and inspection, the owner of the facility shall have the results and certifications of those present recorded on the Quarterly Test and Maintenance Report Form, and shall mail copies to the local administrative authority and supplier of water within 5 days of the test. [N.J.A.C. 7:10-10]**
10. **The permittee is advised that renewal of the permit will require the online submission of the quarterly test results by the Certified Tester prior to the online renewal submission. [N.J.A.C. 7:10-10]**
11. **The permit is revocable, or subject to modification or change, at any time, when in the judgement of the New Jersey Department of Environmental Protection such revocation, modification or change shall be necessary. [N.J.A.C. 7:10-10]**
12. **The issuance of this permit shall not be deemed to affect in any way action by the New Jersey Department of Environmental Protection on any future application. [N.J.A.C. 7:10-10]**
13. **The granting of this permit shall not be construed in any way to affect the title or ownership of property, and shall not make the New Jersey Department of Environmental Protection or the State a party in any suit or question of ownership of property. [N.J.A.C. 7:10-10]**
14. **This permit does not waive the obtaining of Federal or other State or local Government consent when necessary. This permit is not valid and no work shall be undertaken until such time as all other required approvals and permits such as plumbing permit (N.J.S.A. 5:23-2.23) have been obtained. [N.J.A.C. 7:10-10]**
15. **As per N.J.A.C. 7:10-10.10, an applicant for a permit under this subchapter or any person, subject to the limitation on third party appeal rights set forth in P.L. 1993, c.359 (N.J.S.A. 52:4B-3.1 through 3.3), who believes himself or herself to be aggrieved with respect to any decision made by the Department regarding such permit application submitted pursuant to this subchapter, may contest the decision and request an adjudicatory hearing pursuant to the Administrative Procedure Act, N.J.S.A. 52:14B-1 et seq., and the Uniform Administrative Procedure Rules, N.J.A.C. 1:1 within 20 calendar days of the receipt of the permit decision. Filing details and the required form to be submitted are available at www.state.nj.us/dep/watersupply/dws_const.html [N.J.A.C. 7:10-10]**

STATE OF NEW JERSEY
DEPARTMENT OF ENVIRONMENTAL PROTECTION
DIVISION OF LAND USE REGULATION
Mail Code 501-02A, P.O. Box 420, Trenton, New Jersey 08625-0420
Telephone: (609) 777-0454 or Fax: (609) 777-3656
www.nj.gov/dep/landuse

PERMIT

In accordance with the laws and regulations of the State of New Jersey, the Department of Environmental Protection hereby grants this permit to perform the activities described below. This permit is revocable with due cause and is subject to the terms, conditions, and limitations listed below and on the attached pages. For the purpose of this document, "permit" means "approval, certification, registration, authorization, waiver, etc." Violation of any term, condition, or limitation of this permit is a violation of the implementing rules and may subject the permittee to enforcement action.

Approval Date
December 13, 2019

Expiration Date
December 12, 2024

Permit Number(s):	**Type of Approval(s):**	**Enabling Statute(s):**
1507-19-0028.1 LUP190001	CAFRA Individual Permit-Commercial/Industry/Public	NJSA 13:19-1 et seq.

Permittee:

Scott Hesser
Toms River Merchant Solar, LLC
c/o EDF Renewables Distributed Solutions, Inc.
5 Commerce Avenue
West Lebanon, NH 03784

Site Location:

Block(s) & Lot(s): [411, 6.02] [411, 6.03]

Municipality: Township of Toms River

County: Ocean

Description of Authorized Activities:

This permit authorizes the construction of a ground-mounted, 35 megawatt direct-current solar electric generating facility on the former operational areas of the Ciba-Geigy Chemical Corporation site, as shown on the plans referenced on the last page of this permit.

This permit is authorized under and in compliance with the Rules on Coastal Zone Management, N.J.A.C. 7:7-1.1 et seq., as amended through July 15, 2019.

The Director of the Division of Land Use Regulation hereby makes the applicable findings as required by Sections 10 & 11 of the CAFRA statute (N.J.S.A. 13:19-1 et seq.) and the Rules on Coastal Zone Management will be met to the satisfaction of the Bureau of Coastal Regulation. The issuance of this permit is contingent upon compliance with the conditions below. Failure to comply with any or all conditions may result in appropriate enforcement action and revocation of this permit.

Prepared by:

Mark C. Davis

Received and/or Recorded by County Clerk:

If the permittee undertakes any regulated activity, project, or development authorized under this permit, such action shall constitute the permittee's acceptance of the permit in its entirety as well as the permittee's agreement to abide by the requirements of the permit and all conditions therein.

This permit is not valid unless authorizing signature appears on the last page.

TOWNSHIP OF TOMS RIVER
ZONING PERMIT APPLICATION

A ZONING PERMIT APPLICATION MUST INCLUDE ITEMS ON THE DETAILED "ZONING PERMIT INSTRUCTIONS" HANDOUT AND:

1) THIS COMPLETED APPLICATION FORM
2) PLOT PLAN OR SURVEY MARKED TO ADEQUATELY DEPICT THE PROPOSAL
3) ARCHITECTURAL PLANS AND/OR ADEQUATE DETAILS
4) A COPY OF THE RESOLUTION COMPLIANCE CERTIFICATE IF DESIGN HAS PRIOR BOARD APPROVAL
5) WRITTEN CONSENT FROM THE LAND OWNER
6) "RESIDENTIAL DEVELOPMENT FEES TO FUND AFFORDABLE HOUSING" FORM IF APPLICABLE
7) OTHER SUBMITTALS THAT MAY BE REQUIRED BY THE ZONING OFFICER

APPLICANT Toms River Merchant Solar, LLC PHONE _____
(circle one) OWNER CONTRACTOR TENANT CONTRACT PURCHASER

APPLICANT'S ADDRESS 5 Commerce Ave. W. Lebanon, NH
APARTMENT P.O. BOX STREET CITY/TOWN ZIP CODE

E-MAIL ADDRESS: _____ FAX: _____

BLOCK 411 LOT 6.02 + 6.03 SITE ADDRESS 227 Oak Ridge Pkwy

APPROVAL REQUESTED (PLEASE CHECK ALL THAT APPLY):

New single-family(S/F) dwelling*	___	New two-family dwelling*	___
S/F dwelling addition under 150 sq. ft.	___	House raise	___
S/F dwelling addition over 150 sq. ft.*	___	Zoning permit update	___
Accessory building	___	Shed less than 150 sq. ft.	___
Pool	___	Pool heater	___
Deck	___	Fence	___
Generator or air conditioning	___	Above ground tank (S/F)	___
Commercial tent*	___	Sign*	___
Trailer	___	Clothing bin ($30.00 ea.)	___
Special event signage*	___	Verification letter *	___

This request has prior approval from the Zoning Board of Adjustment or Planning Board X
Change of commercial tenant (please submit "STATEMENT OF OPERATIONS/DESCRIPTION OF USE" form)*..... ___
Other (explain)..... MAJOR SITE PLAN / SOLAR FIELD / BASF

With the exception of applications marked by an asterisk* all forms must be accompanied by a $50.00 fee pursuant to §348-3.4. The fee for categories marked by an asterisk is $100.00. With the exception of decks , any construction, pools and/or grading disturbing over 150 square feet of the lot area will require an additional review fee of $125.00 pursuant to §348-3.7A(3)(k).

APPLICATION FEE AMOUNT ENCLOSED: $100.—

PLEASE DO NOT WRITE BELOW THIS LINE - FOR OFFICE USE ONLY

Application number 20-0516 Date received 4/28/20 Receipt number 263035

STATUS	DATE	COMMENT
Submittal	_____	_____
Denied	_____	_____
Resubmittal	_____	_____
Approved	6-4-20	per Cert of Resp/Compliance 2-22-20 Just signed plans

APPLICANT NOTIFIED BY: **DENIAL** **APPROVAL**
PHONE

OCEAN COUNTY
SOIL CONSERVATION DISTRICT

714 Lacey Road, Forked River, NJ 08731 *Tel* (609) 971-7002 *Fax* (609) 971-3391
www.SoilDistrict.org

February 12, 2020

Toms River Merchant Solar LLC
5 Commerce Ave.
West Lebanon, NJ 03784

Re: *Toms River Merchant Solar LLC - Site Plan*
SCD Certification Code: KP7A6X8V8F
Chapter 251 Identification Number: 21073
Acres: 179
Block: 411 Lot: 6.02, 6.03

Dear Applicant:

Your proposed project requires a Stormwater Construction General Permit (5G3) pursuant to N.J.S.A. 4:24-39 et seq. As the applicant, you are required to submit applications and payment electronically utilizing the NJDEP Stormwater Construction Activity E-Permitting System.

You must file for this permit prior to starting soil disturbing activities.

In order to access the E-permitting system you must first become a registered user of NJDEP Online at http://www.nj.gov/dep/online. Once registered, the following information is required to complete the E-Permit, Stormwater Construction General Permit Request for Authorization (RFA).

1. The Application/ Project name.

2. The location of the site – Physical Address, NJ State Plane Coordinates, Block(s) and Lot(s).

3. Highlands Area Approval/ Exemption (*if site is located within the Highlands*)

4. Contact information (*address, email, and phone*) for – Fees/ Billing contact, Owner, and Permittee.

5. Chapter 251 Identification Number and SCD Certification Code (***provided above****)

> *These codes are unique to your stormwater RFA and Chapter 251 approval. Enter these codes in the E-permitting system, on the screen titled "SCD Certified Plan". The codes are **case sensitive** and each code may only be used once.

6. Area of land disturbance (***provided above***)

7. The date activity will commence.

8. Identification number of all existing NJPDES permits for the facility.

9. A project description and description of current land use.

10. Certification PIN (*this PIN is generated and emailed to you when registering a NJDEP online account*).

11. A method of payment – checking/ savings account, voucher payment, credit card

If you have any questions regarding this information or any other aspect of the E-Permitting system please contact Daniel Kuti, NJDEP Bureau of Nonpoint Pollution Control at (609) 633-7021 or at PortalComments@dep.state.nj.us

OCEAN COUNTY
SOIL CONSERVATION DISTRICT

714 Lacey Road, Forked River, NJ 08731 *Tel* (609) 971-7002 *Fax* (609) 971-3391
www.SoilDistrict.org

SOIL EROSION AND SEDIMENT CONTROL CERTIFICATION
N.J.S.A. 4:24-39, ET. SEQ., CHAPTER 251, P.L.1975

CERTIFICATION DATE: February 11, 2020

Toms River Merchant Solar LLC
5 Commerce Ave.
West Lebanon, NJ 03784

Re: SCD#21073; Toms River Merchant Solar LLC - Site Plan; Block 411, Lot 6.02, 6.03; 227 Oak Ridge Parkway; Toms River Township

Pursuant to Chapter 251, Soil Erosion and Sediment Control Act, P.L. 1975, the Ocean County Soil Conservation District, hereby, grants certification of the soil erosion and sediment control plan for the above-referenced project, subject to the following:

1. The applicant is required to schedule a pre-construction meeting with the District prior to the start of soil disturbance activities. The applicant must also notify the District, by mail or fax, at least 48 hours prior to initial land disturbance.

2. Any changes to the certified Soil Erosion and Sediment Control Plan will require the submission of a revised Soil Erosion and Sediment Control Plan to the District for review and approval.

3. The applicant must notify the District when the project is completed.
NOTE: No certificate of occupancy can be granted by a municipality until a report of compliance is issued by the District.

4. The applicant must carry out all land disturbance activities in accordance with the Standards for Soil Erosion and Sediment Control in New Jersey, promulgated by the State Soil Conservation Committee. A copy of the certified plan and a copy of these provisions must be kept on the job site at all times.

5. Any conveyance of the project (or portion thereof) will transfer full responsibility for compliance to subsequent owner(s). The District must be notified in writing of any change of ownership.

6. This certification is limited to the controls specified in this plan. It is not authorization to engage in the proposed land use unless such use has been previously approved by the municipality or other controlling agency. THIS CERTIFICATION SHALL EXPIRE IN 3-1/2 YEARS.

Failure to comply with any of the conditions listed may result in the issuance of a Stop Construction Order.

NOTE: (1) All sediment spilled, dropped, washed or tracked onto roadways (public or private), or other impervious surfaces must be removed immediately.

NOTE: (2) Additional Measures will be required if erosion problems develops.

NOTE: (3) At the time of the final inspection, you are required to submit a Soil Compaction Mitigation Verification Form. You must also provide confirmation that the proper type and amount of seed, lime and fertilizer have been used for permanent stabilization work.

NOTE: (4) The revised Standards for Soil Erosion and Sediment Control in NJ require applicants to perform a soil test to determine the lime application rate prior to permanent stabilization.

William J. Pollock

SUPERVISOR

OCEAN COUNTY
SOIL CONSERVATION DISTRICT

714 Lacey Road, Forked River, NJ 08731 Tel (609) 971-7002 Fax (609) 971-3391
www.SoilDistrict.org

DISTRICT POLICY FOR PRE-CONSTRUCTION MEETINGS

In order to improve the implementation of each certified Soil Erosion and Sediment Control Plan, the Ocean County Soil Conservation District will require all applicants to have a pre-construction meeting prior to the start of construction of any land disturbance activities. This includes demolition.

The intent of the pre-construction meeting is to improve the lines of communications between the District, applicant and the site contractor. This will allow District staffs to collect the latest address, phone, and fax numbers for the applicant, and others that are responsible for the project during construction.

The District will have the opportunity to outline the basic requirements of the Soil Erosion and Sediment Control Plan, point out critical areas that may need specific attention, explain inspection procedures and the actions the District will take if violations of the certified plan occur. The District will also discuss the requirements that need to be completed in order for a Report of Compliance to be issued. Additionally, there will be a review of stormwater permit requirements, if applicable.

The applicant and the site contractor will have the opportunity to explain the project's sequence of construction in more detail and discuss any potential problems that they anticipate during the construction of the project.

When possible, the pre-construction meeting should be held in coordination with the municipal Engineer, at his or her convenience. The pre-construction meeting should be held at the job site. However, if that is not possible, meetings can be held at the Engineer's office, the District office, or at some other mutually agreeable location.

OCEAN COUNTY SOIL CONSERVATION DISTRICT
714 LACEY ROAD, FORKED RIVER NJ 08731
TELEPHONE: 609-971-7002 FAX: 609-971-3391

SCD #_____

REV.08/10

Item #3 of your certification letter states:
THE APPLICANT MUST NOTIFY THE DISTRICT OFFICE OF PROJECT COMPLETION. NO CERTIFICATE OF OCCUPANCY CAN BE GRANTED UNTIL A REPORT OF COMPLIANCE IS ISSUED BY THE DISTRICT.

♦ In order for this office to issue a Report of Compliance, we must perform a field inspection of the completed work.

♦ **NOTIFICATION IS TO BE GIVEN TO THE DISTRICT A MINIMUM OF FIVE (5) WORKING DAYS IN ADVANCE OF THE DATE REQUESTED. The District cannot guarantee inspection scheduling if less notice is given.**

NOTE: At the time of your final inspection, you are required to present evidence that the proper type & amount of materials (seed, lime, fertilizer) have been used for permanent stabilization work

♦ If a requested field inspection shows the project to be incomplete, there will be a re-inspection fee of $150.00.

♦ The information on the form below is required when you request an inspection. You can mail or fax your request. If your request is by telephone, you must also provide the following information:

APPLICANT'S NAME:_____ SCD #_____

TELEPHONE #_____FAX#_____

NAME OF PROJECT:_____

MUNICIPALITY:_____

BLOCK:_____ LOT:_____STREET ADDRESS:_____

BLOCK:_____ LOT:_____STREET ADDRESS:_____

BLOCK:_____ LOT:_____STREET ADDRESS:_____

Use a 2nd sheet for additional lots. Include your SCD# at the top of the page.

REQUESTED DATE OF INSPECTION:*_____***Allow FIVE (5) WORKING DAYS NOTICE!**

FOR DISTRICT USE:

DATE REQUEST RECEIVED:_____ INSPECTOR:_____

RECEIVED BY: DATE OF INSPECTION:

48 HOUR ADVANCE NOTIFICATION OF SOIL DISTURBANCE
OCSCD FAX NO. 609.971.3391

SOIL EROSION AND SEDIMENT CONTROL ACT
NJ.S.A. 4:24-39, ET SEQ.
CHAPTER 251, P.L. 1975

OCSCD APPLICATION NO. SCD#_____

OCSCD CERTIFICATION DATE_____

LATEST PLAN REVISION DATE_____ **(if applicable)**

NAME OF PROJECT_____

BLOCK(S) & LOT(S)_____

PROJECT STREET ADDRESS_____

MUNICIPALITY_____

JOB SUPERVISOR / FIELD AGENT'S NAME_____

TELEPHONE_____ **CELL**_____ **FAX**_____

MAILING ADDRESS_____

_____

OWNER'S NAME_____

TELEPHONE_____ **CELL**_____ **FAX**_____

MAILING ADDRESS_____

_____

DATE OF PRE-CONSTRUCTION MEETING _____ **(if known)**

PROPOSED DATE CONSTRUCTION WILL BEGIN_____

This form must be received by the District at least 48 hours before construction is to start. Failure to do so may result in a $300.00 non-compliance fee and Violation Notice.

_____ _____

Submitted By (Please Print Name) ***Date***

48hour(2) *REV.8.27.12*

New Jersey Department of Agriculture Soil Erosion and Sediment Control Program

Soil Compaction Mitigation Verification Form

Authority: N.J.S.A. 4:24-39 et seq, and P.L. 2010, Chpt. 113

Instructions. This form is to be used only when your soil erosion and sediment control plan denotes areas of the site that are subject to soil compaction mitigation (testing and/or remediation) in accordance with the Standard for Land Grading, N.J.A.C. 2:90-1.3 (a)2, Chpt. 19 (rev. 2017). You have the option to test subsoil in areas of your site for excessive soil compaction. However, remediation (tilling or ripping 6" deep) is required in these areas if testing determines that subsoils are excessively compacted (see below). This form must be filled out completely and submitted to the local soil conservation district prior to the district performing a Report of Compliance inspection.

If an inspection is being requested during a non-growing season (typically summer and winter), testing and/or remediation work may be postponed (box III below) until the next optimum growing season. A new self-certification form will be required at that time when compaction testing or remediation, and vegetation establishment is done.

Date_____ Project Name_____ SCD # _____

County_____ Municipality_____

Street Address _____ Block_____ Lot____

Name of person performing the test (print)_____
(Attach NJPE Certification for Tube[1] or Densitometer Test[2])

Organization/Affiliation with project owner_____

Certification: I hereby certify that the test(s) and / or remediation procedures performed on the subject property were conducted by me or under my supervision and that the information accompanying this form represents the actual work or testing which took place in accordance with the requirements for "Soil Management and Preparation" under the Standard for Land Grading.

Signature _____ Date _____

Place a check ☒in the appropriate category below.

☐ **I. Testing for Presence of Soil Compaction in subsoil.** ☐ **Check here to indicate passing test results.**

Attach copy of plan, plan portion or sketch showing locations where compaction was tested.

Wire test- Insert 15 gage wire (i.e. survey flag) to a 6" depth in subsoil without bending, minimum.

Penetrometer – 6" deep at less than 300 psi, minimum.

For Tube[1] and Densitometer[2] Tests – report direct reading of bulk density in gm/cc, as specified in table 19-1, "Maximum Dry Bulk Densities by soil type, Standard for Land Grading. **Attach certified test results.**

Type of test (circle) Wire Test Penetrometer Tube Bulk Density Test [1] Nuclear Densitometer[2]

☐ **II. Remediation Work Performed**. (performed in lieu of testing or as a result of test failure)

Deep tillage of subsoil within area(s) shown on plan, minimum, of 6" deep, prior to topsoil application. Attach a copy of plan, plan portion or sketch showing locations where remediation was performed.

☐ **III. Non-Growing Season Postponement.**

Testing and/ or remediation has been postponed due to non-growing season conditions. Either testing or remediation will be conducted for this property at the beginning of the next growing season (following spring or fall) at which time this form will be resubmitted.

District Use Only.

Received by_____ Date _____

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[1] This test shall be certified by a New Jersey Licensed Professional Engineer utilizing only undisturbed samples (reconstitution of the sample not permitted) collected utilizing the procedure for Soil Bulk Density Tests as described in the USDA NRCS Soil Quality Test Kit Guide, Section 1-4, July 2001.

[2] This test shall be certified by a New Jersey Licensed Professional Engineer and conducted by a nuclear gauge certified inspector pursuant to ASTM D6938.

FACT SHEET

Soil De-compaction and Testing Requirements
Topsoiling and Land Grading Standards Condensed Notes

Soil Compaction Testing Requirements

1. Subgrade soils **prior to the application of topsoil** (see permanent seeding and stabilization notes for topsoil requirements) shall be free of excessive compaction to a depth of 6.0 inches to enhance the establishment of permanent vegetative cover.

2. Areas of the site which are subject to compaction testing and/or mitigation are **graphically denoted** on the certified soil erosion control plan. See example site plan at: http://www.nj.gov/agriculture/divisions/anr/nrc/njerosion.html

3. **Compaction testing locations** are denoted on the plan. A copy of the plan or portion of the plan shall be used to mark locations of tests, and attached to the **Soil Compaction Mitigation Verification Form**, available from the local soil conservation district or http://www.nj.gov/agriculture/divisions/anr/nrc/njerosion.html. This form must be filled out and submitted prior to receiving a certificate of compliance from the district.

4. In the event that **testing indicates compaction** in excess of the maximum thresholds indicated for the simplified testing methods (see details below), the contractor/owner shall have the **option** to perform either **(1)** compaction mitigation over the entire mitigation area denoted on the plan (excluding exempt areas), or **(2)** perform additional, more detailed testing to establish the limits of excessive compaction whereupon only the excessively compacted areas would require compaction mitigation. Additional detailed testing shall be performed by a trained, licensed professional.

Compaction Testing Methods

A. Probing Wire Test (see detail)
B. Hand-held Penetrometer Test (see detail)
C .Tube Bulk Density Test (licensed professional engineer required
D. Nuclear Density Test (licensed professional engineer required)

Note: Additional testing methods which conform to ASTM standards and specifications, and which produce a dry weight, soil bulk density measurement may be allowed subject to District approval.

Soil compaction testing is not required if/when subsoil compaction remediation (scarification/tillage (6" minimum depth) or similar) is proposed as part of the sequence of construction.

Procedures for Soil Compaction Mitigation

Procedures shall be used to mitigate excessive soil compaction **prior to placement of topsoil** and establishment of permanent vegetative cover.

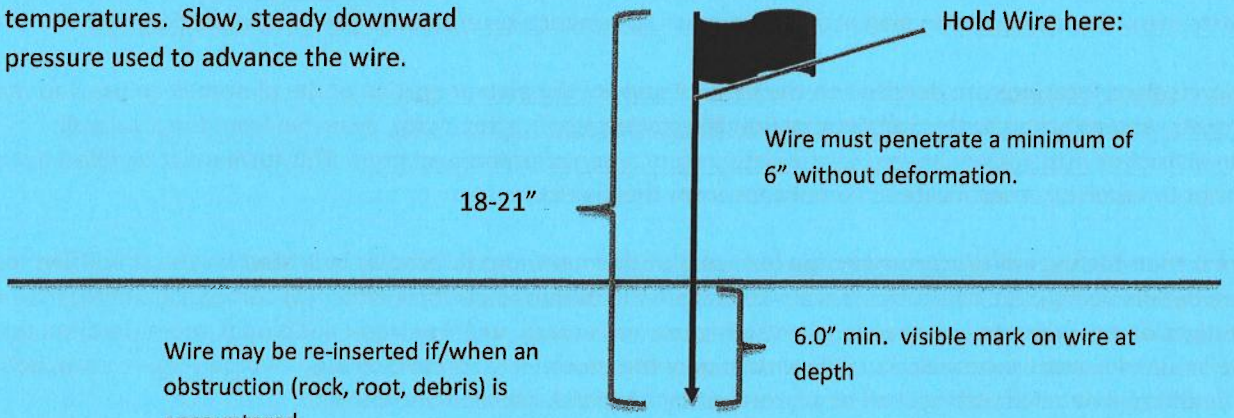
Restoration of compacted soils shall be through deep scarification/tillage (6" minimum depth) where there is no danger to underground utilities (cables, irrigation systems, etc.). In the alternative, another method as specified by a New Jersey Licensed Professional Engineer maybe substituted subject to District Approval.

Effective Date 12/7/2017

Simplified Testing Methods

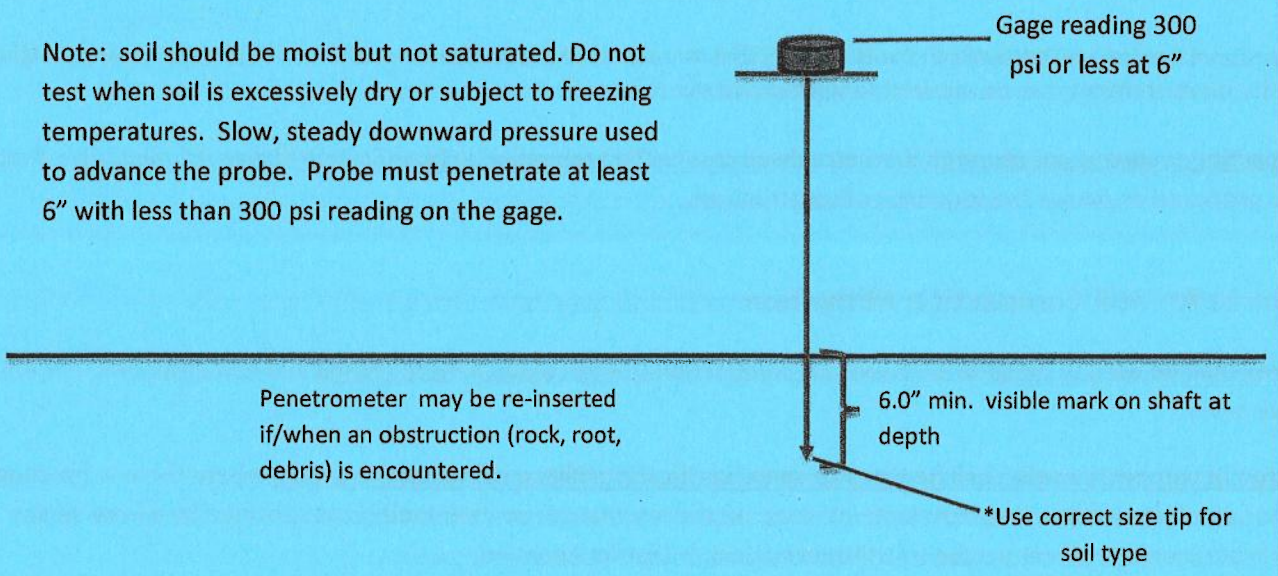
Probing Wire Test- 15.5 ga steel wire (survey flag)

Note: soil should be moist but not saturated. Do not test when soil is excessively dry or subject to freezing temperatures. Slow, steady downward pressure used to advance the wire.



Handheld Soil Penetrometer Test

Note: soil should be moist but not saturated. Do not test when soil is excessively dry or subject to freezing temperatures. Slow, steady downward pressure used to advance the probe. Probe must penetrate at least 6" with less than 300 psi reading on the gage.



REMINGTON & VERNICK ENGINEERS

9 Allen Street
Toms River, NJ 08753
O: (732) 286-9220
F: (732) 505-8416

February 22, 2020

Ms. Lucia Lynch, Secretary
Toms River Township Planning Board
33 Washington Street
Toms River, NJ 08753

Re: Toms River Merchant Solar, LLC (Twp. Escrow # X-23-P01-606)
PB #19-030
Preliminary and Final Major Site Plan - Letter of Compliance
Block 411, Lots 6.02 & 6.03
Location: 227 Oak Ridge Parkway
Applicant: Toms River Merchant Solar, LLC
Owner: BASF Corporation
Our File: 1508-P-708

Dear Ms. Lynch:

In accordance with your authorization, our office has reviewed the following Preliminary and Final Major Site plans for the above-referenced application, prepared by Weston Solutions.:

Sheet No.	Plan	Date	Last Revised
1 of 35	Cover Sheet	Nov. 2019	1/14/20
2 of 35	Notes and Legend	Nov. 2019	1/14/20
3 of 35	Site Development Plan	Nov. 2019	1/14/20
4 of 35	Existing Condition & Demolition Key Plan	Nov. 2019	1/14/20
5 of 35	Exist. Condition & Demolition Plan – Sheet 1 of 7	Nov. 2019	1/14/20
6 of 35	Exist. Condition & Demolition Plan – Sheet 2 of 7	Nov. 2019	1/14/20
7 of 35	Exist. Condition & Demolition Plan – Sheet 3 of 7	Nov. 2019	1/14/20
8 of 35	Exist. Condition & Demolition Plan – Sheet 4 of 7	Nov. 2019	1/14/20
9 of 35	Exist. Condition & Demolition Plan – Sheet 5 of 7	Nov. 2019	1/14/20
10 of 35	Exist. Condition & Demolition Plan – Sheet 6 of 7	Nov. 2019	1/14/20
11 of 35	Exist. Condition & Demolition Plan – Sheet 7 of 7	Nov. 2019	1/14/20
12 of 35	Preliminary & Final Site Key Plan	Nov. 2019	1/14/20
13 of 35	Preliminary & Final Site Plan – Sheet 1 of 7	Nov. 2019	1/14/20
14 of 135	Preliminary & Final Site Plan – Sheet 2 of 7	Nov. 2019	1/14/20
15 of 35	Preliminary & Final Site Plan – Sheet 3 of 7	Nov. 2019	1/14/20
16 of 35	Preliminary & Final Site Plan – Sheet 4 of 7	Nov. 2019	1/14/20
17 of 35	Preliminary & Final Site Plan – Sheet 5 of 7	Nov. 2019	1/14/20
18 of 35	Preliminary & Final Site Plan – Sheet 6 of 7	Nov. 2019	1/14/20
19 of 35	Preliminary & Final Site Plan – Sheet 7 of 7	Nov. 2019	1/14/20
20 of 35	Soil Erosion & Sediment Control Key Plan	Nov. 2019	1/14/20
21 of 35	Soil Erosion & Sediment Control Plan – Sheet 1/7	Nov. 2019	1/14/20
22 of 35	Soil Erosion & Sediment Control Plan – Sheet 2/7	Nov. 2019	1/14/20
23 of 35	Soil Erosion & Sediment Control Plan – Sheet 3/7	Nov. 2019	1/14/20

24 of 35	Soil Erosion & Sediment Control Plan – Sheet 4/7	Nov. 2019	1/14/20
25 of 35	Soil Erosion & Sediment Control Plan – Sheet 5/7	Nov. 2019	1/14/20
26 of 35	Soil Erosion & Sediment Control Plan – Sheet 6/7	Nov. 2019	1/14/20
27 of 35	Soil Erosion & Sediment Control Plan – Sheet 7/7	Nov. 2019	1/14/20
28 of 35	Soil Erosion & Sediment Control Notes – Sheet ½	Nov. 2019	1/14/20
29 of 35	Soil Erosion & Sediment Control Notes – Sheet 2/2	Nov. 2019	1/14/20
30 of 35	Soil Erosion & Sediment Control Details	Nov. 2019	1/14/20
31 of 35	Existing Condition Drainage Area Map	Nov. 2019	1/14/20
32 of 35	Proposed Condition Drainage Area Map	Nov. 2019	1/14/20
33 of 35	Construction Details – Sheet 1 of 3	Nov. 2019	1/14/20
34 of 35	Construction Details – Sheet 2 of 3	Nov. 2019	1/14/20
35 of 35	Construction Details – Sheet 3 of 3	Nov. 2019	1/14/20

The plans are in full compliance with previous reports and the approving resolution.

Enclosed please find an original Resolution Compliance Certificate for the above-referenced project as required by the Township of Toms River.

This concludes our review of this application.

We thank you in advance for your time and cooperation in this matter and if you should have any questions please do not hesitate to contact our Toms River office.

God Bless America,

REMINGTON & VERNICK ENGINEERS

for

Alan B. Dittenhofer, P.E., P.P., C.M.E

EJP/ABD:ag

Enclosure

cc: Mr. Robert Chankalian, Jr., P.E. – Township Engineer
Mr. David Roberts, PP – Township Planner
Mr. Gregory P. McGuckin, Esq. – Planning Board Attorney
Toms River Merchant Solar, LLC – Applicant
BASF Corporation - Owner
Mr. Joseph Dietrich, P.E. – Applicant's Engineer
Mr. Steven P. Gouin, Esq. – Applicant's Attorney
Mr. Ernie Peters, P.E., P.P., C.M.E. – RVE

RESOLUTION COMPLIANCE CERTIFICATE

TOWNSHIP OF TOMS RIVER

APPLICANT **Toms River Merchant Solar, LLC**

BLOCK (S) **411** LOT(S) **6.02 & 6.03**

SITE ADDRESS **227 Oak Ridge Parkway**

☐ **BOARD OF ADJUSTMENT**

APPROVAL DATE _____ RESOLUTION DATE _____

VARIANCE: USE _____ BULK _____

SUBDIVISION: MINOR _____ MAJOR _____

SITE PLAN: MINOR _____ MAJOR _____

CERTIFICATE OF NONCONFORMANCE _____

OTHER _____

☒ **PLANNING BOARD**

APPROVAL DATE **10/16/2019** RESOLUTION DATE **12/4/2019**

SUBDIVISION: MINOR _____ MAJOR _____

SITE PLAN: MINOR _____ MAJOR **X**

OTHER _____

NOTE: THIS IS NOT A ZONING PERMIT. THIS RESOLUTION COMPLIANCE CERTIFICATE AUTHORIZES THE APPICANT TO APPLY FOR A ZONING PERMIT.

*AFFORDABLE HOUSING TRUST FUND PAYMENT REQUIRED: YES ____ NO **X**

I HEREBY CERTIFY THAT THE APPLICANT HAS SATISFIED ALL CONDITIONS OF APPROVAL

_____ 24FEB2020

BOARD ENGINEER DATE

Alan B. Dittenhofer, P.E., P.P., C.M.E.

Distribution of Copies - Township Engineer
Assistant Township Engineer
Applicant
Zoning Officer
File

Last revised: 04/12/07

\\tax\sys\mbenedetto\boa\rescompliancecert

OCEAN COUNTY PLANNING BOARD
PO Box 2191
129 Hooper Avenue
Toms River, New Jersey 08754

Reorganizational meeting, Wednesday, January 15, 2020, 6:00 PM, Engineering Conference Room, Third Floor, 129 Hooper Avenue, Toms River, New Jersey.

The first order of business was the nomination and election of Chairman and Vice Chairman. Mr. Budesa opened the floor for nominations. On a nomination by Mr. Sutton, seconded by Ms. McCrystal, James Russell was nominated for Chairman. The motion was unanimously carried. On a motion by Mr. Bilotta, seconded by Ms. McCrystal, Earl Sutton was nominated for Vice Chairman. The motion was unanimously carried. There being no other nominations for Chairman and Vice Chairman, on a motion by Ms. McCrystal, seconded by Mr. Bilotta, the nominations for Chairman and Vice Chairman were closed and James Russell was elected Chairman and Earl Sutton was elected Vice Chairman. The motion was unanimously carried.

Congratulations Mr. Russell, Chairman, and Mr. Sutton, Vice Chairman

Chairman Russell presiding. Attending: Earl Sutton, Elaine McCrystal, Joseph Bilotta, Scott Tirella, Dennis Liberatore, Joseph Marra, John Ernst, Robert Budesa, Anthony Agliata and Robin Florio. Chairman Russell welcomed new members Dennis Liberatore and Joseph Marra.

Chairman Russell asked if the Planning Board meeting was in compliance with the Open Public Meetings Act. Ms. Florio advised the Chairman that adequate notice of this meeting was provided.

On a motion by Mr. Sutton, seconded by Ms. McCrystal, the minutes of the meeting of December 18, 2019 were moved for approval. The motion was unanimously carried.

SUBDIVISION AND SITE PLAN REVIEW

BRICK: Lot 7, Block 1133 (BRT1964A) Spruce Equities, LLC.

This eight-lot preliminary major subdivision is for six single family residences, one detention basin lot, and one open space lot with a proposed cul-de-sac to be located on Van Zile Road. The plans indicate that the proposed curb will be constructed at 20' from centerline in accordance with the County Master Plan. On a motion by Mr. Tirella, seconded by Ms. McCrystal, this major subdivision was given preliminary approval contingent upon the applicant to address the following items: (1) dimension the existing half width right-of-way on the final plat and since the half width right-of-way is less than 30' from centerline, submit a deed of dedication and metes and bounds description for an additional right-of-way dedication to 30' from centerline to Ocean County, (2) provide a 15:1 paved taper back to the existing edge of pavement to the north, (3) obtain and provide road easements from adjoining lot owners for the area of the 15:1 paved taper that falls outside the existing right-of-way, (4) submit a sight right easement form and metes and bounds description for sight triangle easements at the proposed access point in accordance with County standards to Ocean County, (5) address the following traffic comments: a) provide a vehicle circulation plan to demonstrate the design vehicle can enter and exit the site without encroaching into opposing lanes, b) the report refers to North Bay Avenue and Church Road, neither of which are adjacent to the site, revise accordingly, (6) provide a drainage design to be reviewed and approved by the Ocean County Engineer (per drainage memo dated 1/15/20), (7) dimension the right-of-way half width and full width on the final plat, (8) add the County road improvement plans to the Index of Sheets, (9) revise cross sections for the County road so that the limit of pavement widening maintains a 1%-3% cross slope and positive gutter flow, (10) pay an off-tract traffic improvement fee in an amount to be determined by the Ocean County Engineer, and (11) pay an off-tract drainage improvement fee in an amount to be determined by the Ocean County Engineer. All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

BRICK: Lots 9 Block 903.11 (BRT1995A) Folsom Firehouse

This site plan is for additions and alterations to the Folsom Firehouse located at the intersection of Jordon Road and Midstreams Road. Ocean County requires the applicant to address the following items: (1) dimension the existing right-of-way half width and full width of both County roads on the plan, (2) if the right-of-way half width is less than 30 feet from centerline, submit a deed of dedication and metes and bounds description for an additional right-of-way dedication to 30' from centerline to Ocean County, (3) submit an original executed sight right easement form for the sight triangle easement at the intersection, include a metes and bounds description identifying the total easement area, and provide a legal size easement exhibit showing the layout of the proposed project in accordance with County standards to Ocean County, (4) provide more detail with regard to the proposed pole for the antenna shown on the plans to be located at the northwest corner of the site near the right-of-way of Midstreams Road, (5) submit a traffic report (waiver requested), (6) submit a drainage report (waiver requested), (7) submit County road improvement plans (waiver requested), and (8) submit a CAFRA permit or Jurisdictional Determination (waiver requested). Approval recommended upon fulfillment of the above contingencies and the Board's decision on the waiver request.

A letter dated December 9, 2019 was read from Robert Conley, Architect requesting waivers from submitting a traffic report, drainage report, County road improvement plans and a CAFRA permit. A waiver is requested due to the project being an existing building and there will be no additional usage of the site beyond what is currently used for. Furthermore, the existing property has an impervious coverage of 100% and the proposed plans decrease the amount of impervious coverage to 96%. A waiver is requested from County road improvement plans since the applicant does not propose to widen the pavement on the County road. There will be curbs installed in the County right-of-way. The curbs will be installed per the County curb detail. The curbs will delineate ingress and egress from the property and will improve the safety of the flow of traffic. No CAFRA permit is required based on Section 13:19-5.2, 7(1) of the Coastal Area Facility Review Act which states "a permit shall not be required for the enlargement of any development if the enlargement does not result in the enlargement of the footprint of the development." The property is currently 100% developed and the proposed plans are not increasing the total amount of development.

On a motion by Mr. Ernst, seconded by Mr. Tirella, the Board granted a waiver from submitting a traffic report, drainage report, County road improvement plans and a CAFRA permit; this site plan was given final approval contingent upon the applicant to address the following items: (1) dimension the existing right-of-way half width and full width of both County roads on the plan, (2) if the right-of-way half width is less than 30 feet from centerline, submit a deed of dedication and metes and bounds description for an additional right-of-way dedication to 30' from centerline to Ocean County, (3) submit an original executed sight right easement form for the sight triangle easement at the intersection, include a metes and bounds description identifying the total easement area, and provide a legal size easement exhibit showing the layout of the proposed project in accordance with County standards to Ocean County, and (4) provide more detail with regard to the proposed pole for the antenna shown on the plans to be located at the northwest corner of the site near the right-of-way of Midstreams Road. All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

BRICK: Lots 9 Block 43.01 (BRT1998) Cellco Partnership d/b/a Verizon Wireless

This site plan is for the removal of a lattice tower and the installation of a new monopole for a wireless communication facility at an existing fire house located on Route 35. County facilities will not be impacted. On a motion by Mr. Sutton, seconded by Ms. McCrystal, this site plan was given final approval. The motion was unanimously carried.

LAKEWOOD: Lots 1.04 Block 251 (LAT1447F.01) Kollel Kinyan Torah Inc.

This site plan is for a 27,351 s.f. day care with 43 proposed parking spaces to be located on a vacant lot on the south side of New Egypt Road (CR 528). This project falls within the limits of "Reconstruction and Resurfacing of Certain Roads, Contract 2018 - C". On a motion by Mr. Bilotta, seconded by Mr. Tirella, this site plan was given final approval contingent upon the applicant to address the following items: (1) dimension the existing right-of-way half width and full width of the County road at both front property corners, (2) since the right-of-way half width is less

than 43 feet from centerline, submit a deed of dedication and metes and bounds description for an additional right-of-way dedication to 43' from centerline to Ocean County, (3) submit a sight right easement form and metes and bounds description for sight triangle easements at the proposed access point in accordance with County standards to Ocean County, (4) revise the plans to show all existing features within 200 feet of the site on the proposed plan sheets, including existing drainage features and utility poles on the opposite side of the road and show the locations of driveways on the adjoining properties, (5) address the following traffic comments: a) provide turning templates with the future three lane striping configuration. Please see Plan Sheets 60 & 61 of 83 from the plan set for "Reconstruction and Resurfacing of Certain Roads, Contract 2018 - C", b) the site location description and number of parking spaces are incorrect, c) demonstrate how the site will accommodate the pick-up and drop-off volumes., and d) provide the appropriate signing for one way entrance/exit driveways, (6) provide a drainage design to be reviewed and approved by the Ocean County Engineer (per drainage memo dated 1/15/2020), (7) design the proposed access points along the County road in accordance with Section 606, (8) properly identify the number of proposed parking spaces (application says 44, cover sheet says 41, site plan shows 43), (9) pay an off-tract drainage improvement fee in an amount to be determined by the Ocean County Engineer, and (10) pay an off-tract traffic improvement fee in an amount to be determined by the Ocean County Engineer. All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

LAKEWOOD: Lots 28 & 29 Block 189 (LAT2004.03) Congregation Pri Aahron

This site plan is for a 43,636 s.f. post high school with an 88 bed dormitory and 13 proposed parking spaces to be located on vacant lots on Ridge Avenue next to Ocean County Park. The plans show additional pavement widening to 25' from centerline in accordance with the County Master Plan. On a motion by Mr. Sutton, seconded by Mr. Tirella, this site plan was given final approval contingent upon the applicant to address the following items: (1) provide a deed of consolidation for the proposed lot, (2) revise the plans to show the existing and proposed features within 200 feet of the site on the opposite side of Ridge Avenue, (3) since the existing right-of-way half width of the County road is less than 30 feet from centerline, submit a deed of dedication and metes and bounds description for an additional right-of-way dedication to 30' from centerline to Ocean County, (4) submit a road easement and metes and bounds description for the paved taper back to existing edge of pavement from Lot 27 to Ocean County, (5) revise the County right-of-way dedication detail to include the out bounds of the entire area to be dedicated to Ocean County, include a full width right-of-way dimension, include the metes and bounds of the area to be dedicated, and include the metes and bounds of the road easement from Lot 27, (6) if the sight triangles are located outside of the County right-of-way, submit a sight right easement form and metes and bounds description for sight triangle easements at the proposed egress point in accordance with County standards to Ocean County, (7) revise the Layout & Dimension Plan to provide a dimension to existing driveways on the adjoining property, (8) design the proposed access point along the County road in accordance with Section 606, (9) provide a drainage design to be reviewed and approved by the Ocean County Engineer (per drainage memo dated 1/15/2020), (10) revise the road improvement plans for the County road to indicate with shading the limits of pavement reconstruction on the plan view, (11) since the applicant has provided a truck turning template for an SU-30 design vehicle and has not demonstrated that the site can accommodate bus traffic, provide a deed restriction by the owner to be recorded setting forth a restriction that no school bus or similar student drop off and pick up operations are permitted, unless an amended site plan is reviewed and approved by the Ocean County Planning Board. Any future amendment must provide sufficient on site bus/vehicle stacking for student drop off and pick up safely, and (12) add to the cover sheet the standard County notes for projects located on a County road. All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

LAKEWOOD: Lots 53.01 Block 2 (LAT2075A.01) Torah Education of America Inc.

This site plan in for a 64,760 s.f. school with 30 proposed parking spaces to be located on West County Line Road. On a motion by Mr. Bilotta, seconded by Mr. Tirella, this site plan was given final approval contingent upon the applicant to address the following items: (1) perfect the minor subdivision LAT2075, (2) dimension the existing right-of-way half width and full width of the County road on the plan, (3) since the right-of-way half width is less than 43 feet from centerline then submit a deed of dedication and metes and bounds description for an additional right-of-way

dedication to 43' from centerline to Ocean County, (4) submit a sight right easement form and metes and bounds description for a sight triangle easement at the proposed access point to the school on West County Line Road in accordance with County standards to Ocean County, (5) revise the plans to show all existing features within 200 feet of the site, including the right-of-way line on the opposite side of the road and driveways on adjoining properties, (6) provide dimensions to driveways on adjoining properties and design the site driveways in accordance with Section 606 and Table 600-4, (7) provide a profile for the County road indicating safe sight distance at the proposed driveway in accordance with County standards, to be reviewed and approved by the Ocean County Engineer, (8) address the following traffic comments: a) The traffic study states the site is designed for bifurcated ingress-only and egress-only driveways; however, the traffic circulation plan shows ingress at both driveways. Revise access to right-in/right-out only and demonstrate vehicles will be able to access the parking and drop off areas without queuing into the roadway while buses are parked in the aisle, and b) the traffic distribution table refers to Lanes Mill Road, which is not adjacent to the site, revise accordingly, (9) revise the plans to provide a raised curbed median across the entire frontage of the site to ensure right in right out only access to West County Line Road. It is recommended that the applicant provide alternate access to Pawnee Road, and (10) provide a drainage design to be reviewed and approved by the Ocean County Engineer (per drainage memo dated 1/15/2020). All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

LAKEWOOD: Lots 32,46,49,52,53 Block 2 (LAT2075.01) Torah Education of America Inc.

This minor subdivision is for a lot consolidation into four lots (three single family residential and one school lot) to be located on West County Line Road and Pawnee Road. On a motion by Mr. Tirella, seconded by Mr. Sutton, this minor subdivision was given final approval contingent upon the applicant to address the following items: (1) dimension the existing right-of-way half width and full width of the County road on the plan, (2) if the right-of-way half width is less than 43 feet from centerline, submit a deed of dedication and metes and bounds description for an additional right-of-way dedication to 43' from centerline to Ocean County, (3) submit a sight right easement form and metes and bounds description for a sight triangle easement at the proposed access point to the school to be located on West County Line Road in accordance with County standards to Ocean County, (4) show the proposed right-of-way dedication and the sight easement on the final plat. It is recommended that the applicant consider providing alternate access to the school from Pawnee Road. All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

LAKEWOOD: Lots 17, 20 Block 855.03 (LAT2088) Holtz, David

This five-lot minor subdivision is located on a local road. County facilities will not be impacted. The final plat appears to have been prepared in accordance with the Recordation Act. On a motion by Ms. McCrystal, seconded by Mr. Sutton, this minor subdivision was given final approval. The motion was unanimously carried.

LAKEWOOD: Lots 20, 21 & 23 Block 417 (LAT2089) Eichorn, Mordechai

This six-lot minor subdivision is located on River Avenue (Route 9) and the intersection of two local roads. County facilities are not impacted. The NJDOT Desired Typical Section is shown on the plan. On a motion by Mr. Tirella, seconded by Mr. Bilotta, this minor subdivision was given final approval contingent upon the applicant to address the following items: (1) revise the outline of the lots on the key map of the final plat to include all the lots that are subject of the subdivision, (2) remove the proposed buildings from the final plat, and (3) revise the plans so that north faces up. All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

MANCHESTER: Lots 26 & 28 Block 1.307 (MT506) Porter, Burton & Zofia

This minor subdivision is for a lot line adjustment at the intersection of two local roads. County facilities will not be impacted. The final plat appears to have been prepared in accordance with the

Recordation Act. On a motion by Ms. McCrystal, seconded by Mr. Sutton, this minor subdivision was given final approval. The motion was unanimously carried.

MANCHESTER: Lots 22, 24 Block 1.126 (MT507) M. Sarama Builder, LLC

This two-lot minor subdivision is for a lot consolidation and a minor subdivision located at the intersections of three local roads. County facilities will not be impacted. The final plat appears to have been prepared in accordance with the Recordation Act. On a motion by Ms. McCrystal, seconded by Mr. Liberatore, this minor subdivision was given final approval. The motion was unanimously carried.

PT. PLEASANT BH: Lots 1 Block 91.03 (PPBB274A) Cassie Childers Trust Account

This three-lot minor subdivision is for a three-single family houses to be located at the intersection of Trenton Avenue and Trenton Court. The proposed new lots created by the minor subdivision front on the municipal road. On a motion by Mr. Sutton, seconded by Ms. McCrystal, this minor subdivision was given final approval contingent upon the applicant to address the following items: (1) dimension the existing right-of-way half width and full width of the County road on the plan, (2) since the existing right-of-way is less than 30' from centerline, submit a deed of dedication and metes and bounds description for an additional right-of-way dedication to 30' from centerline to Ocean County, (3) submit a sight right easement form and metes and bounds description for sight triangle easements at the intersection in accordance with County standards to Ocean County, and (4) revise the final plat to include a Land Surveyors signature in accordance with the Recordation Act. All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

STAFFORD: Lots 1.03,1.04,1.05,1.06,1.20/ 1 Block 77/77.01 (ST411S) Manahawkin 2015, LLC

This site plan is for the renovation of the existing K-Mart building to accommodate four new tenants at the Manahawkin Village Shopping Center on Route 72 and Doc Cramer Boulevard. County facilities are not affected. On a motion by Mr. Bilotta, seconded by Mr. Tirella, this site plan was given final approval. The motion was unanimously carried.

STAFFORD: Lots 12 & 13 Block 167 (ST580) Kelly, Jo-Ann & Thomas

This minor subdivision is for a lot consolidation on a local road. County facilities will not be impacted. The final plat appears to have been prepared in accordance with the Recordation Act. On a motion by Ms. McCrystal, seconded by Mr. Bilotta, this minor subdivision was given final approval. The motion was unanimously carried.

TOMS RIVER: Lots 47 Block 173 (TRT1766B6) Ain't No Fun Properties, LLC

This site plan is for a 2,600 s.f. building at a commercial landscaping material supply and storage stockpiling facility with eight parking spaces located on Route 9. County facilities will not impacted. On a motion by Ms. McCrystal, seconded by Mr. Bilotta, with Mr. Tirella abstaining, this site plan was given final approval. The motion was unanimously carried.

TOMS RIVER: Lots 57 Block 298.04 (TRT3104A) AIR LLC c/o Charlie Attar

This three-lot minor subdivision is for three single family residences to be located on Whitesville Road. On a motion by Ms. McCrystal, seconded by Mr. Bilotta, this minor subdivision was given final approval contingent upon the applicant to address the following items: (1) revise the plans to show all existing features within 200 feet of the site, including existing corner monuments, manholes, drainage facilities, water bodies, utility poles, and driveways on the opposite side of the road, (2) dimension the existing right-of-way half width and full width of the County road on the final plat, and if the half-width right-of-way is less than 33 feet from centerline, submit a deed of dedication and metes and bounds description for an additional right-of-way dedication to 33' from centerline to Ocean County, (3) submit a copy of the N.J.D.E.P. Letter of Interpretation for the wetland delineation as shown on the plan and show the location of the wetlands buffer as determined by the N.J.D.E.P. Letter of Interpretation, (4) revise the plans and final plat to show the Stab Branch of the Toms River and show the 300' riparian buffer associated with the Category One waterway, (5) revise the plans to show the proposed improvements on future Lots 57.02 and

57.03, including the proposed location of the single family residences and the proposed access drives to the County road. Note: the stream corridor shall not be used for access to future Lot 57.02, (6) design the proposed access points to the County road in accordance with Section 606 and Table 600-4, specifically the minimum driveway width, the minimum spacing for between driveways, and the minimum spacing from property lines; (7) add the following County standard notes to the plans: (a) The developer is required to obtain a Road Opening permit from the Ocean County Engineering Department prior to the start of construction of any improvements within the County right-of-way and (b) Driveway locations on new lots shall be spaced in accordance with Table 600-4 of Section 606, (8) provide a pavement trench repair detail for the proposed utility connections in Whitesville Road, and (9) provide a drainage easement to Ocean County for the existing headwall and culvert. All of the above conditions must be addressed in order to obtain Ocean County Planning Board approval stamp and signature. Construction shall not commence until all conditions have been met. The motion was unanimously carried.

* * * * * * * *

THE OCEAN COUNTY ENGINEER HAS DETERMINED THAT THE FOLLOWING APPLICATIONS WERE INCOMPLETE FOR REVIEW

BARNEGAT: Lots 1 & 2/ 1/ 1/ 1/ 1/ 1, 2 & 3 Block 175/ 176/ 181/ 182/ 183/ 184 (BAT314A) Barnegat Terrace, LLC

* * * * * * * *

CORRESPONDENCE:

BRICK: Block 755.07, Lot 1 (BRT1815A) Stavola Industries, LLC. This site plan received conditional approval on September 19, 2018. On a motion by Mr. Ernst, seconded by Mr. Sutton, the minutes are hereby amended to remove Condition #6 which required submitting County road improvement plans, and removing Condition #9 which required constructing a 15' wide accel/decal lane on the County road in accordance with Section 607; and further added a condition to provide an off-tract improvement fee in the amount of $12,900.00 in lieu of constructing County road improvements. The motion was unanimously carried.

LAKEWOOD: Block 27, Lot 25 (LAT2070) Yeshiva Emek Hatorah. This site plan received conditional approval on August 7, 2019. A letter dated December 19, 2019 was read from Glenn Lines of Lines Engineering requesting a waiver from the requirement for right-of-way dedications on Kent Road and County Line Road West. The applicant is proposing to construct a two and one-half story dormitory of 9.370 s.f. with a footprint of 3,190 s.f. on the corner lot with a lot coverage of 27.4 percent. The applicant is utilizing the maximum allowable building coverage and does not have future plans to expand the dormitory as it is being constructed to its full potential based on the zoning restrictions. The site is located at the intersection of West County Line Road and Kent Road and is subjected to two front setbacks and two rear setbacks which is more restrictive than if the property had two side yard setbacks. The dormitory is located on an intersection that is fully built out with a traffic signal. The dorm students are not allowed to bring vehicles to school and the site is not designed for heavy traffic. The requested right-of-way dedication would reduce the size of the lot and thereby reduce the building envelope for the proposed building. To provide the dedication of the right-of-way and provide the required front setbacks from West County Line Road and Kent Road, the building would need to be reduced. The reduction in building envelope area would result in the loss of a minimum of two dorm rooms per floor or a total of 6 dorm rooms of the 17 proposed dorm rooms or 35 percent. The reduction in dorm rooms would make the project unfeasible. In lieu of the right-of-way dedications, the applicant is offering to provide road easements to the required 43 feet from the West County Line Road centerline and 30 feet from the centerline of Kent Road. Providing a road easement will allow the necessary area for future widening of the County roads to provide shoulders. On a motion by Mr. Ernst, seconded by Mr. Bilotta, the Board granted a waiver from providing a right-of-way dedication and accepted a road easement in lieu of dedication.

LAKEWOOD: Block 1160.12, Lots 263, 263.01, 263.02 (LAT293X20.01) Airport Road, LLC. This site plan received conditional approval on January 17, 2018. A letter dated December 26, 2019 was read from John Rea and Scott Kennel of McDonough & Rea Associates notifying the Board of revised site plans. Utility pole #JC3675 along the Airport Road frontage will not be relocated due to the prohibitive cost to do so. Therefore, the northerly full movement driveway

previously approved by the County and Township is proposed to be modified as a right turn egress driveway where left turns to and from Airport Road are prohibited. It is McDonough Rae's opinion that the access modifications will enhance traffic conditions along the site frontage with left turns prohibited from the north access given the proximity to the Cedar Bridge Avenue traffic signal. On a motion by Mr. Ernst, seconded by Ms. McCrystal, the Board has no objection to this field change due to the utility pole conflict. The motion was unanimously carried.

LAKEWOOD: Block 961, Lot 2.01 (LAT944Q.02) Avenue of the States, LLC. This site plan received conditional approval on May 18, 2016. On a motion by Mr. Ernst, seconded by Mr. Tirella, the Board hereby amends the minutes to remove Condition #2 that required the payment of an off-tract traffic improvement fee to be determined by the County Engineer, since the fee was paid under a previously approved application (LAT944Q.01). The motion was unanimously carried.

MANCHESTER: Block 38.102, Lot 19.01 (MT221L) 1900 Route 70, LLC. This site plan received conditional approval on June 5, 2019. Condition #2 required the payment of an off-tract traffic improvement fee in an amount to be determined by the County Engineer. The County Engineer has determined the off-tract traffic improvement fee to be $1,389.00. On a motion by Mr. Ernst, seconded by Mr. Bilotta, the Board required the payment of an off-tract traffic improvement fee in the amount of $1,389.00. The motion was unanimously carried.

* * * * * * * *

THE FOLLOWING PLANS HAVING BEEN GIVEN CONDITIONAL APPROVAL AT A PREVIOUS MEETING HAVE NOW MET THE CONTINGENCIES AND CAN BE SIGNED:

MUNICIPALITY:	LOT:	BLOCK:	MEETING DATE:	CONTINGENCIES MET:
BRICK BRT1992	1	862.01	07/02/19	01/09/20
BRICK BRT1071C	30 & 31	702	04/17/19	12/23/19
BRICK BRT1991	33 / 163.02, 163.04	937 / 940	04/17/19	12/20/19
LAKEWOOD LAT2002	4	1607	03/26/18	01/15/20
LAKEWOOD LAT944Q.02	2.01	961	05/18/16	01/15/20
LITTLE EGG HBR LEHT425C	3	79	12/05/18	01/13/20
TOMS RIVER TRT1335Z1	6.02, 6.03	411	09/18/19	01/09/20

* * * * * * * *

There being no further business, on a motion by Mr. Sutton, seconded by Mr. Bilotta, the meeting was adjourned. The motion was unanimously carried.

Respectfully submitted,

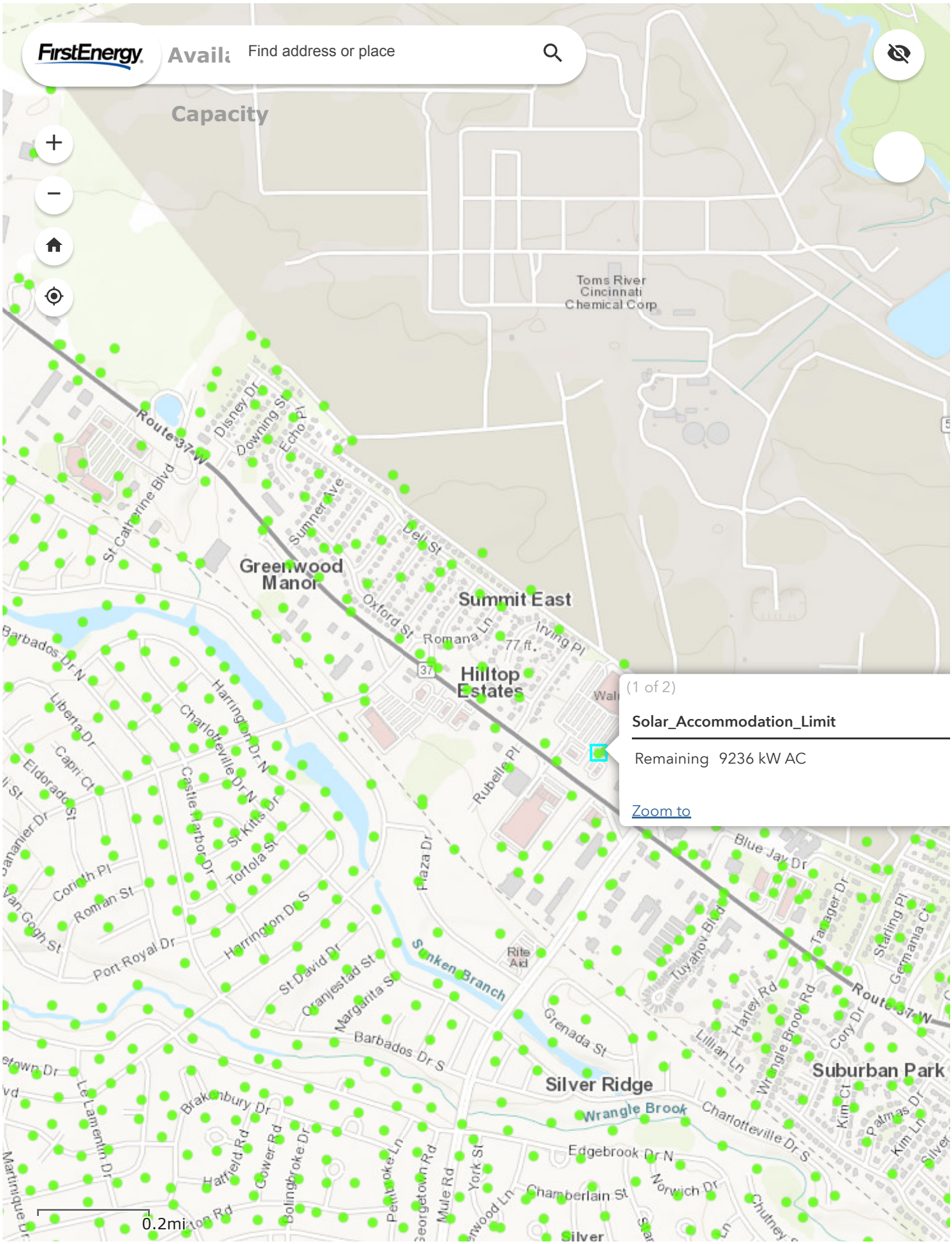
Robin L. Florio

Robin L. Florio, Secretary
Ocean County Planning Board

/rlf

ATTACHMENT 10

SCREENSHOT OF CAPACITY HOSTING MAP & CONDITIONAL INTERCONNECTION APPROVAL


FirstEnergy
Availa
Find address or place
Capacity
Toms River
Cincinnati
Chemical Corp
Route 37 W
Disney Dr
Downing St
Echo Pl
St Catherine Blvd
Summer Ave
Dell St
Greenwood
Manor
Oxford St
Romana Ln
77 ft.
Irving Pl
Summit East
Hilltop
Estates
37
Barbados Dr N
Liberia Dr
Capri Ct
Eldorado St
Corinth Pl
Roman St
Van Gogh St
Port Royal Dr
Harrington Dr N
Charlotteville Dr N
Castle Harbor Dr
St Kitts Dr
Tortola St
Harrington Dr S
St David Dr
Oranjestad St
Margarita St
Barbados Dr S
Plaza Dr
Rubelle Pl
Sunken Branch
Rite
Aid
Grenada St
Silver Ridge
Wrangle Brook
Edgebrook Dr N
Chamberlain St
Norwich Dr
Brakenbury Dr
Harfield Rd
Gower Rd
Bolingbroke Dr
Pembroke Ln
Georgetown Rd
Mule Rd
York St
Martinique Dr
Le Lamentin Dr
Blue Jay Dr
Tuyahov Blvd
Harley Rd
Wrangle Brook Rd
Lillian Ln
Charlotteville Dr S
Tanager Dr
Starling Pl
Germania Ct
Cory Dr
Kim Ct
Kim Ln
Palmas Dr
Suburban Park
Route 37 W
(1 of 2)
Solar_Accommodation_Limit
Remaining 9236 kW AC
Zoom to
0.2mi

Subject: FW: CONDITIONAL **Approval to Install Generating Equipment - CNJ - Toms River Neet Meter Solar LLC / Part 1 / 4000kW Kupper Engineering

Date: Thursday, February 4, 2021 at 11:33:34 AM Eastern Standard Time

From: Elliott Shanley

Attachments: TX Entry 5796 Total Costs.xlsx, SingleLine_Visio-CLS_5796_Community_Solar_Toms_River_(C55 Manitou Pleasant Plains 34.5 kV Line).pdf

This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Level 1-3 Interconnection - CONDITIONAL Approval to Install-COMMUNITY SOLAR

Re: Toms River Neet Meter Solar LLC / 227 Oak Ridge PKW
Account number: TBD
4000.0 kW Solar System

This transmittal serves as:

I. Notification that the Company has received your application for the above account.

II. **Notification that your application has been conditionally approved for interconnection under NJBPU year 2 Community Solar Program.**

III. **The program has started and JCP&L will evaluate any applications we receive, but final approval to participate in the Community Solar program has to be granted by the NJBPU. If JCP&L receives an application for a Community Solar project prior to the project receiving NJBPU approval, we can only issue a conditional approval and if the project does not receive NJBPU approval, the application is considered cancelled.**

IV. **This Community Solar will be interconnect to C 55 line a 34.5 KV.**

V. **Before you submit the PART 2 application, JCP&L must receive up front payment for all connection costs. Conceptual cost estimate is attached here with.**

VI. **Detailed engineering review of the customer equipment and relay/protection scheme has not been completed but it will need to conform with the current FE requirements for Transmission Connected Facilities- and include this link:**

` https://www.firstenergycorp.com/content/dam/feconnect/files/wholesale/Requirements-for-Transmission-Connected-Facilities-10-03-2016.pdf

VII. Developer will also be responsible for obtaining easements for the new 34.5 kV line to the site as well as complying with all FirstEnergy requirements for Transmission Connected Facilities.

This Preliminary Approval of your application is for installation purposes only. It is your responsibility to ensure compliance with any local, state or federal ordinances, statutes, regulations or other legal requirements.

Note: This is NOT the final approval to interconnect and operate this system as we do NOT yet have the completed **Interconnection Application/Agreement - Part 2.** The agreement form can be downloaded from our web site. (URL address given below)

Important reminders when submitting the **Interconnection Application/Agreement - Part 2**:

1. Correct, and identify any changes to the Preliminary Application package.
2. Provide the Manufacturer, Model Number(s), and quantity of the inverter(s) used.

3. The installer must sign and date the Application/Agreement - Part 2
4. The electrical inspector must sign and date the Application/Agreement - Part 2 (or an Inspection certificate must be attached)
5. The customer must sign and date the Application/Agreement - Part 2
6. As part of the Community Solar program, prior to commercial operation, the applicant will need to supply the Company with a list of subscriber accounts in accordance with NJ regulations concerning Community Solar.

To establish a connection account and meter at this location, please call the Customer Service Dept at 1-800-662-3115. You will need to provide the site address, billing address, contact name and associated information to set up a new commercial account. JCP&L personnel will prepare the design work package and billing documents based on the attached Feasibility Study. The bill for any such construction must be paid and processed before the job is scheduled.

If the State of NJ, or the developer makes any substantive changes to the project from the details provided in the Part 1 application, the developer may be required to re-submit the application to JCP&L and the NJBPU with the updated information. A determination by JCP&L will be made if an additional study fee will be required from the applicant.

The customer is NOT permitted to operate the system, except for testing purposes, until we have received and approved the Interconnection Application/Agreement - Part 2.

An electronic mail notification will be forwarded to the contractor and/or customer listed on the application regarding the results of final Interconnection Application/Agreement - Part 2 review.

General Information & Billing Issues - Customer Service Center at 800-662-3115
Project Status - 973-401-8830

Jersey Central Power & Light
Attn: Interconnection Coordinator - Engr Dept.
300 Madison Ave
P.O. Box 1911
Morristown, NJ 07962-1911

E-mail: JC_Interconnection@firstenergycorp.com
Web Site:
https://www.firstenergycorp.com/jersey_central_power_light/small_generationinterconnectionprocess.html

Jersey Central Power & Light
A FirstEnergy Company

Rajendra Patel
Engineer V
office: 732-212-4260 (250-4260) | cell: 201-841-5394
rpatel@firstenergycorp.com
101 Crawford's Corner Rd., Holmdel, NJ 07733 | mailstop: M-HMDL-3

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ATTACHMENT 11

LMI EXPERIENCE



SOLAR FOR EVERY AMERICAN

An overview of Solstice's suite of offerings for community solar developers, including customer acquisition and management services

SOLSTICE
Solar for every American

INDEX

1. SOLSTICE OVERVIEW
   a. The Solstice Team
   b. Projects & Market
   c. The Solstice Model

1. ACQUISITION SERVICES
   b. Marketing
   c. Ambassador Program
   d. Community Partnerships

1. MANAGEMENT SERVICES
   c. Customer Support
   d. Invoicing & Billing
   e. Analytics
   f. Utility Coordination

ADDITIONAL MATERIAL
   a. We Offer a Delightful Experience
   b. Comparative Advantage
   c. COVID Adjustments
   d. Compliance and Consumer Protection
   e. Go to Market Strategy: Illinois
   f. Solar for Every American: LMI Capabilities
   g. Industry Engagement

THE SOLSTICE TEAM



Steph Speirs
Co-Founder & CEO
Obama Campaign/White House, Acumen
(Yale, Princeton, MIT)



Sandhya Murali
Co-Founder & COO
Barclays, Buen Power Peru
(University of Michigan, MIT)



Sarah Moon
Director of BD
McMaster-Carr, EnerNOC
(Harvard, University of Chicago)



Taro Gold
Director of Outreach
Education First, AnyRoad
(Colby College)



Cindy Woo
Director of Marketing
Welch's, The Rockport Co
(Northeastern, Emerson College)



Dan McNamara
Lead Engineer
SyncOnSet
(Northeastern University)

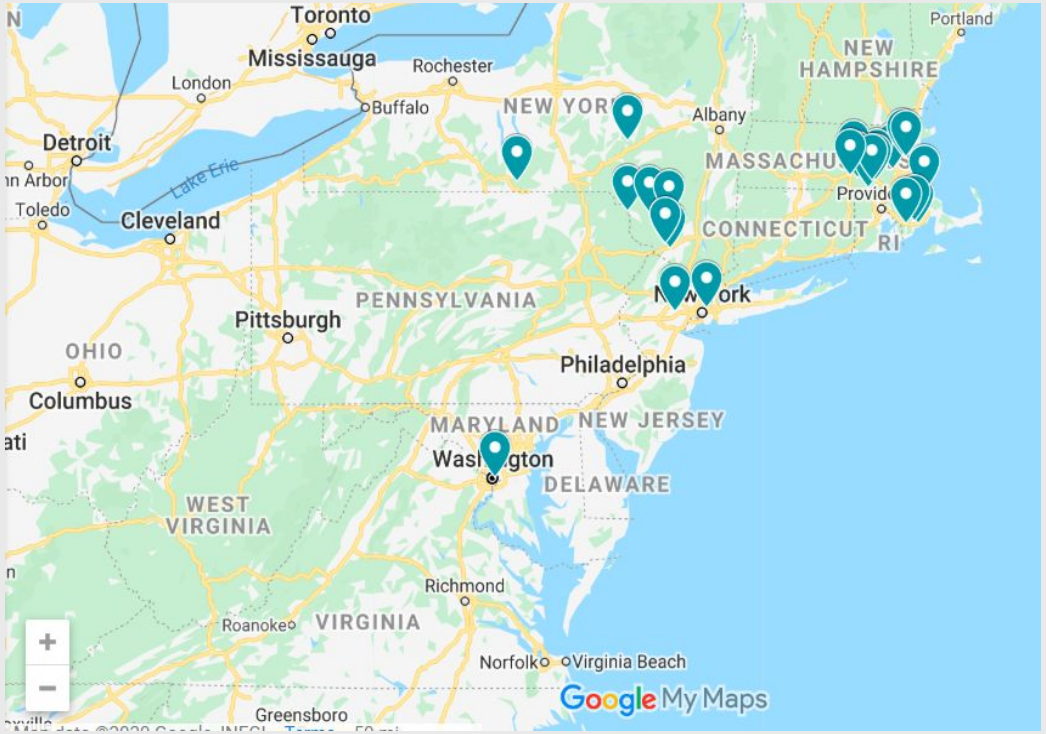


Zachary Muzdakis
BD Coordinator
Bangs Island Mussels, 1% For the Planet
(Boston College)



Tim Brown
Customer Support Manager
MyLife LLC, Regenerate Marine
(Colby College, Harvard Extension School)

PROJECTS & MARKETS



This map displays all of our project locations to date.

To Date

- 25 projects; 133 MW of demand generated
- 8 projects under management, 19 MW

Planned Expansion

- New Markets:
  - IL, MD, ME, PA, HI
- Expanded footprint in NY
- By 2024 plan to have presence in 7 states, managing over 100 MW

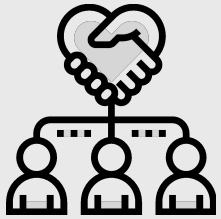
THE SOLSTICE MODEL

Solstice expands the market for community solar by creating an online marketplace and viral community for shared solar

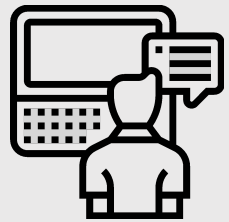


Solar Project Developers





SOLSTICE



Customer Acquisition

Partnerships
Referral Program
Marketing Omni-Channel Strategy

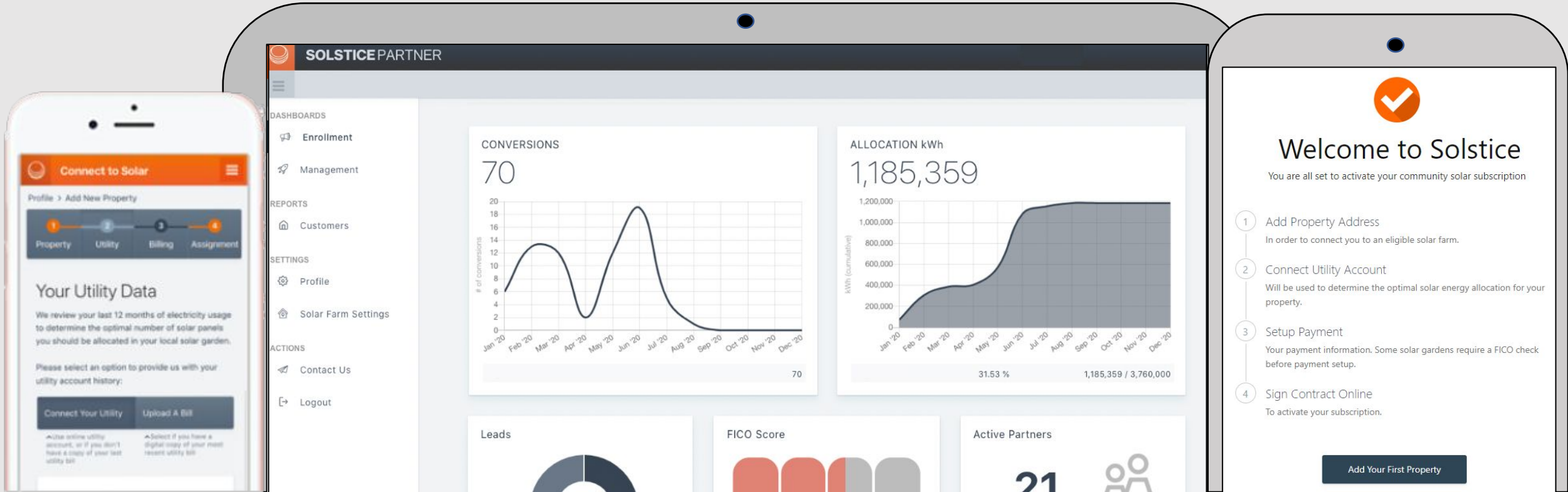
Ongoing Management

Customer Support
Billing / Invoicing
Utility Coordination
Platform for all End-Users

ACQUISITION SERVICES

We employ a multi-channel strategy to fill projects swiftly and effectively

- Marketing
- Ambassador Program
- Community Partnerships



ACQUISITION SERVICES: MARKETING

Solstice Omni-Channel Marketing Strategy

Community Solar is a new product to many, and customer education is critical to success. We use a multi-channel marketing strategy to:

- Educate consumers about the benefits of joining community solar
- Generate awareness about Solstice and our mission
- Acquire new customers

Defining Your Target Audience

Defining clear target audiences is essential to a successful campaign. We develop customer segmentation and customer personas to establish strategic and targeted content that will drive more engagement, click-throughs, and conversions.

Integrated Marketing Experience

An omni-channel marketing campaign allows us to deliver a coordinated experience across all customer touchpoints. Whether they are reading the newspaper, browsing the web, engaging with peers or friends on social media, an omni-channel marketing strategy delivers a seamless and consistent marketing message to all of our customer segments.



ACQUISITION SERVICES: AMBASSADOR PROGRAM



Key Components

- Materials and guidance
  - Ambassador toolkit and educational materials
- Early adopters
  - Customers on the forefront of renewable energy
- Ambassador incentives
  - Gift cards, prizes, cash bonuses
- Customer Success Team
  - Stewards of the ambassador program
  - Establish toolkits and nurture ambassador success

Key Metrics

- 40% conversion rate for ambassador referrals
- 33% of ambassadors refer more than one person

ACQUISITION SERVICES: COMMUNITY PARTNERSHIPS

- Focus on organizations that themselves manage high-electricity properties and / or share our environmental mission
  - Residential services organizations, environmental community groups, mission-driven farms / CSAs and others
  - Municipalities, where leadership is invested in a green future
  - Companies with a sustainability mission to share free, clean energy with employees and/or tenants
- We develop partner-specific campaigns that create a fully integrated customer experience from initial communication through enrollment and customer support - supporting the partner's mission and ours

Successful Partnerships

ARC of Rockland
- Signed up all eligible meters
- Saving $10K per year
- Shared benefits with employees, majority of whom enrolled

Anderson Center for Autism
- Nonprofit organization; signed up both residential and commercial meters
- Saving $39K per year
- Conducted a successful employee sign-up campaign

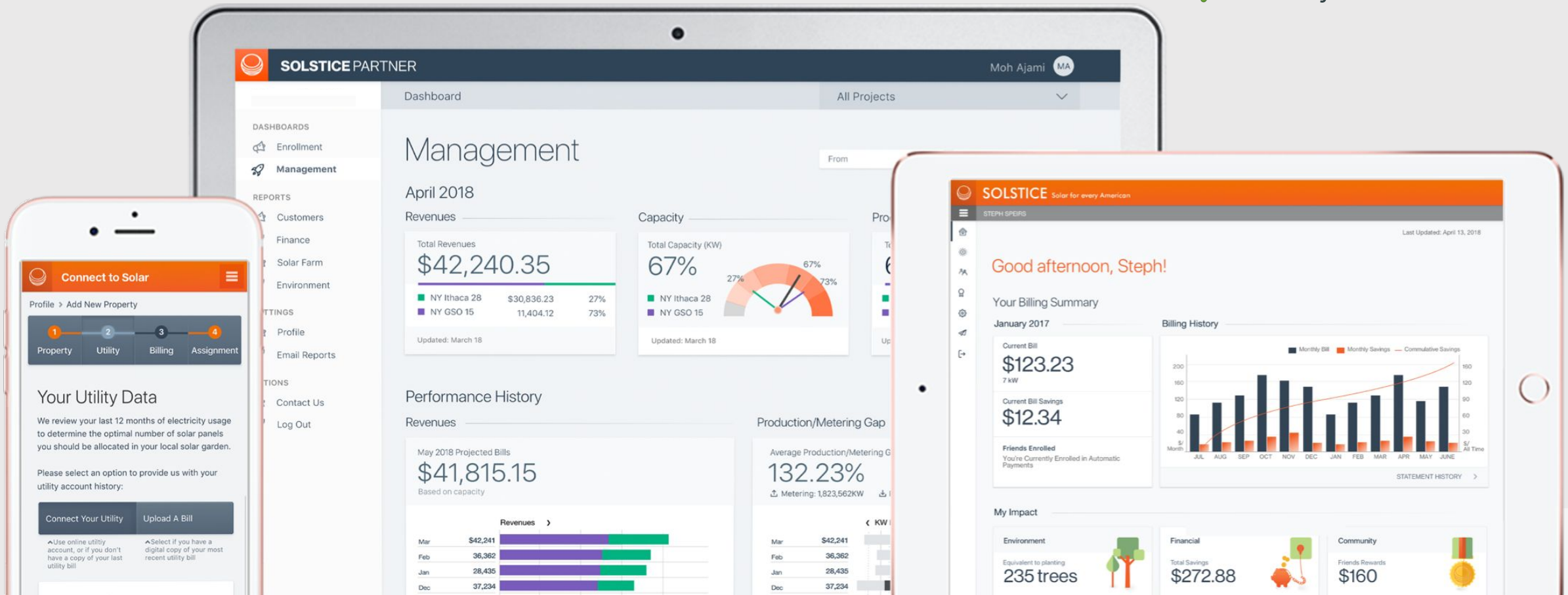
Town of Gallatin
- Secured formal partnership and launched campaign to educate residents about affordable, clean energy
- Town fundraising goal of $10K to fund solar-powered lights for municipal parking lot

The Gardens at Rhinebeck
- Property management group
- Saving $19K per year
- Enrolled management properties and condo-owning residents who otherwise could not access clean energy

MANAGEMENT SERVICES

We provide the platform and service for all stakeholders that makes shared solar projects possible

- Customer Support
- Invoicing & Billing
- Management Analytics
- Utility Coordination



MANAGEMENT SERVICES: CUSTOMER SUPPORT

Expectations & Performance

- Response time of eight business hours to any inquiry - digital or phone
  - *25% better than target*
- Resolution time of one business day
  - *12.5% better than target*
- Customer education post enrollment
  - Email sequences on billing experience / what to expect
  - Webinars / virtual education sessions and customer appreciation events, e.g. Solstice Trivia Night
- 86% of respondents to customer experience survey rated their satisfaction with Solstice as a 6+ on a scale of 1 to 7



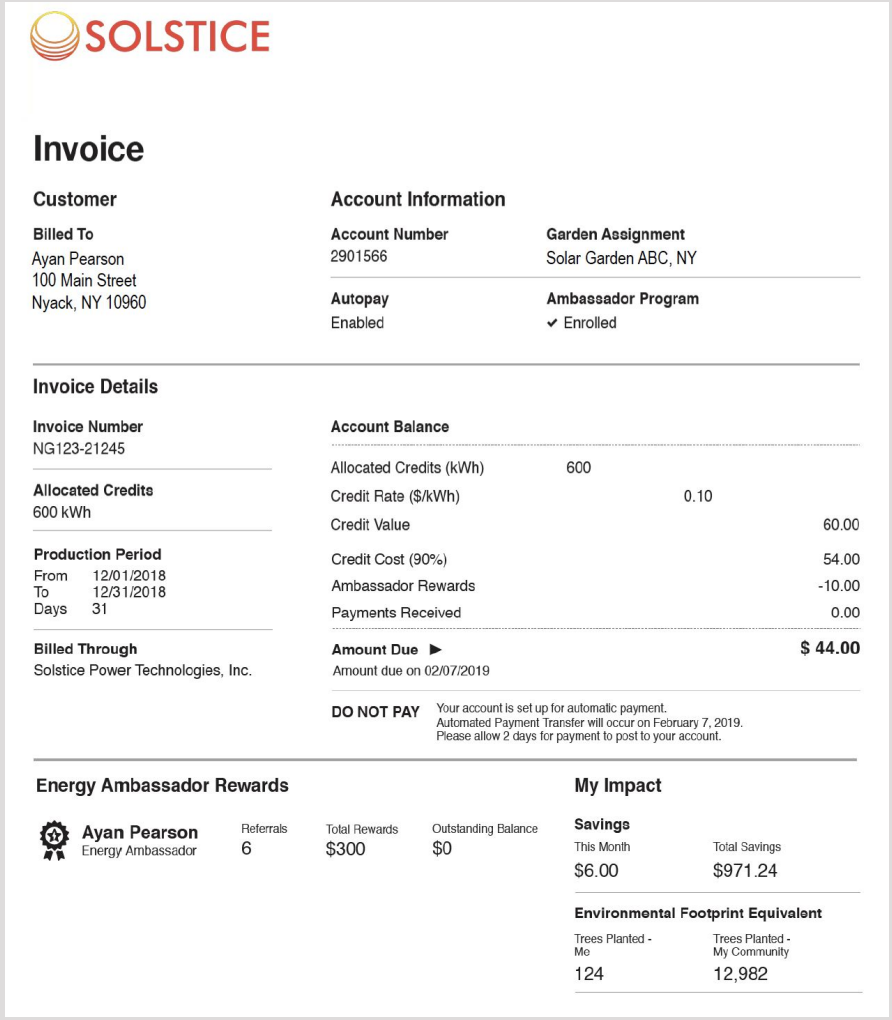
"I was so excited because I could have solar power that I could take with me when I was renting, and the customer service was really incredible."



"The true, well-qualified young people from Solstice blew us away with their expertise."



MANAGEMENT SERVICES: INVOICING & BILLING



SOLSTICE

Invoice

Customer

Billed To
Ayan Pearson
100 Main Street
Nyack, NY 10960

Account Information

Account Number
2901566

Garden Assignment
Solar Garden ABC, NY

Autopay
Enabled

Ambassador Program
✔ Enrolled

Invoice Details

Invoice Number
NG123-21245

Allocated Credits
600 kWh

Production Period
From 12/01/2018
To 12/31/2018
Days 31

Billed Through
Solstice Power Technologies, Inc.

Account Balance

Allocated Credits (kWh)	600	
Credit Rate ($/kWh)	0.10	
Credit Value		60.00
Credit Cost (90%)		54.00
Ambassador Rewards		-10.00
Payments Received		0.00
Amount Due ▶		**$ 44.00**

Amount due on 02/07/2019

DO NOT PAY Your account is set up for automatic payment.
Automated Payment Transfer will occur on February 7, 2019.
Please allow 2 days for payment to post to your account.

Energy Ambassador Rewards

Ayan Pearson
Energy Ambassador

Referrals	Total Rewards	Outstanding Balance
6	$300	$0

My Impact

Savings

This Month	Total Savings
$6.00	$971.24

Environmental Footprint Equivalent

Trees Planted - Me	Trees Planted - My Community
124	12,982

Key Features

- Customer education on billing processes
- Monthly generation of invoices
- Customizable invoice consolidation for customers with multiple properties (e.g. property managers)
- Historical invoices stored in customer portal and are downloadable via email
- Invoices display monthly and lifetime savings and environmental impact
- Auto-billing 3 business days post invoicing

MANAGEMENT SERVICES: ANALYTICS



Metrics Tracked by Project

- Monthly & lifetime revenue collected vs. projected and production
- Payment statuses on a customer basis
- Percentage of monthly on-time payments
- Host summaries saved on dashboard for quick reference
- Customer cancellations: stage processing cancellation along with reason

Management Performance

Customers under management	**1,200**
Successful billing cycles	**23**
Successful first payment rate	**99.8%**
Average overall churn rate per project	**3.8%**
Average churn rate as a result of payment default per project	**0.4%**

MANAGEMENT SERVICES: UTILITY COORDINATION

Communication With Utilities

- Establish relationships with utility representatives to:
  - Understand expectations around deadlines for billing & processing changes to allocations
  - Solve customer support questions that were the result of utility actions
  - Hear first-hand about process updates that may impact customers

Allocation Submissions

- Verify customer historical usage, accuracy of utility numbers & additional customer data in order to submit timely and complete allocations to utilities

Management of Utility Crediting Issues

- On occasion, allocation of credits will be incorrectly completed by the utility
- We manage these issues, handle all customer follow-up, and collaborate with the utility to resolve the issues

ComEd® An Exelon Company

NYSEG

conEdison

Orange & Rockland

EVERSOURCE

nationalgrid

People. Power. Possibilities. Central Hudson A FORTIS COMPANY

WE OFFER A DELIGHTFUL EXPERIENCE



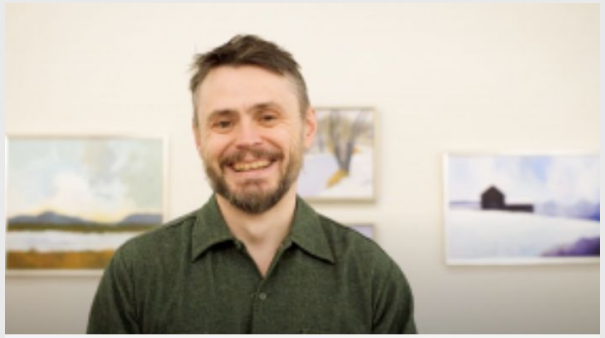
"I got to say you guys have been wonderful because you answered all my questions so I felt pretty confident and then I drove out here to see the farm being built. It was nice to actually see and almost be part of it in a way"



"The best part so far is working with the people at Solstice."



"This came as a great solution for me because I wanted to try solar, but I didn't want to attach it to my house."



"One of the benefits of partnering with Solstice is we were able to reach out to our members in a different way. They were very easy to work with, it was constant contact."



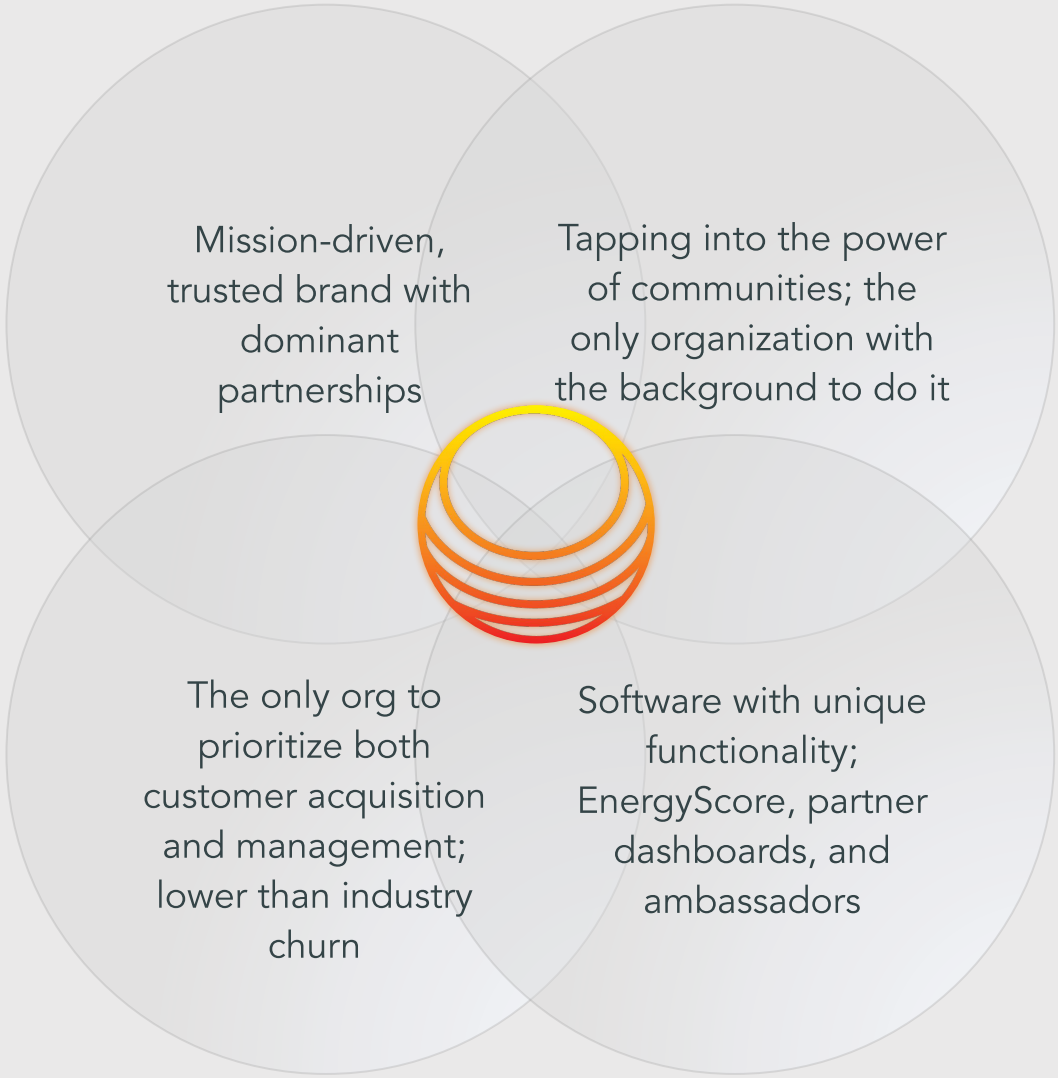
"I just signed all my locations up with them. I have 15 houses, so there were a lot of accounts we were able to take care of and wrap up in one afternoon."



"It's fun, you know, kind of like being part of a family…it's nice to be eco-conscious."

COMPARATIVE ADVANTAGE

Network effects are the key in our approach to shared solar



COVID ADJUSTMENTS

- Despite challenges associated with COVID, 2020 is on track to be our most successful year in customer acquisition
- The need for renewable energy and cleaner air, and the appeal of saving money, has only increased as a result of the pandemic

Changes to Acquisition Strategy

- Marketing: omni-channel strategy has remained largely the same, as most people are at home receiving mail and/or spending time online
- Sales: outreach focused on building partnerships with local community leaders and larger organizations; transition to virtual meetings and webinars has been successful
- Channel partners: newer partnerships with entities like energy brokers have been very successful
    - Many households and organizations have outside help when making energy decisions, and going through these trusted channels has enabled us to tap into new networks





COMPLIANCE AND CONSUMER PROTECTION

Compliance is critically important to Solstice and our partners. We have implemented a number of processes to ensure the protection and proper use of customer information, and ensure our marketing and outreach tactics are compliant with all applicable regulations

Compliance Highlights

- OWASP Standards as a guideline for implementing security standards
  - Level 1 completed; currently working on Level 2 with a long term plan of completing Level 3
- Utilize top-tier third-party technology products for their security, including DocuSign, Stripe, Experian, and Salesforce
- Compliant with the New York Data Security Agreement

INDUSTRY ENGAGEMENT

The community solar policy landscape is rapidly changing, and we recognize the importance of raising our voice on relevant issues that impact our stakeholders. Advocating for consumer and developer interests is one of our core responsibilities.

- Active member of CCSA and VoteSolar-led coalitions such as New Jersey Shines - attend regular meetings to hear about policy updates, share learnings amongst members, and collectively formulate industry comments on proposed changes
- Member of two working groups in New York that collaborate on improving billing and crediting processes; groups include utilities, developers, customer acquisition and management providers, and the Department of Public Service

COALITION FOR COMMUNITY SOLAR ACCESS

NJ SHINES

VOTE SOLAR



SOLAR FOR EVERY AMERICAN: LMI CAPABILITIES

Solstice Initiative

- Non-profit affiliate of Solstice Power Technologies, Inc. focused on:
  - Community Education
  - Research & Innovation
  - Project Development & Enrollment of LMI customers
  - Policy & Advocacy

On the following slides, we'll share detailed examples of both of our organizations' work focused primarily on increasing LMI access to community solar.



ENERGYSCORE

- In partnership with the Department of Energy and in collaboration with researchers at MIT and Stanford, Solstice developed the EnergyScore.
- What is it?
  - The EnergyScore, an alternative to traditional credit scores, is a machine-learning algorithm that improves access to community solar for low-to-moderate-income households. By predicting the probability of utility payment delinquency using several consumer datasets, Solstice can better ensure that churn and default rates within community solar projects are kept low.
- Why do we need it?
  - LMI households face limited access to renewable energy, in part because credit score requirements are a primary barrier to expanding community solar access
  - There is also a strong relationship between income, race, and credit
- Key Findings?
  - At 90+ days definition of utility bill delinquency, EnergyScore increases overall prediction accuracy by 6 percentage points compared to a FICO cutoff of 680
  - Increases number of LMI applicants approved by approximately 10% compared to FICO cutoff of 700



Read more details here: https://drive.google.com/file/d/12ZBgvY8Mc3x3cCyEkivQ7TA3n52AA1Tk/view

NYSERDA LMI Acquisition Research

- Solstice was awarded a grant to subscribe LMI households into CSS arrays in Southern and Western NY in order to test enrollment and outreach strategies to determine best practices for LMI customer acquisition.
- Working with PUSH Buffalo and the Cornell Cooperative Extension of Tompkins County
  - Solstice will enroll 280 LMI households in Western NY and 280 LMI households in the Southern Tier region of NY.
  - Solstice has committed to educating 4,000 households through educational events, digital outreach, and newspaper articles.
  - Solstice will work with 20 community organizations that work closely with LMI populations.
  - Solstice will utilize the power of an equitable shared solar contract.
    - Solstice is dedicated to providing contracts with no credit requirements, and short contract terms to make CSS subscriptions more equitable to LMI populations.

NEW YORK STATE OF OPPORTUNITY. | NYSERDA



NYCHA PROJECT

- Awarded alongside the rest of our coalition to build and subscribe community solar projects on NYCHA rooftops, and bring clean, low-cost energy and monthly savings to NYCHA residents throughout the city.
  - The coalition includes: Bright Power, Sol Purpose, Green City Force, and SolarOne
- Customer Acquisition and Management Services:
  - Solstice is providing acquisition and management services to hundreds of offtakers in NYCHA using the following methods:
    - Community partnerships - working with local non profits, food banks, and the NYCHA resident engagement team to reach networks of LMI community members who could benefit from this program.
    - Ambassador programs - NYCHA residents who are interested in taking more significant action can sign up their friends and family with assistance from Solstice's marketing team, helping to share the value of the community solar farm with NYCHA residents.
- Workforce Development efforts with Green City Force:
  - Hiring a NYCHA resident as a partnerships associate to help with on-the-ground acquisition and network building

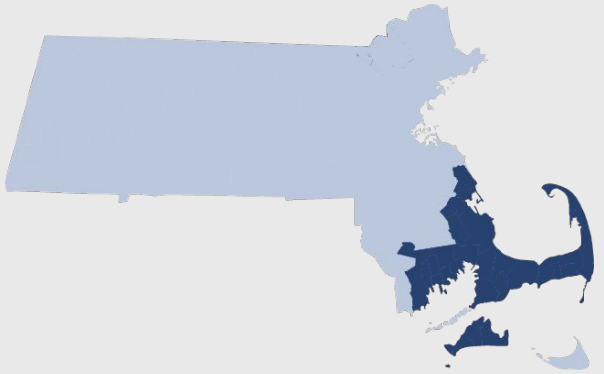
NEW YORK CITY HOUSING AUTHORITY

EVERSOURCE MA PROJECTS

- Solstice acquired and currently manages customers for the first 2 pilot LMI community solar projects in Eversource SEMA territory under the Massachusetts SMART program:
  - These projects have been subscribed and generating credits for customers since 2019.
  - Two locations totaling roughly 100 kW dc in size

- Key Takeaways:
  - As pilot projects these two farms have proved a valuable learning opportunity for both acquisition and management strategy for low-income customers.
  - Solstice partnered with local Southeastern Massachusetts organizations to subscribe this project. The monthly savings from this project have been particularly helpful for SEMA's elderly community who depend on energy-intensive medical devices and those living in outdated housing stock equipped with inefficient and expensive appliances.
  - In order to provide flexibility in billing dates to those on a fixed-income, we offered both paper billing and online billing solutions.

EVERSOURCE



SMART
MASSACHUSETTS SOLAR PROGRAM

OUR LMI ACQUISITION APPROACH: Community Outreach

- Solstice believes the ability to acquire LMI customers effectively comes from strong relationships with local organizations dedicated to their communities.
  - These organizations can be non-profits, locally geared small businesses, housing authorities, food banks, townships etc.
- Solstice views these partnerships as more than just a channel and strives to share value and profits from the community solar farm with these groups and their networks.
- Over the last two years, Solstice has raised $102,500 for its community partners, supporting organizations, communities and the causes they care about.
- Some examples of our current community partners in our LMI work are:
  - Self Reliance
  - Green City Force
  - Resident Engagement Team at NYCHA
  - PUSH Buffalo
  - Duke Housing Authority, Martha's Vineyard





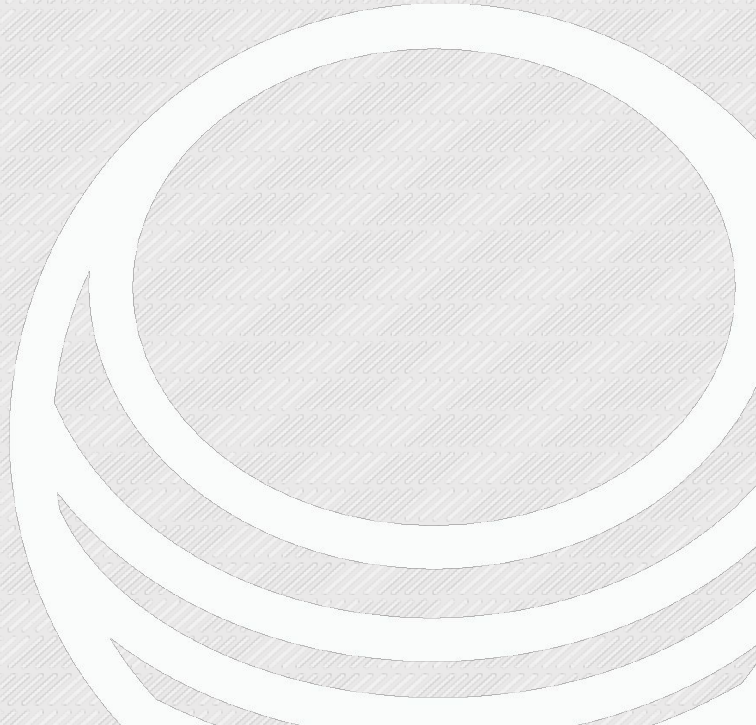


THANK YOU

For more information, please contact:

Sarah Moon
Director of Business Development
sarahm@solstice.us

Zachary Muzdakis
Business Development Coordinator
zack@solstice.us



ATTACHMENT 12

LETTERS OF SUPPORT

possible planet | regenerative FINANCING

Center for Regenerative Community Solutions, a 501(c)(3) NJ Nonprofit
121 Wawayanda Road, Highland Lakes, NJ 07422

Thursday, February 4, 2021

NJ Board of Public Utilities
44 South Clinton Avenue, 9th Floor
Trenton, New Jersey 08625-0350

Dear NJ BPU:

RE: Oak Ridge Community Solar Project – Letter of Support

On behalf of New Jersey PACE | Possible Planet | Regenerative Financing please accept this letter of support to EDF DS in their application for Toms River Community Solar Project to the Community Solar Energy Pilot Program Year 2.

NJPACE is an initiative of Possible Planet that helps communities, including public, private, and nonprofit leaders, understand and implement the features and benefits of PACE (Property Assessed Clean Energy).

NJPACE supports the Toms River Community Solar project because of the savings that will be realized by community members and businesses alike on their utility bills, the promotion of local renewable energy production, and their dedication to investing in the community's future through locally sourced clean energy.

NJPACE is excited to assist EDF Renewables and Solstice Power Technologies in the acquisition of subscribers for the Oak Ridge community solar farm. With strong community ties, and embedded networks, NJPACE will be a valued partnership in the upcoming acquisition efforts.

If you require more information about NJPACE, please contact us at 908-581-8418 or jcloud@newjerseypace.org. Thank you.

Sincerely,

Jonathan Cloud
Executive Director
New Jersey PACE

HOMES for All

Changing Lives Through Affordable Housing for 35 Years

70 Hadley Avenue Toms River, NJ 08753 | (732) 286-7929 | Homesforallnj.org

February 4, 2021

NJ BPU

44 South Clinton Avenue, 9th Floor

Trenton, New Jersey 08625-0350

Dear NJ BPU:

RE: Toms River Community Solar Project – Letter of Support

To Whom It May Concern,

On behalf of Homes For All, please accept this letter of support to EDF DS in their application for Toms River Community Solar Project to the Community Solar Energy Pilot Program Year 2.

Homes For All has been providing affordable housing to low income families for 35 years. Affordable expenses, including utilities, is an extremely important component in affordability.

Homes For All supports the Toms River Community Solar project because of the savings that will be realized by community members and businesses alike on their utility bills, the promotion of local renewable energy production, and their dedication to investing in the community's future through locally sourced clean energy.

If you require more information, please contact me at (732) 286-7929.

Sincerely,

Glen McDonald

Executive Director

Homes For All

Citizens Action Committee on Childhood Cancer Cluster
883 Somerset Drive
Toms River, New Jersey 08753

January 12, 2021

The New Jersey Board of Public Utilities

44 So. Clinton Ave., 7th Floor
Trenton, NJ 08625

Re: Community Solar, Toms River NJ

To Whom it May Concern;

The Citizen Action Committee on childhood cancer was created by the Ocean County Department of Health and is dedicated to keeping the community educated regarding the Ciba Geigy Superfund Site, and has fought vigorously to insure proper cleanup and that the community was and is properly informed regarding the site's remediation and possible development.

We have become familiar with Elliott Shanley of PVOne, LLC the Co-Developer of the Toms River Merchant Solar, LLC project and his plans for a solar farm on the Ciba Geigy Superfund site. We have also become aware of the New Jersey Community Solar Pilot Program, and Mr. Shanley's intent to incorporate a Community Solar component into the solar project.

While we do not make endorsements per se of individual development projects, we do broadly support efforts that utilize the land on the Superfund site that is not in active remediation in ways that contribute positively to environmental protection, sustainability and the protection of human health. We believe community solar is a positive use on this site.

Thank you,

Linda Gillick

Chairwoman

New Jersey Conservation
FOUNDATION

February 3, 2021

NJ Board of Public Utilities

44 South Clinton Avenue, 9th Floor

Trenton, New Jersey 08625-0350

RE: Toms River Community Solar Project – Letter of Support

Dear NJ BPU:

On behalf of NJ Conservation Foundation, please accept this letter of support to EDF DS in their application for Toms River Community Solar Project to the Community Solar Pilot Program Year 2.

NJ Conservation Foundation has been working to preserve land for the benefit of all New Jerseyans since 1960. We strongly support the growth of solar energy that is sited in an environmentally responsible manner.

We support the Toms River Community Solar project because it would provide adaptive re-use of a brownfield site and avoid impacts to important agricultural lands, forests or natural resources. We are pleased to support what would be the largest brownfield solar project in New Jersey.

Thank you for your efforts to bring the benefits of solar energy to underserved communities through the Community Solar Pilot Program.

Sincerely,

Thomas A. Gilbert

Campaign Director, Energy, Climate & Natural Resources

02-05-2021

NJ BPU

44 South Clinton Avenue, 9th Floor

Trenton, New Jersey 08625-0350

Dear NJ BPU:

RE: Toms River Community Solar Project – Letter of Support

On behalf of Princeton Entrepreneurship Council, please accept this letter of support to EDF DS in their application for Toms River Community Solar Project to the Community Solar Energy Pilot Program Year 2.

The mission of the Princeton Entrepreneurship Council is to engage the Princeton entrepreneurial and innovation ecosystem of faculty, students and alumni through education, mentoring and funding, in collaborative spaces.

The Princeton Entrepreneurship Council supports the Toms River Community Solar project because of the savings that will be realized by community members and businesses alike on their utility bills, the promotion of local renewable energy production, and their dedication to investing in the community's future through locally sourced clean energy.

If you require more information about the Princeton Entrepreneurship Council, please contact us via Anne-Marie Maman, Executive Director Princeton Entrepreneurship Council. Email: amaman@princeton.edu. Phone: 609-258-4499.

Sincerely,

Lauren Bender

Lauren Bender for Anne-Marie Maman

Program Manager

Princeton Entrepreneurship Council

ATTACHMENT 13

PROJECT COST TABLE

COST SUMMARY (PAGE 16)	$/Watt DC	
DEVELOPMENT	$	0.14
BUILDING COSTS - EPC	$	1.04
EQUIPMENT	$	0.61
Misc. & Other	$	0.10
Community Solar AQUSTION Costs	$	0.20
Total Cost	$	2.09

ATTACHMENT 14

PROOF OF AREA IN NEED OF REDEVELOPMENT

TOWNSHIP OF TOMS RIVER

MASTER PLAN
LAND USE PLAN ELEMENT

Township of Toms River
Ocean County, NJ
April 9, 2017

ADOPTED: APRIL 19, 2017

Prepared by:

David G. Roberts, AICP, PP, LLA, LEED AP ND
Township Planner
NJ Planner #3081, AICP Member # 042045

Erika Stahl, P.P. #6245, AICP
Assistant Township Planner
NJ Planner #6245, AICP Member # 026200

* * *

GOALS AND OBJECTIVES

The New Jersey Municipal Land Use Law (MLUL) requires all Municipal Master Plans to have a statement of goals and objectives to be used as the basis for the document. The goals provide a general framework for future development and preservation throughout the Township, while the objectives offer more specific means of reaching the goals. The different plan elements then recommend ways of implementing the objectives to achieve the goals that have been set forth.

The Goals and Objectives presented in this Master Plan were established through a review of Township documents including past master plan amendments and revisions, redevelopment studies, various Post Sandy planning studies and reports and the Township's Land Use Ordinance. Input was provided by local officials, Citizens Advisory Subcommittee concerned citizens and organizations within the Township.

STATEMENT OF GOALS

The Township of Toms River seeks to achieve an overall balance between the preservation of its natural resources and its residential and economic development. This need for balance has become even more acute as the Township recovers from the aftermath of Superstorm Sandy, which was devastating both socially and economically. The Township's natural resources are abundant. The waterways surrounding the Township provide a unique setting and offer various recreational and environmental advantages. Preserving much of the remaining open space within the Township is crucial to sustaining its natural resources. Toms River Township residents also have deep roots in the historic village of Toms River and strive to maintain and revitalize this area. The municipality envisions an overall design theme for the Township, consistent with the theme of the downtown, to provide a more inter-related residential and economic foundation. The preservation and expansion of these resources are imperative in order to maintain and improve upon the existing quality of life.

STATEMENT OF OBJECTIVES

This Master Plan is intended to advance the purposes of the Municipal Land Use Law as contained in 40:55D-2. The following objectives address the general intent of the Municipal Land Use Law as it pertains to the Township of Toms River. These objectives have been categorized according to the different elements set forth in this Master Plan.

Land Use

1. To guide future residential and non-residential growth in a coordinated and managed approach as set forth in this Master Plan and to provide for logical transitional uses between residential and non-residential areas of the Township.
2. Develop Historic Downtown Toms River as a regional center for Ocean County, and create additional nodes and centers throughout the Township to encourage walkability and reduce vehicular trips.

3. Continue to use practical and flexible development controls in order to gain open space, conserve the natural landscape and protect the environmentally sensitive areas of the Township.

4. Relate future residential growth to the municipal infrastructure.

5. Encourage controlled and properly designed commercial and industrial development in areas so designated on the Master Plan.

6. Provide for the Township's fair share of low-and-moderate-income housing as set forth in the amended Housing Element and Fair Share Compliance Plan adopted in February of 2017 as a result of mediation and a determination of compliance by the court in 2016.

7. Promote redevelopment of the Ciba-Geigy property, portions of Downtown Toms River between Huddy Park and the Parkway, and Route 37 between Fischer Boulevard and the bridge. Explore additional revitalization of Downtown Toms River through one or more rehabilitation area designations, including the waterfront east of Huddy Park and the downtown core between the river, Main Street and Hooper Avenue north to Madison Avenue along Hooper and Lien Street along Main Street.

8. Promote the drafting of a new development regulations ordinance to be entirely compatible with this Master Plan.

9. Within developed areas of the Township, the new ordinance should provide zoning districts that reflect existing land use patterns in order to minimize nonconforming lots and to diminish the need for bulk variances.

10. Create zoning ordinance provisions that recognize prevailing block patterns, especially in the R-40A and R-40B zones of the barrier island, as appropriate. Any provisions adopted should anticipate the need for subsequent development of accessory structures or additions.

11. Encourage cluster development in order to preserve large tracts of land.

12. Establish a transfer of development rights, clustering on noncontiguous lots or similar zoning techniques to direct growth to centers and preserve open space in environmentally sensitive areas and in areas vulnerable to flooding and sea-level rise.

13. Achieve regional coastal center designation for Toms River Center.

14. Achieve center designations for other locations in the Township that meet the criteria for centers in the State Development and Redevelopment Plan as coordinated through the New Jersey Office of Planning Advocacy through the Plan Endorsement Process.

15. Investigate new areas for redevelopment and revitalization.

16. Maintain the rural character of North Dover and Pleasant Plains in the face of increasing development pressure generated by the rapid population growth in Lakewood Township.

17. Encourage appropriate development of vacant or underutilized parcels.

18. Continue strategic implementation of the Downtown Master Plan and Proposed Zoning Amendments as Part of this Master Plan (see Appendix). Any modifications to the recommendations set forth in that document are specifically identified herein.

19. Opportunities should be created for the provision of affordable housing for those who are active in the workforce. To the extent feasible, these should be small in scale and designed to provide 100 percent of the units within the affordable range. Such opportunities should be consistent with availability of employment and transit resources, such as through the redevelopment of underutilized sites in the Waterfront Redevelopment Area along Water Street near the Toms River Bus Station, as well as expanded bicycle and pedestrian mobility. Care should be taken to avoid over-development of such opportunities along Route 9 until such time as the substandard capacity of that highway is addressed by the NJDOT.

<u>Economic Development</u>

1. Promote jobs and activities for the Township's large senior population.

2. Develop additional jobs for the Township's large professional population to encourage people to live and work in Toms River Township.

3. Capitalize on Toms River's location and designation as the county seat to become a regional center. Encourage mixed-use development within the downtown, along with cultural and entertainment uses in order to attract young professionals that prefer walkable and diverse environments. Emerging uses such as "nano-breweries" (micro-breweries in small spaces), art galleries, brew pubs and similar uses that attract visitors and make downtown living more appealing should be encouraged.

4. Enhance the visual design of existing businesses to attract more consumers.

5. Encourage new businesses to establish in the Township.

6. Promote core retail destinations in areas where new residential development can support them, such as in the highway cores (Route 37, Route 9, Route 70, Hooper Avenue, etc), and in Ortley Beach and Coates Pointe.

7. Capitalize on mixed-use redevelopment and revitalization of areas that are becoming obsolescent.

8. Create new employment centers to reduce the number of residents who have to leave the county to find employment, and by so doing to reduce reliance on the congested regional highway system.

9. Use the historic and cultural assets of Downtown Toms River to cultivate cultural and heritage tourism, including the removal of regulatory obstacles to uses such as restaurants, entertainment and cultural venues, lodging and water-related activities, while enhancing and promoting the seaport and revolutionary war history of the downtown.

Community Facilities

1. Support the expansion of the Township's healthcare services while maintaining and preserving the residential character of the area surrounding the Community Medical Center.
2. Maintain and improve upon the success of police and fire protection.
3. Update the equipment used by emergency personnel.
4. Meet or exceed all State and Federal requirements for the number of emergency personnel.
5. Continue to renew the Township's infrastructure.
6. Maintain a uniformed police presence throughout the Township.
7. Encourage strategic location of emergency facilities and traffic routes that provide fast and easy maneuverability to all areas of the Township.
8. Ensure the expansion of community facilities to account for current and future growth, especially in light of the development pressure generated on North Dover by the population growth in Lakewood.
9. Provide adequate school facilities in accordance with the pace of development, working with the Toms River Regional School District to deal with shifts in enrollment trends between different areas of the Township.
10. Continue to provide high quality civic, library, medical and other community facilities to meet the broad ranging needs of the municipality.
11. Improve public transportation service for senior citizens and create bicycle and paratransit links between the Toms River Bus Station and the Downtown.
12. Build upon the lessons learned in responding to the emergency conditions caused by Superstorm Sandy related to preparedness and resiliency from major storm events.

Recycling and Solid Waste

1. Prepare for the complete utilization of Toms River Township's landfill.
2. Curb illegal dumping.
3. Continue to increase recycling awareness to reach a 75% recycling rate of Toms River Township's municipal solid waste stream.
4. Consider the utilization of trash incinerators.
5. Continue to improve coordination with the Ocean County recycling program.
6. Encourage activities of the Township's Green Team to educate and motivate recycling within the Township.

Utility Services

1. Link the entire Township to public sanitary sewer service.

2. Upgrade the Township's water supply system
3. Test private wells for water quality and, where feasible, utilize water supply system to diminish reliance on private wells.
4. Develop a list of mitigation projects for groundwater recharge, stormwater quantity control and stormwater quality control in accordance with the Municipal Stormwater Management Plan. Encourage Best Practices for nonstructural stormwater management, such as the integration of bioswales, raingardens, green roofs, etc., especially on smaller sites where structural stormwater management may inhibit economic investment.
5. Require developers to contribute to or complete a mitigating alternative that clearly offsets the effect on groundwater recharge, stormwater quantity control and/or stormwater quality control that was created by the granting of a variance or exemption.
6. Require developers to provide funding or partial funding for environmental enhancement projects that have been identified on the Toms River Township mitigation project list or towards the development of a regional stormwater management plan.
7. Revitalize the Township's Water Advisory Task Force.
8. Develop better coordination with the New Jersey Department of Environmental Protection and United Water Toms River to alleviate water demand and supply deficit issues in a manner that links the character, location, magnitude and timing of development and redevelopment to available water supply.
9. Adopt model water conservation ordinance (amend Article VIII of Chapter 589 – "Water Use Restrictions") part of the Plan Implementation Agenda (PIA) adopted by the State Planning Commission as part of Plan Endorsement.

<u>Energy Conservation</u>

1. Educate the public about alternative energy choices.
2. Encourage solar energy utilization where appropriate. The incorporation of net-metered facilities as an accessory use for commercial, educational, multifamily and institutional uses is specifically encouraged in appropriate locations that have minimal visual impacts on adjacent residential neighborhoods. The use of prime agricultural land and environmentally sensitive land for solar "farms" that generate energy into the grid are specifally discouraged. The use of brownfield sites such as landfills or capped areas for such solar farm uses is encouraged with appropriate design parameters.
3. Implement energy efficient land use and design standards.

<u>Environmental/Conservation and Recreation</u>

1. Preserve the Township of Toms River's vast natural resources by restoring, maintaining, protecting and enhancing vital wetlands, waterways and forested areas.

2. Incorporate the Natural Resource Inventory, dated June 2016 and approved by the Township Environmental Commission on February 7, 2017, as a support document to a new Conservation Recreation and Open Space Element
3. Conserve the Township's remaining farm lots and maintain the rural character of the existing agricultural properties.
4. Provide sufficient active and passive recreational facilities for the existing and future populations, and update the implementation strategy in the Recreation and Open Space Facilities Plan.
5. Preserve additional vacant parcels to protect them from future development.
6. Link parkland, open space and community facilities.
7. Identify environmental constraints throughout the Township and continue to prohibit development in environmentally sensitive regions.
8. Encourage acquisition of land for public open space and recreation.
9. Identify and utilize preservation tools and funding sources for future conservation.
10. Utilize either a Transfer of Development Rights (TDR) program or non-contiguous cluster program, with incentives designed to preserve open space, including environmentally sensitive areas.
11. Encourage the development of smaller scale pocket parks in existing and proposed neighborhoods.
12. Develop a full inventory and conditions survey of all existing parks and recreational facilities while calculating the projected needs of future open space and recreation.
13. Develop a comprehensive environmental education program.
14. Form a cooperative/joint venture with surrounding municipalities for the purchase, maintenance, use and preservation of beach maintenance equipment and replenishment of beachfront in order to cut costs and promote harmony by uniform cleaning and preservation of the beachfront and bay front beaches.
15. Incorporate sustainability and resiliency recommendations of the "Sustainability and Resiliency Master Plan Update" report, dated October of 2016, into the appropriate Elements of this Master Plan.
16. Reduce nonpoint source pollution from the developed landscape that adversely impacts the Barnegat Bay, with particular attention to nutrient pollution from stormwater runoff on maintained turf areas.

<u>Historic Preservation</u>

1. Utilize the Township's historic assets to promote Smart Growth that incorporates conservation, sound land use and economic development throughout the entire municipality.

2. Celebrate the historic character of Downtown Toms River and spread its design elements to other areas of Toms River. Utilize the historic seaport theme of Downtown Toms River to cultivate cultural and heritage tourism.
3. Protect and maintain existing historic places and their features.
4. Enhance the role of the Historic Preservation Commission through the provision of ordinance standards for historic sites and districts.
5. Designate Historic Districts, where warranted, throughout Toms River Township.
6. Increase awareness of the Historic Preservation Commission and its role in planning in Toms River Township.
7. Seek funding for the protection, maintenance and enhancement of historic resources.
8. Encourage municipal actions that will result in the long-range preservation of historical assets throughout the Township of Toms River.
9. Link the Township's historic places with its environmental and recreational resources.

Circulation

1. Discourage jughandles as a design solution for congested intersections.
2. Improve access to business properties from adjoining roadways.
3. Install more collector or pass-through roads to move traffic to main roads through development areas.
4. Address problem intersections.
5. Support rail transportation.
6. Minimize the use of cul-de-sacs.
7. Coordinate with the New Jersey Department of Transportation and neighboring municipalities to identify strategic improvements and long-term solutions that coordinate traffic flow with land use, particularly along heavily traveled roads such as Route 9, Route 70 and Route 37.
8. Work with Manchester Township to implement the recommendations of the Route 37 Corridor Study developed by Together North Jersey (TNJ), including the potential for light-rail or Bus Rapid Transit (BRT) along the former freight rail line that runs parallel to Route 37.
9. Work with Ocean County to study the Route 9 corridor, with particular attention to the creation of east-west links of County roads, such as Hickory Street (being connected through a PUD under construction), North Maple Avenue (to link Route 9 and Route 70 at Massachusetts Avenue), Clayton Road to Whitty Road, Stevens to Church Road, etc. To the extent that such connections can be made as part of PUD development along Route 9, such ROW dedications should be included in the developers agreements.



Figure 1: Extensions of County roads, such as Hickory Street pictured above, through new development sites along Route 9 will improve east-west connections across Route 9.

10. Work with South Toms River Borough and Ocean County to extend the Barnegat Branch Trail from its current terminus at Admiral Boulevard and Route 166 along the former rail ROW in South Toms River to the Herflicker Street bridge, and then to the Toms River Bus Station.
11. Work with Ocean County to provide safe bicycle routes through the Downtown, consistent with the recommendations of the 2011 Bicycle-Pedestrian Plan developed as a Subregional Plan by the County with funding from NJTPA, as deemed appropriate by the Township Engineer and County Engineer.

Sustainability & Resiliency

1. Implement the recommendations for land use changes and land use regulation provided by the 2014 Strategic Planning Recovery Report that are not yet implemented, including the following:
    - Elevate all substantially damaged homes to mitigate impact of flood related hazards in accordance with the Township Hazard Mitigation Plan.
    - Continue to participate in the National Flood Insurance Program to support proactive floodplain management that will protect property from flood-related hazards, clearly inform property owners about the risks of being in and near the Special Flood Hazard Area, and promote flood insurance.
    - Continue to enforce building codes to require building, renovations, and re-building that meets or exceeds the Uniform Construction Code thus protecting homes from risk related to hazards including flooding, fire, wind, earthquake, and winter storm.
    - Continue participation in the Community Rating System program and consider upgrading to the next class level to complete proactive floodplain management and assist residents with flood insurance costs.
    - The Township has added Floor Area Ratio as a required zoning standard for zones located on the barrier island to prevent overbuilding. The Township should continue this work by reviewing other zoning provisions to ensure that zoning reflects existing conditions to reduce number of variance requests.
    - Add standards specific to reducing and/or intercepting stormwater runoff by incentivizing the use of rain barrels and other viable methods of stormwater capture in the waterfront neighborhoods.
    - Differentiate flood-mitigation building design standards such as skirting of pilings, use of decks, parking under elevated homes, etc., by lot sizes on the mainland, bayside, lagoon, and barrier island communities.
2. Create Redevelopment Plans with appropriate land use standards and bulk standards for mixed-use, compact development for the Ciba-Geigy site and the Route 37 Area in Need of Redevelopment (Coates Pointe).
3. Amend the Phase 1 Waterfront Redevelopment Plan in accordance with the findings of the Downtown Circulation Neighborhood Plan so that it can be adopted with its suite of land use, bulk, and design changes for the Downtown area.
4. The development of a Transfer of Development Credits (TDC) program has been a land use goal of the Township for a number of years. The program should be developed, and expanded to include a plan for rezoning upland properties to accommodate possible shifts of residents away from high risk flood zones. The flood zone areas would be the “sending” areas of the TDC program, while the upland areas would be the “receiving” zone. The Township would have to account for value differences, since land in high risk flood areas tend to be higher in value than inland properties. The Township could implement this recommendation with an overlay zone for both the receiving and sending areas.

5. Identify long-term inundation caused by sea level rise as a hazard in municipal plans and consider disclosing hazard risks to potential buyers or developers.
6. Use land use standards as a means for achieving the objectives of the Township's 2016 Smart Growth Plan for establishing Transit Oriented Development (TOD) and/or a Transit Improvement District in the Downtown Toms River Regional Center by amending the R-50 zone within ½ mile of the train station for higher-density multi-family housing. TOD's around bus stations are recommended to have a minimum density of 8 units to the acre. At present, the R-50 zone permits only single-family dwellings.

LAND USE ELEMENT

Toms River Township is comprised of eight neighborhood sections that include Toms River, East Toms River, West Toms River, North Toms River, Pleasant Plains, Silverton and the beach areas of Ortley, Chadwick, Ocean and Normandy Beach. Approximately three miles (2.94) of land in Toms River Township has ocean frontage and an additional thirty-one miles of land has bay frontage. Toms River Township has more bay frontage than any other municipality in the county, as well as the most area in the county that falls under the Coastal Area Facility Review Act (CAFRA). Toms River Township has approximately 107.2 linear miles of tidal frontage.[1] Virtually all 41.62 square miles of the Township are under CAFRA jurisdiction. Only about 14 acres fall in the Pinelands and they are found in the northwesterly corner of the Township adjoining Jackson Township in the upper reaches of the Toms River watershed. The Township is suburban in character with more densely populated areas along the northern border and in the beach areas on the eastern barrier island. Commercial development is concentrated along Route 37, Route 9, Fischer Boulevard, Hooper Avenue, and in Downtown Toms River.

CAFRA

In 1973 the State of New Jersey adopted legislation with the intent to establish environmental safeguards for coastal areas, while encouraging development of compatible land uses to improve the economic position of coastal towns. This legislation became known as the Coastal Area Facility Review Act (CAFRA). CAFRA regulates development in coastal areas along the entire New Jersey coastline.

The NJDEP restricts impervious coverage within CAFRA areas, and requires additional permits to be obtained in order to develop CAFRA protected land. NJDEP categorizes CAFRA land into CAFRA Areas and CAFRA nodes, cores and centers. The nodes, cores and centers allow for more concentrated growth than the individual CAFRA planning areas. The nodes, cores and centers designation was implemented by NJDEP in 2000 with an expiration date of 2005 if the State Planning Commission did not formally adopt these designations. The designations were not formally adopted and

[1] Toms River Municipal Public Access Plan, Toms River Township, New Jersey, Adopted 2016, page 9.

therefore expired on February 6, 2005, mandating that the much more restrictive impervious surface coverage of CAFRA areas be used rather than those of the nodes, cores and centers. Extensions have been granted for the previously established centers, and they are in place through either December 31, 2016 or June 31, 2017, depending on whether the 2016 one year extension of the Permit Extension Act for Sandy impacted areas of New Jersey included center designations. As a part of the process of the approved Conditional Plan Endorsement (January 18, 2017), new center boundaries were drawn in Toms River Township and other coastal municipalities and they will replace the previously designated centers as defined by CAFRA. These new centers, nodes and cores will become recognized as CAFRA centers, cores and nodes upon the adoption of the updated Master Plan and zoning map and regulations and the amendment by the State Planning Commission of the Planning Area Policy Map of the State Development and Redevelopment Plan (SDRP).

Since virtually the entire Township of Toms River is designated as a CAFRA area, it is subject to regulation under CAFRA rules. There are two CAFRA planning areas in Toms River Township. The Suburban Planning Area (PA-2) restricts the maximum permitted impervious surface coverage to 30%, and the Environmentally Sensitive Planning Area (PA-5) restricts the maximum permitted impervious coverage to 3%. The majority of Toms River Township is designated as a Suburban Planning Area. The barrier island, the areas surrounding the North Branch of the Toms River, and the areas with substantial wetlands between Church Road and Hooper Avenue and along the Barnegat Bay south of Silver Bay are in the Environmentally Sensitive Planning Area, although the barrier island is treated in a different manner because of the extent of existing development. A large portion of the Township was designated as a Coastal Regional Center under CAFRA regulations, but that designation will be replaced by the centers and cores approved through Plan Endorsement. The new designations include the two Downtown Toms River Regional Centers (east and west of the Toms River), the Industrial Regional Center (former Ciba Giegy site and a portion of the Route 37 corridor), and several highway cores (Route 9, Route 37 (east and west), Route 70, Hooper Avenue, and Fischer Boulevard). The Coastal Regional Center Designation allowed for an 80% maximum impervious coverage and encompassed the most intensely developed areas of the Township including the barrier island, Downtown Toms River, and areas along Route 37, Route 9, Fischer Boulevard and Hooper Avenue. However, due to the center designation expiration, those areas will be regulated by the much more restrictive Suburban Planning area and Environmentally Sensitive Planning area impervious surface coverage restrictions, except for those areas that will fall within newly defined centers or cores resulting from the Plan Endorsement process through the Office of Smart Growth.

EXISTING LAND USE PATTERNS

Toms River Township is considered to be a developed suburb, but many other uses also exist in the Township. New Jersey Parcel Mapping (NJPM) is a computer program that stores tax data and tax mapping for New Jersey municipalities. Using this program it is possible to identify the land use designations of specific parcels within the Township based on the state's tax code classification system. The following **Table 6** depicts the

number of parcels and total acreage of different land uses present throughout Toms River Township:

Table 6
Existing Land Use

Use	No. of Parcels* 2005	No. of Parcels 2016	% Change	Total Acres 2005	% of Total Acres	Total Acres 2016	% Change	% of Total Acres
Residential & Apartments	35,429	37,376	+5.5%	10,050	50%	10,497	4.4%	51.9%
Public (US, NJ, County, municipal)	439	488	+11.1%	1,786	9%	2,505	40.2%	12.5%
Schools (public/private)	34	35	+2.9%	894	4%	894	0%	4%
Commercial	1,503	1,533	+2%	2,191	11%	2,736	24.9%	13.6%
Industrial	47	43	-8.5%	1,407	7%	289	-79.5%	1.5%
Vacant & Farmland	1,771	2,238	+26.9%	3,300	16%	2,707	-17.9%	13.5%
Other	243	394	-79.4%	580	3%	580	0%	3%
Totals	**39,466**	**42,410**	**+7.5%**	**20,208**	**100%**	**20,208**	**0%**	**100%**

**Some parcels incorporate more than one lot.*
Source: 2005 Toms River Township Tax Data using NJPM; 2016 Toms River Tax Data – Ocean County Department of Taxation

Residential uses make up the largest land use category in Toms River Township and account for approximately half of the total acreage of the Township. Over the past ten years since the 2006 Master Plan, the number of residential parcels increased by 5.5% and the amount of land used for residential purposes increased by about 2%. Residential uses in the Township can be further broken down into high, medium and low densities as depicted in **Map 1**. Approximately 16% of the total acreage of the Township was classified as vacant or farmland in 2006. However, thousands of properties were substantially damaged by Superstorm Sandy and many new vacant lots were created which are gradually being improved with new elevated homes. This trend is underscored by the increase in vacant parcels by 27% over the past ten years, while the acreage of vacant land decreased by 18% over the same period (see Table 6). The parcels of vacant land that became developed were obviously much larger than the parcels of land that became vacant. Many of the vacant lots in the Township have environmental constraints such as wetlands that make them unsuitable for development, so the consumption of a net of 593 acres of land over the past ten years is significant development, especially considering the “great recession” that bottomed in 2008. Commercial and Industrial uses, which represent good tax ratables, account for relatively small percentages of the overall acreage of the Township at 11% and 7% respectively. In the ten years since the 2006 Master Plan, there has been some shift of parcels from industrial to commercial as shown in Table 6. The most significant former industrial property in the Township is the 1,200 acre former Ciba Giegy site, which is now listed as “4A” (commercial) rather than “4C” (industrial). That accounts for the drop in industrial acreage from 1,407 acres to 289 acres between 2006 and 2016.

The amount of land that is owned by the state, County or Township increased from 9% to 12.5% of the total acreage in Toms River Township , while an additional 4% is used for schools. The additional 719 acres of publicly owned land over the past ten years is

indicative of the consistent efforts of Ocean County and the Township to strategically acquire land for open space through the use of open space trust funds. More information on the location and type of open space within the Township can be found in the Open Space, Conservation and Recreation Element.

Note that the total acreage for the Township in **Table 6** is far below the actual total land area of the Township. As stated earlier, the Township has a land area of 41.62 square miles. This amounts to 26,630 acres, so the acreage shown in **Table 6** is only about 76 percent of the total for the Township. Most of this difference can be attributed to streets.

Barrier Island

The barrier island that extends east of Toms River Township's mainland is one of the most densely developed areas of the Township. Settlement of the island began during the 19th century, at which time the entire island was part of Toms River Township. In 1881 the extension of the Philadelphia and Long Branch Railroad services initiated the first large resorts to be constructed, but large-scale residency on the island did not begin until after World War II. A sandbar that runs the length of the island provides protection from rough surf so that amateur swimmers can safely enjoy the ocean. Due to the calm surf, the barrier island has become a sought after vacation spot.

The barrier island in Toms River Township is almost entirely built-out. However there are some smaller environmentally constrained islands to the west of the main barrier island in the Barnegat Bay that are completely vacant. The Township's shore community along the main barrier island includes Normandy Beach, Chadwick Beach, Ocean Beach and Ortley Beach, Silver Beach, Normandy Shores, as well as several others.[2] Commercial development in these communities is relatively consistent smaller-scale retail concentrated along Route 35, which runs north and south down the middle of the entire island. The remaining portions of these communities are residential, with each community having its own residential character.

The most northern of the four beach communities is Normandy Beach. The well maintained houses of Normandy Beach make it a highly desirable vacation spot for those who choose to rent summer homes at the Jersey Shore. Further south are Chadwick and Ocean Beaches. These two bungalow communities have smaller, more densely developed residential lots than in Normandy Beach. Even further south, between Lavallette and Seaside Heights is Ortley Beach. Ortley Beach is a family-oriented community with a small boardwalk. It creates a smooth transition between the highly commercialized tourism in Seaside Heights and the more permanent family community of Lavallette. In conjunction with the changing character of shore communities all along the New Jersey coastline, many of the smaller homes along the barrier island in Toms River Township have been expanded or entirely razed and rebuilt into larger more modern houses. This trend accelerated to unprecendented levels after Superstorm Sandy, especially in Ortley Beach. The small summer homes and

[2] For a detailed overview of the barrier island neighborhoods see "Toms River Master Plan Reexamination and Land Use Plan Amendment – Coastal Neighborhoods Component", March, 2017, by T&M Associates, which is a supporting document to the Master Plan.

bungalows that were substantially damaged during the storm became replaced, in many cases, with much larger homes with more bedrooms and the Zoning Board of Adjustment was handling many applications for variances of required yards and setbacks to allow larger footprints. The Township responded by incorporating a Floor Area Ratio standard in the waterfront neighborhood that helped to slow down the overbuilding trend. While the recovery has slowed from the frenetic pace of the first few years after the storm, it is estimated that around 1200 substantially damaged properties remain in 2017.

Existing zoning includes Conservation Residential (R-400C) on the smaller undeveloped lands to the west of the main barrier island. The barrier island itself has four different zoning designations. The areas along Route 35 are primarily zoned General Business (GB). Zoning from Chadwick Beach north, including Chadwick Beach, Silver Beach, Normandy Shores and Normandy Beach is Residential (R-40A), while the rest of the beach communities are zoned Residential (R-40B), such as Ortley Beach and Multifamily (MF-16), such as Rutherford Homes and Brightwater.

The New Jersey Department of Community Affairs utilized a portion of the Post-Sandy disaster relief funding from the U.S. Department of Housing and Urban Development (HUD) to offer grants to impacted counties and municipalities for recovery planning efforts. Toms River aggressively pursued these “Post Sandy Recovery Planning Grants”, completing and adopting its Strategic Recovery Planning Report in 2014, which identified over ten planning projects. Those planning projects were then engaged with Phase 2 grants in 2015 and 2016, and the results of those efforts are reflected in this Master Plan. One of the projects was an analysis of neighborhoods within the Township that were particularly impacted and which remain vulnerable to future storm events and repetitive damage from periodic coastal flooding. Another of these initiatives included a Sustainability and Resiliency Master Plan Update. Many of the recommendations in the SRPR and the Neighborhood Analysis identified changes needed to recognize the large number of nonconforming lots caused by the street grids in the neighborhoods on the barrier island.

Summary of Recommendations:
The following summary of zoning recommendations for the Barrier Island neighborhoods are contained in a report, entitled “Proposed Land Use and Development Regulations”, prepared by T&M Associates and funded with one of the Post Sandy Phase 2 grants:

- Remove lot depth requirements from the zoning standards for Ortley Beach to allow for variations in the street grid.

- On the north beaches of the Barrier Island, create new zoning districts to address the lot size and dimension characteristics of the individual neighborhoods, with an emphasis on minimum lot width due to the existing street grid. Remove existing grandfathering provisions.

- Rezone a portion of the R-40B zone on the north beach to MF-16 in order to accommodate an existing nonconforming multifamily development.

- Allow more development flexibility along the Route 35 North corridor of Ortley Beach to permit both multifamily and commercial uses by merging them into a single zone distriction (GB/MF), provided that sufficient parking can be accommodated.

- Based on the 2014 Annual Report of the Toms River Zoning Board of Adjustment, there were a inordinate number of variance applications for two-family dwellings in the Ortley Beach neighborhood on lots where single family dwellings were damaged by Sandy. A concentration of two-family dwellings exists on the east side of Route 35 southbound. It is recommended that two family dwellings be restricted to the proposed R-40E district as a conditional use with conditional use standards that incorporate storm resilience measures and appropriate parking for the higher density.

- In the Brighton/Rutherford/Brightwater neighborhood in the North Beaches section of the Barrier Island, create a new district ("Shore Multifamily" -SMF) to address the unique character of three existing modular developments.

- Create several "Barrier Island Residential" districts to address existing lot sizes and dimensions driven by the street grid unique to a particular section.

Pelican Island & Mainland Bayshore

The other waterfront residential areas in Toms River that were impacted by Superstorm Sandy were Pelican Island and the Mainland Bayshore. Most of these neighborhoods were constructed on fill dredged during the construction of lagoons after World War II and many of the homes were originally vacation homes that have increasingly become primary residences in recent decades leading up to Superstorm Sandy in October of 2012. The Pelican Island neighborhood is split between Toms River and Berkeley Townships, with the western third in Toms River and the eastern two-thirds of the island in Berkeley. The Mainland Bayshore neighborhoods are known as Gilford Park, Bay Shore, Shelter Cove, East Dover, Snug Harbor, Green Island and Silverton.

Gilford Park

This neighborhood is located between Route 37 south to the Barnegat Bay. The entire residential portion of Gilford Park is zoned R-50, which requires a minimum lot width of 50 feet and a minimum lot area of 5,000 square feet. However, the Neighborhood Analysis performed by T&M Associates as part of this Land Use Plan Update, concluded that the prevailing lot width in this neighborhood is actually 40 feet. The recommendation in the Proposed Land Use and Development Regulations is to rezone the neighborhood R-40A.

Bay Shore

This neighborhood is bordered by Gilford Park to the west, Route 37 to the north and the Barnegat Bay to the south and east. This neighborhood is also zoned R-50, but the prevailing lot width matches the zoning and no changes are recommended.

Shelter Cove

Shelter Cover is a small lagoon neighborhood on the north side of Goose Creek to the east of Fischer Boulevard and south of Bay Avenue. The neighborhood is almost entirely within the AE Flood Zone. It is currently zoned R-75 with lot widths that are generally 50 to 75 feet, with the 75 foot wide lots generally located west of Nassau Drive and the non-conforming 50 foot wide lots generally found east of Nassau Drive. It is recommended that the eastern portion be rezoned to R-50 to match the prevailing 50 foot lot widths.

East Dover

East Dover is one of the largest of the Mainland Bayshore neighborhoods and consists of several sub-neighborhoods between Fischer Boulevard and the Barnegat Bay (Silver Bay, Goose Creek), including Windsor Park and Barnegat Bay Estates. Most of the residential areas are currently zoned either R-75 or R-400C. The Neighborhood Analysis done as part of this Land Use Plan Update showed that some of Windsor Park and the small lagoon clusters along Fischer Boulevard have prevailing lot widths less than 75 feet. The portions of East Dover that have concentrations of undersized lots are recommended to be rezoned to R-50.

Snug Harbor

Almost all of Snug Harbor is zoned R-75 and consists of lagoon lots with prevailing widths of 65 and 75 feet. Of the 454 total parcels in Snug Harbor, 429 are single family residential properties. A small portion of the neighborhood (three commercial lots) is zoned HB and R-400C (adjacent to Catus Island Park). The prevailing lot widths of 65 feet are concentrated in the blocks east of the lagoon on the east side of Monitor Drive, while the rest of Snug Harbor to the west has prevailing lot widths of 75 feet. It is recommended that the area with 65 foot prevailing lot widths be zone R-50 and the remainder remain zoned R-75. This would reduce the number of nonconforming and the only lots that would lend themselves to subdivision with out variances would be those few that are 10,000 square feet or greater.

Green Island

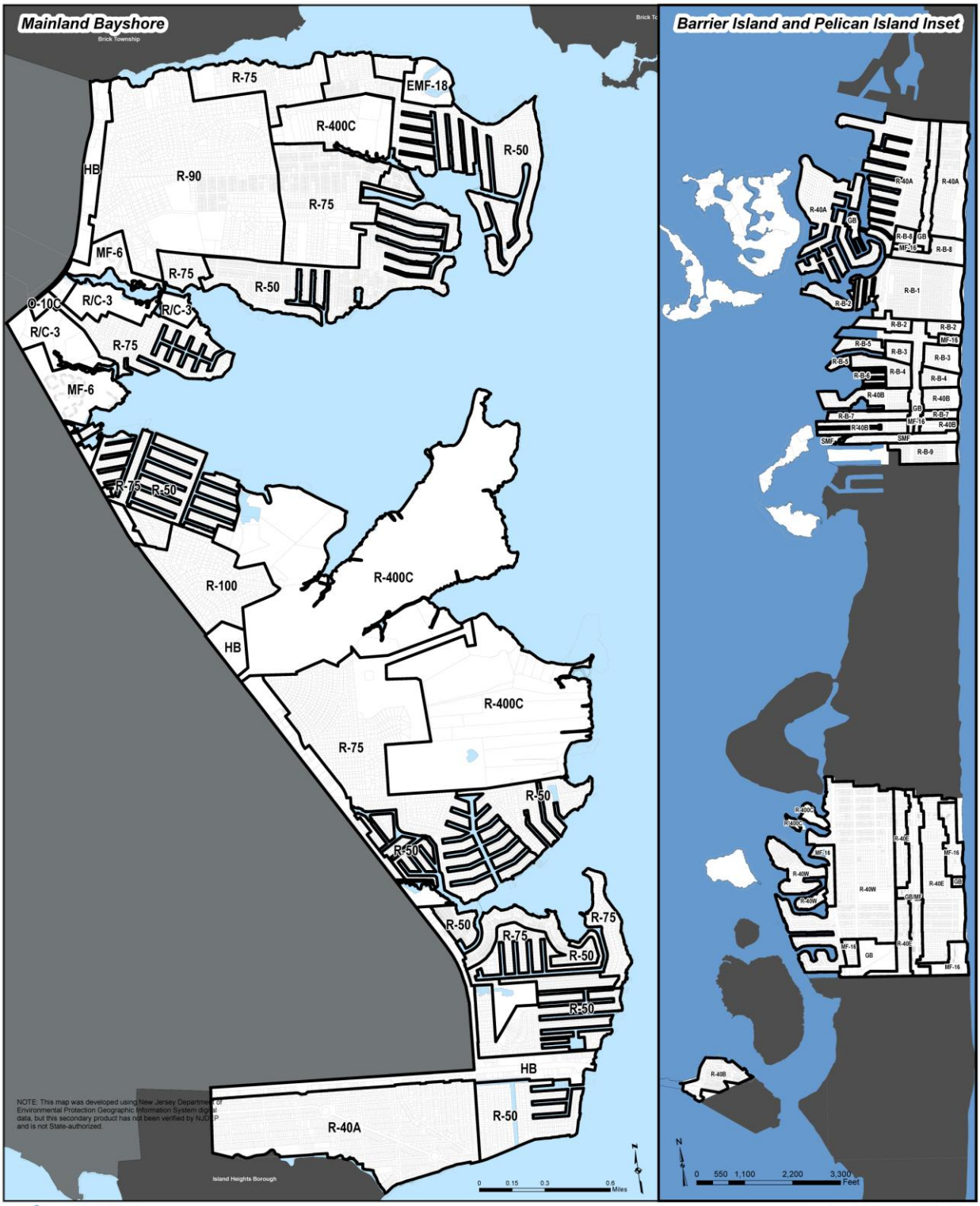
Green island is another lagoon neighborhood on the eastern tip of Silverton to the east of Fischer Boulevard. While Green Island is zoned R-75, the prevailing lot width is 50 feet. This led to variances for lot area, lot width and side yard setback during the reconstruction of homes in the aftermath of Sandy. It is recommended that Green Island

be rezoned to R-50 to recognize the prevailing lot widths and provide for side yard setback requirements more in keeping with 50 foot wide lots.

Silverton

Silverton is the northern most neighborhood with lagoon neighborhoods along Fischer Boulevard. About half (eastern and southern) of the total neighborhood is in a flood hazard area and is zoned R-75. The more inland portions are out of the flood hazard area and are zoned R-90. The Fischer Boulevard corridor is zoned Highway Business (HB). Of 3,214 parcels, 3,023 are residential properties, 43 are public properties and 24 are commercial properties.

Within the eastern half of the neighborhood currently zoned R-75, the lots on lagoons to the south and east (opposite Green Island) have prevailing lot widths of 50 feet, which led to variances of lot width, area, and side yard setback for reconstructed homes after Sandy. It is recommended that these lagoon blocks be rezoned to R-50 to reflect the prevailing lot widths.



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Revised Coastal Zoning
Toms River Township
Ocean County, New Jersey

Historic Downtown Toms River

Downtown Toms River encompasses the area bounded to the south by the Toms River, to the west by the Garden State Parkway, by Route 37 to the north, and slightly past Hooper Avenue to the east. The Downtown Village of Toms River has always had a unique character. It was an important gateway seaport during Revolutionary times and continued to be a strong center for trade into the early twentieth century. However, the opening of the Ocean County Mall in 1976 and the construction of strip malls along Route 37 and Hooper Avenue caused retail in the downtown to suffer. Nevertheless, the downtown has remained a strong civic center for both Township and county offices. Additionally, professional offices dominate the downtown, many of them law offices due to the close proximity of the County Court House.

Existing land use in Downtown Toms River is mostly commercial. However, the area lacks the critical retail mass that could transform it into a destination center. Commercial uses in the Downtown are mostly civic and office uses along with a few restaurants. Residential uses are sparse in the historic village and current zoning prohibits residential mixed-use development in some of the downtown.

In recent years, Downtown Toms River has been designated as a Business Improvement District (BID). In 2003, The Downtown Toms River Business Development Corporation took over management of the TRBID. This non-profit organization guides the economic revitalization of Downtown Toms River and provides a variety of services to help promote the renewal of the area. One service that has been provided by the organization has been the preparation of the Downtown Toms River Master Plan, which is incorporated herein as a part of the Toms River Master Plan and is found in **Appendix E**.

Additional initiatives of the TRBID since the 2006 Master Plan included the designation of the area bounded by Iron Street and the Toms River to the East and south, both sides of Water Street to the north and the Garden State Parkway to the west as an Area In Need of Redevelopment (redevelopment area). The redevelopment area was expanded in 2012 to include the block bounded by Lien Street, Main Street, Water Street and Irons Street and a Phase 1 Redevelopment Plan was drafted by a consultant to the TRBID and reviewed by the Township. After most of the redevelopment area was flooded by Superstorm Sandy later in October of 2012, the Township pursued a Post Sandy Recovery Planning Grant that paid for a traffic circulation modeling of the intersections along Water Street that were considered an impediment to absorbing any additional traffic from new redevelopment. The trip generation estimated from the buildout of the draft Phase 1 Redevelopment Plan was loaded into the model and recommendations for improvements to accommodate the additional trips were specified. The application of a Transportation Improvement District (TID) was recommended as an implementation acton step and would quantify the costs of recommended improvements and apportion the cost to redevelopment projects as they come online pursuant to individual redevelopment agreements after the Phase1 Plan is updated and adopted.



Figure 2: Rendering of 3D model of potential buildout and street network for Phase 1 Redevelopment Plan.

Related land use and circulation synergies associated with the redevelopment of the West Water Street corridor include the application of Complete Streets design in the street network, Transportation Demand Management to connect new redevelopment projects to the Toms River Bus Station and a paratransit (shuttle) that would circulate around the entire downtown.

Riverine Corridor

Situated along the North Branch of the Toms River, between Whitesville Road and Manchester Township, is the Riverine Corridor. Development in this area is primarily low to medium density residential, though two higher density multifamily communities are also located there. Those areas along the corridor that are not developed are mostly forested and involve some wetlands. Existing zoning in this area is almost entirely residential and permits a range of densities from multi-family to low density R-800 zoning. Over time the Township has acquired much of the vacant land along the river and much of it is used for active and passive recreation, including Winding River Park, and more recently Camp Anaconda (former Boy Scouts camp). More detail is available in the Conservation, Recreation and Open Space Plan Element (adopted as a standalone Element on March 15, 2017).

Route 9 Corridor

Route 9 runs north and south through the western section of Toms River. The highway connects Lakewood Township to the north and Berkeley Township to the south. From

Route 571 in Toms River Township to Route 530 in Berkeley Township, Route 9 is converged with the Garden State Parkway. Land use along the Route 9 corridor is mostly commercial, but a small pocket of residential uses exists near the intersection of Route 571 and Route 9. Additionally several parcels along the northern section of Route 9 are still vacant or under-utilized. The majority of land along the corridor is zoned RHB, Rural Highway Business.

With the recent conclusion of the Route 9 Corridor Study by the NJTPA it has become evident that there is little chance of improvements to Route 9 over the foreseeable future. At the same time, there has been a spike in construction activity in the northern section of the corridor between Whitesville Road to the south and the Lakewood border to the north with the construction of several Planned Unit Developments, with several others in various stages of the approval process. The Corridor Study recommended improvements to the County road system to take some of that new traffic and the County launched a study in 2017 of the intersections of its roads with Route 9. However, it is recommended that the current RHB zoning of southern half of the Corridor, south of Cox Cro Road, be reviewed and rezoned, where appropriate, to LI. HB zoning or retention of RHB zoning would be limited to signalized intersections or properties with multiple access points were retail uses would be more appropriate, or where RHB zoning is necessary to prevent existing uses from becoming nonconforming. Sites that have been developed, approved or are before the Planning Board or Board of Adjustment under one of the permitted uses in the RHB zone that are not permitted in the HB zone should remain in the RHB zone.

Many of the properties along this stretch of Route 9 are far deeper than they are wide and many are already improved with uses permitted in the LI zone, such as self-storage, contractor’s units (Ocean Business Park) and the like.



Existing Route 9 Light Industrial Zone: This location is about 37 acres in size. As with Site 1 above, this area consists of paper streets and small lots, most of which are under one ownership. The adjoining zoning to the west, north and east is RHB and it adjoins a mobile home park to the south. A reasonable approach to providing development opportunities at this location would be to identify it as an Area in Need of Redevelopment, allowing for comprehensive development of the site through vacating streets and consolidating ownership. This site provides potential access to both Route 9 and Route 70, and with proper improvements of North Maple Avenue is can provide access to Massachusetts Avenue as well, which should be a distinct advantage for commercial development. Specific development controls would be spelled out in an adopted Redevelopment Plan ordinance.

Route 37 Corridor

Route 37 is the main east-west connection through the southern part of Toms River Township. This highway connects Manchester Township and points west to the Borough of Seaside Heights on the barrier island. Route 37 is almost entirely developed with both small and large scale commercial uses. However, many of the businesses are run down and poorly maintained or not developed to their full potential. This presents many opportunities for infill development, revitalization and redevelopment along the corridor.

In 2015, the Township engaged Together North Jersey to provide technical assistance in the form of a team of consultants to work with Toms River and Manchester to develop a vision plan for the Route 37 corridor between the Barnegat Bay and Lakehurst circle (interchange with Route 70) the Route 37 Corridor looked at the two major property holdings along the corridor, the 1200 acre former Ciba Giegy site in Toms River and the

7,000 acre former Heritage Minerals site in Manchester. It also recommended activation of the former freight rail line that runs parallel to Route 37 along the corridor, or an adaptation to Bus Rapid Transit (BRT), with a connection to the Toms River Bus Depot at the western edge of the Downtown Waterfront Redevelopment Area.

Hooper Avenue

Hooper Avenue runs north and south through the center of the Township. It is largely developed with commercial uses under 0-10, 0-15 and HB zoning. However, the greatest concentration of commercial development in the Township is found in the RC, Regional Commercial zone in the vicinity of Bay Avenue. This is the home of the Ocean County Mall and a number of other commercial centers whose vitality is directly linked to the draw provided by the regional mall.

In the decade since the 2006 Master Plan, the Hooper Avenue corridor has experienced economic challenges that have led to a decline in property value at the Ocean County Mall property, which had been the anchor of the corridor with a regional draw. Over time the strength of the retail market, competition from other retail locations and the emergence of internet commerce has hurt the mall economically, as well as several of the linear shopping centers along Hooper that had benefited from their proximity to the mall, such as Seacourt Pavilion and the Target-Lowes shopping centers.

Simultaneously, the office market in Ocean County, as in New Jersey as a whole, has suffered through an extended period of excess supply and increasing vacancies, which prompted rezoning requests for both the Office-10 (O-10) at the north end of the Mall at Oak street, as well as the Office-15 (O-15) Zone to the south of Seacourt Pavilion. In the case of the O-10 area the proposal was for rezoning to permit a hotel, while the request for the O-15 was for more retail uses. The O-15 Zone was amended to allow freestanding restaurants to locate in an Office Park, but allowing any other retail uses was rejected out of concern for adversely affecting the Mall.

Given the above, this Land Use Element recommends that the Hooper Avenue corridor from Oak Street south to include the O-15 Zone be evaluated as a whole with the goal of proactively working with key property owners to develop a combination of land uses, including the possibility of higher density residential and/or mixed use buildings in appropriate locations, that would serve to revitalize both the mall property and the O-15 and O-10 Office Park Zones. The area between the O-15 and Seacourt Pavilion is largely vacant land and has been identified as a potential redevelopment area due to the property assemblage challenges presented by numerous subscription lots and paper streets. If the area is designated as a redevelopment area, the associated redevelopment plan may be an opportunity to provide connectivity between the Seacourt Pavilion and adjacent higher density residential development (rezoned from Regional Commercial to Multifamily – 8 du/acre) on one side and the O-15 Zone on the other.



Figure 3: Google Earth graphic marked to illustrate proximity of the office, residential and retail development with the potential redevelopment area in the center.

Fischer Boulevard

Intersecting Hooper Avenue in the north and Route 37 in the southeast, Fischer Boulevard runs northwest to southeast along the eastern side of the Toms River Township mainland. Fischer Boulevard is almost entirely built-out with medium density residential and some commercial uses. There are significant wetlands and environmentally sensitive areas near the intersection of Hooper Avenue and Fischer Boulevard. Numerous lagoon neighborhoods rely on Fischer Boulevard as their primary access. These neighborhoods were previously addressed in the section on the Mainland Bayshore neighborhoods.

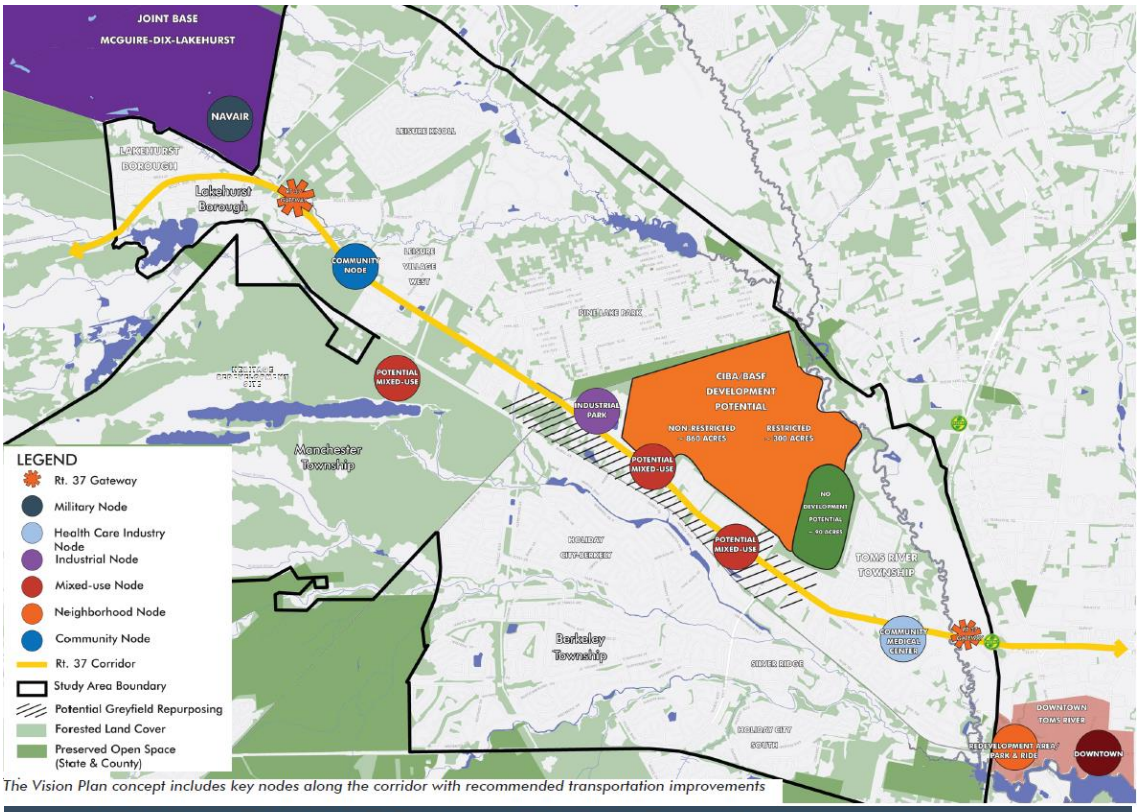
Ciba-Geigy Site

Ciba-Geigy is a former chemical manufacturing plant located in the southwestern corner of Toms River. The property is comprised of approximately 1,200 acres. A portion of the site is contaminated and cleanup is ongoing. Approximately 800 acres of the site is undeveloped and possibly uncontaminated land. The current zone designation for this site is Industrial (I). The Township is investigating possible redevelopment opportunities for the site and it was included as an "Industrial Center" in the Township's Petition for Plan Endorsement that was conditionally approved by the State Planning Commission on January 18, 2017. It has been determined to be an Area in Need of Redevelopment based on a report adopted by the Planning Board, a determination made by Township Council, and a filing made with the New Jersey Department of Community Affairs. A redevelopment plan has not yet been prepared or adopted for the site, as the site remains owned by BASF, which is responsible for the ongoing remediation. However, the Route 37 Economic Corridor Vision Plan, prepared with a Local Demonstration

Project grant from Together North Jersey in May of 2015, recommended that this site, along with the Heritage Minerals site in Manchester, had the potential to be centers of economic activity in the future. The Ciba-Geigy Site has long been viewed by the Township as an opportunity to create an alternative route for County Route 527 to relieve the neighborhood along Oak Ridge Parkway from through traffic. There are already controlled intersections with Route 37 that could serve as access points to the site.



Figure 4: Google Earth view of Ciba Geigy Site facing north across Route 37 with the current Route 527 (Oak Ridge Parkway) visible in the lower right corner.



The Vision Plan concept includes key nodes along the corridor with recommended transportation improvements

ECONOMIC DEVELOPMENT OPPORTUNITY SITE: CIBA-GEIGY/BASF

CIBA/BASF REDEVELOPMENT PLAN

The Ciba-Geigy site is a major opportunity for redevelopment. Redeveloping the clean land on site provides an opportunity to bring additional jobs and property tax revenue into the area. Freight access and service at sites like Ciba-Geigy could accommodate the transportation of materials to and from the Joint-Base and the Lakewood Industrial Park. Having warehouse and manufacturing space nearby would also allow start-up and relocating companies to save costs and time on goods shipment.

Ongoing remediation is taking place in areas that faced contamination. Redevelopment could occur by separating out remediated areas, contamination areas, and clean areas that could qualify to be parkland.

A number of uses for the site have been suggested in various plans and focus groups. Some potential uses for the site include a satellite college campus, a site for light manufacturing, a mixed-use, mixed-generation, and mixed-income complex with a "downtown feel," a potential site for a sports team or outlet shopping, a walkable transit village that connects to downtown and parks, a spa and fitness center, or a site for green technology and manufacturing. These concepts would need a real estate analysis for feasibility.

Resolve tax appeal situation

BASF is currently in an appeal with Toms River Township on their taxes for the CIBA property. The dispute has caused advancing any redevelopment efforts on the property to be at a standstill.

Removal of Super Fund designation

The Super Fund designation of the property has had a substantial impact on it perception in the region and in the marketplace. One of the key ways of improving the marketing of the property is to have the designation removed. There is a process for partial delisting if some portion of the property meets the requirements for delisting with the USEPA.

The Cell 1 area is under the purview of NJDEP, not USEPA's Superfund program, and has always been a regulated landfill permitted under state regulations. Cell 1 has been subdivided out and the remainder of the property has development potential, some with restrictions and some without. The land owner has to take initiative to get any portion delisted, so once the tax appeal is resolved, BASF should work with the Township's support to formally apply to get the delisting.

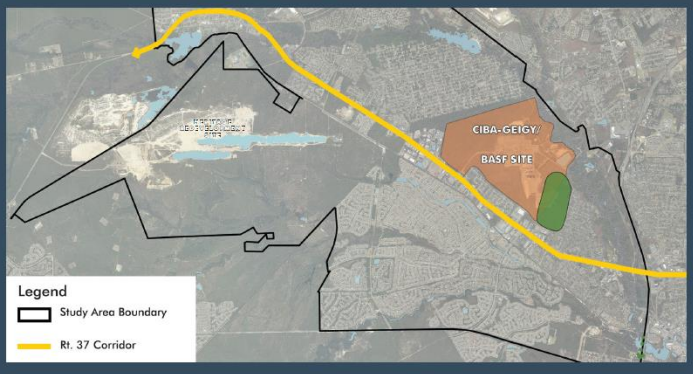


Figure 5: Graphics from the Route 37 Economic Corridor Vision Plan regarding Ciba Geigy Site.

North Dover, Silverton and Pleasant Plains

The northern part of Toms River Township is largely developed with residential subdivisions. A number of these developments are higher density retirement communities, especially in the central and western parts of North Dover. Medium density single family housing also exists in the Silverton area adjoining Barnegat Bay and Brick Township. Sections of Silverton involving lagoon neighborhoods were previously addressed under “Mainland Bayshore” above.

The neighborhoods of North Dover include single family subdivisions along Whitesville Road and the connecting roads to Route 9 (Stevens Road, Sunset Road, Whitty Road and Riverwood Drive) and Church Road, N. Maple Avenue, Hickory Street and Silverton Road to the east, between Route 9 and Hooper Avenue. They also include senior communities such as Lake Ridge and higher density townhouse development such as Saratoga. The area has various multifamily residential developments in the past several years, most of which are providing affordable units as part of the Township’s Housing Element and Fair Share Plan, adopted on February 15, 2017.

With the sudden construction activity along the Route 9 portion of North Dover, and the recent recommendations of the Route 9 Corridor Study (December 2016) indicating that improvements to substandard conditions along Route 9 by the NJDOT are not anticipated in the foreseeable future, the focus of this Land Use Element is to shift future higher density development to the Downtown Redevelopment Area and the Hooper Avenue Corridor.

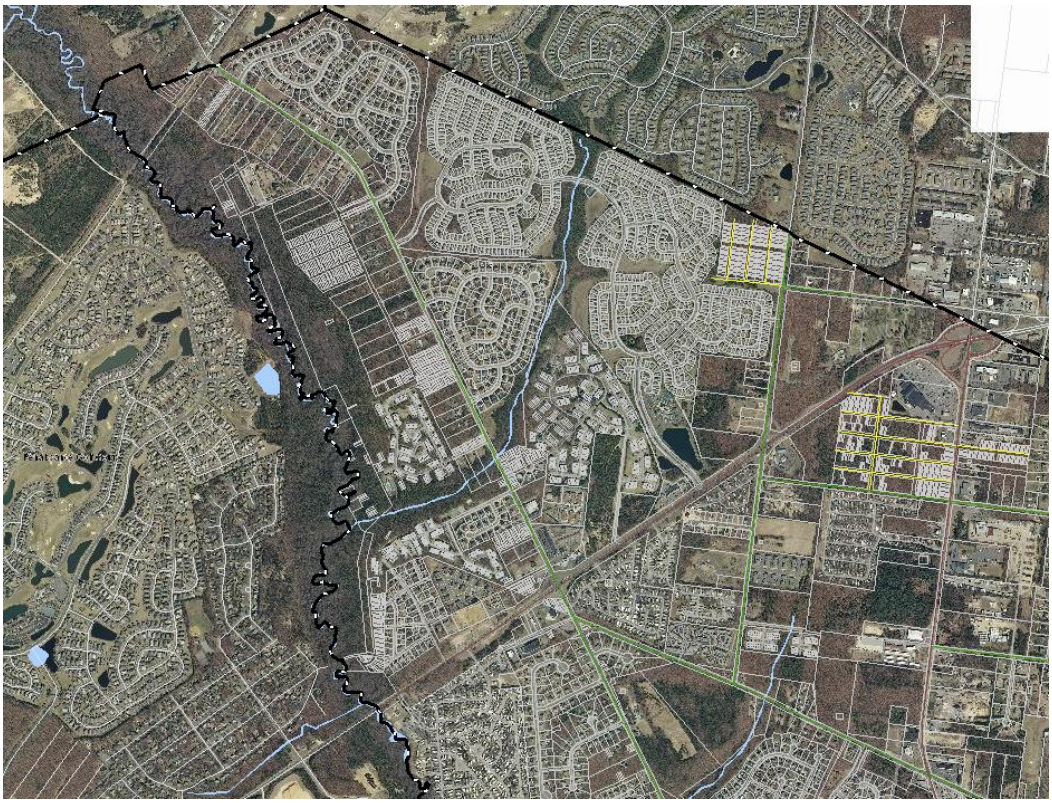


Figure 6: Aerial view of North Dover section of Toms River Township

LAND USE PLAN ELEMENT

The Land Use Plan is shown on **Map 2** of this Master Plan, and **Map 3** shows the areas where the Land Use Plan calls for a fundamental change in the zoning map. As a general zoning and planning principle in this Master Plan, zoning categories should be selected that will minimize the number of nonconforming lots in established areas, particularly in residential neighborhoods. The map incorporates the following categories of land use within the Township:

1. **Low Density Residential**-within these areas of the Township, it is recommended that single-family housing be permitted at a density of less than one dwelling unit per acre. Many of the low density areas recommended in the Land Use Plan are areas which are environmentally sensitive to intense development and/or do not have the traffic circulation, utilities or other public service facilities required to support more intense development. Within the majority of the low density residential areas, the zoning categories are R-800, R-400, R-400C, C/R-3 and Rural. The following principles and recommendations apply:

   Consider consolidating the Rural and R-400 zoning districts during the time of updating the zoning ordinance. The standards for the two districts are sufficiently similar that it may not warrant two different zones. Careful attention in this review should be given to the list of conditional uses in each zone. This recommendation remains the same as the 2006 Master Plan, as the changes would be included in amendments to Chapter 348 of the Municipal Code (Land Use and Development).

   Cluster development and noncontiguous clustering should be encouraged for the remaining larger vacant or underutilized tracts, particularly where environmental sensitivities make conventional development impractical. Noncontiguous clustering simply means that development potential can be moved from one parcel to another, with appropriate deed restrictions placed on the sending parcel to make certain that it is not subjected to development in the future. The statutory authority for noncontiguous clustering is found in the Municipal Land Use Law under the definition of “Residential Cluster”, which reads “…a contiguous or noncontiguous area to be developed as a single entity according to a plan containing residential housing units which have a common or public open space area as an appurtenance.”

   For the R-800 zone, continue to permit clustering at a rate of 0.5 units per acre, but increase the lot size for non-cluster development to about three acres. This will diminish potential adverse environmental impacts in the Riverine Corridor, especially for those who choose noncontiguous clustering as an option.

2. **Moderate Density Residential**-Within these areas of the Township, it is recommended that single-family housing be permitted at densities ranging from 1

to 2.5 dwelling units per acre. The zoning districts that fall in the Moderate Density range are R-200 and R-150. In spite of the 5,000 square foot difference in minimum lot area, both of these districts allow cluster development at a gross density of two units per acre.

The density incentives would apply in areas involving at least thirty acres of land, contiguous or noncontiguous, and for the R-200 portion the gross density for clustering would increase to 2.5 units per acre from two per acre under existing zoning. For R-150 the gross density for clustering under the incentive provision would be three units per acre from two per acre. As with the Low Density Residential category, significant lot size reductions should be incorporated into the zoning regulations in order to generate sizable parcels for preservation of open space and environmentally sensitive features. Large minimum tract sizes should be required in order to qualify for the density bonus, with the bonus related to the generation of sizable tracts of land appropriate for preservation of open space and environmentally sensitive features.

Age-restricted housing could be used in conjunction with the density incentives since these have lower per-unit occupancy rates and lower service demands than conventional housing. A density increase factor over conventional housing of 50 to 100 percent should be considered as a part of the rezoning. Ocean County has a high demand for age-restricted housing, and by encouraging such housing through density incentives the impacts on the surrounding road network and peak traffic will be diminished. Water usage and corresponding sewage treatment requirements will not be exacerbated by using these multipliers for age-restricted housing as compared with conventional housing.

Any specific map changes involving lands in the Moderate Density Residential category are shown on **Map 3**. In addition to those identified in the preceding section of this Land Use Plan dealing with Low Density Residential, there are two locations that call for a map change. In the vicinity of Church Road and Hooper Avenue, the R-90 area should be rezoned to R-150 based on existing lot sizes. This recommendation is continued from the 2006 Master Plan, as it has not yet been implemented.

3. **Medium Density Residential**-Densities from 2.5 to 5 dwelling units per acre are recommended within the Medium Density Residential areas. Minimum lot sizes ranging from 7,500 to 12,000 square feet are proposed for single family development in these areas. Large scale retirement communities, falling in the PRC zones, are found in this use category as well. In keeping with the overall principle of reducing the number of nonconforming lots in existing developed areas, careful consideration should be given in the rezoning process to the pattern of existing lot sizes. New development on lots ten acres or larger can take place in multiple dwellings, but the overall density for non-age restricted housing should not exceed four units per acre. In accordance with the lower impact of age-restricted housing, density increases of 50 to 100 percent could

apply to such housing, not to exceed eight units per acre. However, the density increases should only be permitted on larger tracts, starting at about ten acres. The following specific changes are recommended:

The development density on large parcels should be capped at four units per acre, with age restricted housing capped at eight per acre, and an effort should be made to provide for neighborhood amenities and open space as each parcel develops. Bedroom density controls on non-age restricted housing can be used to balance the impacts of smaller and larger housing units by allowing for adjustments in actual dwelling unit density. These details would be worked out in the process of developing zoning standards. Pedestrian scale development is encouraged, and effective bicycle and pedestrian paths to nearby commercial destinations and bus transit routes should be incorporated into the overall design.

Most of the waterfront properties and lagoon developments on the mainland fall into the Medium Density Residential use category. In the zoning standards, special consideration should be given to waterfront properties, including lagoon lots, to effectively address front and rear yard issues, placement of sheds, and effective standards that can adequately respond to over-development concerns.

4. **High Density Residential**-Within the residential areas on the barrier island, single family housing development is permitted on minimum lot sizes of 4,000 square feet (approximately 11 dwelling units per acre) and two-family housing development is permitted on minimum lot sizes of 6,000 square feet (approximately 14.5 dwelling units per acre). Many of the homes on the barrier island are presently seasonal dwellings. To the extent that these dwellings are converted to or replaced with year-round housing units, they will provide an additional housing resource without adding to the total number of housing units in the Township. However, they would also increase the need for municipal services.

   Within the high density residential areas on the mainland, single-family housing is permitted on minimum lot sizes of 5,000 square feet, which equates to approximately 8 dwelling units per acre.

   Mobile home parks are included in this use category, although they should continue to have their own zoning identification. No new mobile home parks are proposed and no additional mobile home parks should be provided for through zoning.

   The most important consideration for this land use category is to carefully review the zoning standards to minimize the number of nonconforming lots in each area. Based on a recommendation in the 2006 Land Use Plan Element, zoning regulations were adopted in the form of Floor Area Ratio (FAR) standards intended to diminish the negative impacts of over-sized homes on small lots. Not only should lot size conformity be an issue in the development of zoning

standards, but they should address building height, yard setbacks, placement of accessory buildings, building and lot coverage, along with floor area ratios. All of these zoning techniques should be considered for each of the small lot High Density Residential use categories. The High Density Residential use category is essentially fully built out.

Many of the homes on the barrier island were seriously damaged or destroyed in 2012 during Superstorm Sandy. During the rebuilding process, it has become apparent that with homes being elevated to address flooding issues, the size and scale of the rebuilt homes has been brought sharply into focus. The Township has responded by putting in place impervious lot coverage limitations and floor area ratio controls. This Land Use Plan Element now recommends that in the R-40B zoning district on the barrier island that the ordinance be made more restrictive by only permitting two-family dwellings as conditional uses. In an effort to further limit development intensity and some of the problems attendant to it such as the loss of on-street parking, the conditional use standards should include the following: a minimum lot size of 6,000 square feet, a minimum lot frontage of 60 feet, and strict adherence to the parking requirements set forth in the ordinance.

The following changes are recommended in mapping:

In the Downtown Toms River area, the R-50 zone was expanded west of Main Street as recommended in the 2006 Land Use Plan Map (Map 2). This expansion runs generally from Lien Street to Broad Street and would adjoin an existing senior citizen affordable housing complex located on Colfax Street and Highland Parkway.

Another small expansion of the R-50 Zone recommended in the 2006 Land Use Plan Element was made in Downtown in the vicinity of Hooper Avenue along Field Street and Lawn Street. This latter area was changed in order to provide compatible housing and land uses along both sides of these residential streets. The remaining portion of this block would continue as VO, Village Office zone.

5. **Multifamily Housing**-This use category includes conventional multiple dwellings and townhouses. Multifamily housing built or anticipated to be built to address the Township's need for low and moderate income housing is also shown in this category. Specific sites for low and moderate income housing are identified in the Housing Plan Element of the Master Plan.

Density varies in multifamily developments throughout the Township and zoning standards should reflect the prevailing development density for the site. The range of densities is from six to sixteen units per acre, with the higher densities found on the barrier island and in redevelopment plans within the Downtown and

possibly other redevelopment areas recommended in this Land Use Plan Element.

Several approvals for multifamily dwellings were granted through use variances and the sites are fully developed and operating. Those parcels should be rezoned to reflect their use as multiple dwellings.

In addition to modifying the zoning map to reflect sites that are developed as multifamily, the following changes are recommended:

As recommended in the 2006 Land Use Plan Element, the higher density multifamily zones now require a 20 percent setaside with a 15% density bonus for affordable rental units. This aspect of the Master Plan is set forth in detail in the Housing Element and Fair Share Plan adopted by the Planning Board on February 15, 2017.

In order to further implement the provisions of the 2006 Master Plan related to existing multifamily development, the Land Use Plan and Land Use Plan Map was amended in 2007 by creating two new land use categories as follows: Existing Multi-Family – 18 (EMF-18) and Existing Multi-Family – 10 (EMF-10). The land use categories are intended to designate existing multi-family developments and prescribe densities (18 and 10 dwelling units/acre respectively) more reflective of existing conditions and thereby render the sites more conforming with the Township's adopted Master Plan.

In addition, Block 404, Lot 79 abuts Route 166 on the westerly side of the highway, just north of the intersection with Old Freehold Road and Presidential Boulevard. The property was zoned O-15 except for the frontage on Route 166, which was zoned Highway Business to a depth of 200 feet. No change was made for the Highway Business portion of the parcel, but the O-15 portion was changed to the MF-8 zoning district in 2008, reflecting a more compatible land use relationship with the multifamily developments that lie immediately to the north and the south of the parcel. The MF-8 zoning district has a 16 bedroom per acre density control that effectively accommodates the typically smaller households found in the region. The change from O-15 to MF-8 not only provided a more compatible land use relationship with adjoining parcels, but it avoids encouraging office development in that heavily traveled portion of Route 166. Due to access difficulties to Route 166, a cross-access easement was strongly recommended through the apartment complex to the south, which offers an opportunity not only for left-turning movements through a signalized intersection at Route 166 and Old Freehold Road, but for more convenient access to the shopping center. As with all multifamily developments, and in accordance with the Township's adopted zoning provisions, 20 percent of the units would be set aside for affordable housing.

6. **Office**-Within the Village Office areas of Downtown Toms River and along Lakehurst Road where medically related offices are encouraged, zoning controls have been established that will protect the existing architectural and historic character of the area. Within this area, restoration of existing structures to be utilized for office and related uses should continue to be encouraged. New office structures should have the size and scale limited in order to be compatible with existing residences in the area. It is a specific intent of this Land use Plan that office uses be so designed that they will have long term compatibility with single family dwellings in the area. Lighting, parking, building size, buffering, setbacks and architectural style are all important elements in generating compatibility. In drafting zoning controls to implement this plan, strong consideration should be given to more restrictive controls on building height and building size. The existing controls of 40 feet and 5,000 square feet per building allow for structures that are significantly larger than the homes found in these areas.

Since the 2006 Master Plan there has been increasing interest in diversifying uses along Main Street in Downtown Toms River. The stretch of Main Street between Route 37 and Lien Street remains identified as a Historic District in the Historic Preservation Element, but in the interest of revitalizing the "Downtown Core", the Township and the Downtown Business Improvement District (TRBID) have agreed that uses should be more diverse than just office and residential in order to stimulate pedestrian activity and to make the Downtown both a daytime and evening destination. Such new permitted uses would include restaurants and taverns, brew-pubs, entertainment venues, Bed and Breakfast Inns (the only B&B in the Downtown is at 600 Main Street), and art galleries. It will be important to distinguish the Village Office zone on Main Street from that zone along Lakehurst Road, where retail would be inappropriate. It is recommended that a new VO-B (Village Office-Business) zone be designated from the existing VO zone along Main Street and the regulations for the new VOB include residential, office, mixed-use buildings, and certain business uses such as are listed above. It is also recommended that "Nano Breweries" (a micro-brewery in a small space, usually 1,000 square feet or less) be defined and permitted in the new VOB.

The VS Village Seaport zone is included in the Office land use category on **Map 2**. As indicated in the Downtown Toms River Master Plan, this zoning district is retained to reflect unique waterfront locations and incorporates some offices and historic buildings. No changes in the size of the Village Seaport zone are recommended, but additional uses that promote cultural and heritage tourism (theaters, performing venues, art galleries, brew-pubs (micro-brewery with associated pub), are encouraged.

The 2006 Land Use Plan Element recommended that the office areas along Hooper Avenue south of Bay Avenue be developed with a maximum land coverage of 15 percent and a minimum open space requirement of 20 percent of the land area. It was also recommended that office buildings in this area be permitted to utilize up to 10 percent of their first floor space for commercial

service type uses, such as restaurants or other types of commercial uses that are ancillary to the office use and serve the office workers. These provisions were added to the Land Use and Development Regulations, but subsequent discussions regarding the declining economic conditions in the area that includes the Regional Commercial Zone around the Ocean County Mall and the office park on Hooper Avenue that includes offices of Ocean County and the State of New Jersey suggest that the entire Hooper Avenue corridor between the existing O-15 zone to the east and the O-10 zone at Oak Street to the west of Ocean County Mall be evaluated for a more blended mix of office, retail and residential development (see Figure 3).

The O-10C zone at the intersection of Fischer Boulevard and Hooper Avenue is one of the gateway locations in the Township. This location is adjoined by open space and environmentally sensitive areas and is separated from retail commercial uses to the north and south. This area should continue to be zoned for Office uses. Retail use would not be compatible because of the high volume of traffic passing through this intersection. However, a mid-rise hotel use would be compatible with the high visibility of the location, and the traffic patterns associated with a hotel use would generally not coincide with peak traffic flows through the intersection. A hotel use would also serve as a housing resource for people visiting Ocean County College and this function will have increasing importance as OCC implements its plans to offer a four year baccalaureate program. As this area was not accepted by the Office of Planning Advocacy of the State Planning Commission as a “center” for purposes of retaining the prior 80% impervious surface coverage, it will revert back to 30% coverage upon the expiration of the original center designation. In order to compensate for the more restrictive impervious coverage, it may be necessary to increase allowable height to allow for viable hotel development.

The following zoning changes are recommended:

Based on the recommendation in the 2006 Land Use Plan Element, the Village Office zone in Downtown Toms River along Main Street was expanded to West Gateway, replacing the Highway Business zone that applied to those lots. This is in response to some proposed traffic flow changes in that immediate area.

In the southwest quadrant of the intersection of Hooper Avenue and Bay Avenue, a property now zoned Regional Commercial was recommended to be rezoned to Office in the 2006 Land Use Plan Element . Access to this 3.7 acre parcel from Hooper is not good. Lands lying to the south of Mapletree Road are in office use, and those lying to the northwest of this parcel are Township-owned or environmentally constrained wetlands and flood-prone areas.

On the westerly side of Fischer Boulevard south of Bay Avenue, the small lot single family homes have been rezoned in accordance with the 2006 Master Plan to permit office use, but not retail. Lot sizes are too small for retail and it is

difficult to maintain sound residential development along that section based on the volume of traffic and the presence of retail development across Fischer Boulevard. The Office zone applies only to the frontage lots in order to avoid adverse impacts on the dwellings to the rear that are served by local streets. Since the 2006 Master Plan requests have been received to permit multifamily development on these lots rather than office. However, given the shallow nature of these lots, the single family neighborhood to the rear that prevents buffering and the potential congestion on Bay Avenue from multiple driveway cuts, it has been determined that the Office use should remain unchanged.

Recommendations of the 2017 Periodic Reexamination Report:

1. Main Street VO Zone: The request is from TR BID to permit restaurants in the VO Zone, with the understanding that some accommodation would have to be made for parking. This section of the Township has been identified as an historic corridor by the Historic Preservation Commission, but it has not been memorialized in the Master Plan in accordance with historic preservation procedures identified in the Municipal Land Use Law and other governing statutes.

   It is recommended that agreed that a new Village Office-Business (VOB) be created from the existing VO Zone along Main Street in Downtown Toms RIver to encourage future development in the downtown consistent with cultural heritage tourism and higher density residential development, including allowing mid-rise residential and mixed-use buildings at a maximum of 10 stories.

2. Permit mid-rise residential buildings downtown, including in the VO Zone on Hooper: This is more of a general request to increase housing in the downtown area as a means of providing convenient access to employment opportunities and to strengthen the commercial aspect of downtown. The specific request is for six to eight story buildings on sites that are at least one-half acre in size.

3. Adopt a Redevelopment Plan for the Water Street Redevelopment Area: This proposal has been under consideration since before the last comprehensive Master Plan update in 2006. There has been a declaration that the area is an Area in Need of Redevelopment, and there has been a proposed redevelopment plan prepared at the request of TR BID, but to date the plan has not been adopted. There are a number of complicating factors that are part of the planning process, including the ongoing coal tar cleanup, flood elevations, traffic flows, communication towers and others.

4. Hooper Avenue O-15 inclusion of commercial options:

   No immediate change recommended, but as referenced earlier, it is recommended that the O-15, RC and O-10 Zones along Hooper Avenue around the intersection of Hooper and Bay Lea Avenue be studied with

specific emphasis on revitalizing the Ocean County Mall and O-15 Office Park.

5. Hooper Avenue O-10 to RC: This is a request not only for a map change but for a change in the minimum floor area for a business. This parcel (Block 394.0, Lot 124.01) immediately adjoins a shopping center and is about 2.6 acres in size.

   Recommended changing from O-10 to RC and also change some adjacent lots to RC. Other lots in the immediate vicinity should be examined to potentially include in RC zone from O-10.

6. South of Caudina and South of Seacourt Pavilion: This is another area with paper streets and small lots that are mostly owned by one entity. The paper street system includes two zoning districts – O-15 and R-120. In order for this area to effectively develop it would be appropriate to treat it as a redevelopment area so lot consolidation could occur and the obsolete street system changed. As part of the preparation of a redevelopment plan, proper consideration could be given to compatibility with nearby uses, including a fire house and bank, and zoning for both multifamily and single family homes.

   Recommend a redevelopment area. This site is recommended to be part of the land use study of the Hooper Avenue corridor, inclusive of Ocean County Mall, Seacourt Pavilion and its adjacent high density residential development and the O-15 Zone.

7. O-10 on Oak Avenue adjoining Penny Layne condos: This parcel was the subject of a separate request to rezone the property to O-15. While there is no pending request for rezoning to any particular zoning district, it is included because of its recent history before both the Planning Board and Township Council.

   Undeveloped and currently located in the O-10 zone. It is recommended that the best way to encourage the appropriate development would be to change zone to RC if it would support the Ocean County Mall. This site is recommended to be part of the land use study of the Hooper Avenue corridor, inclusive of Ocean County Mall, Seacourt Pavilion and its adjacent high density residential development and the O-15 Zone.

7. **Commercial**-The 2006 Master Plan recommended that commercial areas on the barrier island along N.J. Route No. 35 northbound be permitted on minimum lot sizes of 5,000 square feet. Since many of the commercial uses on the beach are seasonal and largely service walking trade, their off-street parking needs may be less than would be required for similar uses elsewhere in the Township. That recommendation was implemented in amendments to the General Business zone on the island. In addition, shared parking provisions were added to the GB zone regulations. These standards provide for the option of securing parking off-site within walking distance through the provision of a long term instrument. Each proposed commercial use on the barrier island should be considered individually as part of development review, and where it is determined that reduced parking requirements may be appropriate, design exceptions should be considered. A

wide range of commercial uses is permitted in the General Business zone found primarily on the barrier island. Based on the Coastal Neighborhoods Component of the Toms River Master Plan Reexamination and Land Use Plan Amendment, the General Business zone will be modified to permit mixed use development in the GB zone because of the pedestrian scale of development, opening up opportunities for the effective use of floor space above stores. As with other portions of the intensely developed barrier island, careful consideration should be given during the preparation of updated zoning standards to building height, lot coverage, building coverage and parking regulations. Due to the limited space and small lot sizes, overcrowding is a serious issue, particularly since Route 35 is the only major north-south roadway serving the area between Island Beach State Park and Point Pleasant Beach.

Within the pedestrian scale core of Downtown Toms River area, commercial uses should not be required to provide their own off-street parking. Parking to service the commercial, office and other downtown uses are provided in large parking areas operated by the Toms River Township Parking Authority and the County of Ocean. Also, it is proposed that in the Downtown Toms River area, it is recommended that uses be encouraged that will complement the office and commercial activities of the Downtown Toms River area. Significant retail expansion and higher density mixed use development is proposed for Downtown Toms River. Modifications to the traffic patterns were implemented since the 2006 Master Plan and have reduced congestion with the movement of pass-through traffic in the vicinity of Water Street and Route 166. See the Downtown Toms River Master Plan in **Appendix E** for additional details. Additional circulation improvements are recommended in conjunction with the Downtown Waterfront Phase 1 Redevelopment Plan, as is detailed in the Circulation Plan Element.

The following map changes affect the Commercial land use category, which includes the Highway Business, Rural Highway Business, Regional Commercial, General Business and Village Business zones:

The existing Highway Business zone between Lakehurst Road and Route 37 on the west side of the Garden State Parkway should be rezoned to R-400C. This area is constrained by several features that make it inappropriate for commercial development. There are wetlands associated with the Toms River, there are overhead power lines in a 320 foot wide easement running north-south through the 65 acre zoning district, and there are significant access constraints along both Route 37 and Lakehurst Road. This area, as well as similarly constrained lands in private ownership lying to the north of Route 37 and to the south of Lakehurst Road, should become part of the open space network associated with the Toms River Riverine Corridor. This recommendation was made in the 2006 Master Plan, but not implemented. It remains a valid recommendation in this Land Use Plan Element.

On Route 70 between Whitesville Road and Massachusetts Avenue, change a portion of the Office-10 zone to HB making it compatible with the recommended rezoning of adjoining RHB zones to HB. East of Massachusetts Avenue a small portion of land now zoned for Light Industrial, but located in close proximity to the highway and an existing shopping center, should be rezoned HB, as shown on **Map 3**.

In the Downtown Toms River area, the Village Business zone should be expanded to Lien Street, as shown in the Downtown Toms River Master Plan. The Village Business zone south of Water Street was designated to be a redevelopment area, with the broad purpose of establishing a critical retail and residential massing that is conveniently linked and within walking distance of the center of Toms River (see Figure 2).

At the southeast corner of Bay Avenue and Fischer Boulevard, the HB zone should be increased slightly to incorporate lots that are in common ownership with the portion that lies in the HB zone. This will provide added frontage along Bay Avenue, improving the potential for access to the lot as it redevelops for commercial purposes.

Recommendations of 2017 Periodic Reexamination Report:

The locations are as follows along with recommendations on each recommended zone change:

1. Massachusetts Avenue at Lakewood Border: This area consists of small lots and paper streets, most of which is under the control of one owner. Existing zoning is one acre RR and request is for R-200. This particular location has been the subject of many written comments from Lakewood residents living in Fairways at Lake Ridge who would like to have the area preserved as open space. Based on diverse ownership and an obsolete street pattern, this area should be treated as an Area in Need of Redevelopment. With that designation, the Township would be in a position to vacate streets and acquire lots through eminent domain. A redevelopment plan would be prepared setting forth development controls in order to make the land available for development. The development controls would be subject to a public hearing and adoption by ordinance and would function in a similar manner to zoning. The R-200 could be applied to the area lying east of Massachusetts as well across from the cemetery, which now lies in the RR zone. This recommendation was made in the 2006 Master Plan but not implemented by ordinance.

Recommended that the RR zone remain in place and a redevelopment area be investigated for designation. Cluster option can be exercised once redevelopment plan is adopted and streets are vacated and ownership is

consolidated. Another option is to add this to the adjoining Lake Ridge development in Toms River, which may be difficult due to the existing street layout and the secured access points to the gated community.

2. NW Corner Route 70 and Massachusetts Avenue: Property now lies in RHB along the road frontage and R-200 behind. Development of this site has consistently been objected to by residents of Lake Ridge. Under the terms of the RHB zone, this site is large enough to accommodate the minimum tract size of 20 acres needed for a PUD, which allows for mixed commercial and residential development.

   Increase depth of RHB in order to allow for feasible commercial development. Increase depth of RHB zone to about 600' from 200'. Keep R-200 in the rear of the properties to remain a buffer to Lake Ridge.
   On Route 70 change RHB to HB for smaller parcels.

3. Block 135, Lot 4, Route 70 East of Whitesville Road: This tract is over 15 acres in size and is zoned O-10 Office. While not the subject of a recent rezoning request, it did surface in Housing Element discussions by an interested party since the 2006 Master Plan Update. The existing zoning is O-10. The private road known as Yale Avenue adjoins the parcel and provides access to the Saratoga multifamily development, which lies in the MF-6 multifamily zone. The portion of the site that lies closer to Route 70 is adjoined by the RHB zone. The earlier rezoning request was for multifamily development with an inclusionary component. As with other multifamily rezoning requests, this would depend to some extent on findings with respect to affordable housing.

   Recommend that the front portion of the lot be or HB along with the rezoning of adjacent RHB properties and the rear portion remain O-10 and follow existing zone lines.

4. Route 9 Light Industrial Zone: This location is about 37 acres in size. As with Site 1 above, this area consists of paper streets and small lots, most of which are under one ownership. The adjoining zoning to the west, north and east is RHB and it adjoins a mobile home park to the south. A reasonable approach to providing development opportunities at this location would be to identify it as an Area in Need of Redevelopment, allowing for comprehensive development of the site through vacating streets and consolidating ownership. This site provides potential access to both Route 9 and Route 70, and with proper improvements of North Maple Avenue is can provide access to Massachusetts Avenue as well, which should be a distinct advantage for commercial development. Specific development controls would be spelled out in an adopted Redevelopment Plan ordinance.

   Best course of action is to declare a redevelopment area. Recommend HB zone use and possibly expand HB zone to existing Stop & Shop property.

5. Planned Unit Development as a Conditional Use: Currently, Planned Unit Developments are allowed as a permitted use in the RHB Zone on tracts of 20

acres or more. Because the 20 acre tract requirement is not linked to a Conditional Use standard at least one application has applied for relief as an bulk variance for tracts as small as 10 acres.

Recommend changing PUD to a Conditional Use in RHB and changing smaller parcels fronting Route 9 to HB.

6. Church Road adjoining HB Zone, Block 192.05, Lots 47-48: These two lots adjoin the entrance to a recently approved commercial development on Hooper Avenue that also has access from Church Road. The lots lie in the RR one acre residential zone and are about 4.5 acres in size. The property is over 600 feet deep and 300 feet wide. Consideration is requested for expansion of the HB zone or some other business zone.

   Change from RR to HB and extend depth of HB zone.

7. Cardinal Drive, Block 508.03, Lot 4: This lot is zoned R-90 and adjoins an HB Zone. The request is to expand the HB to include this lot in order to provide a more suitable development site for a proposed commercial use, with Lot 4 used primarily to accommodate a proposed extension of Wren Place to Cardinal Drive.

   Change from R 90 to HB

8. R-90 to Hospital Zone between Lakehurst Road and Route 37: There are two clusters of houses included in this request that has been filed through the offices of Harvey York, Esq. The operating premise of this request appears to be that the two neighborhoods do not have sufficient critical mass to remain viable as residential neighborhoods long-term. Based on citizen participation at work sessions on the Master Plan and on comments related to development applications in this area, it is anticipated that there will be significant opposition from the public. This area was the subject of another request in January of 2017 to change a six acre parcel between the Smith Street and Oliver Street neighborhoods, owned by the owner of Community Hospital, from R-90 to HMS.

   Leave as R-90. There has been a trend of available residential lots and homes in the R-90 being purchased by owners of medical uses (see Figure 2 below) and the Zoning Board recently denied a Use Variance application of the Health South Rehabilitation Hospital to expand a parking area and building a 20,000 square foot office building in the R-90 Zone on Oliver Street. It is estimated that around 30 residential homes remain in each of the two R-90 neighborhoods, which is substantial enough to maintain the current zone plan.

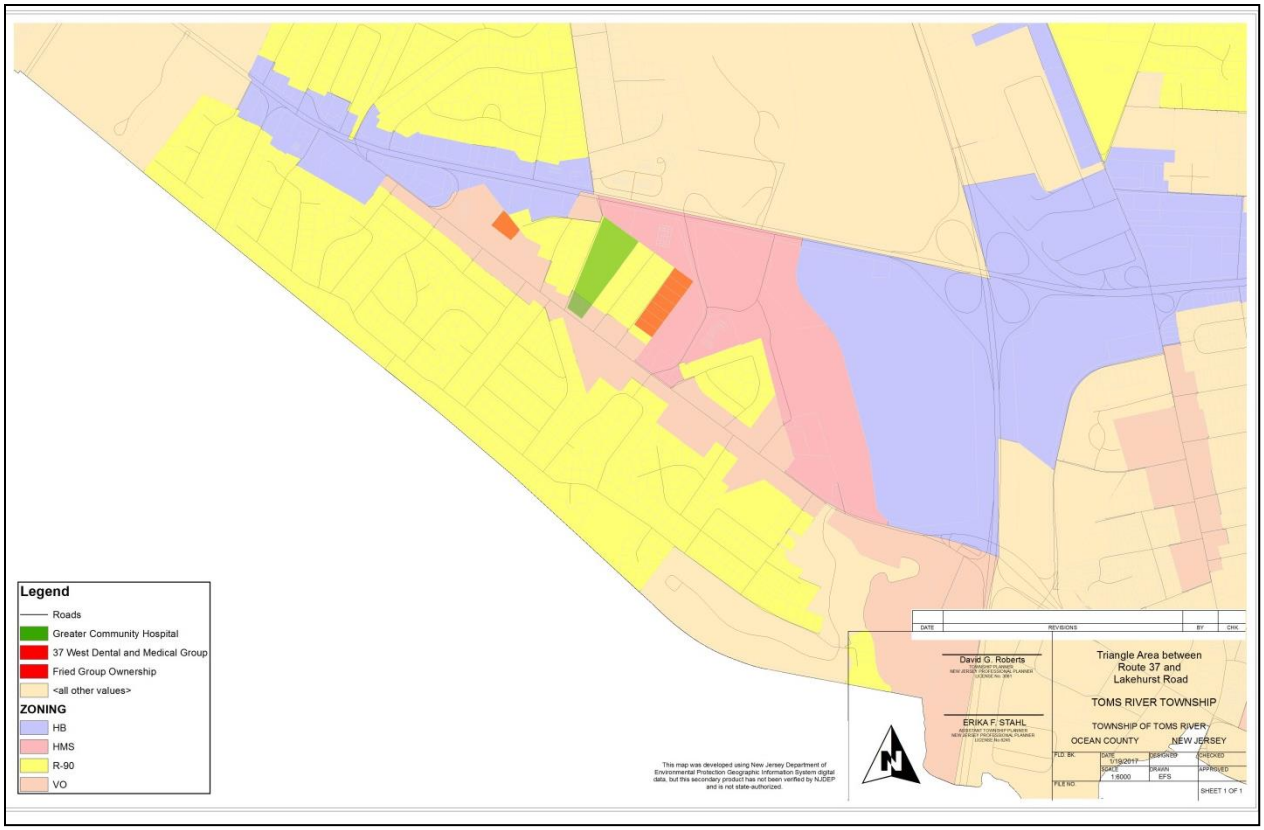


Figure 7: The map above shows the 6 acre parcel in green that was proposed to be rezoned from R-90 to HMS and the potential impact that the introduction of medical uses would have on the existing neighiborhoods zoned R-90 shown in yellow.

8. **Industrial**-The existing Toms River Corporate Park accounts for the majority of proposed Industrial land use in the Township. While the Ciba-Geigy site is currently designated as an existing industrial zone in the zoning ordinance, it is shown as a redevelopment area in this Master Plan, with use determinations to be made as a part of the process of adopting a redevelopment plan. The Light Industrial zoning district can be eliminated based on the recommendations set forth herein.

   The following changes are recommended in the Industrial zone in addition to those described in the preceding Commercial section of this Plan:

   Given the current limitations of Route 9 to support the more extensive trip generation of residential and retail uses and the lack of any commitment from NJDOT to fund a widening project in the foreseeable future, it is recommended that the RHB zoning south of Cox Cro Road be changed to Light Industrial, except that the major signalized intersection of Cox Cro and Route 9 be a retail node zoned as HB, The four-way signalized intersection makes it more attractive to retail uses and the relatively narrow but deep (“bowling alley” lots) along that

section of Route 9 are appropriate for light industrial uses that do not rely on visibility from the highway and have lower trip generation characteristics.

9. **Hospital and Medical Service**-Existing hospital and medical service uses include the Community Medical Center, HealthSouth Rehabilitation Facility and other medically related uses located adjacent to the hospital. Opportunities should be provided for hospital expansion either on-site or on other nearby locations, but only in a manner that will not adversely affect established single family residential neighborhoods. In the development of zoning standards related to hospital and medical service uses, the HMS zone should primarily be limited to hospital locations because of the increased height limits associated with hospitals. The supporting medical service and medical professional uses can fall within the HMS zone if they are in the immediate vicinity of a hospital, or they can be placed within an Office zone. The zoning and site limitation standards for hospital expansion should be closely coordinated with any long range facility planning carried out by the hospital. This recommendation is a continuation of the land use policy of the 2006 Land Use Plan Element and is retained despite several requests by adjoining medical property owners to change the R-90 zoning of properties that they acquired to HMS. As long as there are R-90 neighborhoods that represent a significant number of households, the primary objective will be to keep the residential zoning in place.

10. **Quasi-Public**-Existing quasi-public uses consist of houses of worship, non-public schools, cemeteries, the YMCA and other nonprofit and charitable uses. The Land Use Plan does not designate areas for future development of quasi-public uses, but it shows the location of existing uses in that category. It is recommended that quasi-public uses be permitted as conditional uses, with lot size and location criteria directing them to larger lots on streets that have a collector function or higher.

11. **Public Facilities**-These areas of the Land Use Plan indicate the locations of existing and proposed public buildings including major County and Township facilities. Consideration should be given to creating a zoning district that will specifically identify all public facilities on the zoning map. This district designation should only apply to properties that are in public ownership. Properties proposed for public acquisition need to fall within a zoning district that permits private development in order to avoid an inverse condemnation issue.

12. **Public Schools**-These areas of the Land Use Plan indicate the locations of existing and proposed public schools including all existing property of the Toms River Regional Board of Education, the County Vocational School and the Ocean County College. Public schools should be placed in the same zoning district as other public facilities, as noted in the preceding paragraph.

13. **Parks and Recreation**-The park and recreation areas shown on the Land Use plan include existing and developed as well as existing but undeveloped facilities.

They also include any areas known at this time to be proposed for future recreation purposes. Part of the overall approach to recreation and open space planning has been addressed in earlier planning documents, the most recent of which is a needs assessment completed in 2003. Those earlier reports should be supplemented by an analysis of the remaining recreation facility needs of the Township and it should be coordinated through a joint effort of the Planning Board, Recreation Committee and Township Council. Existing public parks and recreation areas should be placed in a new zoning district for public facilities, as described above.

14. **Conservation Areas**-The recommended conservation areas within the Township include the tidal wetland areas along the Barnegat Bay, floodplain areas along the Toms River, Long Swamp Creek, Kettle Creek and North Branch Creek of Silver Bay as well as other drainage courses and other internal wetlands areas which are not suitable for development. Some of these areas are not separately designated in this Land Use Plan, but are incorporated in the above referenced land uses. The inclusion of these areas in the above land use designations does not, in any way, reduce the need to protect conservation areas. It is anticipated that most, if not all of the area in the Township designated as conservation will be secured as permanent open space in conjunction with future developments.

The Riverine Corridor along the Toms River has been singled out for particular conservation measures. Steps have been taken to have the Toms River designated as a Category 1 stream corridor. In that regard, and in the interest of protecting the integrity of the stream, this Land Use Plan encourages land conservation measures throughout the entire length of the corridor, particularly in the areas lying west of the Parkway and west of Whitesville Road and Route 571. Among the conservation measures to be incorporated into the land use regulations would be the opportunity to transfer development potential from the corridor to lands outside the corridor, or to lands within the corridor that are not environmentally sensitive and meet all the appropriate setbacks from Category 1 streams.

Certain areas of the Township are designated as Planning Area 5 in the State Development and Redevelopment Plan. PA-5 is the designation given to lands that are environmentally sensitive and sufficiently sized to be of statewide or regional significance. The Township is in the process of securing Plan Endorsement through the Office of Smart Growth and part of that process is to examine the various planning areas set forth in the State Plan to determine whether any boundary modifications are warranted.

To the extent conservation areas shown in the Master Plan are in public ownership, they should be shown in the public lands zoning district used for public facilities, public schools, parks and recreation areas. This distinction was made in both the Conservaton, Recreation and Open Space Plan Element

(adopted into the Master Plan on March 15, 2017) and the Community Facilities Plan Element (also adopted into the Master Plan on March 15, 2017).

15. **Centers**-The Township obtained Conditional Plan Endorsement through the State Planning Commission and the Office of Planning Advocacy on January 18, 2017. As a part of the Plan Endorsement process, center boundaries were established and will serve to identify areas that will function with interactive land uses and generally at a pedestrian scale, although larger centers at a more regional scale need to be receptive to automobile and commercial traffic as well. The centers approved by the State Planning Commission involve commercial cores within the Township along major roadways (Route 37, Route 70, Route 166, Hooper Avenue and Fischer Boulevard, as well as Downtown Toms River (Downtown Regional Center East and West) and the Industrial Regional Center (former Ciba Giegy site and adjacent properties on the Manchester border of Route 37). Mixed residential and nonresidential uses will be encouraged within these areas. See Figure for the approved boundaries.

15.

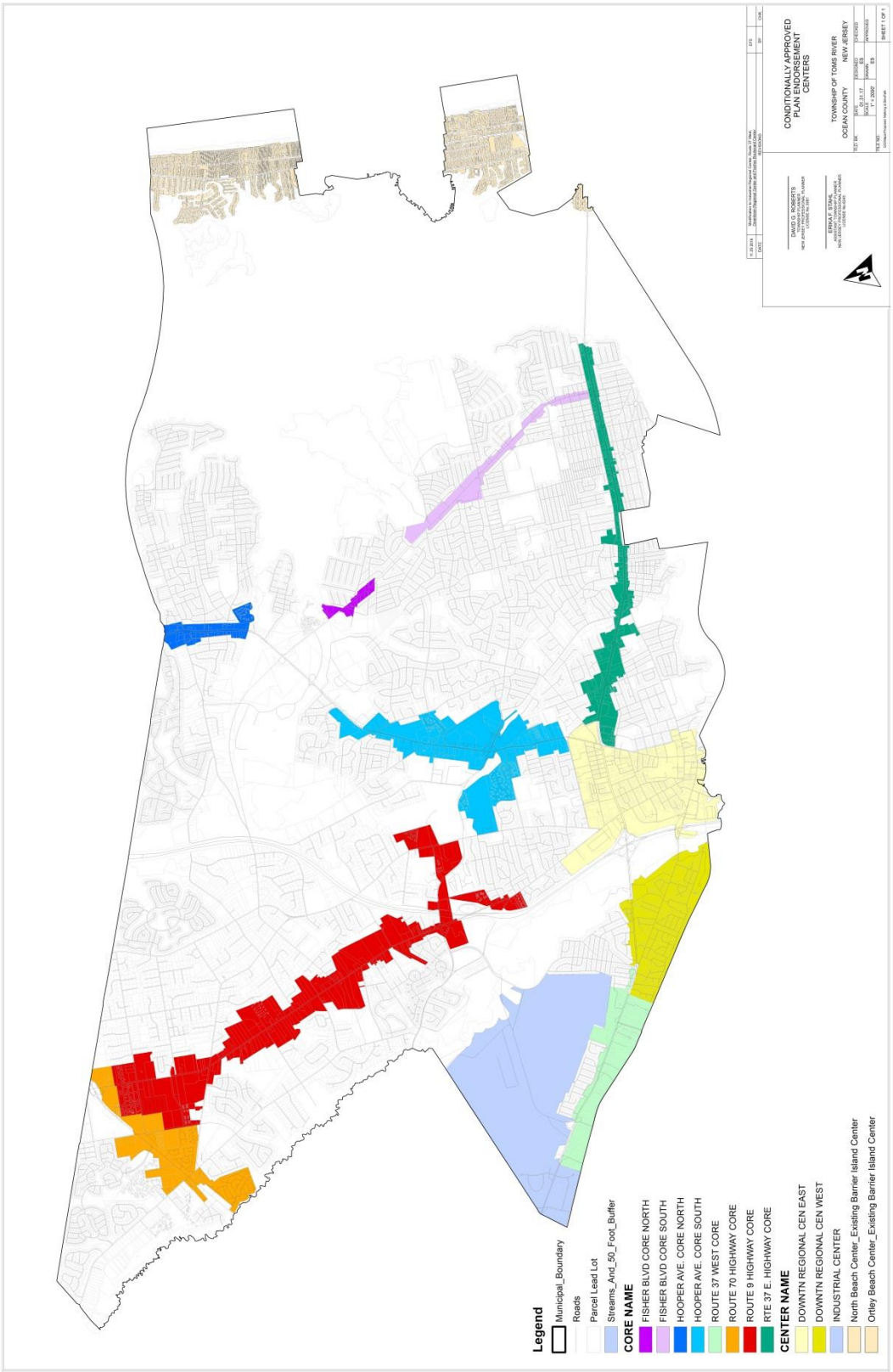


Figure 8: Toms River Plan Endorsement - Approved Centers

16. **Redevelopment Areas**-The Land Use Plan shows those areas that have either been determined to be Areas in Need of Redevelopment, including Route 37 East (Coates Point), Downtown Toms River Waterfront Redevelopment Area, Dover Mall and Ciba-Geigy. The Draft Waterfront Redevelopment Area Phase 1 Plan was developed as a draft in 2011 and will be revised pursuant to a Circulation Plan developed with a Post Sandy Planning Grant. A model of the potential buildout pursuant to these two documents is shown in Figure 2. The Dover Mall has an approved redevelopment plan which is mostly constructed, while the Coates Point redevelopment areas has not yet had a redevelopment plan created. The normal process for adopting redevelopment plans calls for referral action by the Planning Board and adoption by Township Council by ordinance. The controls for redevelopment areas supersede zoning. In addition to the areas that have been determined to be redevelopment areas, there are two areas that are proposed for such a designation. One is the vacant area of subscription lots and paper streets north of Maple Avenue west of Route 9. \Other potential redevelopment areas are the vacant area of subscription lots and paper streets between Seacourt Pavilion and Hooper Avenue north of the O-15 zone on the east side of Hooper Avenue, and another substantial area of subscription lots and paper streets on Massachusetts Avenue.

    While there have been no previous designations of Areas In Need of Rehabilitation in Toms River, the older sections of Downtown Toms River, such as along Main Street and Washington Street, may benefit from such a designation as a way of employing five-year tax abatements to incentivize economic investment in rehabilitation of existing buildings and infilling vacant lots and any underutilized surface parking lots.

Recommendations from 2006 Master Plan

The following recommendations from the 2006 Master Plan Land Use Plan Element are carried forward as follows:

- Non-residential use encroachment into viable residential neighborhoods should be discouraged and constrained and special planning controls should be established to assure residential neighborhoods are protected. Although this is a Township-wide problem, areas of special concern are: the Route 37 business corridor, the Hooper Avenue business corridor, the Village Business/Office areas, the Route 37/Lakehurst Rd. Village Office and HMS areas, and the Route 9, Route 166 and Route 70 business corridors.

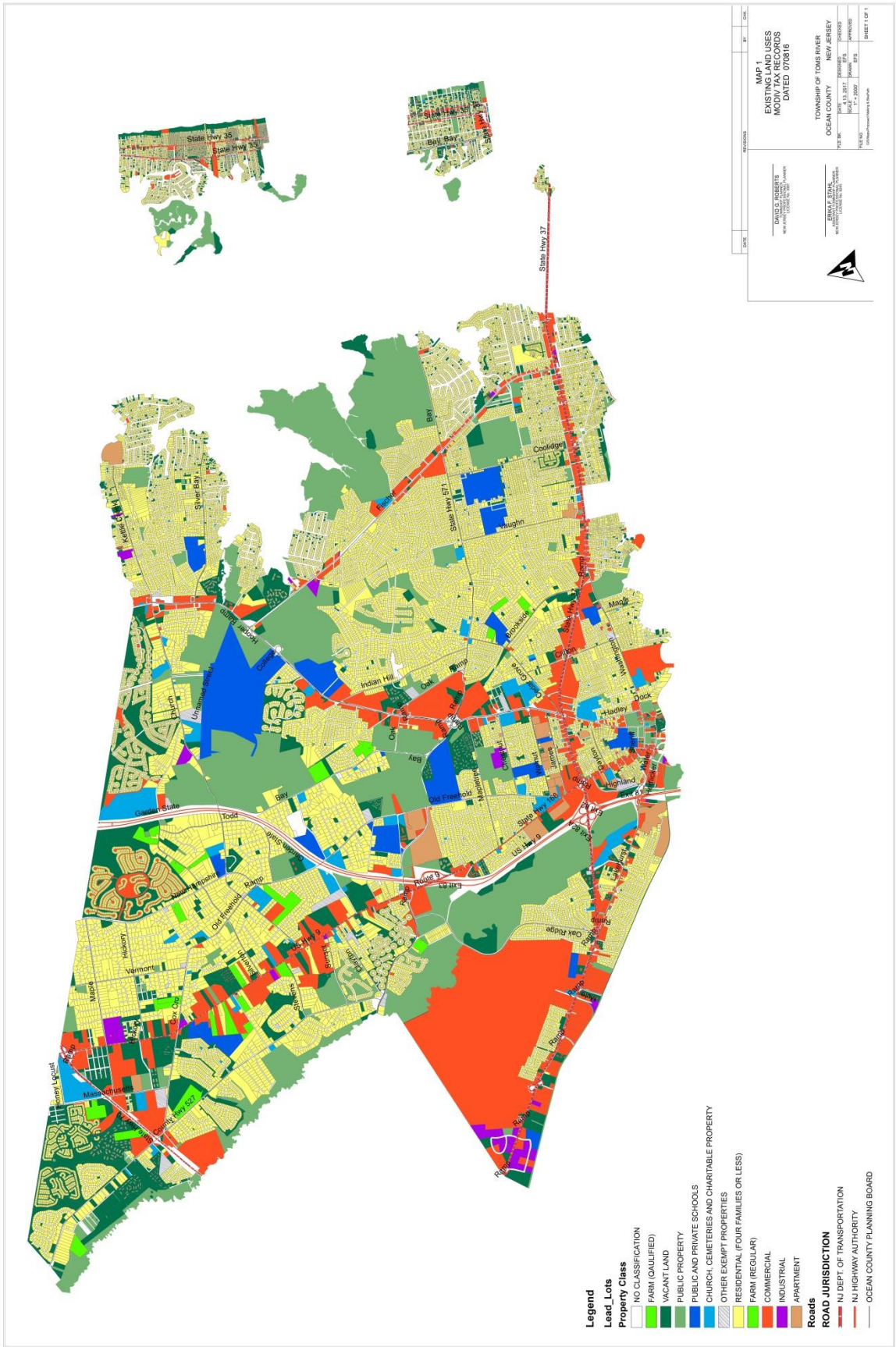
- Architectural themes should be incorporated into local planning where permitted by statute, including historic preservation areas, special improvement districts, and redevelopment areas.

- Single family residential developments that need to provide affordable housing to meet “growth share” requirements should be given some flexibility in the zoning

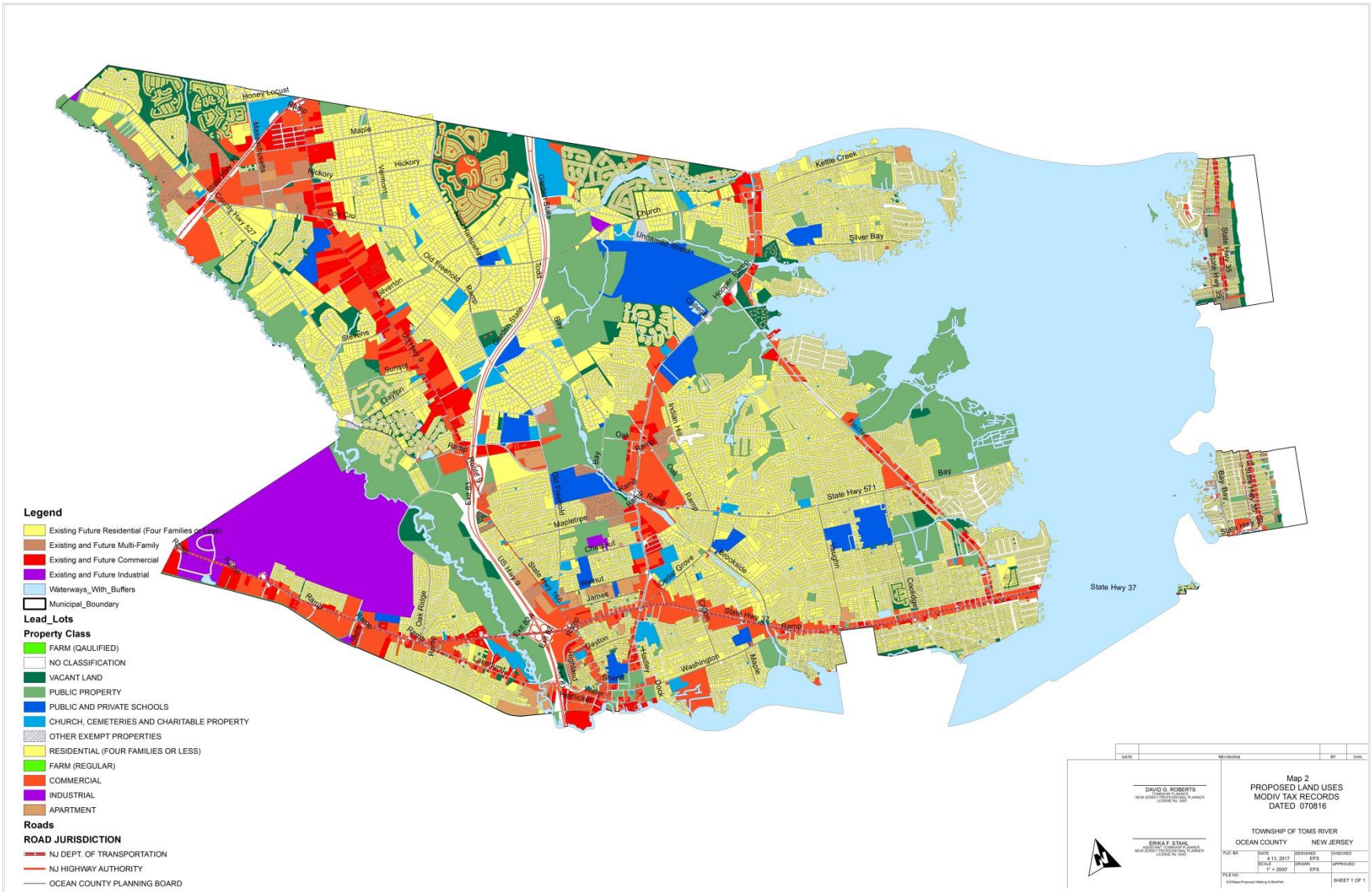
regulations to provide affordable housing through the use of accessory apartments and duplexes. These affordable units would be provided within the overall zoning density framework of each zoning district.

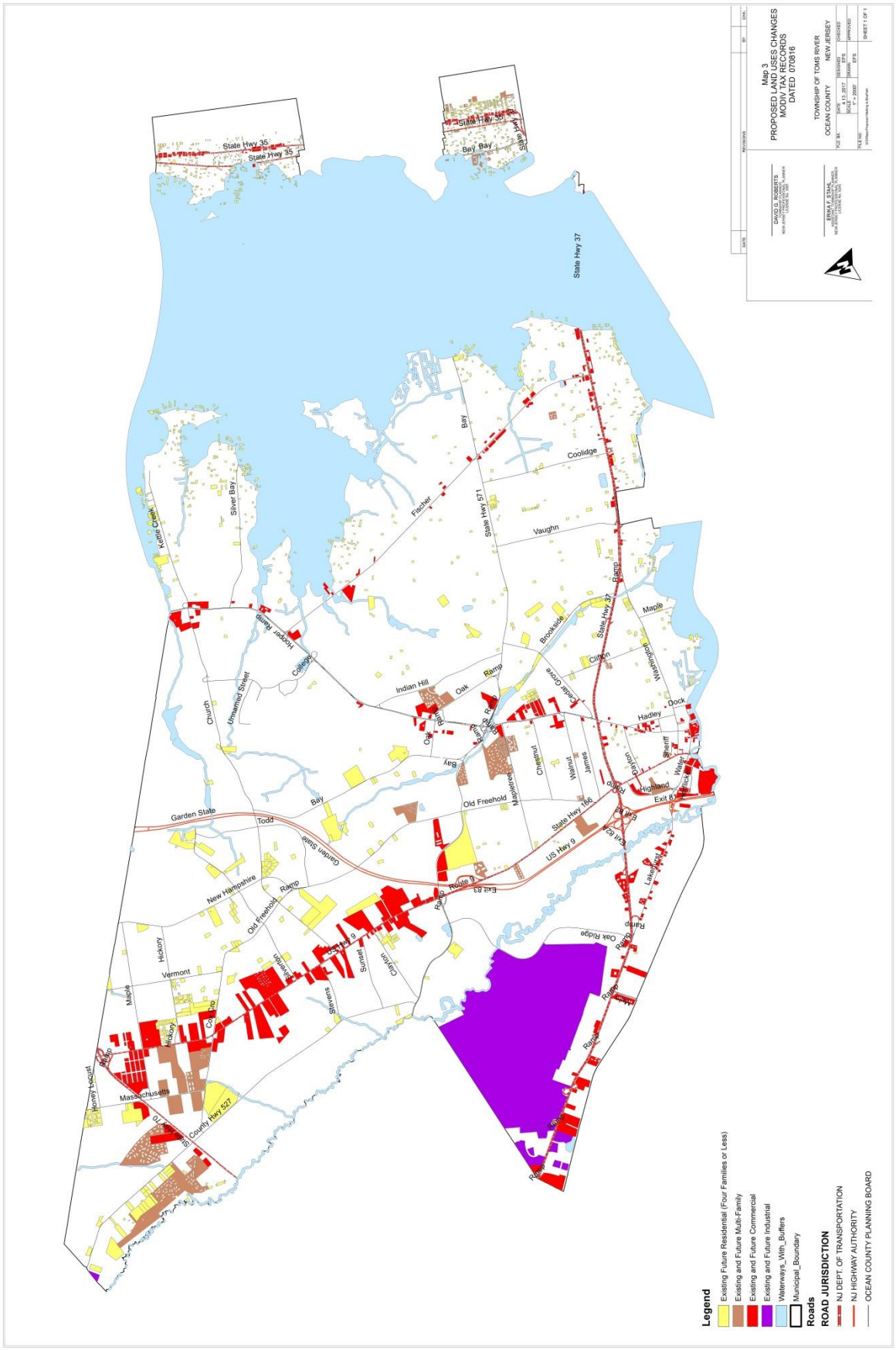
- In designing traffic circulation plans and road improvements, efforts should be made throughout the residential areas of the Township to discourage regional traffic from taking shortcuts through residential streets.

- Site yield adjustments should be incorporated into the land use regulations to reduce development potential in those areas that are environmentally constrained. Typical constraints to be addressed would be wetlands, floodplains and seasonally high water tables.


MAP 1
EXISTING LAND USES
MODIV TAX RECORDS
DATED 070816
TOWNSHIP OF TOMS RIVER
OCEAN COUNTY NEW JERSEY
DAVID S. ROBERTS
ERIK F. STOK
Legend
Lead_Lots
Property Class
NO CLASSIFICATION
FARM (QAULIFIED)
VACANT LAND
PUBLIC PROPERTY
PUBLIC AND PRIVATE SCHOOLS
CHURCH, CEMETERIES AND CHARITABLE PROPERTY
OTHER EXEMPT PROPERTIES
RESIDENTIAL (FOUR FAMILIES OR LESS)
FARM (REGULAR)
COMMERCIAL
INDUSTRIAL
APARTMENT
Roads
ROAD JURISDICTION
NJ DEPT. OF TRANSPORTATION
NJ HIGHWAY AUTHORITY
OCEAN COUNTY PLANNING BOARD

LU50


Legend
Existing Future Residential (Four Families or Less)
Existing and Future Multi-Family
Existing and Future Commercial
Existing and Future Industrial
Waterways_With_Buffers
Municipal_Boundary
Lead_Lots
Property Class
FARM (QAULIFIED)
NO CLASSIFICATION
VACANT LAND
PUBLIC PROPERTY
PUBLIC AND PRIVATE SCHOOLS
CHURCH, CEMETERIES AND CHARITABLE PROPERTY
OTHER EXEMPT PROPERTIES
RESIDENTIAL (FOUR FAMILIES OR LESS)
FARM (REGULAR)
COMMERCIAL
INDUSTRIAL
APARTMENT
Roads
ROAD JURISDICTION
NJ DEPT. OF TRANSPORTATION
NJ HIGHWAY AUTHORITY
OCEAN COUNTY PLANNING BOARD
Honey Locust
Maple
Hickory
Vermont
County Hwy 527
Old Freehold
Elverton
Stevens
Sunset
Dayton
Route 9
Garden State
Parkway
Bay
Kettle Creek
Church
Silver Bay
Unnamed Street
Hooper Beach
Indian Trail
Oak
Ramp
State Hwy 571
Mapletree
Chestnut
Walnut
James
Cedar Grove
Brookside
Dogwood
Cloverridge
State Hwy 37
Oak Ridge
US Hwy 9
State Hwy 166
Dayton
Highland
Harvard
Washington
Maple
Sterling
Merrick
Pine
Ext
Rt 9
Bay Bay
DAVID G. ROBERTS
NEW JERSEY PLANNER
LICENSE No. 3365
ERIKA F. STAHL
NEW JERSEY PROFESSIONAL PLANNER
LICENSE No. 5345
Map 2
PROPOSED LAND USES
MODIV TAX RECORDS
DATED 070816
TOWNSHIP OF TOMS RIVER
OCEAN COUNTY NEW JERSEY
4.13.2017
1" = 2000
EFS
SHEET 1 OF 1


Map 3
PROPOSED LAND USES CHANGES
MODIV TAX RECORDS
DATED 070616
TOWNSHIP OF TOMS RIVER
OCEAN COUNTY NEW JERSEY
DAVID G. ROBERTS
ERMA F. ESHA
Legend
Existing Future Residential (Four Families or Less)
Existing and Future Multi-Family
Existing and Future Commercial
Existing and Future Industrial
Waterways_With_Buffers
Municipal_Boundary
Roads
ROAD JURISDICTION
NJ DEPT. OF TRANSPORTATION
NJ HIGHWAY AUTHORITY
OCEAN COUNTY PLANNING BOARD
State Hwy 35
State Hwy 37
Bay
Coolidge
Vaughn
Fischer
Kettle Creek
Silver Bay
Hooper Farm
College
Church
Unnamed Street
Indian Hill
Oak
Brookside
Maple
Cypress
Waterwood
Hadley
Dock
Sheriff
Walnut
James
Chestnut
Magnetic
Old Freehold
Garden State
Todd
Central State
New Hampshire
Old Freehold Ramp
Hickory
Vermont
Maple
Honey Locust
Massachusetts
Sycamore
Stevens
Clinton
Oak Ridge
Lake Ridge
Exit 83
Route 9
US Hwy 9
State Hwy 166
Exit 82
Highland
Exit 81
County Hwy 527
Ramp