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AN EXAMINATION OF THE BARKSDALE DUPONT
EXPLOSIVES FACILITY FOR THE
POSSIBILITY OF
TOXIC WASTES

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Inorganic wastes are largely contributed by the producers of alkalies and chlorine, industrial gases, inorganic pigments, paints, fertilizers, insecticides and explosives. Together in 19 68 these industries discharged 1,178 billion gallons of water laden with a variety of inorganic chemical wastes.¹ Possible human effects from these chemicals include the induction of cancer, genetic mutations, and birth defects. This problem is further complicated by the complexity of these exotic pollutants which are not easy to observe or identify. This study will localize the emphasis of this problem upon the abandoned DuPont explosives plant at Barksdale Wisconsin.

To fully understand this problem and its complexity one must examine both the socio-political aspects as well as the ecological factors. The industrial revolution created an immense demand for reliable and effective explosives. By 1914 the American Chemical Industry was probably the second largest in the world.² Then the outbreak of W.W. I brought another wild boom in the American Chemical Industry, and the output of explosives soared resulting in the

demand needed to expand DuPont and establish the production facility at Barksdale. The actual starting date was not found, however from my own observations of the area, brownstone foundations were noted thereby indicating construction during the first quarter of this century. As a result this plant had to have been in operation for approximately 50 years, and during that period, dumping chemical wastes into Boyd Creek, a tributary of Lake Superior.

Having established a background, the paper will now examine past research on Boyd Creek, chemicals used in explosives manufacturing and their health problems, environmental observations, and the possible application of toxic waste legislation to assure public health.

In the past, knowledge of Boyd Creek's pollution problem was highly visible yet little was done to examine the long range environmental consequences. During this plant's operation, a combination of being a major employer in an economically depressed area and an absence of an overall environmental awareness in the public sector caused the apathic approach to the problem. To support these statements one can observe DNR water quality tests and their interpretations of that data.

In July of 1969, DNR officials tested Boyd Creek for pH, MPA (ppm), and specific conductance. The results of these tests were listed as unmeasurable. Furthermore the water color was noted as red. ³ PH is the negative logarithm of the hydrogen ion concentration which allows one to determine the acidic or basic characteristics of the water. As the pH starts to deviate greatly from the neutral 7, it becomes harder for aquatic life to exist. MPA is the Methyl purple alkalinity which is used to determine the available carbonates, bicarbonates, and hydroxides in a ppm. of water. This test is used to express the level of fertility of water. The specific conductance is the total concentrations of dissolved electrolytes in the water expressed in micromhos per centimeter at 77 ° F, and corresponds roughly to the MPA, though using a different value scale. Boyd Creek was the only stream, out of 103 named streams, classified as unmeasurable.

An examination of the DNR's interpretation of this, and any other data collected maybe observed in the following paragraph:

Industrial pollution is not considered to be a serious problem in Bayfield County. The E.I. DuPont de Nemours company, a producer of mining and military explosives located at Barksdale south of the City of Washburn, is the major polluting industry in Bayfield County. The production wastes from this company have completely destroyed all forms of life in Boyd Creek, a small tributary of Lake Superior. These wastes, which include acid washings, sellite wastes or "red waters," and cooling waters are also major pollutants to Chequam - egon Bay, Lake Superior. This company has recently announced its intent to discontinue its operation by March 31, 1971. ⁴ The DNR also stated, " The stream has no wildlife value." ⁵

At this point one must examine two important factors such as the type of tests taken and the time period of these interpretations. These test results are usually provided from Hach water testing kits and do not provide an accurated representation of specific chemicals being emitted and their concentrations. Furthermore these proceeedures are designed to access the feasibility of fish habitats, not human health hazards sould they exist. Toxic waste tests are designed to examine a particular chemical and determine its concentrations.

Once these tests are completed and each chemical and its concentration is determined a comparison is then made to establish compliance with the toxic effluent standards set by the EPA as authorized by the Federal Water Pollution Act of 1972.

The timing of the plant abandonment had pronounced affect on the lack of environmental investigation. Since the Water Pollution Act wasn't passed until 1972 this plant was never required to obtain dumping permits from the EPA. It is also logical to assume the EPA concentrated its industrial pollution investigation to plants in operation due to appropriation limits of money and personnel, and as a result overlooked the Barksdale facility. It is also logical to assume the abandonment of this plant would also end the pollution problem. As time went on, Boyd Creek did in fact experience a natural reclamation stage in which the pollutants were greatly reduced in concentration, thereby returning the stream to a more productive state. Studies done by Northland College students in the fall of 1978 indicated this improvement and the reestablishment of aquatic life as observed in comparing Boyd Creek to Pine Creek on the next page.

(A). Comparison of data for Boyd and Pine creek.

	BOYD	PINE	avg. Boyd	avg. Pine
Temperature	6.0C	6.0C	6.9C	7.2C
P.H.	6.1	6.5	6.4	6.35
MHCS	280	70	265	69.5
D.O.	15ppm	12.6ppm	11.4ppm	10.3ppm
Saturation curve	120%	100%	-	-
Shannon index	1.355	1.677	-	-
Organisms/ft ²	4.2	1.5	-	-
Phosphate conc.	150ppb	140ppb		
Nitrate conc.	3500ppb	230ppb		

(B). Comparison of Benthos for Boyd and Pine creek

BOYD BENTHOS		PINE BENTHOS	
Plectoptera	11	Pecoptera	1
Trichoptera	4	Amphipoda Gammarus	1
Diptera Tendipes	3	Trichoptera	1
Diptera Stratomyia	2	Ephemeroptera Bactis	10
Ephemeroptera	2	Gammarus	7
Pontopoeria	3	Lioplaxsubearinata	1
Ameletus	1	Notropis Hudsonius	1
Halesus	2	Coleoptera Iaccophilus	1
Diptera Tabanus	1	Ephemeroptera Humeralis	1
Trichoptera Philoptamus	1	Trichoptera Hydropsuchs	9
Plecoptera Perla	15		
Gammarus	21		

(C). Comparison of algae for Boyd and Pine creek

BOYD ALGAE	PINE ALGAE
Oscillatoria	Gonatozgon
Batrachospermum	navicula
Vavcheria	Stephanodiscus
Bacilliarophcene	Campylodiscus
Myxophycean	chlorosarcina
Chlorphyceae	Phormidium
Hormogonales	Bumilleria Sicula
Xanthophceae	
Diatom Cyclotella	
Synicha	
srauroneis	
Cpephora	
Navicula	
Diatoma	
Fragilaria	
Cocconeis Pediculus	

Such water quality improvements caused further lax DNR concern for Boyd Creek and any possible toxic wastes from the DuPont facility. However the differences in nitrate levels of 3500 ppb in Boyd Creek, as compared to 230 ppb in Pine Creek, indicate more studies should be made to insure no other chemicals are leaching from the DuPont facility.

Since Boyd Creek drains the red clay region of Bayfield County, the DuPont sight may provide a constant source of chemical pollutants in the future. A pipe from the DuPont sight is presently emitting an unknown chemical into Boyd Creek thereby establishing another reason for DNR investigations for the possibility of toxic wastes.

Since no record of specific chemicals and their concentrations could be found, one can only examine chemicals which have a high probability of occurrence, due to their use in the production of explosives, and what possible human health problems they may cause in the future. The following page has a list of these chemicals and human health problems they have caused in the past, particularly in the explosives industry.

* The following information concerning chemically caused health problems was taken from INDUSTRIAL TOXICOLOGY by Hamilton and Hardy, with the page numbers provided for easy conformation of health problems caused by explosive industry workers.

NITRITES (p. 305)	are absorbed through the skin and hinder oxygen transferal in the blood (Methemoglobinemia ingestion affects intestinal bacteria evidence of aplatic anemia which is also referred to as TNT poisoning.
NITRIC ACID (p. 211)	Cause sudden circulatory colaspe in high concentrations.
NITRATES (potassium nitrate) (p.317)	absorbed through skin and produces Methemoglobinem also produces hypotension, nausea, vomiting, and "powder headache"
AMMONIA (p.207)	pulmonary damage, hemoptysis, and in high concentrations death
SULFUR (with rain will form sulfuric acid) (p.209)	irritates skin, mucous membranes, and in a fine vapor may cause lung damage
LEAD (p.97)	in the gastrointestinal tract causes colic suspected of also causing impaired liver and kidney functions

To further prove to need for a toxic waste investigation one may examine DuPont's own safety rules governing chemical exposure from substances used in the production of explosives.

A shower bath shall be taken daily at the end of each shift. No clothing worn during one shift shall be taken off the plant.

Food must not be taken into operating buildings. Always wash hands and face and rinse mouth before eating.

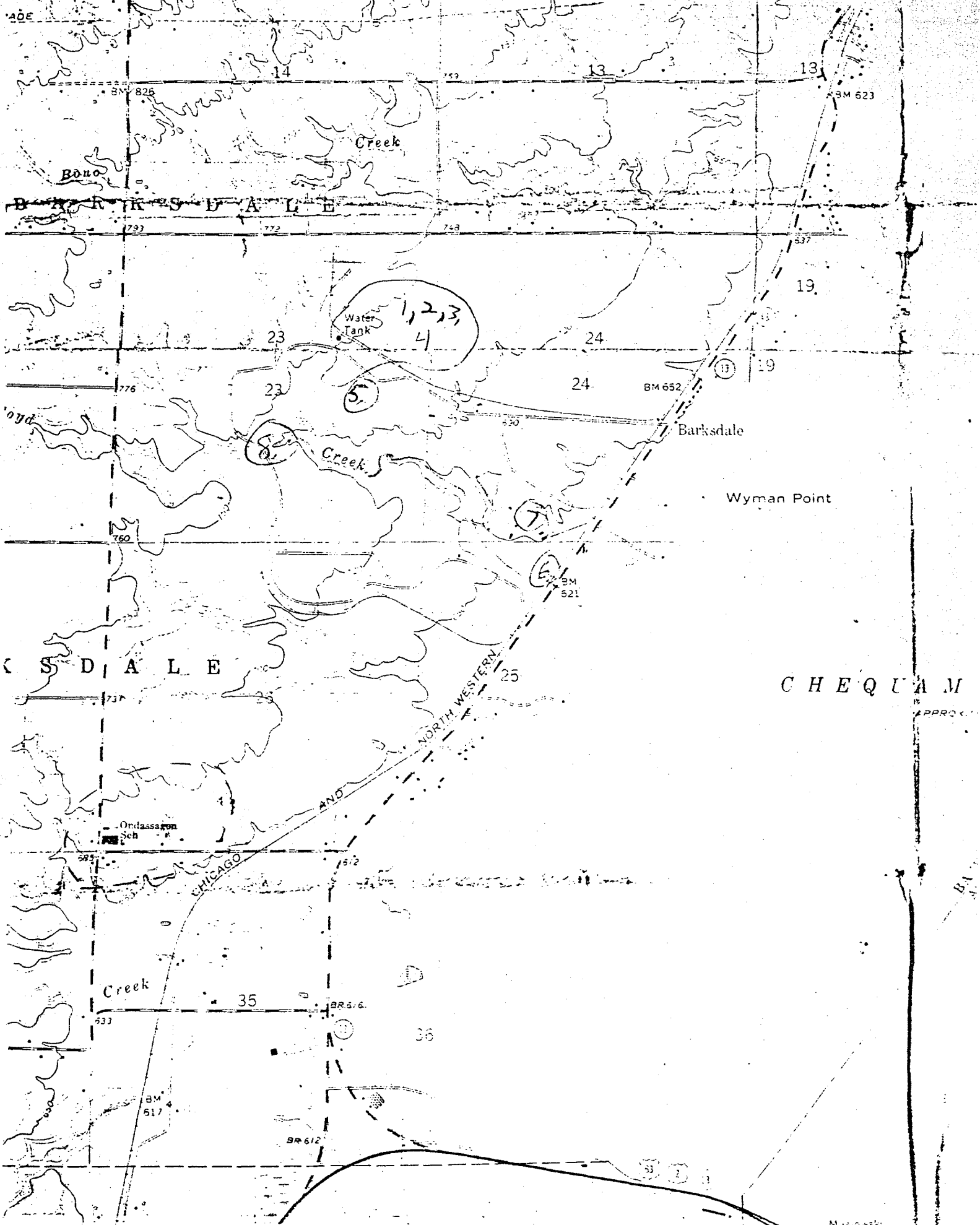
Every effort should be made to avoid skin contact with TNT. In case of skin contact with these chemicals, wash immediately with soap and water to remove contamination. Avoid exposure to fumes of TNT as much as possible.

It is also important to realize that these chemicals may form solvents which possibly are more dangerous than the chemicals DuPont used for production.

Observations on the DuPont area are listed below and are illustrated on the following map.

- 1) Red and black discolored soil with moss growing.
- 2) Whitish coating on rocks.
- 3) Large amounts of sulfur and some lead deposits with no plant growth evident.
- 4) A whitish fluid from a trench.
- 5) A sewer pipe with a yellowish orange colored liquid running into Boyd Creek.
- 6) Foam in Boyd Creek with intensive algae growth covering rocks.
- 7) Downed power insulators and transformers indicating the possibility of PCB's.
- 8) Old dump with metal drums and assorted containers.

Even though no specific conclusions can be drawn from this limited data, one may classify this area as a sight of primary succession, whereby the soil is forming through the establishment of moss communiti



Water Tank
1, 2, 3
4

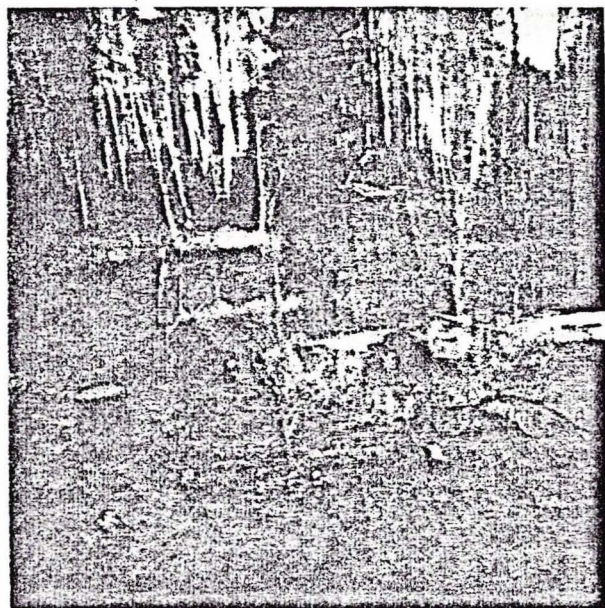
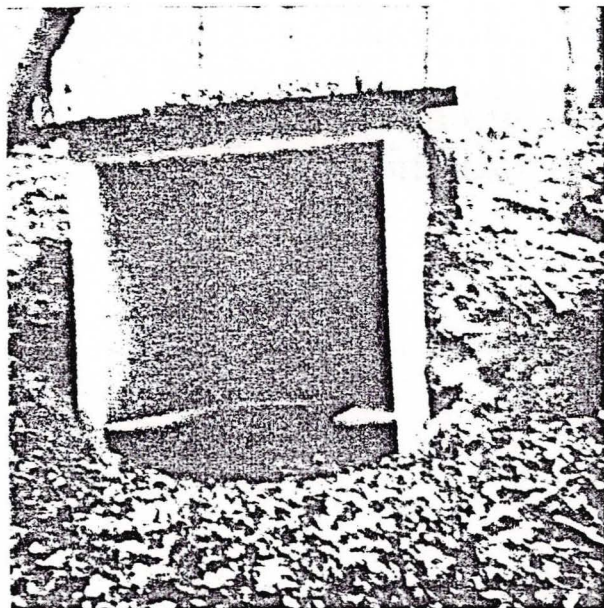
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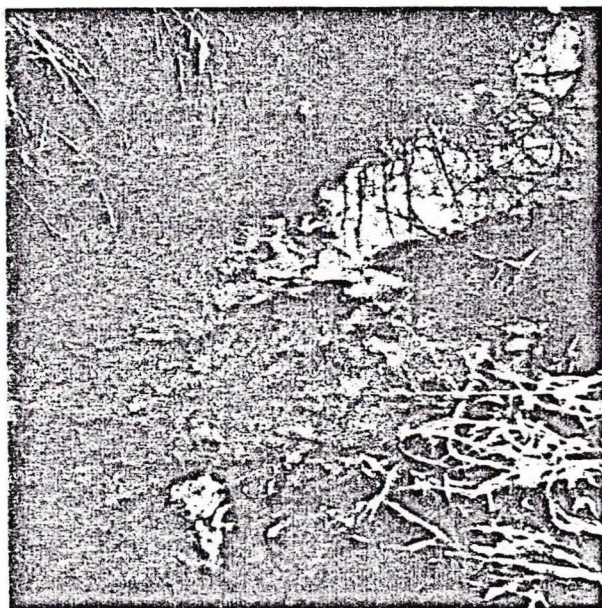
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Observations
1,2,3,4



Observation 8



Observation 5

This is a profound problem in that it will take nature hundreds of years to reestablish the climax community of this area and obtain its past ecological stability.

Presently five major Federal laws enforced by five federal agencies would apply to this DuPont plant. However I decided to concentrate on state law enforced by Wisconsin's DNR due to their past response to public pressure. The following state laws may be violated by the DuPont facility: Clean Water Act, Safe Drinking Water Act, and the Toxic Substance Control Act.

In conclusion, even though no specific toxic wastes were identified enough data has been provided to warrant an investigation by specialists trained in the identification of possible toxic wastes upon the DuPont facility and thereby ensure the health of area citizens.

FOOTNOTES

- 1 Consumer Health and Product Hazards/Chemicals, Electronic Products, Radiation p.105
- 2 The Chemical Economy p.19
- 3 Surface Water Resources of Bayfield County p.361
- 4 Ibid p.279
- 5 Ibid p.211
- 6 Safety and Operating Rules Nitramon Area pp.3-4

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